

PLANNED INSTRUCTION

A PLANNED COURSE FOR:

Auto Mechanics Technology/Technician

Curriculum writing committee: Justin Ryan

Grade Level: 10, 11, 12

Date of Board Approval: _____

CURRICULUM MAP

Level I - Overview with time range in days: 177 days

Level I - Goals:

Understanding of:

- Orientation
- Safety
- Tools and Fasteners
- Industry Certifications
- Suspension and Steering
- Preventative Maintenance

Level II - Overview with range in days: 177 days

Level II - Goals

Understanding of:

- Orientation
- Safety
- Industry Certifications
- Brakes
- Electrical-Electronic Systems
- Engine Performance
- HVAC
- Drive Trains

Level III - Overview with range in days: 177 days

Level III - Goals:

Understanding of:

- Orientation
- Safety
- Industry Certifications
- Brakes
- Electrical-Electronic Systems
- Engine Performance
- HVAC
- Drive Trains
- Employment and Leadership Skills

Course: Auto Mechanics Technology/Technician

Unit Name: ORIENTATION

Number: 100 **Days:** 28

Description/Objectives:

The students will learn the following concepts: career opportunities, SP2 certifications expectations for safety, hygiene, customer service and shop management skills.

Tasks:

PA101 - Explain and follow all lab rules.

PA102 - Participate in basic shop management.

PA103 - Participate in parts ordering.

PA104 - Demonstrate auto shop safety and hygiene.

PA105 - Demonstrate the use of service information.

PA106 - Demonstrate proper telephone courtesy.

PA107 - Identify vehicle by: sight, V.I.N. and/or ID tag.

PA108 - Identify career paths within the career and technical education program.

Chapter 1: The Automobile

Objectives Standards:

- Identify and locate the most important parts of a vehicle.
- Describe the purpose of the fundamental automotive systems.
- Explain the interaction of automotive systems.
- Describe major automobile design variations.
- Comprehend later text chapters with a minimum amount of difficulty.
- Correctly answer ASE certification test questions that require a knowledge of the major parts and systems of a vehicle.

Chapter 2: Automotive Careers and ASE Certification

Objectives Standards:

- List the most common automotive careers.
- Describe the type of skills needed to be an auto technician.
- Explain the tasks completed by each type of auto technician.

- Summarize the ASE certification program.

Chapter 7: Service Information and Work Orders

Objectives Standards:

- Describe the different types of service manuals.
- Find and use the service manual index and contents sections.
- Explain the different kinds of information and illustrations used in a service manual.
- Describe the three basic types of troubleshooting charts found in service manuals.
- Explain how to use computer-based service information.
- Correctly answer ASE certification test questions concerning service information.

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- 3.5.9-12.L Interpret laws, regulations, policies, and other factors that impact the development and use of technology.
- 3.5.9-12.3 Strand: Integration of Knowledge, Technologies, and Practices.
- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Focus Anchor/Standard #2:

MATH/SCIENCE

Supporting Anchor/Standards:

- S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.
- S11.A.1.1.3 Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).
- S11.A.2.1.2 Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate and communicate results) applicable to a specific technological design.
- S11.C.2.2.2 Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion
- 3.5.9-12.P Apply a broad range of design skills to a design thinking process.

Connecting Anchor/Standard:**CAREER EDUCATION & WORK****Supporting Anchor/Standards:**

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
- 13.1.11.G Assess the implements of the individualized career plan through the ongoing development of the career portfolio.
- 13.1.11.H Review personal high school plan against current personal career goals and select postsecondary opportunities based upon personal career interests.
- 13.3.11.A Evaluate personal attitudes and work habits that support career retention and advancement.

Instructional Activities:

- K-W-L with a twist
- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills:

- The student will complete and return all first day paperwork.
- The student will complete and return the auto safety contract.
- The student will gain a thorough understanding of the expectations of the class. The student will order all required shop clothing, including a uniform shirt, and PPE.
- The student will complete SP2 Safety and Pollution Certification with a score of 100%.
- The student will complete the CCAR safety unit of Electude LMS with a score of 100%.

- The student will complete shop equipment assignment and familiarize with all equipment, their safety concerns and locations.
- The student will learn the locations of all fire extinguishers, safety shut off switches and eye wash and chemical shower locations specific to the shop.
- The student will understand and explain the importance of lab safety rules.
- The student will demonstrate the ability to follow all posted and verbal safety instructions.
- The student will recognize safety hazards in the lab environment and take appropriate action to avoid injury.
- The student will practice proper handling and use of equipment to ensure a safe working environment.
- The student will demonstrate knowledge of personal protective equipment (PPE) and wear it when necessary.
- The student will understand the roles and responsibilities in an automotive shop environment.
- The student will assist in maintaining an organized and efficient work area.
- The student will demonstrate the ability to communicate effectively with team members and supervisors.
- The student will participate in inventory management by tracking parts and tools.
- The student will assist in scheduling tasks and prioritizing work to meet deadlines.
- The student will identify the parts ordering process and how to accurately identify needed parts.
- The student will use catalogs, computer systems, or online databases to find part numbers and descriptions.
- The student will demonstrate the ability to communicate effectively with vendors for parts ordering.
- The student will track and record orders to ensure timely delivery of parts.
- The student will summarize the importance of verifying part specifications and compatibility before ordering.
- The student will understand and demonstrate basic auto shop safety procedures, including the proper use of tools and machinery.
- The student will maintain a clean and safe work environment by regularly cleaning and organizing tools and workspaces.
- The student will follow proper waste disposal guidelines for hazardous materials such as oil, brake fluid, and other automotive chemicals.
- The student will demonstrate proper fire safety and emergency response procedures in the shop.
- The student will practice good personal hygiene to minimize contamination of parts and surfaces.
- The student will determine how to access service manuals and technical service bulletins (TSBs) for vehicles.
- The student will demonstrate the ability to read and interpret service information to diagnose vehicle issues.
- The student will use online databases and software to retrieve and analyze vehicle service data.

- The student will accurately follow service guidelines and repair procedures to ensure correct repairs.
- The student will demonstrate the ability to update service records and logs for future reference.
- The student will answer the phone in a professional and courteous manner, using appropriate greetings.
- The student will demonstrate active listening skills and take clear, concise messages.
- The student will use professional language and tone when speaking with clients, vendors, or colleagues over the phone.
- The student will follow up on phone inquiries and requests in a timely and efficient manner.
- The student will handle difficult phone calls calmly and professionally, directing them to the appropriate person when necessary.
- The student will identify key vehicle features by sight, including make, model, year, and other distinguishing characteristics.
- The student will understand the importance and location of a Vehicle Identification Number (V.I.N.) and demonstrate the ability to locate and record it.
- The student will recognize and interpret manufacturer ID tags, labels, and other identifiers commonly found on vehicles.
- The student will use the V.I.N. to retrieve vehicle history, specifications, and recall information.
- The student will cross-reference vehicle identification information with service records to ensure accuracy.
- The student will understand and explain the various career paths within the automotive industry, such as automotive service technician, parts specialist, or service advisor.
- The student will research and identify education and certification requirements for different career opportunities.
- The student will demonstrate knowledge of potential advancement opportunities within the automotive field.
- The student will discuss the skills and competencies required for success in various automotive careers.
- The student will explore industry trends and emerging career opportunities in automotive technology.

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)
- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
- Taking Tests in Alternate Setting (or if requested)

- Drill and Practice (Repetition of Material)
- Copy of Teacher/Student Notes/Skeleton Notes
- Use of Daily Planner/Assignment Book (monitor use of)
- Positive Reinforcement
- Have Student Repeat Directions
- Provide Frequent Feedback
- Regular Notebook Check
- Communication Regarding Behavior & Consequences (PBS)
- Clear Language for Directions
- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills
- Provide Verbal and Written Directions
- All Vocabulary to be Defined Before Testing

Safety:

Student Safety Pledge:

I, _____, understand that the automotive
(Print name)

shop is an inherently dangerous place to work. I pledge to:

1. Follow all school regulations listed in the student handbook at all times.
2. Follow all safety regulations as they pertain to the shop and its equipment at all times.
3. I will wear work clothes as specified, work shoes, and safety glasses at all times.
4. Avoid horseplay or other distracting behavior.
5. Perform all work in a careful and safe manner.
6. Receive instruction and permission before using any equipment.
7. Never work in the shop without the instructor present.
8. Pass a general safety test, as well as demonstrate the safe use of all equipment.

I agree to the above terms of the safety pledge and understand that failure to live up to the terms above is grounds for discipline, as spelled out in the student handbook. Repeat offenses may result in removal from the program. Failure to follow these rules may result in serious injury or death. By signing below, I agree to all the terms above.

(Signed by Student)

(Today's date)

Assessment:

THEORY EVALUATION

- Traditional Tests - multiple choice, matching, true/false, short answer completion
- Traditional Quizzes - multiple choice, matching, true/false, short answer completion
- Graded Homework
- Graded Math practice assignments
- Graded Reading assignments
- Notebook checks
- Class oral responses
- Business and Industry Credentialing Tests
- Exit Slips/Time Cards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
- The teacher will assess students' understanding through discussions, quizzes, or practical demonstrations.
- The teacher will ensure scores are given on projects when they are completed.
- The teacher will observe and score when a job is completed.
- The teacher will observe and assess the quality of work being done by a student on an assigned job.
- The teacher will determine if students use the appropriate terminology for particular jobs.
- The teacher will determine if the student has the skills to work independently on an assigned job.
- The teacher will evaluate students' ability to maintain their work areas throughout the duration of the course.
- The teacher will evaluate student communication in group activities and projects.
- The teacher will evaluate that the PA Program of Study tasks are being achieved as expected.
- The teacher will evaluate the students' class participation.
- The teacher will assess the students' ability to work within a team when teamwork is necessary.

- The teacher will evaluate the student's responsibility to complete work logs as expected.
- The teacher will evaluate if students work without hindering other students' progress.
- The teacher will assess if students stay on task in accordance with the job expectation.
- The teacher will observe students' ability to track tools, parts, and equipment efficiently.
- The teacher will account if students are prepared for class each day.
- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5
- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- Electude Learning Management System (LMS)
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: SAFETY

Number: 200 **Days:** 28

Description/Objectives:

The student will demonstrate knowledge of safety and implement general, shop and equipment specific safety rules. The student will also identify the location MSDS (Material Safety Data Sheets) forms, fire extinguishers and first aid equipment. The knowledge component shall be evidenced by passing SP-2 certification. Written examinations, worksheets, review questions and evaluation of psychomotor (hands-on) skills shall be used to evaluate the student's ability based on ASE and NOCTI Guidelines.

Tasks:

PA201 - Identify and follow all safety rules.

PA202 - Demonstrate the ability to secure vehicles on jack stands and hydraulic lifts.

PA203 - Demonstrate the ability to safely set-up/shut-down oxygen acetylene welding equipment.

PA204 - Identify chemical safety, 'Right-To-Know Laws' and MSDS (Material Safety Data Sheets).

PA205 - Identify and demonstrate the safe use of hand tools.

PA206 - Identify and demonstrate the safe use of power tools.

PA207 - Identify and demonstrate the safe use of protective clothing and equipment.

PA208 - Identify and demonstrate the safe use of fire protection equipment.

PA209 - Identify and demonstrate the safe use of shop equipment.

PA206 - Identify and demonstrate the safe use of power tools.

PA207 - Identify and demonstrate the safe use of protective clothing and equipment.

PA208 - Identify and demonstrate the safe use of fire protection equipment.

PA209 - Identify and demonstrate the safe use of shop equipment.

PA210 - Explain EPA and OSHA regulations.

Chapter 5: The Auto Shop and Safety

Objectives Standards:

- Describe the typical layout and sections of an auto shop.
- List the types of accidents that can occur in an auto shop.
- Explain how to prevent auto shop accidents.
- Describe general safety rules for the auto shop.

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

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- S11.C.2.2.2 Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion
- 3.5.9-12.P Apply a broad range of design skills to a design thinking process.

Connecting Anchor/Standard:

CAREER EDUCATION & WORK

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
- 13.1.11.G Assess the implements of the individualized career plan through the ongoing development of the career portfolio.
- 13.1.11.H Review personal high school plan against current personal career goals and select postsecondary opportunities based upon personal career interests.
- 13.3.11.A Evaluate personal attitudes and work habits that support career retention and advancement.

Instructional Activities:

- K-W-L with a twist
- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills

- The student will demonstrate understanding of workplace safety guidelines and regulations.
- The student will recognize potential hazards in the automotive repair environment.
- The student will apply appropriate personal safety measures (PPE) at all times.
- The student will follow proper safety protocols when working with vehicles, tools, and equipment.
- The student will identify safety hazards and report them to the appropriate authorities.
- The student will properly inspect hydraulic lifts, and jack stands for functionality before use.
- The student will safely raise and secure vehicles on jack stands following manufacturer's specifications.

- The student will understand and apply weight distribution principles when positioning the vehicle.
- The student will follow procedures for lifting and securing a vehicle safely to prevent accidents.
- The student will safely inspect oxygen and acetylene tanks and regulators for leaks or damage.
- The student will set up oxygen-acetylene welding equipment according to safety guidelines.
- The student will properly adjust pressure settings for the welding process.
- The student will demonstrate the correct procedure for shutting down welding equipment to prevent accidents.
- The student will understand the importance of ventilation and safe working areas when using welding equipment.
- The student will identify hazardous chemicals commonly used in the automotive industry.
- The student will understand and apply 'Right-to-Know' laws regarding hazardous materials.
- The student will demonstrate the ability to read and interpret MSDS (Material Safety Data Sheets) for chemicals.
- The student will use appropriate protective measures (PPE) when handling hazardous materials.
- The student will properly store and dispose of hazardous chemicals as per safety regulations.
- The student will correctly identify various hand tools and their specific uses in automotive repair.
- The student will inspect hand tools for defects before use, ensuring they are in good working condition.
- The student will demonstrate proper handling and technique to avoid accidents and injuries.
- The student will safely store hand tools after use to prevent misuse or damage.
- The student will use tools for their intended purpose to maintain safety standards.
- The student will identify various power tools and their intended functions in the automotive repair process.
- The student will conduct pre-operation inspections to ensure power tools are in safe working order.
- The student will use power tools with appropriate safety precautions (e.g., guards, protective eyewear, hearing protection).
- The student will demonstrate proper handling and control to prevent accidents.
- The student will follow manufacturer instructions for safe operation and maintenance.

- The student will recognize the need for protective clothing and equipment in various automotive repair tasks.
- The student will select and wear appropriate PPE (e.g., gloves, goggles, aprons, ear protection) based on the task.
- The student will inspect PPE for wear and damage before use.
- The student will demonstrate proper care and maintenance of protective gear.
- The student will understand the limitations of PPE and when additional safety equipment is required.
- The student will identify the different types of fire extinguishers and their uses (e.g., Class A, B, C, D, K).
- The student will demonstrate the proper technique for using a fire extinguisher (PASS method: Pull, Aim, Squeeze, Sweep).
- The student will identify fire hazards in the automotive shop and take preventive measures.
- The student will understand emergency fire evacuation procedures.
- The student will demonstrate how to safely handle flammable materials in the workshop.
- The student will identify and describe various shop equipment (e.g., air compressors, diagnostic machines, tire changers).
- The student will demonstrate safe operation and maintenance of shop equipment.
- The student will conduct regular safety checks to ensure equipment is in working order.
- The student will follow correct operating procedures to avoid accidents and injuries.
- The student will understand and follow the manufacturer's instructions for shop equipment usage.
- The student will understand the role of the Environmental Protection Agency (EPA) and Occupational Safety and Health Administration (OSHA) in the workplace.
- The student will explain how EPA regulations govern environmental safety, including waste disposal and emissions standards.
- The student will identify OSHA regulations that apply to automotive shops and maintenance areas.
- The student will follow OSHA's guidelines to ensure a safe working environment.
- The student will understand the reporting procedures for safety violations under EPA and OSHA regulations.

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)
- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
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- Drill and Practice (Repetition of Material)
- Copy of Teacher/Student Notes/Skeleton Notes
- Use of Daily Planner/Assignment Book (monitor use of)
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- Have Student Repeat Directions
- Positive Reinforcement
- Provide Frequent Feedback
- Regular Notebook Check
- Communication Regarding Behavior & Consequences (PBS)
- Clear Language for Directions
- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills
- Provide Verbal and Written Directions
- All Vocabulary to be Defined Before Testing

Safety:

- The teacher will distribute the Safety Pledge to the students.
- The teacher will have students and parent complete and return the Safety Pledge.
- The teacher will review personal safety rules & clothing requirements with students.
- The teacher will review shop safety rules with students.
- The teacher will review equipment specific safety rules with the students.
- The teacher will review Material Safety Data Sheets (MSDS) / Right to Know with the students.
- The teacher will review fire extinguishers and types of fires with students.
- The teacher will review first aid procedures with students.

Assessment:

THEORY EVALUATION

- Traditional tests - multiple choice, matching, true/false, short answer completion
- Traditional quizzes - multiple choice, matching, true/false, short answer completion
- Graded homework
- Graded math practice assignments
- Graded reading assignments
- Notebook checks
- Class oral responses
- Business and industry credentialing tests
- Exit slips/timecards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
- The teacher will assess students' understanding through discussions, quizzes, or practical demonstrations.
- The teacher will ensure scores are given on projects when they are completed.
- The teacher will observe and score when a job is completed.
- The teacher will observe and assess the quality of work being done by a student on an assigned job.
- The teacher will determine if students use the appropriate terminology for particular jobs.
- The teacher will determine if the student has the skills to work independently on an assigned job.
- The teacher will evaluate students' ability to maintain their work areas throughout the duration of the course.
- The teacher will evaluate student communication in group activities and projects.
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- The teacher will evaluate the students' class participation.
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- The teacher will account if students are prepared for class each day.
- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
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- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- SP2 Pollution Program
- Electude Learning Management System (LMS)
- MSDS (Material Safety Data Sheets) forms
- CCAR Safety Unit
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: TOOLS and FASTENERS

Number: 300 **Days:** 15

Description/Objectives:

The student will identify and describe the use of tools and fasteners, as well as the repair of damaged fasteners. Written examinations, worksheets, review questions and evaluation of psychomotor (hands-on) skills shall be used to evaluate the student's ability based on ASE and NOCTI Guidelines.

Chapter 3: Basic Hand Tools

Objectives Standards:

- Identify common automotive hand tools.
- List safety rules for hand tools.
- Select the right tool for a given job.
- Maintain and store tools properly.
- Use hand tools safely.
- Correctly answer ASE certification test questions referring to hand tools.

Chapter 4: Power Tools and Equipment

Objectives Standards:

- List the most commonly used power tools and equipment.
- Describe the uses for power tools and equipment.
- Explain the advantages of one type of tool over another.
- Explain safety rules that pertain to power tools and equipment.
- Correctly answer ASE certification test questions that require a knowledge of power tools and equipment.

Tasks:

PA301 - Identify and use fasteners and bolts.

PA302 - Demonstrate the ability to correctly drill and use re-threading tools.

PA303 - Demonstrate the ability to correctly read and interpret precision automotive measuring tools.

PA304 - Demonstrate the ability to correctly use automotive tools.

PA305 - Perform common fastener and thread repairs, to include: remove broken bolt, restore internal and external threads, and repair internal threads with a threaded insert.

Chapter 9: Fasteners, Gaskets, Seals, and Sealants

Objectives Standards:

- Identify commonly used automotive fasteners.
- Select and use fasteners properly.
- Remove, select, and install gaskets, seals, and sealants correctly.
- Summarize safety rules relating to fasteners, gaskets, seals, and sealants.
- Correctly answer ASE certification test questions that require a knowledge of fasteners, gaskets, seals, and sealants.

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- 3.5.9-12.L Interpret laws, regulations, policies, and other factors that impact the development and use of technology.
- 3.5.9-12.3 Strand: Integration of Knowledge, Technologies, and Practices.
- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Focus Anchor/Standard #2:

MATH/SCIENCE

Supporting Anchor/Standards:

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- S11.C.2.2.2 Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion
- 3.5.9-12.P Apply a broad range of design skills to a design thinking process.

Connecting Anchor/Standard:

CAREER EDUCATION & WORK

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
- 13.1.11.G Assess the implements of the individualized career plan through the ongoing development of the career portfolio.
- 13.1.11.H Review personal high school plan against current personal career goals and select postsecondary opportunities based upon personal career interests.
- 13.3.11.A Evaluate personal attitudes and work habits that support career retention and advancement.

Instructional Activities:

- K-W-L with a twist
- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills

- The student will identify different types of fasteners (e.g., nuts, bolts, washers, screws) and understand their specific uses in automotive applications.

- The student will select appropriate fasteners based on the material, strength, and requirements of a given automotive task.
- The student will demonstrate proper installation techniques for fasteners, including correct torque and tightening methods.
- The student will use a variety of fasteners and bolts in automotive assembly and repair, ensuring a secure and accurate fit.
- The student will recognize and avoid common mistakes when using fasteners, such as cross-threading or over-tightening.
- The student will select and use the correct drill bit size and type for the task at hand, considering material and hole requirements.
- The student will demonstrate proper technique when drilling, ensuring straight, accurate holes without damaging surrounding materials.
- The student will use re-threading tools (such as taps and dies) to restore damaged or worn threads, ensuring they are functional and smooth.
- The student will follow safety procedures when using drills and re-threading tools to avoid injury and equipment damage.
- The student will check the quality of the threads after re-threading to ensure they are consistent, functional, and meet the required specifications.
- The student will correctly use precision measuring tools (e.g., micrometers, calipers, depth gauges) to take accurate measurements of automotive parts.
- The student will interpret both metric and imperial measurements and apply them correctly to the task at hand.
- The student will demonstrate the ability to measure and assess parts for proper fit, tolerance, and wear during automotive repair or assembly.
- The student will verify the accuracy of measurements by cross-checking with standard specifications.
- The student will use measuring tools to ensure that automotive parts meet required standards for safety and functionality.
- The student will correctly identify and use a variety of automotive tools, including hand tools (e.g., wrenches, screwdrivers) and power tools (e.g., drills, grinders).
- The student will demonstrate proper handling, maintenance, and storage of tools to ensure their longevity and safe use.
- The student will select the appropriate tool for each task, ensuring the tool's proper application to maximize efficiency and safety.
- The student will use tools according to manufacturer instructions and standard operating procedures.
- The student will demonstrate safe tool usage, including wearing proper personal protective equipment (PPE) and following safety protocols.
- The student will demonstrate the ability to remove broken or seized bolts using correct techniques, such as using bolt extractors or other removal methods.

- The student will restore internal threads using taps and external threads using dies, ensuring smooth, functional threads for proper bolt or fastener engagement.
- The student will repair damaged internal threads by installing threaded inserts, ensuring the insert is correctly placed and secure.
- The student will apply appropriate torque specifications during the repair process to ensure the strength and durability of fasteners and threads.
- The student will inspect repaired threads for quality and functionality, verifying they meet industry standards and specifications.
- The student will maintain safety practices during all repair activities, including using safety equipment and following proper tool handling procedures.

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)
- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
- Taking Tests in Alternate Setting (or if requested)
- Drill and Practice (Repetition of Material)
- Copy of Teacher/Student Notes/Skeleton Notes
- Use of Daily Planner/Assignment Book (monitor use of)
- Positive Reinforcement
- Have Student Repeat Directions
- Positive Reinforcement
- Provide Frequent Feedback
- Regular Notebook Check
- Communication Regarding Behavior & Consequences (PBS)
- Clear Language for Directions
- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills
- Provide Verbal and Written Directions
- All Vocabulary to be Defined Before Testing

Safety:

- Safety glasses must be worn at all times by students in the Auto Shop.
- Students must always wear their work uniform in the Auto Shop.
- Work shoes must be always worn by students in the Auto Shop.
- Students will follow the safety rules as they apply to each tool or piece of equipment.
- Students will conduct themselves in a safe and professional manner.

Assessment:

THEORY EVALUATION

- Traditional tests - multiple choice, matching, true/false, short answer completion
- Traditional quizzes - multiple choice, matching, true/false, short answer completion
- Graded homework
- Graded math practice assignments
- Graded reading assignments
- Notebook checks
- Class oral responses
- Business and industry credentialing tests
- Exit slips/timecards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
- The teacher will assess students' understanding through discussions, quizzes, or practical demonstrations.
- The teacher will ensure scores are given on projects when they are completed.
- The teacher will observe and score when a job is completed.
- The teacher will observe and assess the quality of work being done by a student on an assigned job.
- The teacher will determine if students use the appropriate terminology for particular jobs.
- The teacher will determine if the student has the skills to work independently on an assigned job.

- The teacher will evaluate students' ability to maintain their work areas throughout the duration of the course.
- The teacher will evaluate student communication in group activities and projects.
- The teacher will evaluate that the PA Program of Study tasks are being achieved as expected.
- The teacher will evaluate the students' class participation.
- The teacher will assess the students' ability to work within a team when teamwork is necessary.
- The teacher will evaluate the student's responsibility to complete work logs as expected.
- The teacher will evaluate if students work without hindering other students' progress.
- The teacher will assess if students stay on task in accordance with the job expectation.
- The teacher will observe students' ability to track tools, parts, and equipment efficiently.
- The teacher will account if students are prepared for class each day.
- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5
- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- Electude Learning Management System (LMS)
- ASE Certification
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: CERTIFICATIONS

Number: 400 **Days:** 36

Description/Objectives:

The student will be given the opportunity to receive the following industry certifications. Achieving certification is dependent upon the student's ability to meet the criteria set up by the issuing corporation, governmental agency or bureau. (Many agencies require the student to be a minimum of 18 years of age. As a result, each student may not meet the guidelines.)

Tasks:

PA401 - Prepare to obtain PA Safety Inspection Certification.

PA402 - Prepare to obtain EPA 609 Refrigerant Recovery, Recycling Certification.

PA403 - Prepare to obtain Emission Inspection Certification.

PA404 - S/P-2 Safety & Environmental Protection Certification

PA405 - Pro-Cut Factory Certification - Brake Lathe

PA406 - Prepare to take the NOCTI Written Exam

PA407 - Prepare to take the NOCTI Psychomotor Skills Exam

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- 3.5.9-12.L Interpret laws, regulations, policies, and other factors that impact the development and use of technology.
- 3.5.9-12.3 Strand: Integration of Knowledge, Technologies, and Practices.
- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Focus Anchor/Standard #2:**MATH/SCIENCE****Supporting Anchor/Standards:**

- S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.
- S11.A.1.1.3 Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).
- S11.A.2.1.2 Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate and communicate results) applicable to a specific technological design.
- S11.C.2.2.2 Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion
- 3.5.9-12.P Apply a broad range of design skills to a design thinking process.

Connecting Anchor/Standard:**CAREER EDUCATION & WORK****Supporting Anchor/Standards:**

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
- 13.1.11.G Assess the implements of the individualized career plan through the ongoing development of the career portfolio.
- 13.1.11.H Review personal high school plan against current personal career goals and select postsecondary opportunities based upon personal career interests.
- 13.3.11.A Evaluate personal attitudes and work habits that support career retention and advancement.

Instructional Activities:

- K-W-L with a twist
- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning

- Exit slips of questions
- Test question list

Skills:

- The student will identify components of a vehicle that need to be inspected under state law (e.g., brakes, tires, lights, suspension).
- The student will perform a basic safety inspection on a vehicle, including checks on the braking system, lights, exhaust system, tires, and more.
- The student will demonstrate knowledge of proper inspection procedures and protocols.
- The student will understand how to accurately document inspection results and report findings.
- The student will understand the importance of proper refrigerant handling and its environmental impact.
- The student will identify the types of refrigerants used in automotive air conditioning systems and their respective regulations.
- The student will demonstrate the ability to recover, recycle, and recharge refrigerant in an automotive air conditioning system using proper tools and techniques.
- The student will follow safety procedures related to refrigerant recovery and system repairs.
- The student will complete the necessary paperwork and comply with EPA regulations regarding refrigerant handling.
- The student will understand the principles and purpose of emission inspections for vehicles.
- The student will identify the key components and systems involved in vehicle emissions (e.g., exhaust system, catalytic converter, oxygen sensors).
- The student will conduct basic emission testing on vehicles using the required equipment.
- The student will identify and troubleshoot common emission-related problems and suggest potential repairs.
- The student will comply with state and federal environmental regulations when performing emissions testing.
- The student will understand and demonstrate the importance of workplace safety in the automotive repair environment.
- The student will identify potential safety hazards in an automotive service facility and demonstrate proper hazard mitigation strategies.
- The student will understand the principles of environmental protection related to automotive repair, including waste disposal and handling of hazardous materials.

- The student will implement safety protocols such as Personal Protective Equipment (PPE) usage, fire safety procedures, and emergency response techniques.
- The student will apply OSHA and EPA guidelines in daily practices within the automotive shop.
- The student will understand the function and importance of brake lathes in automotive repair.
- The student will demonstrate proper operation of a Pro-Cut brake lathe, including setup and adjustment.
- The student will identify when to use a brake lathe for resurfacing rotors and drums.
- The student will follow safety procedures when operating the brake lathe to avoid injury and ensure quality work.
- The student will complete brake lathe procedures, including measuring, cutting, and finishing brake components to manufacturer specifications.
- The student will review key automotive systems and concepts, including engine performance, brakes, electrical systems, and more.
- The student will demonstrate knowledge of automotive diagnostics, repair, and service techniques.
- The student will prepare for multiple-choice and short-answer questions covering theory, procedures, and industry standards.
- The student will review and practice the relevant terminology, tools, and equipment commonly used in the automotive field.
- The student will use study guides and practice tests to assess readiness for the written exam.
- The student will perform practical tasks in automotive diagnostics, repair, and maintenance, including engine performance, electrical systems, suspension, and brakes.
- The student will demonstrate the ability to use tools and equipment safely and effectively in various automotive tasks.
- The student will complete hands-on exercises such as diagnosing a fault, repairing components, and servicing vehicles according to industry standards.
- The student will follow safety protocols and work in a professional, efficient manner.
- The student will maintain accurate records of performed tasks, including parts used, time spent, and repair procedures.

Special Adaptations:

- Extended Time (assignments and/or testing)

- Chunking of Assignments/Material
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Resources/Equipment:

- SP2 Safety Program
- Electude Learning Management System (LMS)
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: SUSPENSION AND STEERING

Number: 500 **Days:** 40

Description/Objectives:

The student will demonstrate a working knowledge of suspension and steering systems, the repair and maintenance of the components and four-wheel alignment. Written examinations, worksheets, review questions and evaluation of psychomotor (hands-on) skills shall be used to evaluate the students ability based on ASE and NOCTI Guidelines.

Chapter 65: Tire, Wheel, and Wheel Bearing Fundamentals

Objectives Standards:

- Identify the parts of a tire and wheel.
- Describe different methods of tire construction.
- Explain tire and wheel sizes.
- Describe tire ratings.
- Identify the parts of driving and non-driving hub and wheel bearing assemblies.
- Correctly answer ASE certification test questions requiring a knowledge of tires, wheels, hubs, and wheel bearings.

Chapter 66: Tire, Wheel, and Wheel Bearing Service

Objectives Standards:

- Diagnose common tire, wheel, and wheel bearing problems.
- Describe tire inflation and rotation procedures.
- Measure tire and wheel run-out.
- Explain static and dynamic wheel balance.
- Summarize different methods of balancing wheels and tires.
- Explain service procedures for wheel bearings.
- Use safe practices while servicing tires and wheels.
- Correctly answer ASE certification test questions requiring a knowledge of the service and repair of tires, wheels, and wheel bearings.

Chapter 67: Suspension System Fundamentals

Objectives Standards:

- Identify the major parts of a suspension system.
- Describe the basic function of each suspension system component.
- Explain the operation of the four common types of springs.
- Compare the various types of suspension systems.
- Explain automatic suspension leveling systems.
- Correctly answer ASE certification test questions requiring a knowledge of suspension system construction and design.

Chapter 68: Suspension System Diagnosis and Repair

Objectives Standards:

- Diagnose problems relating to a suspension system.
- Replace shock absorbers and ball joints.
- Describe the removal and replacement of springs.
- Service a strut assembly.
- Replace control arm bushings.
- Use safe work procedures while repairing suspension systems.
- Diagnose and repair electronically-controlled suspension systems.
- Correctly answer ASE certification test questions about the diagnosis and repair of suspension systems.

Chapter 69: Steering System Fundamentals

Objectives Standards:

- Identify the major parts of a steering system.
- Explain the operating principles of steering systems.
- Compare the differences between a linkage steering and a rack-and-pinion steering system.
- Describe the operation of hydraulic and electric-assist power steering systems.
- Explain the operation of four-wheel steering systems.
- Correctly answer ASE certification test questions requiring a knowledge of modern steering system designs.

Chapter 70: Steering System Diagnosis and Repair

Objectives Standards:

- Describe common steering system problems.
- Properly inspect and determine the condition of a steering system.
- Explain basic steering column repair operations.
- Adjust both worm gears and rack-and-pinion gears.
- Describe service and repair procedures for a rack-and-pinion steering gear.
- Service power steering belts, hoses, and fluid.
- Explain how to complete basic power steering tests.
- Use safe work procedures.
- Correctly answer ASE certification test questions about the diagnosis and repair of today's steering systems.

Tasks:

PA501 - Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.

PA502 - Identify and interpret suspension and steering system concerns; determine necessary action.

PA503 - Research applicable vehicle and service information, such as suspension and steering system operation, vehicle service history, service precautions, and technical service bulletins.

PA504 - Locate and interpret vehicle and major component identification numbers.

PA505 - Disable and enable supplemental restraint system (SRS).

PA506 - Remove and replace steering wheel; center/time supplemental restraint system (SRS) coil (clock spring).

PA507 - Remove and replace rack and pinion steering gear; inspect mounting bushings and brackets.

PA508 - Inspect and replace rack and pinion steering gear inner tie rod ends (sockets) and bellows boots.

PA509 - Determine proper power steering fluid type; inspect fluid level and condition.

PA510 - Flush, fill, and bleed power steering system.

PA511 - Diagnose power steering fluid leakage; determine necessary action.

PA512 - Remove, inspect, replace, and adjust power steering pump belt.

PA513 - Remove and reinstall power steering pump.

PA514 - Remove and reinstall press fit power steering pump pulley, check pulley and belt alignment.

PA516 - Inspect and replace pitman arm, relay (centerlink/intermediate) rod, idler arm and mountings, and steering linkage damper.

PA517 - Inspect, replace, and adjust tie rod ends (sockets), tie rod sleeves, and clamps.

PA518 - Inspect and test electric power assist steering.

PA519 - Remove, inspect, and install upper and lower control arms, bushings, shafts, and rebound bumpers.

PA520 - Remove, inspect and install strut rods and bushings.

PA521 - Remove, inspect, and install upper and/or lower ball joints.

PA522 - Remove, inspect, and install steering knuckle assemblies.

PA523 - Remove, inspect, and install short and long arm suspension system coil springs and spring insulators.

PA524 - Remove, inspect, install, and adjust suspension system torsion bars; inspect mounts.

PA525 - Remove, inspect, and install stabilizer bar bushings, brackets, and links.

PA526 - Remove, inspect, and install strut cartridge or assembly, strut coil spring, insulators (silencers), and upper strut bearing mount.

PA527 - Inspect, remove, and replace shock absorbers.

PA528 - Remove, inspect, and service or replace front and rear wheel bearings.

PA529 - Lubricate suspension and steering systems.

PA530 - Perform pre-alignment inspection and measure vehicle ride height; perform necessary action.

PA531 - Prepare vehicle for wheel alignment on the alignment machine; perform four wheel alignment by checking and adjusting front and rear wheel caster, camber, and toe as required; center steering wheel.

PA532 - Check SAI (steering axis inclination) and included angle; determine necessary action.

PA533 - Check rear wheel thrust angle; determine necessary action.

PA534 - Check for front wheel setback; determine necessary action.

PA535 - Check front and/or rear cradle (subframe) alignment; determine necessary action.

PA536 - Inspect tire condition; identify tire wear patterns; check and adjust air pressure; determine necessary action.

PA537 - Diagnose wheel/tire vibration, shimmy, and noise; determine necessary action.

PA538 - Rotate tires according to manufacturer's recommendations.

PA539 - Measure wheel, tire, axle flange, and hub runout; determine necessary action.

PA540 - Diagnose tire pull problems; determine necessary action.

PA541 - Dismount, inspect, and remount tire on wheel; Balance wheel and tire assembly (static and dynamic).

PA542 - Dismount, inspect, and remount tire on wheel equipped with tire pressure monitoring system sensor.

PA543-Reinstall wheel, torque lug nuts.

PA544 - Inspect tire and wheel assembly for air loss; perform necessary action.

PA545 - Repair tire using internal patch.

Chapter 74: Wheel Alignment

Objectives Standards:

- Explain the principles of wheel alignment.
- List the purpose of each wheel alignment setting.
- Perform a pre-alignment inspection of tires, steering, and suspension systems.
- Describe caster, camber, and toe adjustment.
- Explain toe-out on turns, steering axis inclination, and tracking.
- Describe the use of different types of wheel alignment equipment.
- Correctly answer ASE certification test questions requiring a knowledge of wheel alignment angles and procedures.

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- 3.5.9-12.L Interpret laws, regulations, policies, and other factors that impact the development and use of technology.
- 3.5.9-12.3 Strand: Integration of Knowledge, Technologies, and Practices.
- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Focus Anchor/Standard #2:

MATH/SCIENCE

Supporting Anchor/Standards:

- S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.
- S11.A.1.1.3 Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).
- S11.A.2.1.2 Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate and communicate results) applicable to a specific technological design.
- S11.C.2.2.2 Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion
- 3.5.9-12.P Apply a broad range of design skills to a design thinking process.

Connecting Anchor/Standard:

CAREER EDUCATION & WORK

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
- 13.1.11.G Assess the implements of the individualized career plan through the ongoing development of the career portfolio.
- 13.1.11.H Review personal high school plan against current personal career goals and select postsecondary opportunities based upon personal career interests.
- 13.3.11.A Evaluate personal attitudes and work habits that support career retention and advancement.

Instructional Activities:

- K-W-L with a twist
- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge

- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills:

- The student will accurately collect customer information, vehicle identification details, and service history.
- The student will record customer concerns and ensure clarity in documenting the problem and requested services.
- The student will identify and document the cause of the issue and describe the corrective action taken.
- The student will ensure all information on the work order is accurate and complete for proper service tracking.
- The student will recognize common suspension and steering system issues through visual inspection and diagnostic testing.
- The student will analyze symptoms such as handling problems, noises, or uneven tire wear to identify underlying suspension or steering problems.
- The student will determine and perform the necessary repairs or replacements based on the diagnosis.
- The student will utilize manufacturer service manuals, databases, and technical service bulletins to gather relevant information for service procedures.
- The student will apply knowledge of suspension and steering system operations and precautions when working on vehicles.
- The student will keep track of the vehicle's service history to make informed decisions on repairs.
- The student will identify the vehicle identification number (VIN) and other major component identification numbers on a vehicle.
- The student will interpret the information from these identification numbers to determine the vehicle's specifications and history.
- The student will safely disable the supplemental restraint system (SRS) before working on components related to airbags or safety systems.
- The student will follow proper procedures for enabling the SRS after repairs are completed.

- The student will ensure the SRS system is properly checked and reactivated to ensure safety.
- The student will carefully remove and replace the steering wheel without damaging the SRS components.
- The student will properly center and time the SRS coil (clock spring) to ensure proper airbag deployment in the event of a collision.
- The student will safely remove and replace the rack and pinion steering gear, following manufacturer specifications.
- The student will inspect mounting bushings and brackets for wear or damage and replace them as necessary.
- The student will inspect inner tie rod ends and bellows boots for wear, cracks, or damage.
- The student will replace worn or damaged components to ensure proper steering function and alignment.
- The student will identify the correct type of power steering fluid for different vehicle makes and models.
- The student will inspect the power steering fluid level and condition, ensuring it is clean and within the recommended range.
- The student will flush the power steering system to remove old fluid and contaminants.
- The student will fill the system with the correct type and amount of fluid and properly bleed the system to remove air pockets.
- The student will diagnose the source of power steering fluid leakage and identify potential repair solutions.
- The student will follow proper procedures to fix the leak, which may include replacing hoses, seals, or the pump.
- The student will remove the power steering pump belt, inspecting it for signs of wear or damage.
- The student will replace the belt if necessary and adjust it to the manufacturer's specifications.
- The student will safely remove and reinstall the power steering pump, ensuring that all connections are properly sealed.
- The student will test the system after reinstallation to ensure proper function and fluid flow.
- The student will remove and reinstall the press-fit power steering pump pulley with the proper tools.
- The student will ensure the pulley and belt are aligned correctly to prevent premature wear or failure.
- The student will inspect components such as the pitman arm, relay rod, idler arm, and steering linkage damper for wear or damage.

- The student will replace these components as needed and ensure all mountings are properly secured.
- The student will inspect tie rod ends, sleeves, and clamps for wear, ensuring no play or damage.
- The student will replace or adjust these components to maintain proper steering control and alignment.
- The student will inspect the electric power assist steering system for functionality and signs of wear.
- The student will test the system to ensure proper assist and diagnose any issues related to the steering assist motor or components.
- The student will remove and inspect control arms, bushings, shafts, and rebound bumpers for wear or damage.
- The student will replace or reinstall components to ensure proper suspension operation.
- The student will remove and inspect strut rods and bushings for wear or damage.
- The student will reinstall or replace the components to ensure proper suspension function.
- The student will remove and inspect upper and lower ball joints for play or wear.
- The student will replace and reinstall ball joints to maintain proper steering and suspension geometry.
- The student will safely remove, inspect, and install steering knuckle assemblies, ensuring proper alignment with suspension components.
- The student will inspect coil springs and spring insulators for cracks, fatigue, or damage.
- The student will replace and reinstall springs and insulators as necessary to maintain proper suspension height and ride quality.
- The student will remove, inspect, and adjust suspension system torsion bars and check the mounting points for wear.
- The student will reinstall and adjust torsion bars to the manufacturer's specifications.
- The student will remove, inspect, and install stabilizer bar bushings, brackets, and links to ensure proper handling and stability.
- The student will safely remove and inspect strut cartridges, coil springs, and upper strut bearing mounts for wear or damage.
- The student will reinstall the components after replacing damaged parts, ensuring proper suspension function.
- The student will inspect shock absorbers for leaks, wear, or performance issues.
- The student will remove and replace faulty shock absorbers to restore proper vehicle handling.
- The student will remove and inspect wheel bearings for wear, noise, or damage.

- The student will replace or service the bearings to maintain smooth wheel rotation and prevent vehicle vibration.
- The student will lubricate suspension and steering system components, following manufacturer recommendations for lubricants and intervals.
- The student will inspect the vehicle's suspension for any wear or damage that may affect alignment.
- The student will measure ride height and adjust as necessary to ensure proper vehicle stance and alignment.
- The student will prepare the vehicle for a four-wheel alignment by ensuring all components are properly adjusted.
- The student will measure and adjust wheel angles (caster, camber, toe) and ensure the steering wheel is centered.
- The student will measure and evaluate the steering axis inclination and included angle.
- The student will perform adjustments or repairs based on the measurements to ensure proper steering geometry.
- The student will measure the rear wheel thrust angle and determine if adjustments or repairs are required.
- The student will check the front wheel setback to ensure correct wheel alignment.
- The student will make necessary corrections to restore proper alignment.
- The student will inspect and measure the alignment of the front or rear cradle/subframe for accuracy.
- The student will perform the necessary actions to correct any misalignment.
- The student will inspect tires for wear patterns, bulges, or punctures.
- The student will adjust tire pressure to the manufacturer's specifications and take corrective action as needed.
- The student will diagnose wheel or tire issues that cause vibration or noise during operation.
- The student will determine the appropriate corrective action, including balancing, alignment, or tire replacement.
- The student will perform tire rotations based on the vehicle manufacturer's recommendations to ensure even wear and extend tire life.
- The student will measure runout on wheels, tires, axle flanges, and hubs to detect any deformation.
- The student will perform the necessary corrective actions to ensure safe and effective tire and wheel performance.
- The student will diagnose issues that cause the vehicle to pull to one side during driving.
- The student will determine the root cause, such as misalignment or tire issues, and take appropriate action.

- The student will dismount, inspect, and remount tires on wheels while checking for damage or wear.
- The student will balance the wheel and tire assembly to ensure smooth operation.
- The student will handle tires equipped with tire pressure monitoring system (TPMS) sensors carefully.
- The student will inspect and ensure the sensor is properly installed during tire remounting.
- The student will reinstall wheels securely and torque lug nuts to the specified manufacturer torque settings.
- The student will inspect tire and wheel assemblies for air loss and identify possible causes, such as punctures or valve leaks.
- The student will perform the necessary repair or replacement.
- The student will properly repair a tire using an internal patch, ensuring a safe and durable repair.

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)
- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
- Taking Tests in Alternate Setting (or if requested)
- Drill and Practice (Repetition of Material)
- Copy of Teacher/Student Notes/Skeleton Notes
- Use of Daily Planner/Assignment Book (monitor use of)
- Positive Reinforcement
- Have Student Repeat Directions
- Positive Reinforcement
- Provide Frequent Feedback
- Regular Notebook Check
- Communication Regarding Behavior & Consequences (PBS)
- Clear Language for Directions
- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills

- Provide Verbal and Written Directions
- All Vocabulary to be Defined Before Testing

Safety:

- Safety glasses must be worn at all times by students in the Auto Shop.
- Students must always wear their work uniform in the Auto Shop.
- Work shoes must be always worn by students in the Auto Shop.
- Students will follow the safety rules as they apply to each tool or piece of equipment.
- Students will conduct themselves in a safe and professional manner.

Assessment:

THEORY EVALUATION

- Traditional tests - multiple choice, matching, true/false, short answer completion
- Traditional quizzes - multiple choice, matching, true/false, short answer completion
- Graded homework
- Graded math practice assignments
- Graded reading assignments
- Notebook checks
- Class oral responses
- Business and industry credentialing tests
- Exit slips/timecards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
- The teacher will assess students' understanding through discussions, quizzes, or practical demonstrations.
- The teacher will ensure scores are given on projects when they are completed.
- The teacher will observe and score when a job is completed.

- The teacher will observe and assess the quality of work being done by a student on an assigned job.
- The teacher will determine if students use the appropriate terminology for particular jobs.
- The teacher will determine if the student has the skills to work independently on an assigned job.
- The teacher will evaluate students' ability to maintain their work areas throughout the duration of the course.
- The teacher will evaluate student communication in group activities and projects.
- The teacher will evaluate that the PA Program of Study tasks are being achieved as expected.
- The teacher will evaluate the students' class participation.
- The teacher will assess the students' ability to work within a team when teamwork is necessary.
- The teacher will evaluate the student's responsibility to complete work logs as expected.
- The teacher will evaluate if students work without hindering other students' progress.
- The teacher will assess if students stay on task in accordance with the job expectation.
- The teacher will observe students' ability to track tools, parts, and equipment efficiently.
- The teacher will account if students are prepared for class each day.
- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5

- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- Electude Learning Management System (LMS)
- ASE Certification
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: PREVENTIVE MAINTENANCE

Number: 1200 **Days:** 30

Description/Objectives:

The student will learn skills associated with the general preventive maintenance checks performed on a vehicle. This guide targets Level 1 students and the tasks they will need to succeed and progress within this level of the program.

Tasks:

PA529 - Lubricate suspension and steering systems.

PA538 - Rotate tires according to manufacturer's recommendations.

PA544 - Inspect tire and wheel assembly for air loss; perform necessary action.

PA545 - Repair tire using internal patch.

PA710 - Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.

PA716 - Perform battery state-of-charge test; determine necessary action.

PA720 - Perform battery charge.

PA735 - Inspect, replace, and aim headlights and bulbs.

PA846 - Perform engine oil and filter change.

PA911 - Back-flush a heater core and radiator.

PA912 - Drain, refill and bleed the air from a cooling system.

PA1006 - Check the fluid in a transfer case.

PA1003 - Check the fluid level on a manual transmission.

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- 3.5.9-12.L Interpret laws, regulations, policies, and other factors that impact the development and use of technology.
- 3.5.9-12.3 Strand: Integration of Knowledge, Technologies, and Practices.
- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Focus Anchor/Standard #2:

MATH/SCIENCE

Supporting Anchor/Standards:

- S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.
- S11.A.1.1.3 Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).
- S11.A.2.1.2 Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate and communicate results) applicable to a specific technological design.
- S11.C.2.2.2 Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion
- 3.5.9-12.P Apply a broad range of design skills to a design thinking process.

Connecting Anchor/Standard:

CAREER EDUCATION & WORK

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
- 13.1.11.G Assess the implements of the individualized career plan through the ongoing development of the career portfolio.
- 13.1.11.H Review personal high school plan against current personal career goals and select postsecondary opportunities based upon personal career interests.
- 13.3.11.A Evaluate personal attitudes and work habits that support career retention and advancement.

Instructional Activities:

- K-W-L with a twist
- Read the questions at the end of the chapter
- Read the summary information first

- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills:

- The student will demonstrate the proper technique for lubricating suspension and steering components to ensure smooth operation and reduce wear.
- The student will identify the correct lubricants for various suspension and steering system components.
- The student will use proper equipment and safety protocols when lubricating suspension and steering systems.
- The student will correctly identify and follow the manufacturer's recommendations for tire rotation patterns and intervals.
- The student will safely remove, rotate, and reinstall tires, ensuring proper torque and alignment.
- The student will inspect tire condition during rotation and take necessary actions based on wear patterns.
- The student will inspect the tire and wheel assembly for air loss by checking for punctures, leaks, or damage.
- The student will use appropriate tools and techniques to identify the cause of air loss and determine the proper action to resolve it.
- The student will repair or replace damaged components as necessary to ensure the tire maintains proper air pressure.
- The student will demonstrate the correct procedure for removing the tire from the wheel and inspecting it for damage.
- The student will apply an internal patch to a tire, ensuring the repair is secure and safe for continued use.
- The student will balance the wheel and tire assembly after the patch is applied, following safety and manufacturer guidelines.
- The student will identify fusible links, circuit breakers, and fuses in the electrical system.
- The student will inspect and test these components for continuity and functionality.

- The student will determine the necessary action if a component is found to be faulty, including replacement or repair.
- The student will perform a state-of-charge test on a vehicle battery using proper testing equipment.
- The student will interpret test results and determine the battery's condition and necessary action.
- The student will recommend whether the battery needs charging, replacement, or other service based on test findings.
- The student will safely connect a battery charger to a vehicle battery.
- The student will monitor the charging process to ensure the battery reaches the appropriate charge level without overcharging.
- The student will disconnect the charger safely after the battery is fully charged.
- The student will inspect headlights and bulbs for proper operation and signs of damage.
- The student will replace faulty or burned-out headlights and bulbs using the correct parts and procedures.
- The student will aim the headlights to ensure optimal visibility and safety.
- The student will drain the engine oil and remove the old oil filter.
- The student will replace the oil filter and add the correct amount and type of engine oil.
- The student will check for leaks and ensure the engine operates within normal parameters after the oil change.
- The student will perform a back-flush on the heater core and radiator to remove blockages and ensure proper coolant flow.
- The student will use the appropriate tools and techniques to prevent damage to the system.
- The student will check the system for leaks and ensure it is properly filled with coolant after flushing.
- The student will safely drain coolant from the cooling system and dispose of it according to safety and environmental regulations.
- The student will refill the cooling system with the appropriate type and amount of coolant.
- The student will bleed air from the system to ensure proper coolant flow and prevent overheating.
- The student will locate the transfer case and check the fluid level according to the manufacturer's specifications.
- The student will assess the fluid's condition, noting any signs of contamination or wear.
- The student will determine whether fluid needs to be added or replaced based on the inspection.

- The student will locate and check the fluid level in a manual transmission using the correct procedure.
- The student will assess the fluid for proper condition, color, and clarity, identifying any potential issues.
- The student will determine if fluid needs to be added or replaced and take appropriate action.

Special Adaptations:

- Extended Time (assignments and/or testing)
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- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)
- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
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Assessment:

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- Exit slips/timecards

SKILL EVALUATION

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- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- Electude Learning Management System (LMS)
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: ORIENTATION

Number: 100 **Days:** 15

Description/Objectives:

The students will review the following concepts from Level 1 – Orientation: career opportunities, SP2 certifications expectations for safety, hygiene, customer service and shop management skills.

Tasks:

PA101 - Explain and follow all lab rules.

PA102 - Participate in basic shop management.

PA103 - Participate in parts ordering.

PA104 - Demonstrate auto shop safety and hygiene.

PA105 - Demonstrate the use of service information.

PA106 - Demonstrate proper telephone courtesy.

PA107 - Identify vehicle by: sight, V.I.N. and/or ID tag.

PA108 - Identify career paths within the career and technical education program.

Chapter 1: The Automobile

Objectives Standards:

- Identify and locate the most important parts of a vehicle.
- Describe the purpose of the fundamental automotive systems.
- Explain the interaction of automotive systems.
- Describe major automobile design variations.
- Comprehend later text chapters with a minimum amount of difficulty.
- Correctly answer ASE certification test questions that require a knowledge of the major parts and systems of a vehicle.

Chapter 2: Automotive Careers and ASE Certification

Objectives Standards:

- List the most common automotive careers.
- Describe the type of skills needed to be an auto technician.
- Explain the tasks completed by each type of auto technician.
- Summarize the ASE certification program.

Chapter 7: Service Information and Work Orders

Objectives Standards:

- Describe the different types of service manuals.
- Find and use the service manual index and contents sections.
- Explain the different kinds of information and illustrations used in a service manual.
- Describe the three basic types of troubleshooting charts found in service manuals.
- Explain how to use computer-based service information.
- Correctly answer ASE certification test questions concerning service information.

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- 3.5.9-12.L Interpret laws, regulations, policies, and other factors that impact the development and use of technology.
- 3.5.9-12.3 Strand: Integration of Knowledge, Technologies, and Practices.
- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Focus Anchor/Standard #2:

MATH/SCIENCE

Supporting Anchor/Standards:

- S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.
- S11.A.1.1.3 Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).
- S11.A.2.1.2 Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate and communicate results) applicable to a specific technological design.
- S11.C.2.2.2 Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion
- 3.5.9-12.P Apply a broad range of design skills to a design thinking process.

Connecting Anchor/Standard:

CAREER EDUCATION & WORK

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
- 13.1.11.G Assess the implements of the individualized career plan through the ongoing development of the career portfolio.
- 13.1.11.H Review personal high school plan against current personal career goals and select postsecondary opportunities based upon personal career interests.
- 13.3.11.A Evaluate personal attitudes and work habits that support career retention and advancement.

Instructional Activities:

- K-W-L with a twist
- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills:**The students will review the following skills from Level 1 – Orientation:**

- The student will complete and return all first day paperwork.
- The student will complete and return the auto safety contract.
- The student will gain a thorough understanding of the expectations of the class. The student will order all required shop clothing, including a uniform shirt, and PPE.
- The student will complete SP2 Safety and Pollution Certification with a score of 100%.
- The student will complete the CCAR safety unit of Electude LMS with a score of 100%.
- The student will complete shop equipment assignment and familiarize with all equipment, their safety concerns and locations.
- The student will learn the locations of all fire extinguishers, safety shut off switches and eye wash and chemical shower locations specific to the shop.

- The student will understand and explain the importance of lab safety rules.
- The student will demonstrate the ability to follow all posted and verbal safety instructions.
- The student will recognize safety hazards in the lab environment and take appropriate action to avoid injury.
- The student will practice proper handling and use of equipment to ensure a safe working environment.
- The student will demonstrate knowledge of personal protective equipment (PPE) and wear it when necessary.
- The student will understand the roles and responsibilities in an automotive shop environment.
- The student will assist in maintaining an organized and efficient work area.
- The student will demonstrate the ability to communicate effectively with team members and supervisors.
- The student will participate in inventory management by tracking parts and tools.
- The student will assist in scheduling tasks and prioritizing work to meet deadlines.
- The student will identify the parts ordering process and how to accurately identify needed parts.
- The student will use catalogs, computer systems, or online databases to find part numbers and descriptions.
- The student will demonstrate the ability to communicate effectively with vendors for parts ordering.
- The student will track and record orders to ensure timely delivery of parts.
- The student will summarize the importance of verifying part specifications and compatibility before ordering.
- The student will understand and demonstrate basic auto shop safety procedures, including the proper use of tools and machinery.
- The student will maintain a clean and safe work environment by regularly cleaning and organizing tools and workspaces.
- The student will follow proper waste disposal guidelines for hazardous materials such as oil, brake fluid, and other automotive chemicals.
- The student will demonstrate proper fire safety and emergency response procedures in the shop.
- The student will practice good personal hygiene to minimize contamination of parts and surfaces.
- The student will determine how to access service manuals and technical service bulletins (TSBs) for vehicles.
- The student will demonstrate the ability to read and interpret service information to diagnose vehicle issues.
- The student will use online databases and software to retrieve and analyze vehicle service data.
- The student will accurately follow service guidelines and repair procedures to ensure correct repairs.
- The student will demonstrate the ability to update service records and logs for future reference.

- The student will answer the phone in a professional and courteous manner, using appropriate greetings.
- The student will demonstrate active listening skills and take clear, concise messages.
- The student will use professional language and tone when speaking with clients, vendors, or colleagues over the phone.
- The student will follow up on phone inquiries and requests in a timely and efficient manner.
- The student will handle difficult phone calls calmly and professionally, directing them to the appropriate person when necessary.
- The student will identify key vehicle features by sight, including make, model, year, and other distinguishing characteristics.
- The student will understand the importance and location of a Vehicle Identification Number (V.I.N.) and demonstrate the ability to locate and record it.
- The student will recognize and interpret manufacturer ID tags, labels, and other identifiers commonly found on vehicles.
- The student will use the V.I.N. to retrieve vehicle history, specifications, and recall information.
- The student will cross-reference vehicle identification information with service records to ensure accuracy.
- The student will understand and explain the various career paths within the automotive industry, such as automotive service technician, parts specialist, or service advisor.
- The student will research and identify education and certification requirements for different career opportunities.
- The student will demonstrate knowledge of potential advancement opportunities within the automotive field.
- The student will discuss the skills and competencies required for success in various automotive careers.
- The student will explore industry trends and emerging career opportunities in automotive technology.

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)
- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
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- Provide Verbal and Written Directions
- All Vocabulary to be Defined Before Testing

Safety:

Student Safety Pledge:

I, _____, understand that the automotive
(Print name)

shop is an inherently dangerous place to work. I pledge to:

1. Follow all school regulations listed in the student handbook at all times.
2. Follow all safety regulations as they pertain to the shop and its equipment at all times.
3. I will wear work clothes as specified, work shoes, and safety glasses at all times.
4. Avoid horseplay or other distracting behavior.
5. Perform all work in a careful and safe manner.
6. Receive instruction and permission before using any equipment.
7. Never work in the shop without the instructor present.
8. Pass a general safety test, as well as demonstrate the safe use of all equipment.

I agree to the above terms of the safety pledge and understand that failure to live up to the terms above is grounds for discipline, as spelled out in the student handbook. Repeat offenses may result in removal from the program. Failure to follow these rules may result in serious injury or death. By signing below, I agree to all the terms above.

(Signed by Student)

(Today's date)

Assessment:

THEORY EVALUATION

- Traditional Tests - multiple choice, matching, true/false, short answer completion
- Traditional Quizzes - multiple choice, matching, true/false, short answer completion
- Graded Homework
- Graded Math practice assignments
- Graded Reading assignments
- Notebook checks
- Class oral responses
- Business and Industry Credentialing Tests
- Exit Slips/Time Cards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
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- Extended time to complete the assessment
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Resources/Equipment:

- SP2 Safety Program
- Electude Learning Management System (LMS)
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: SAFETY

Number: 200 **Days:** 15

Description/Objectives:

The student will review their knowledge of safety and show they are able to implement general, shop and equipment specific safety rules. The student will also review the location MSDS (Material Safety Data Sheets) forms, fire extinguishers and first aid equipment. The knowledge component shall be evidenced by passing SP-2 certification. Written examinations, worksheets, review questions and evaluation of psychomotor (hands-on) skills shall be used to evaluate the student's ability based on ASE and NOCTI Guidelines.

Tasks:

PA201 - Identify and follow all safety rules.

PA202 - Demonstrate the ability to secure vehicles on jack stands and hydraulic lifts.

PA203 - Demonstrate the ability to safely set-up/shut-down oxygen acetylene welding equipment.

PA204 - Identify chemical safety, 'Right-To-Know Laws' and MSDS (Material Safety Data Sheets).

PA205 - Identify and demonstrate the safe use of hand tools.

PA206 - Identify and demonstrate the safe use of power tools.

PA207 - Identify and demonstrate the safe use of protective clothing and equipment.

PA208 - Identify and demonstrate the safe use of fire protection equipment.

PA209 - Identify and demonstrate the safe use of shop equipment.

PA206 - Identify and demonstrate the safe use of power tools.

PA207 - Identify and demonstrate the safe use of protective clothing and equipment.

PA208 - Identify and demonstrate the safe use of fire protection equipment.

PA209 - Identify and demonstrate the safe use of shop equipment.

PA210 - Explain EPA and OSHA regulations.

Chapter 5: The Auto Shop and Safety

Objectives Standards:

- Describe the typical layout and sections of an auto shop.
- List the types of accidents that can occur in an auto shop.
- Explain how to prevent auto shop accidents.
- Describe general safety rules for the auto shop.

Standards / Assessment Anchors***Focus Anchor/Standard #1:*****LITERACY*****Supporting Anchor/Standards:***

- R11.B.3.3.3 Explain, interpret, and/or analyze graphics and charts, and/or make connections between text and the content of graphics and charts.
- R11.B.3.3.2 Explain, interpret, and/or analyze the author's purpose for decisions about text organization and content.
- R11.B.3.3.1 Explain, interpret, and/or analyze the effect of text organization, including the use of headers.
- R11.B.3.3 Identify, compare, explain, interpret, describe, and analyze how text organization clarifies meaning of nonfictional text.
- R11.B.3.3.4 Identify, explain, compare, interpret, describe, and/or analyze the sequence of steps in a list of directions.

Focus Anchor/Standard #2:**MATH/SCIENCE*****Supporting Anchor/Standards:***

- CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.
- CC.2.1.8.E.4 Estimate irrational numbers by comparing them to rational numbers.
- CC.2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers.
- S11.A.1.3.1 Use appropriate quantitative data to describe or interpret change in systems (e.g., biological indices, electrical circuit data, automobile diagnostic systems data).

- S11.A.2.1.1 Critique the elements of an experimental design (e.g., raising questions, formulating hypotheses, developing procedures, identifying variables, manipulating variables, interpreting data, and drawing conclusions) applicable to a specific experimental design.
- M11.D.2 Represent and/or analyze mathematical situations using numbers, symbols, words, tables/or graphs.
- M11.E.4.1.2 Use probability to predict outcomes.

Connecting Anchor/Standard:

CAREER EDUCATION & WORK

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.

Instructional Activities:

- K-W-L with a twist
- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills

The student will review the following skills from Level 1 – Safety:

- The student will demonstrate understanding of workplace safety guidelines and regulations.
- The student will recognize potential hazards in the automotive repair environment.

- The student will apply appropriate personal safety measures (PPE) at all times.
- The student will follow proper safety protocols when working with vehicles, tools, and equipment.
- The student will identify safety hazards and report them to the appropriate authorities.
- The student will properly inspect hydraulic lifts, and jack stands for functionality before use.
- The student will safely raise and secure vehicles on jack stands following manufacturer's specifications.
- The student will understand and apply weight distribution principles when positioning the vehicle.
- The student will follow procedures for lifting and securing a vehicle safely to prevent accidents.
- The student will safely inspect oxygen and acetylene tanks and regulators for leaks or damage.
- The student will set up oxygen-acetylene welding equipment according to safety guidelines.
- The student will properly adjust pressure settings for the welding process.
- The student will demonstrate the correct procedure for shutting down welding equipment to prevent accidents.
- The student will understand the importance of ventilation and safe working areas when using welding equipment.
- The student will identify hazardous chemicals commonly used in the automotive industry.
- The student will understand and apply 'Right-to-Know' laws regarding hazardous materials.
- The student will demonstrate the ability to read and interpret MSDS (Material Safety Data Sheets) for chemicals.
- The student will use appropriate protective measures (PPE) when handling hazardous materials.
- The student will properly store and dispose of hazardous chemicals as per safety regulations.
- The student will correctly identify various hand tools and their specific uses in automotive repair.
- The student will inspect hand tools for defects before use, ensuring they are in good working condition.
- The student will demonstrate proper handling and technique to avoid accidents and injuries.
- The student will safely store hand tools after use to prevent misuse or damage.
- The student will use tools for their intended purpose to maintain safety standards.

- The student will identify various power tools and their intended functions in the automotive repair process.
- The student will conduct pre-operation inspections to ensure power tools are in safe working order.
- The student will use power tools with appropriate safety precautions (e.g., guards, protective eyewear, hearing protection).
- The student will demonstrate proper handling and control to prevent accidents.
- The student will follow manufacturer instructions for safe operation and maintenance.
- The student will recognize the need for protective clothing and equipment in various automotive repair tasks.
- The student will select and wear appropriate PPE (e.g., gloves, goggles, aprons, ear protection) based on the task.
- The student will inspect PPE for wear and damage before use.
- The student will demonstrate proper care and maintenance of protective gear.
- The student will understand the limitations of PPE and when additional safety equipment is required.
- The student will identify the different types of fire extinguishers and their uses (e.g., Class A, B, C, D, K).
- The student will demonstrate the proper technique for using a fire extinguisher (PASS method: Pull, Aim, Squeeze, Sweep).
- The student will identify fire hazards in the automotive shop and take preventive measures.
- The student will understand emergency fire evacuation procedures.
- The student will demonstrate how to safely handle flammable materials in the workshop.
- The student will identify and describe various shop equipment (e.g., air compressors, diagnostic machines, tire changers).
- The student will demonstrate safe operation and maintenance of shop equipment.
- The student will conduct regular safety checks to ensure equipment is in working order.
- The student will follow correct operating procedures to avoid accidents and injuries.
- The student will understand and follow the manufacturer's instructions for shop equipment usage.
- The student will understand the role of the Environmental Protection Agency (EPA) and Occupational Safety and Health Administration (OSHA) in the workplace.

- The student will explain how EPA regulations govern environmental safety, including waste disposal and emissions standards.
- The student will identify OSHA regulations that apply to automotive shops and maintenance areas.
- The student will follow OSHA's guidelines to ensure a safe working environment.
- The student will understand the reporting procedures for safety violations under EPA and OSHA regulations.

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)
- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
- Taking Tests in Alternate Setting (or if requested)
- Drill and Practice (Repetition of Material)
- Copy of Teacher/Student Notes/Skeleton Notes
- Use of Daily Planner/Assignment Book (monitor use of)
- Positive Reinforcement
- Have Student Repeat Directions
- Positive Reinforcement
- Provide Frequent Feedback
- Regular Notebook Check
- Communication Regarding Behavior & Consequences (PBS)
- Clear Language for Directions
- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills
- Provide Verbal and Written Directions
- All Vocabulary to be Defined Before Testing

Safety:

- The teacher will distribute the Safety Pledge to the students.

- The teacher will have students and parent complete and return the Safety Pledge.
- The teacher will review personal safety rules & clothing requirements with students.
- The teacher will review shop safety rules with students.
- The teacher will review equipment specific safety rules with the students.
- The teacher will review Material Safety Data Sheets (MSDS) / Right to Know with the students.
- The teacher will review fire extinguishers and types of fires with students.
- The teacher will review first aid procedures with students.

Assessment:

THEORY EVALUATION

- Traditional tests - multiple choice, matching, true/false, short answer completion
- Traditional quizzes - multiple choice, matching, true/false, short answer completion
- Graded homework
- Graded math practice assignments
- Graded reading assignments
- Notebook checks
- Class oral responses
- Business and industry credentialing tests
- Exit slips/timecards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
- The teacher will assess students' understanding through discussions, quizzes, or practical demonstrations.
- The teacher will ensure scores are given on projects when they are completed.
- The teacher will observe and score when a job is completed.

- The teacher will observe and assess the quality of work being done by a student on an assigned job.
- The teacher will determine if students use the appropriate terminology for particular jobs.
- The teacher will determine if the student has the skills to work independently on an assigned job.
- The teacher will evaluate students' ability to maintain their work areas throughout the duration of the course.
- The teacher will evaluate student communication in group activities and projects.
- The teacher will evaluate that the PA Program of Study tasks are being achieved as expected.
- The teacher will evaluate the students' class participation.
- The teacher will assess the students' ability to work within a team when teamwork is necessary.
- The teacher will evaluate the student's responsibility to complete work logs as expected.
- The teacher will evaluate if students work without hindering other students' progress.
- The teacher will assess if students stay on task in accordance with the job expectation.
- The teacher will observe students' ability to track tools, parts, and equipment efficiently.
- The teacher will account if students are prepared for class each day.
- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5

- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- SP2 Pollution Program
- Electude Learning Management System (LMS)
- MSDS (Material Safety Data Sheets) forms
- CCAR Safety Unit
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: CERTIFICATIONS

Number: 400 **Days:** 15

Description/Objectives:

The student will be given the opportunity to receive the following industry certifications. Achieving certification is dependent upon the student's ability to meet the criteria set up by the issuing corporation, governmental agency or bureau. (Many agencies require the student to be a minimum of 18 years of age. As a result, each student may not meet the guidelines.)

Tasks:

PA401 - Prepare to obtain PA Safety Inspection Certification.

PA402 - Prepare to obtain EPA 609 Refrigerant Recovery, Recycling Certification.

PA403 - Prepare to obtain Emission Inspection Certification.

PA404 - S/P-2 Safety & Environmental Protection Certification

PA405 - Pro-Cut Factory Certification - Brake Lathe

PA406 - Prepare to take the NOCTI Written Exam

PA407 - Prepare to take the NOCTI Psychomotor Skills Exam

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- R11.B.3.3.3 Explain, interpret, and/or analyze graphics and charts, and/or make connections between text and the content of graphics and charts.
- R11.B.3.3.2 Explain, interpret, and/or analyze the author's purpose for decisions about text organization and content.
- R11.B.3.3.1 Explain, interpret, and/or analyze the effect of text organization, including the use of headers.

- R11.B.3.3 Identify, compare, explain, interpret, describe, and analyze how text organization clarifies meaning of nonfictional text.
- R11.B.3.3.4 Identify, explain, compare, interpret, describe, and/or analyze the sequence of steps in a list of directions.

Focus Anchor/Standard #2:

MATH/SCIENCE

Supporting Anchor/Standards:

- CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.
- CC.2.1.8.E.4 Estimate irrational numbers by comparing them to rational numbers.
- CC.2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers.
- S11.A.1.3.1 Use appropriate quantitative data to describe or interpret change in systems (e.g., biological indices, electrical circuit data, automobile diagnostic systems data).
- S11.A.2.1.1 Critique the elements of an experimental design (e.g., raising questions, formulating hypotheses, developing procedures, identifying variables, manipulating variables, interpreting data, and drawing conclusions) applicable to a specific experimental design.
- M11.D.2 Represent and/or analyze mathematical situations using numbers, symbols, words, tables/or graphs.
- M11.E.4.1.2 Use probability to predict outcomes.

Connecting Anchor/Standard:

CAREER EDUCATION & WORK

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.

Instructional Activities:

- K-W-L with a twist

- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills:

- The student will understand the Pennsylvania Vehicle Safety Inspection Manual and relevant state regulations.
- The student will identify components of a vehicle that need to be inspected under state law (e.g., brakes, tires, lights, suspension).
- The student will perform a basic safety inspection on a vehicle, including checks on the braking system, lights, exhaust system, tires, and more.
- The student will demonstrate knowledge of proper inspection procedures and protocols.
- The student will understand how to accurately document inspection results and report findings.
- The student will understand the importance of proper refrigerant handling and its environmental impact.
- The student will identify the types of refrigerants used in automotive air conditioning systems and their respective regulations.
- The student will demonstrate the ability to recover, recycle, and recharge refrigerant in an automotive air conditioning system using proper tools and techniques.
- The student will follow safety procedures related to refrigerant recovery and system repairs.
- The student will complete the necessary paperwork and comply with EPA regulations regarding refrigerant handling.
- The student will understand the principles and purpose of emission inspections for vehicles.
- The student will identify the key components and systems involved in vehicle emissions (e.g., exhaust system, catalytic converter, oxygen sensors).

- The student will conduct basic emission testing on vehicles using the required equipment.
- The student will identify and troubleshoot common emission-related problems and suggest potential repairs.
- The student will comply with state and federal environmental regulations when performing emissions testing.
- The student will understand and demonstrate the importance of workplace safety in the automotive repair environment.
- The student will identify potential safety hazards in an automotive service facility and demonstrate proper hazard mitigation strategies.
- The student will understand the principles of environmental protection related to automotive repair, including waste disposal and handling of hazardous materials.
- The student will implement safety protocols such as Personal Protective Equipment (PPE) usage, fire safety procedures, and emergency response techniques.
- The student will apply OSHA and EPA guidelines in daily practices within the automotive shop.
- The student will understand the function and importance of brake lathes in automotive repair.
- The student will demonstrate proper operation of a Pro-Cut brake lathe, including setup and adjustment.
- The student will identify when to use a brake lathe for resurfacing rotors and drums.
- The student will follow safety procedures when operating the brake lathe to avoid injury and ensure quality work.
- The student will complete brake lathe procedures, including measuring, cutting, and finishing brake components to manufacturer specifications.
- The student will review key automotive systems and concepts, including engine performance, brakes, electrical systems, and more.
- The student will demonstrate knowledge of automotive diagnostics, repair, and service techniques.
- The student will prepare for multiple-choice and short-answer questions covering theory, procedures, and industry standards.
- The student will review and practice the relevant terminology, tools, and equipment commonly used in the automotive field.
- The student will use study guides and practice tests to assess readiness for the written exam.
- The student will perform practical tasks in automotive diagnostics, repair, and maintenance, including engine performance, electrical systems, suspension, and brakes.

- The student will demonstrate the ability to use tools and equipment safely and effectively in various automotive tasks.
- The student will complete hands-on exercises such as diagnosing a fault, repairing components, and servicing vehicles according to industry standards.
- The student will follow safety protocols and work in a professional, efficient manner.
- The student will maintain accurate records of performed tasks, including parts used, time spent, and repair procedures.

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)
- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
- Taking Tests in Alternate Setting (or if requested)
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- Clear Language for Directions
- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills
- Provide Verbal and Written Directions
- All Vocabulary to be Defined Before Testing

Safety:

- Safety glasses must be worn at all times by students in the Auto Shop.
- Students must always wear their work uniform in the Auto Shop.

- Work shoes must be always worn by students in the Auto Shop.
- Students will follow the safety rules as they apply to each tool or piece of equipment.
- Students will conduct themselves in a safe and professional manner.

Assessment:

THEORY EVALUATION

- Traditional tests - multiple choice, matching, true/false, short answer completion
- Traditional quizzes - multiple choice, matching, true/false, short answer completion
- Graded homework
- Graded math practice assignments
- Graded reading assignments
- Notebook checks
- Class oral responses
- Business and industry credentialing tests
- Exit slips/timecards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
- The teacher will assess students' understanding through discussions, quizzes, or practical demonstrations.
- The teacher will ensure scores are given on projects when they are completed.
- The teacher will observe and score when a job is completed.
- The teacher will observe and assess the quality of work being done by a student on an assigned job.
- The teacher will determine if students use the appropriate terminology for particular jobs.
- The teacher will determine if the student has the skills to work independently on an assigned job.
- The teacher will evaluate students' ability to maintain their work areas throughout the duration of the course.

- The teacher will evaluate student communication in group activities and projects.
- The teacher will evaluate that the PA Program of Study tasks are being achieved as expected.
- The teacher will evaluate the students' class participation.
- The teacher will assess the students' ability to work within a team when teamwork is necessary.
- The teacher will evaluate the student's responsibility to complete work logs as expected.
- The teacher will evaluate if students work without hindering other students' progress.
- The teacher will assess if students stay on task in accordance with the job expectation.
- The teacher will observe students' ability to track tools, parts, and equipment efficiently.
- The teacher will account if students are prepared for class each day.
- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5
- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program

- Electude Learning Management System (LMS)
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: BRAKES

Number: 600 **Days:** 35

Description/Objectives:

The student will demonstrate the knowledge of brake systems, ABS, TCC Systems and the repair and maintenance of the components. Written examinations, worksheets, review questions and evaluation of psychomotor (hands-on) skills shall be used to evaluate the student's ability based on ASE and NOCTI Guidelines.

Tasks:

PA601 - Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.

PA602 - Identify and interpret brake system concern; determine necessary action.

PA603 - Research applicable vehicle and service information, such as brake system operation, vehicle service history, service precautions, and technical service bulletins.

PA604 - Locate and interpret vehicle and major component identification numbers.

PA605 - Measure brake pedal height, travel, and free play (as applicable); determine necessary action.

PA606 - Check master cylinder for internal/external leaks and proper operation; determine necessary action.

PA607 - Remove, bench bleed, and reinstall master cylinder.

PA608 - Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and supports; determine necessary action.

PA609 - Replace brake lines, hoses, fittings, and supports.

PA610 - Fabricate brake lines using proper material and flaring procedures (double flare and ISO types).

PA611 - Select, handle, store, and fill brake fluids to proper level.

PA612 - Inspect, test, and/or replace components of brake warning light system.

PA 613 Bleed and/or flush brake system.

PA614 - Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action.

PA615 - Remove, clean, inspect, and measure brake drums; determine necessary action.

PA616 - Refinish brake drum; measure final drum diameter.

PA617 - Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.

PA618 - Inspect and install wheel cylinders.

PA619 - Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings.

PA620 - Install wheel, torque lug nuts, and make final checks and adjustments.

PA621 - Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pulsation concerns; determine necessary action.

PA622 - Remove caliper assembly; inspect for leaks and damage to caliper housing; determine necessary action.

PA623 - Clean and inspect caliper mounting and slides/pins for operation, wear, and damage; determine necessary action.

PA624 - Reassemble, lubricate, and reinstall caliper, pads, and related hardware; seat pads, and inspect for leaks.

PA625 - Clean, inspect, and measure rotor thickness, lateral runout, and thickness variation; determine necessary action.

PA626 - Remove and reinstall rotor.

PA627 - Refinish rotor on vehicle; measure final rotor thickness.

PA628 - Refinish rotor off vehicle; measure final rotor thickness.

PA629 - Install wheel, torque lug nuts, and make final checks and adjustments.

PA630 - Check brake pad wear indicator system operation; determine necessary action.

PA631 - Test pedal free travel; check power assist operation.

PA632 - Check vacuum supply to vacuum-type power booster.

PA633 - Remove, clean, inspect, repack, and install wheel bearings and replace seals; install hub and adjust bearings.

PA634 - Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed.

PA635 - Check parking brake and indicator light system operation; determine necessary action.

PA636 - Check operation of brake stop light system; determine necessary action.

PA637 - Replace wheel bearing and race.

PA638 - Inspect and replace wheel studs.

PA639 - Remove and reinstall sealed wheel bearing assembly.

PA640 - Identify and inspect electronic brake control system components; determine necessary action.

PA641 - Diagnose electronic brake control system electronic control(s) and components by retrieving diagnostic trouble codes, and/or using recommended test equipment; determine necessary action.

PA642 - Depressurize high-pressure components of the electronic brake control system.

PA643 - Bleed the electronic brake control system hydraulic circuits.

PA644 - Identify traction control/vehicle stability control system components.

Chapter 71: Brake System Fundamentals

Objectives Standards:

- Explain the hydraulic and mechanical principles of a brake system.
- Identify the major parts of an automotive brake system.
- Define the basic functions of the major parts of a brake system.
- Compare drum and disc brakes.
- Describe the operation of parking brakes.
- Explain the operation of power brakes.
- Correctly answer ASE certification test questions requiring a knowledge of automotive brake systems.

Chapter 72: Brake System Diagnosis and Repair

Objectives Standards:

- Diagnose common brake system problems.
- Inspect and maintain a brake system.
- Describe basic procedures for servicing a master cylinder and a brake booster.
- Explain how to service a disc brake assembly.
- Explain how to service a drum brake assembly.
- Describe the procedures for both manual and pressure bleeding of a brake system.
- Cite the safety rules that should be followed when servicing brake systems.
- Correctly answer ASE certification test questions about the diagnosis and repair of brake systems.

Chapter 73: Anti-Lock Brakes, Traction Control, and Stability Control**Objectives Standards:**

- Identify the major parts of a typical anti-lock brake system.
- Describe the operation of anti-lock brake systems.
- Compare anti-lock brake design variations.
- Diagnose problems in anti-lock brake systems.
- Repair anti-lock brake systems.
- Describe the purpose and operation of traction control and stability control systems.
- Diagnose and repair traction control and stability control systems.
- Correctly answer ASE certification test questions requiring a knowledge of anti-lock brake systems, traction control systems, and stability control systems.

Standards / Assessment Anchors***Focus Anchor/Standard #1:*****LITERACY*****Supporting Anchor/Standards:***

- 3.5.9-12.L Interpret laws, regulations, policies, and other factors that impact the development and use of technology.
- 3.5.9-12.3 Strand: Integration of Knowledge, Technologies, and Practices.
- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Focus Anchor/Standard #2:**MATH/SCIENCE****Supporting Anchor/Standards:**

- S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.
- S11.A.1.1.3 Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).
- S11.A.2.1.2 Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate and communicate results) applicable to a specific technological design.
- S11.C.2.2.2 Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion
- 3.5.9-12.P Apply a broad range of design skills to a design thinking process.

Connecting Anchor/Standard:**CAREER EDUCATION & WORK****Supporting Anchor/Standards:**

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
- 13.1.11.G Assess the implements of the individualized career plan through the ongoing development of the career portfolio.
- 13.1.11.H Review personal high school plan against current personal career goals and select postsecondary opportunities based upon personal career interests.
- 13.3.11.A Evaluate personal attitudes and work habits that support career retention and advancement.

Instructional Activities:

- K-W-L with a twist
- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge

- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills:

- The student will accurately document customer information, vehicle identifying details, customer concerns, related service history, and the cause and correction of issues.
- The student will ensure proper communication of vehicle concerns and service requirements in work orders.
- The student will identify common brake system issues such as poor stopping, noise, vibration, or pedal pulsation.
- The student will assess the situation to determine necessary action for brake system concerns, using diagnostic skills.
- The student will use service manuals, technical service bulletins, and vehicle-specific information to diagnose brake system issues.
- The student will identify service precautions and follow manufacturer recommendations when addressing brake system concerns.
- The student will identify major vehicle components using vehicle identification numbers (VIN) and other component identifiers.
- The student will ensure correct identification and traceability of components for service or replacement.
- The student will use proper tools to measure brake pedal height, travel, and free play (as applicable).
- The student will determine necessary action based on measurements and diagnose possible concerns.
- The student will inspect the master cylinder for internal and external leaks and verify its proper operation.
- The student will determine necessary corrective actions based on inspection results.
- The student will safely remove the master cylinder, bench bleed, and reinstall it while ensuring proper alignment and function.
- The student will inspect brake lines, flexible hoses, and fittings for signs of wear, leaks, dents, kinks, rust, cracks, or bulging.
- The student will tighten loose fittings and supports, and determine necessary corrective actions.
- The student will properly replace brake lines, hoses, and fittings while adhering to manufacturer specifications.

- The student will ensure secure connections and leak-free operation after installation.
 - The student will fabricate brake lines using the proper material, flaring procedures (double flare and ISO types), and tools.
 - The student will ensure fabricated lines meet specifications and are leak-free.
 - The student will select the appropriate brake fluid for the vehicle.
 - The student will safely handle, store, and fill brake fluids to the proper level without contamination.
 - The student will inspect brake warning light systems for functionality.
 - The student will replace faulty components to restore system operation.
 - The student will perform brake system bleeding and flushing procedures to remove air and contaminants, ensuring optimal brake system performance.
 - The student will identify issues such as poor stopping, noise, vibration, pulling, grabbing, dragging, or pedal pulsation in the brake system.
 - The student will diagnose and determine necessary actions based on system concerns.
 - The student will remove, clean, inspect, and measure brake drums for wear and damage.
 - The student will determine necessary corrective actions based on inspection results.
 - The student will refinish brake drums to manufacturer specifications and measure the final diameter for correct fitment.
 - The student will inspect, clean, and measure brake shoes, springs, clips, and other brake hardware.
 - The student will lubricate and reassemble components as needed.
 - The student will inspect wheel cylinders for leaks and damage.
 - The student will install replacement wheel cylinders as needed for proper brake function.
 - The student will pre-adjust brake shoes and parking brakes, install brake drums or drum/hub assemblies, and wheel bearings.
 - The student will properly install the wheel, torque lug nuts to specifications, and perform final checks and adjustments for safety and performance.
-
- The student will use diagnostic skills to address issues related to poor stopping, noise, vibration, pulling, grabbing, dragging, or pulsation in the brake system.
 - The student will remove caliper assembly, inspect it for leaks or damage, and determine necessary corrective actions.
 - The student will clean and inspect caliper mounting, slides, and pins for wear and proper function.
 - The student will determine necessary actions based on condition.
 - The student will reassemble, lubricate, and reinstall caliper components, ensuring pads are properly seated and the system is leak-free.
 - The student will clean, inspect, and measure rotor thickness, lateral runout, and thickness variation.
 - The student will determine necessary corrective actions based on measurements.

- The student will safely remove and reinstall brake rotors, ensuring proper fit and operation.
- The student will refinish rotors while on the vehicle, ensuring that they meet thickness specifications and are free of defects.
- The student will refinish rotors off the vehicle and measure final rotor thickness for proper fitment.
- The student will install the wheel, torque the lug nuts, and make necessary final checks and adjustments.
- The student will inspect and test brake pad wear indicator systems for functionality.
- The student will determine necessary action to restore system performance if needed.
- The student will test brake pedal free travel and check the operation of the power assist system.
- The student will verify the vacuum supply to vacuum-type power boosters and troubleshoot as needed.
- The student will remove, clean, inspect, repack, and install wheel bearings, ensuring proper bearing adjustment and seal installation.
- The student will inspect parking brake cables and components for wear, binding, or corrosion.
- The student will clean, lubricate, adjust, or replace components as necessary.
- The student will inspect and test the parking brake system and related indicator light functionality.
- The student will determine necessary corrective action.
- The student will inspect and verify brake stop light operation.
- The student will diagnose and correct any issues with the brake light system.
- The student will remove, inspect, and replace wheel bearings and races, ensuring proper installation and adjustment.
- The student will inspect and replace damaged or worn wheel studs, ensuring proper wheel fitment.
- The student will safely remove and reinstall sealed wheel bearing assemblies, ensuring proper operation and fit.
- The student will identify components of the electronic brake control system and perform inspection for faults or damage.
- The student will determine necessary actions based on inspection findings.
- The student will diagnose issues with the electronic brake control system using diagnostic trouble codes (DTCs) and recommended testing equipment.
- The student will determine and implement necessary corrective actions.
- The student will safely depressurize high-pressure components of the electronic brake control system in accordance with safety protocols.
- The student will perform hydraulic bleeding of the electronic brake control system's circuits, ensuring air removal and proper fluid flow.
- The student will identify and inspect components of the traction control and vehicle stability control systems, ensuring proper functionality.

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)
- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
- Taking Tests in Alternate Setting (or if requested)
- Drill and Practice (Repetition of Material)
- Copy of Teacher/Student Notes/Skeleton Notes
- Use of Daily Planner/Assignment Book (monitor use of)
- Positive Reinforcement
- Have Student Repeat Directions
- Positive Reinforcement
- Provide Frequent Feedback
- Regular Notebook Check
- Communication Regarding Behavior & Consequences (PBS)
- Clear Language for Directions
- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills
- Provide Verbal and Written Directions
- All Vocabulary to be Defined Before Testing

Safety:

- Safety glasses must be worn at all times by students in the Auto Shop.
- Students must always wear their work uniform in the Auto Shop.
- Work shoes must be always worn by students in the Auto Shop.
- Students will follow the safety rules as they apply to each tool or piece of equipment.
- Students will conduct themselves in a safe and professional manner.

Assessment:

THEORY EVALUATION

- Traditional tests - multiple choice, matching, true/false, short answer, completion

- Traditional quizzes - multiple choice, matching, true/false, short answer completion
- Graded homework
- Graded math practice assignments
- Graded reading assignments
- Notebook checks
- Class oral responses
- Business and industry credentialing tests
- Exit slips/timecards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
- The teacher will assess students' understanding through discussions, quizzes, or practical demonstrations.
- The teacher will ensure scores are given on projects when they are completed.
- The teacher will observe and score when a job is completed.
- The teacher will observe and assess the quality of work being done by a student on an assigned job.
- The teacher will determine if students use the appropriate terminology for particular jobs.
- The teacher will determine if the student has the skills to work independently on an assigned job.
- The teacher will evaluate students' ability to maintain their work areas throughout the duration of the course.
- The teacher will evaluate student communication in group activities and projects.
- The teacher will evaluate that the PA Program of Study tasks are being achieved as expected.
- The teacher will evaluate the students' class participation.
- The teacher will assess the students' ability to work within a team when teamwork is necessary.
- The teacher will evaluate the student's responsibility to complete work logs as expected.

- The teacher will evaluate if students work without hindering other students' progress.
- The teacher will assess if students stay on task in accordance with the job expectation.
- The teacher will observe students' ability to track tools, parts, and equipment efficiently.
- The teacher will account if students are prepared for class each day.
- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5
- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- Electude Learning Management System (LMS)
- ASE Certification
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: ELECTRICAL/ELECTRONIC SYSTEMS

Number: 700 **Days:** 32

Description/Objectives:

The students will demonstrate the knowledge and ability to repair electrical and electronic components on a vehicle. Written examinations, worksheets, review questions and evaluation of psychomotor (hands-on) skills shall be used to evaluate the student's ability based on ASE and NOCTI Guidelines.

Tasks:

PA701 - Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.

PA702 - Identify and interpret electrical/electronic system concern; determine necessary action.

PA703 - Research applicable vehicle and service information, such as electrical/electronic system operation, vehicle service history, service precautions, and technical service bulletins.

PA704 - Locate and interpret vehicle and major component identification numbers.

PA705 - Use wiring diagrams during diagnosis of electrical circuit problems.

PA705 - Use wiring diagrams during diagnosis of electrical circuit problems.

PA706 - Check electrical circuits with a test light; determine necessary action.

PA707 - Check electrical circuits using fused jumper wires; determine necessary action.

PA708 - Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action.

PA709 - Measure and diagnose the cause(s) of excessive parasitic draw; determine necessary action.

PA710 - Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.

PA711 - Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; perform necessary action.

PA712 - Remove and replace terminal end from connector; replace connectors and terminal ends.

PA713 - Repair wiring harness (including CAN/BUS systems).

PA714 - Perform solder repair of electrical wiring.

PA715 - Identify location of hybrid vehicle high voltage circuit disconnect (service plug) location and safety procedures.

PA716 - Perform battery state-of-charge test; determine necessary action.

PA717 - Perform battery capacity test; confirm proper battery capacity for vehicle application; determine necessary action.

PA718 - Maintain or restore electronic memory functions.

PA719 - Inspect, clean, fill, and/or replace battery, battery cables, connectors, clamps, and hold-downs.

PA720 - Perform battery charge.

PA721 - Start a vehicle using jumper cables or an auxiliary power supply.

PA722 - Identify electronic modules, security systems, radios, and other accessories that require reinitialization or code entry following battery disconnect.

PA723 - Perform starter current draw tests; determine necessary action.

PA724 - Perform starter circuit voltage drop tests; determine necessary action.

PA725 - Inspect and test starter relays and solenoids; determine necessary action.

PA726 - Remove and install starter in a vehicle.

PA727 - Inspect and test switches, connectors, and wires of starter control circuits; perform necessary action.

PA728 - Differentiate between electrical and engine mechanical problems that cause a slow-crank or no-crank condition.

PA729 - Perform charging system output test; determine necessary action.

PA730 - Diagnose charging system for the cause of undercharge, no-charge, and overcharge conditions.

PA731 - Inspect, adjust, or replace generator (alternator) drive belts, pulleys, and tensioners; check pulley and belt alignment.

PA732 - Remove, inspect, and install generator (alternator).

PA733 - Perform charging circuit voltage drop tests; determine necessary action.

PA734 - Diagnose the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action.

PA735 - Inspect, replace, and aim headlights and bulbs.

PA736 - Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action.

PA737 - Inspect and test gauges and gauge sending units for cause of abnormal gauge readings; determine necessary action.

PA738 - Inspect and test connectors, wires, and printed circuit boards of gauge circuits; determine necessary action.

PA739 - Diagnose the cause of incorrect operation of warning devices and other driver information systems; determine necessary action.

PA740 - Diagnose incorrect horn operation; perform necessary action.

PA741 - Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action.

PA742 - Diagnose incorrect washer operation; perform necessary action.

PA743 - Diagnose incorrect operation of motor-driven accessory circuits; determine necessary action.

PA745 - Disarm and enable the airbag system for vehicle service.

PA746 - Remove and reinstall door panel.

Chapter 8: Basic Electricity and Electronics

Objectives Standards:

- Explain the principles of electricity.
- Describe the action of basic electric circuits.
- Compare voltage, current, and resistance.
- Describe the principles of magnetism and magnetic fields.
- Identify basic electric and electronic terms and components.
- Explain different kinds of automotive wiring.
- Perform fundamental electrical tests.
- Correctly answer ASE certification test questions that require a basic understanding of electricity and electronics.

Chapter 28: Automotive Batteries

Objectives Standards:

- Explain the operating principles of a lead-acid battery.
- Describe the basic parts of an automotive battery.
- Compare conventional and maintenance-free batteries.
- Explain how temperature and other factors affect battery performance.
- Describe safety practices that should be followed when working with batteries.
- Correctly answer ASE certification test questions that require a basic knowledge of automotive batteries.

Chapter 29: Battery Testing and Service

Objectives Standards:

- Visually inspect a battery for obvious problems.
- Perform common battery tests.
- Clean a battery case and terminals.
- Charge a battery.
- Jump-start a car using a second battery.
- Replace a defective battery.
- Describe safety practices to follow when testing and servicing batteries. Correctly answer ASE certification test questions on battery service.

Chapter 30: Starting System Fundamentals

Objectives Standards:

- Explain the principles of an electric motor.
- Describe the construction and operation of a starting motor.
- Sketch a simple starting system circuit.
- Explain the operation of solenoids.
- List the functions of the main starter drive parts.
- Describe starter drive operation.
- Compare different types of starting motors.
- Describe starting system safety features.
- Correctly answer ASE Certification test questions that require a knowledge of starting system fundamentals.

Chapter 31: Starting System Testing and Repair

Objectives Standards:

- Diagnose common starting system troubles.
- Make orderly starting system tests.
- Remove and replace a starting motor.
- Explain typical procedures for a starting motor rebuild.
- Adjust a neutral safety switch.
- Describe the safety practices that should be followed when testing or repairing a starting system. Correctly answer ASE certification test questions on starting system diagnosis, service, and repair.

Chapter 32: Charging System Fundamentals

Objectives Standards:

- List the basic parts of a charging system.
- Explain charging system operation.
- Describe the construction of major charging system components.
- Compare alternator and voltage regulator design differences.
- Explain charging system indicators.
- Describe safety practices to follow when working with charging systems.
- Correctly answer ASE certification test questions that require a knowledge of charging system fundamentals.

Chapter 33: Charging System Diagnosis, Testing, and Repair

Objectives Standards:

- Diagnose charging system troubles.
- Inspect a charging system.
- Test charging system output with a voltmeter or a load tester.
- Remove, test, repair, and replace an alternator.
- Adjust an alternator belt.
- Remove and replace a voltage regulator.
- Describe safety practices to follow when testing or repairing a charging system.
- Correctly answer ASE certification test questions on charging system diagnosis and repair.

Chapter 36: Lights, Instrumentation, Wipers, and Horns-Operation and Service

Objectives Standards:

- Explain the operating principles of automotive light, wiper, and horn systems.
- Diagnose problems in light, wiper, and horn systems.
- Summarize automatic light and wiper systems.
- Replace burned-out bulbs.
- Explain how to aim headlights.
- Describe the safety practices to follow when working with light, wiper, and horn systems.
- Explain both analog and digital instrumentation.
- Summarize how to remove and service an instrument cluster.
- Correctly answer ASE certification test questions on light, instrumentation, wiper, and horn systems.

Chapter 37: Sound Systems and Power Accessories (Optional Time Permitting)

Objectives Standards:

- Describe the operating principles of a radio.
- Explain the basic difference between AM and FM radios.
- Diagnose basic sound system problems.
- Explain the operation and service of power windows.
- Sketch a rear window defogger circuit.
- Describe and repair a power lock system.
- Summarize the operation and testing of a speed control system.
- Describe safety practices that must be followed when working with electrical accessory circuits. Correctly answer ASE certification test questions on the service of sound systems and power accessories.

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- 3.5.9-12.L Interpret laws, regulations, policies, and other factors that impact the development and use of technology.
- 3.5.9-12.3 Strand: Integration of Knowledge, Technologies, and Practices.

- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Focus Anchor/Standard #2:

MATH/SCIENCE

Supporting Anchor/Standards:

- S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.
- S11.A.1.1.3 Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).
- S11.A.2.1.2 Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate and communicate results) applicable to a specific technological design.
- S11.C.2.2.2 Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion
- 3.5.9-12.P Apply a broad range of design skills to a design thinking process.

Connecting Anchor/Standard:

Career Education & Work

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
- 13.1.11.G Assess the implements of the individualized career plan through the ongoing development of the career portfolio.
- 13.1.11.H Review personal high school plan against current personal career goals and select postsecondary opportunities based upon personal career interests.
- 13.3.11.A Evaluate personal attitudes and work habits that support career retention and advancement.

Instructional Activities:

- K-W-L with a twist

- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills:

- The student will accurately gather customer information, vehicle identification numbers (VIN), and service history to complete work orders.
- The student will record customer concerns and document the observed symptoms of vehicle issues.
- The student will analyze and document the cause of vehicle issues and the corrective action taken.
- The student will organize and file work orders, ensuring that all necessary details (service history, cause, correction) are included.
- The student will use diagnostic tools and visual inspection to identify issues in electrical/electronic systems.
- The student will interpret diagnostic trouble codes (DTC) and symptoms to determine necessary actions.
- The student will determine whether an issue is related to electrical components, wiring, or external factors.
- The student will access vehicle manufacturer databases to research system operations and technical specifications.
- The student will review and apply technical service bulletins and vehicle service history to guide diagnosis and repairs.
- The student will identify and interpret manufacturer recommendations and safety precautions relevant to repairs.
- The student will identify and record vehicle and component identification numbers (VIN, engine numbers) accurately.
- The student will use identification numbers to cross-reference parts and ensure correct replacement or service.
- The student will access and interpret wiring diagrams to identify the layout of electrical circuits.
- The student will apply knowledge of wiring diagrams to troubleshoot electrical circuit issues and find the root cause.
- The student will properly use a test light to check for voltage at specified points in an electrical circuit.

- The student will determine circuit continuity and diagnose faults based on test results (e.g., shorts, open circuits).
- The student will safely use fused jumper wires to test the functionality of electrical circuits.
- The student will determine appropriate action (e.g., repair, replace) based on test results from jumper wires.
- The student will use diagnostic tools to locate electrical faults such as shorts, grounds, or open circuits.
- The student will determine the correct course of action to repair or replace faulty components based on diagnostic results.
- The student will use a multimeter to measure current draw and diagnose excessive parasitic draw.
- The student will identify the source of the parasitic draw and recommend corrective action, such as component repair or replacement.
- The student will inspect fusible links, circuit breakers, and fuses for damage or wear.
- The student will test these components and replace as necessary based on test results.
- The student will perform visual and functional tests on switches, connectors, relays, solenoids, and other components.
- The student will identify faulty components and replace or repair as necessary.
- The student will safely remove and replace terminal ends on electrical connectors.
- The student will ensure proper connection and secure fitting after replacement to avoid future issues.
- The student will diagnose issues in the wiring harness, including CAN/BUS systems, and make necessary repairs.
- The student will properly reassemble and secure the repaired wiring harness.
- The student will use proper soldering techniques to repair electrical wiring.
- The student will ensure secure, reliable solder joints that meet industry standards for conductivity and safety.
- The student will accurately locate the high voltage circuit disconnect (service plug) on hybrid vehicles.
- The student will follow safety procedures when working with high-voltage circuits to avoid accidents.
- The student will use appropriate tools to test the battery's state of charge.
- The student will analyze test results and determine whether the battery needs charging or replacement.
- The student will perform battery capacity tests to ensure the battery can handle the vehicle's electrical load.
- The student will recommend corrective action, such as battery replacement, if capacity is insufficient.
- The student will follow procedures to maintain or restore electronic memory functions (e.g., radio settings, vehicle preferences).
- The student will utilize appropriate tools or methods to reset or restore settings after power loss.

- The student will inspect the battery, cables, and connectors for wear, corrosion, or damage.
- The student will clean terminals, replace cables, or secure the battery and hold-downs to ensure proper functioning.
- The student will safely charge a vehicle battery using an appropriate charging device.
- The student will monitor the charging process and ensure the battery is properly charged without overcharging.
- The student will properly connect jumper cables or an auxiliary power supply to start a vehicle.
- The student will follow safety procedures when jump-starting vehicles to avoid damage to electrical systems.
- The student will recognize which vehicle components require reinitialization or code entry after a battery disconnect.
- The student will safely reset or reprogram electronic modules and accessories as needed.
- The student will use a clamp meter to measure the starter motor's current draw during startup.
- The student will analyze the test results and determine if the starter motor needs repair or replacement.
- The student will conduct a voltage drop test on the starter circuit to check for resistance.
- The student will determine corrective action based on test results, such as replacing wiring or connectors.
- The student will inspect and test starter relays and solenoids for proper operation.
- The student will diagnose and replace faulty relays or solenoids as necessary.
- The student will safely remove and install the starter motor, ensuring correct alignment and torque specifications.
- The student will reconnect electrical connections and test the starter for proper operation.
- The student will inspect switches, connectors, and wiring for continuity and proper operation.
- The student will replace or repair faulty components in the starter control circuit.
- The student will use diagnostic tools to differentiate between electrical and mechanical issues.
- The student will accurately diagnose and repair the underlying issue causing the slow-crank or no-crank condition.
- The student will conduct a charging system output test to verify alternator performance.
- The student will analyze test results and determine whether the alternator or associated components require replacement.
- The student will diagnose and identify the cause of charging system issues such as undercharging or overcharging.
- The student will determine the necessary course of action, including repair or replacement of alternators, voltage regulators, or other components.

- The student will inspect generator drive belts, pulleys, and tensioners for wear or damage.
- The student will adjust or replace components as needed to ensure proper charging system operation.
- The student will safely remove and install the alternator, ensuring proper alignment and connection.
- The student will test the new alternator to confirm proper operation.
- The student will perform voltage drop tests on charging circuit wiring to identify any resistance.
- The student will recommend repairs based on test results to restore proper charging functionality.
- The student will use diagnostic tools to assess the cause of lighting issues in the vehicle.
- The student will diagnose and repair the source of light problems, such as faulty bulbs, wiring, or switches.
- The student will inspect and replace headlights and bulbs to ensure proper illumination.
- The student will properly aim headlights according to manufacturer specifications to ensure road safety.
- The student will inspect turn signal and hazard light circuits for issues.
- The student will diagnose the root cause of the malfunction and take corrective actions.
- The student will test gauges and sending units for proper operation.
- The student will diagnose and repair the cause of abnormal readings in gauges (e.g., oil pressure, temperature).
- The student will inspect and test gauge circuit components for continuity and function.
- The student will repair or replace faulty connectors, wires, or circuit boards to restore proper gauge function.
- The student will inspect warning systems for proper function and diagnose faulty components.
- The student will perform necessary repairs or replacements to restore proper operation of warning devices and driver information systems.
- The student will test the vehicle's horn for proper function.
- The student will diagnose the cause of malfunction and repair or replace faulty components.
- The student will inspect and diagnose issues with wiper operation, including speed control and park functionality.
- The student will perform necessary repairs or replace faulty components in the wiper system.
- The student will inspect and diagnose issues with the vehicle's washer system.
- The student will repair or replace components to restore proper washer operation.
- The student will identify issues with motor-driven accessories such as fans, seats, and windows.

- The student will diagnose and perform corrective actions to restore proper accessory operation.
- The student will safely disarm and enable the vehicle's airbag system following manufacturer procedures.
- The student will confirm that the airbag system is correctly reset before the vehicle is returned to service.
- The student will safely remove and reinstall vehicle door panels without damaging trim or internal components.
- The student will ensure proper alignment and reattach components such as switches and handles

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)
- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
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- Use of Daily Planner/Assignment Book (monitor use of)
- Positive Reinforcement
- Have Student Repeat Directions
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- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills
- Provide Verbal and Written Directions
- All Vocabulary to be Defined Before Testing

Safety:

- Safety glasses must be worn at all times by students in the Auto Shop.

- Students must always wear their work uniform in the Auto Shop.
- Work shoes must be always worn by students in the Auto Shop.
- Students will follow the safety rules as they apply to each tool or piece of equipment.
- Students will conduct themselves in a safe and professional manner.

Assessment:

THEORY EVALUATION

- Traditional tests - multiple choice, matching, true/false, short answer completion
- Traditional quizzes - multiple choice, matching, true/false, short answer completion
- Graded homework
- Graded math practice assignments
- Graded reading assignments
- Notebook checks
- Class oral responses
- Business and industry credentialing tests
- Exit slips/timecards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
- The teacher will assess students' understanding through discussions, quizzes, or practical demonstrations.
- The teacher will ensure scores are given on projects when they are completed.
- The teacher will observe and score when a job is completed.
- The teacher will observe and assess the quality of work being done by a student on an assigned job.
- The teacher will determine if students use the appropriate terminology for particular jobs.
- The teacher will determine if the student has the skills to work independently on an assigned job.
- The teacher will evaluate students' ability to maintain their work areas throughout the duration of the course.

- The teacher will evaluate student communication in group activities and projects.
- The teacher will evaluate that the PA Program or Study tasks are being achieved as expected.
- The teacher will evaluate the students' class participation.
- The teacher will assess the students' ability to work within a team when teamwork is necessary.
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- The teacher will account if students are prepared for class each day.
- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5
- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- Electude Learning Management System (LMS)
- ASE Certification

- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: ENGINE PERFORMANCE

Number: 800 **Days:** 34

Description/Objectives:

The student will understand the systems and the principles necessary for the repair and maintenance of engine performance related issues. This shall include fuel, ignition and computer related systems. Written examinations, worksheets, review questions and evaluation of psychomotor (hands-on) skills shall be used to evaluate the student's ability based on ASE and NOCTI Guidelines.

Tasks:

PA801 - Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.

PA802 - Identify and interpret engine performance concern; determine necessary action.

PA803 - Research applicable vehicle and service information, such as engine management system operation, vehicle service history, service precautions, and technical service bulletins.

PA804 - Locate and interpret vehicle and major component identification numbers.

PA805 - Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.

PA806 - Diagnose abnormal engine noise or vibration concerns; determine necessary action.

PA807 - Diagnose abnormal exhaust color, odor, and sound; determine necessary action.

PA808 - Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.

PA809 - Perform cylinder power balance test; determine necessary action.

PA810 - Perform cylinder cranking and running compression tests; determine necessary action.

PA811 - Perform cylinder leakage test; determine necessary action.

PA812 - Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns; determine necessary action.

PA813 - Verify engine operating temperature; determine necessary action.

PA813 - Verify engine operating temperature; determine necessary action.

PA814 - Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action.

PA815 - Verify correct camshaft timing.

PA816 - Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.

PA817 - Diagnose the causes of emissions or drivability concerns with stored or active diagnostic trouble codes; obtain, graph, and interpret scan tool data.

PA818 - Access and use service information to perform step-by-step diagnosis.

PA819 - Perform active tests of actuators using a scan tool; determine necessary action.

PA820 - Describe the importance of running all OBDII monitors for repair verification.

PA821 - Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor drivability, spark knock, power loss, poor mileage, and emissions concerns; determine necessary action.

PA822 - Inspect and test ignition primary and secondary circuit wiring and solid state components; test ignition coil(s); perform necessary action.

PA823 - Inspect and test crankshaft and camshaft position sensor(s); perform necessary action.

PA824 - Inspect, test, and/or replace ignition control module, powertrain/engine control module; reprogram as necessary.

PA825 - Diagnose hot or cold no-starting, hard starting, poor drivability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems; determine necessary action.

PA826 - Inspect and test fuel pumps and pump control systems for pressure, regulation, and volume; perform necessary action.

PA827 - Replace fuel filters.

PA828 - Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air.

PA830 - Verify idle control operation.

PA831 - Inspect the integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shield(s); perform necessary action.

PA832 - Diagnose oil leaks, emissions, and drivability concerns caused by the positive crankcase ventilation (PCV) system; determine necessary action.

PA833 - Inspect, test and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action.

PA834 - Diagnose emissions and drivability concerns caused by the exhaust gas recirculation (EGR) system; determine necessary action.

PA835 - Inspect, test, service and replace components of the EGR system, including EGR tubing, exhaust passages, vacuum/pressure controls, filters and hoses; perform necessary action.

PA836 - Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; perform necessary action.

PA837 - Inspect and test mechanical components of secondary air injection systems; perform necessary action.

PA838 - Inspect and test electrical/electronically-operated components and circuits of air injection systems; perform necessary action.

PA839 - Inspect and test catalytic converter efficiency.

PA840 - Diagnose emissions and drivability concerns caused by the evaporative emissions control system; determine necessary action.

PA841 - Inspect and test components and hoses of the evaporative emissions control system; perform necessary action.

PA842 - Interpret diagnostic trouble codes (DTCs) and scan tool data related to the emissions control systems; determine necessary action.

PA843 - Remove and replace timing belt; verify correct camshaft timing.

PA844 - Remove and replace thermostat and gasket/seal.

PA845 - Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action.

PA846 - Perform engine oil and filter change.

Chapter 11: Engine Fundamentals

Objectives Standards:

- Identify the major parts of a typical automotive engine.
- Describe the four-stroke cycle.
- Define common engine terms.
- Explain the basic function of the major parts of an automotive engine.
- Cite and demonstrate safe working practices related to engines.
- Correctly answer ASE certification test questions that require knowledge of the basic operation of piston engines.

Chapter 12: Engine Design Classifications

Objectives Standards:

- Describe basic automotive engine classifications.
- Compare gasoline and diesel engines.
- Contrast combustion chamber designs.
- Discuss alternative engine types.
- Compare two- and four-stroke cycle engines.
- Correctly answer ASE certification test questions that require a knowledge of engine classifications and design differences.

Chapter 13: Engine Top End Construction

Objectives Standards:

- Describe the design and construction of an engine cylinder head.
- Explain umbrella and O-ring type oil seals.
- Explain the purpose of valve spring shims, rotators, stem caps, and spring shields.
- Describe the construction and operation of a camshaft.
- Explain hydraulic and mechanical lifters.
- Describe different types of rocker arm assemblies.
- Explain the construction and design of intake and exhaust manifolds.
- Describe safety practices used when working on engine top end components.
- Answer ASE certification test questions that require a knowledge of engine top end construction.

Chapter 14: Engine Bottom End Construction

Objectives Standards:

- Compare the construction of different types of cylinder blocks.
- Explain how piston construction affects engine operation.
- Describe piston ring variations.
- Explain the construction of engine bearings.
- Compare design variations of different engine bottom end components.
- Explain safe practices when working with engine bottom end components.
- Correctly answer ASE certification test questions on engine bottom end construction.

Chapter 39: Cooling System Fundamentals

Objectives Standards:

- Summarize the functions of a cooling system.
- Explain the operation and construction of major cooling system components.
- Compare cooling system design variations.
- Explain the importance of antifreeze.
- Discuss safety procedures to follow when working with cooling systems.
- Correctly answer ASE certification test questions on cooling system construction and operation.

Chapter 40: Cooling System Testing, Maintenance, and Repair

Objectives Standards:

- List common cooling system problems and their symptoms.
- Describe the most common causes of system leakage, overheating, and overcooling.
- Perform a combustion leak test and a system pressure test.
- Check the major parts of a cooling system for proper operation.
- Replace faulty cooling system components.
- Drain, flush, and refill a cooling system.
- Describe safe working practices to use when testing, maintaining, or repairing a cooling system. Correctly answer ASE certification test questions on cooling system troubleshooting and repair.

Chapter 41: Lubrication System Fundamentals

Objectives Standards:

- List the basic parts of a lubrication system.
- Summarize the operation of a lubrication system.
- Describe the construction of lubrication system parts.
- Compare different lubrication system designs.
- Explain the characteristics and ratings of engine oil.
- Discuss safety procedures that should be followed when working with the lubrication system. Correctly answer ASE certification test questions that require a knowledge of lubrication system construction and operation.

Chapter 42: Lubrication System Testing, Service, and Repair

Objectives Standards:

- List common lubrication system problems and symptoms.
- Diagnose lubrication system troubles.
- Measure engine oil pressure.
- Change engine oil and filter.
- Remove and install an oil pan.
- Service an oil pump.
- Test and repair an oil pressure indicating light and gauge.
- Describe safe working practices to use when testing, servicing, or repairing a lubrication system.
- Correctly answer ASE certification test questions on the testing, service, and repair of engine lubrication systems.

Chapter 17: Computer System Fundamentals

Objectives Standards:

- Compare computer systems to the human body's nervous system.
- Describe the input, processing, and output sections of a basic computer system.
- Explain input sensor and output device classifications and operation.
- Summarize computer system signal classifications.
- Sketch a block diagram for a computer system.
- Summarize where computers, control modules, sensors, and actuators are typically located.
- Summarize the flow of data through a computer.

- Explain how a computer uses sensor inputs to determine correct outputs.
- Correctly answer ASE certification test questions that require a knowledge of automotive computer system fundamentals.

Chapter 18: On-Board Diagnostics and Scan Tools

Objectives Standards:

- Discuss the purpose and operation of on-board diagnostic systems. Explain the use of scan tools to simplify reading of trouble codes. Compare OBD I and OBD II system capabilities and procedures.
- Locate the data link connector on most makes and models of cars.
- Activate on-board diagnostics and read trouble codes with and without a scan tool.
- Use a trouble code chart in a service manual or code conversion by a scan tool.
- Erase diagnostic trouble codes.
- Correctly answer ASE certification test questions concerning late-model on-board diagnostics and scan tool use.

Chapter 19: Computer System Service

Objectives Standards:

- Perform a visual inspection of the engine, its sensors, actuators, and the systems they monitor and control.
- Test sensors and their circuits.
- Remove and replace sensors.
- Test and replace actuators.
- Remove and replace a computer.
- Remove and replace a computer PROM.
- Program an EEPROM.
- Demonstrate safe working practices when servicing automotive computers.
- Correctly answer ASE certification test questions on servicing computer system components.

Chapter 20: Automotive Fuels, Gasoline and Diesel Combustion

Objectives Standards:

- Summarize how crude oil is converted into gasoline, diesel fuel, liquefied petroleum gas, and other products.
- Describe properties of gasoline and diesel fuel.
- Explain octane and octane ratings.
- Describe normal and abnormal combustion of gasoline and diesel fuel.
- Summarize the properties of alternative fuels.
- Correctly answer ASE certification test questions on automotive fuels and combustion.

Chapter 21: Fuel Tanks, Pumps, Lines, and Filters

Objectives Standards:

- Define the major parts of a fuel supply system.
- Describe the operation of mechanical and electric fuel pumps.
- Describe the construction and action of air filters.
- Explain the tests used to diagnose problems with fuel pumps, fuel filters, and fuel lines.
- Repair a fuel line or replace a fuel hose.
- Locate and replace fuel filters in both gasoline and diesel fuel systems.
- State safety rules for working on fuel supply systems.
- Correctly answer ASE certification test questions on fuel tanks, fuel pumps, fuel lines, fuel filters, and air filters.

Chapter 22: Gasoline Injection Fundamentals

Objectives Standards:

- List some of the possible advantages of gasoline injection.
- Describe the classifications of gasoline injection.
- Explain the operation of electronic throttle body gasoline injection.
- Explain the operation of electronic multiport gasoline injection.
- Summarize the operation of airflow-sensing, hydraulic-mechanical (continuous), and pressure-sensing gasoline injection systems.
- Compare the various types of gasoline injection systems.
- Correctly answer ASE certification test questions on gasoline injection systems.

Chapter 23: Gasoline Injection Diagnosis and Repair

Objectives Standards:

- Diagnose typical gasoline injection system problems.
- Test a fuel pressure regulator.
- Test both electronic and continuous fuel injectors.
- Explain OBD II testing features used on late-model fuel injection systems.
- Use a service manual when making basic adjustments on gasoline injection systems.
- Cite safety rules for injection system service.
- Correctly answer ASE certification test questions about fuel injection system diagnosis, service, and repair.

Chapter 25: Diesel Injection Fundamentals

Objectives Standards:

- Explain the operating principles of a diesel injection system.
- Summarize the differences between gasoline and diesel engines.
- Describe the major parts of a diesel injection system.
- Compare variations in the design of diesel injection systems.
- Correctly answer ASE certification test questions that require a knowledge of the fundamentals of diesel injection.

Chapter 27: Exhaust Systems, Turbochargers, and Superchargers

Objectives Standards:

- Describe the basic parts of an exhaust system.
- Compare exhaust system design differences.
- Perform exhaust system repairs.
- Explain the fundamental parts of a turbocharging system.
- Describe the construction and operation of a turbocharger and waste gate.
- Remove and replace a turbocharger and waste gate.
- Summarize the construction and operation of a supercharging system.
- Demonstrate an understanding of safety procedures for working on exhaust systems, turbochargers, and superchargers.
- Correctly answer ASE certification test questions on exhaust system, turbocharger, and supercharger operation and service.

Chapter 34: Ignition System Fundamentals

Objectives Standards:

- Explain the operating principles of an automotive ignition system.
- Compare contact point, electronic, and computer controlled ignition systems.
- Describe the function of major ignition system components.
- Explain vacuum, centrifugal, and electronic ignition timing advance.
- Sketch the primary and secondary sections of an ignition system.
- Compare ignition coil, spark plug, and distributor design variations.
- Describe the safety practices that must be followed when working with ignition systems.
- Correctly answer ASE certification test questions that require a knowledge of ignition system fundamentals.

Chapter 35: Ignition System Problems, Testing, and Repair

Objectives Standards:

- Diagnose typical ignition system problems.
- List the symptoms produced by faulty ignition system components.
- Describe common tests used to find ignition system troubles.
- Explain how to replace or repair ignition system parts.
- Summarize contact point and pickup coil adjustments.
- Adjust ignition timing.
- Describe safety practices to follow when testing or repairing an ignition system.
- Correctly answer ASE certification test questions on the diagnosis and repair of ignition systems.

Chapter 38: Hybrid Drive System Operation and Repair

Objectives Standards:

- Identify the major parts of a hybrid drive system.
- Explain the construction and operation of hybrid drive assemblies.
- List the safety measures that must be followed when working on high-voltage hybrid drive systems.
- Use on-board diagnostics to find the source of problems in a hybrid vehicle propulsion system. Identify the most common problems that occur in a hybrid vehicle drive system.
- Perform basic tests to verify hybrid drive trouble codes.
- Safely remove and replace a hybrid battery pack, power control module, power cables, ECUs, and motor-generator assemblies.

Chapter 43: Emission Control Systems

Objectives Standards:

- Define the fundamental terms relating to automotive emission control systems.
- Explain the sources of air pollution.
- Describe the operating principles of emission control systems.
- Compare design differences in emission control systems.
- Explain how a computer or engine control module can be used to operate emission control systems. Summarize how OBD II systems use multiple oxygen sensors to check air-fuel mixture and catalytic converter efficiency.
- Correctly answer ASE certification test questions that require a knowledge of emission control system operation and construction.

Chapter 44: Emission Control System Testing, Service, and Repair

Objectives Standards:

- Explain the use of exhaust gas analyzers.
- Inspect and troubleshoot emission control systems.
- Perform periodic service operations on emission control systems.
- Test individual emission control components.
- Replace or repair major emission control components.
- Demonstrate and practice safe work procedures.
- Correctly answer ASE certification test questions on emission control system testing and service.

Chapter 45: Engine Performance and Driveability

Objectives Standards:

- List the most common engine performance problems.
- Describe the symptoms for common engine performance problems.
- Explain typical causes of engine performance problems.
- Use a systematic approach when diagnosing engine performance problems.
- Correctly answer ASE certification test questions on problems affecting engine performance.

Chapter 46: Advanced Diagnostics

Objectives Standards:

- Use advanced diagnostic techniques to troubleshoot difficult problems.
- Use scan tool snapshot and datastream values to find problems not tripping trouble codes.
- Use a breakout box to measure circuit values.
- Explain the principles of an oscilloscope.
- Summarize how to use waveforms to analyze the operation of sensors, actuators, ECU outputs, and other electrical-electronic devices.
- Evaluate ignition system waveforms.
- Summarize how to use an engine analyzer.

Chapter 47: Engine Tune-Up

Objectives Standards:

- Describe the typical difference between a minor tune-up.
- List the basic steps for an engine tune-up.
- Explain service operations commonly performed during a tune-up.
- List the safety precautions that should be remembered during a tune-up.
- Correctly answer ASE certification test questions on engine tune-up and engine problem diagnosis.

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- 3.5.9-12.L Interpret laws, regulations, policies, and other factors that impact the development and use of technology.
- 3.5.9-12.3 Strand: Integration of Knowledge, Technologies, and Practices.
- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Focus Anchor/Standard #2:

MATH/SCIENCE

Supporting Anchor/Standards:

- S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.
- S11.A.1.1.3 Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).
- S11.A.2.1.2 Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate and communicate results) applicable to a specific technological design.
- S11.C.2.2.2 Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion
- 3.5.9-12.P Apply a broad range of design skills to a design thinking process.

Connecting Anchor/Standard:

CAREER EDUCATION & WORK

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
- 13.1.11.G Assess the implements of the individualized career plan through the ongoing development of the career portfolio.
- 13.1.11.H Review personal high school plan against current personal career goals and select postsecondary opportunities based upon personal career interests.
- 13.3.11.A Evaluate personal attitudes and work habits that support career retention and advancement.

Instructional Activities:

- K-W-L with a twist
- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions

- Test question list

Skills:

- The student will accurately complete work orders by including all necessary details, such as customer information, vehicle identification, service history, customer concerns, cause, and corrective actions.
- The student will identify and interpret engine performance issues using diagnostic tools, and determine the appropriate corrective actions based on their findings.
- The student will research and interpret vehicle-specific information, including engine management system operations, service history, and technical service bulletins, to assist in diagnosing engine concerns.
- The student will locate and accurately interpret vehicle identification numbers (VIN) and major component IDs to ensure proper identification and correct parts are used in service.
- The student will inspect the engine assembly for any signs of fuel, oil, coolant, or other leaks, and determine the necessary steps for repair or replacement.
- The student will diagnose the source of abnormal engine noise or vibration and determine the necessary corrective actions.
- The student will assess abnormal exhaust conditions such as color, odor, and sound to diagnose potential issues and recommend appropriate actions for correction.
- The student will perform engine vacuum/boost manifold pressure tests to evaluate engine performance and determine corrective actions if needed.
- The student will perform a cylinder power balance test to identify engine performance issues and determine necessary corrective actions.
- The student will perform cylinder cranking and running compression tests to assess engine health and determine the necessary course of action for repair.
- The student will perform cylinder leakage tests and determine corrective actions based on the test results.
- The student will diagnose issues related to engine mechanics, electrical systems, electronics, fuel systems, and ignition systems, and determine the appropriate action for repair.
- The student will verify that the engine is operating within the correct temperature range and determine if any corrective action is needed.
- The student will perform cooling system pressure tests, check the coolant condition, inspect and test components such as the radiator, pressure cap, recovery tank, and hoses, and determine the necessary corrective actions.
- The student will verify and adjust the camshaft timing to ensure proper engine function.
- The student will retrieve and accurately record diagnostic trouble codes (DTCs), OBD monitor status, and freeze frame data, and clear codes when applicable.

- The student will diagnose emissions or drivability concerns using stored or active DTCs, obtain scan tool data, and interpret the results to determine corrective actions.
- The student will access and utilize service information to perform systematic and accurate diagnoses of vehicle issues.
- The student will perform active tests of actuators using a scan tool to verify component function and determine necessary repair actions.
- The student will explain the importance of completing all OBDII monitors to verify repairs and ensure that the vehicle is functioning properly.
- The student will diagnose ignition system problems including no-starting, engine misfire, poor drivability, and emissions concerns, and recommend the necessary corrective actions.
- The student will inspect and test ignition circuit wiring and components, including testing ignition coils, and perform necessary repairs or replacements.
- The student will inspect and test crankshaft and camshaft position sensors, and take corrective action if the sensors are found to be faulty.
- The student will inspect, test, and, if necessary, replace the ignition control module or engine control module, and reprogram the system as required.
- The student will diagnose and determine the necessary actions for various engine performance issues including no-starting, rough idling, engine misfire, and poor drivability.
- The student will inspect and test fuel pumps and control systems for pressure, regulation, and volume, and perform necessary corrective actions.
- The student will replace fuel filters to ensure proper fuel flow and engine performance.
- The student will inspect the throttle body, air induction system, intake manifold, and gaskets for vacuum leaks and unmetered air, and address any issues found.
- The student will verify the correct operation of idle control systems and determine necessary actions if issues are identified.
- The student will inspect the exhaust system for any damage or faults and perform repairs or replacements as necessary.
- The student will diagnose issues related to oil leaks, emissions, and drivability concerns caused by the PCV system, and take appropriate corrective action.
- The student will inspect, test, and service the PCV system components, including filters, valves, hoses, and orifices, and take necessary action.
- The student will diagnose emissions and drivability concerns stemming from the EGR system and determine the necessary steps for repair.
- The student will inspect, test, service, and replace components of the EGR system, ensuring they are functioning correctly and meeting emissions standards.
- The student will inspect and test the electrical and electronic components of the EGR system and perform the necessary repairs or replacements.
- The student will inspect and test the mechanical components of secondary air injection systems and take corrective action as needed.
- The student will inspect and test the electrical and electronic components of air injection systems and perform necessary actions for repair.

- The student will inspect and test the catalytic converter's efficiency and determine necessary actions to address inefficiency or failure.
- The student will diagnose emissions and drivability concerns caused by the evaporative emissions control system and recommend corrective actions.
- The student will inspect and test the components and hoses of the evaporative emissions control system and perform necessary corrective actions.
- The student will interpret DTCs and scan tool data related to emissions control systems and determine necessary actions based on the diagnostic results.
- The student will remove and replace the timing belt and verify that the camshaft timing is correctly set.
- The student will remove and replace the thermostat, gasket, or seal, ensuring proper engine cooling system function.
- The student will inspect and test mechanical and electrical fans, fan clutches, air dams, and fan control devices, and perform any necessary repairs or replacements.
- The student will perform engine oil and filter changes to ensure proper engine lubrication and function.

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)
- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
- Taking Tests in Alternate Setting (or if requested)
- Drill and Practice (Repetition of Material)
- Copy of Teacher/Student Notes/Skeleton Notes
- Use of Daily Planner/Assignment Book (monitor use of)
- Positive Reinforcement
- Have Student Repeat Directions
- Positive Reinforcement
- Provide Frequent Feedback
- Regular Notebook Check
- Communication Regarding Behavior & Consequences (PBS)
- Clear Language for Directions
- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills
- Provide Verbal and Written Directions

- All Vocabulary to be Defined Before Testing

Safety:

- Safety glasses must be worn at all times by students in the Auto Shop.
- Students must always wear their work uniform in the Auto Shop.
- Work shoes must be always worn by students in the Auto Shop.
- Students will follow the safety rules as they apply to each tool or piece of equipment.
- Students will conduct themselves in a safe and professional manner.

Assessment:**THEORY EVALUATION**

- Traditional tests - multiple choice, matching, true/false, short answer completion
- Traditional quizzes - multiple choice, matching, true/false, short answer completion
- Graded homework
- Graded math practice assignments
- Graded reading assignments
- Notebook checks
- Class oral responses
- Business and industry credentialing tests
- Exit slips/timecards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
- The teacher will assess students' understanding through discussions, quizzes, or practical demonstrations.
- The teacher will ensure scores are given on projects when they are completed.
- The teacher will observe and score when a job is completed.
- The teacher will observe and assess the quality of work being done by a student on an assigned job.

- The teacher will determine if students use the appropriate terminology for particular jobs.
- The teacher will determine if the student has the skills to work independently on an assigned job.
- The teacher will evaluate students' ability to maintain their work areas throughout the duration of the course.
- The teacher will evaluate student communication in group activities and projects.
- The teacher will evaluate that the PA Program of Study tasks are being achieved as expected.
- The teacher will evaluate the students' class participation.
- The teacher will assess the students' ability to work within a team when teamwork is necessary.
- The teacher will evaluate the student's responsibility to complete work logs as expected.
- The teacher will evaluate if students work without hindering other students' progress.
- The teacher will assess if students stay on task in accordance with the job expectation.
- The teacher will observe students' ability to track tools, parts, and equipment efficiently.
- The teacher will account if students are prepared for class each day.
- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5
- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options

- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- Electude Learning Management System (LMS)
- ASE Certification
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: AUTOMOTIVE HVAC (Optional)

Number: 900 **Days:** 16

Description/Objectives:

The student will understand the operating principles of automotive HVAC systems as well as the environmental impact of refrigerants, as well as common procedures needed to acquire an EPA609 certification for A/C repair through MACS. (This section is optional.) Written examinations, worksheets, review questions and evaluation of psychomotor (hands-on) skills shall be used to evaluate the student's ability based on ASE and NOCTI Guidelines.

Tasks:

PA901 - Explain the operation of an expansion valve, constant run compressor system.

PA902 - Explain the operation of a capillary tube, cycling compressor system.

PA903 - Explain the environmental impact of leaking R-12 from pre-1996 systems.

PA904 - Explain the difference in R-134A compounds used in modern automobiles and R-12 used in pre-1996 vehicles.

PA905 - Demonstrate the use of a recycling machine to recover refrigerant.

PA906 - Perform a 30 minute static vacuum test for system leakage on an empty system.

PA907 - Demonstrate the use of a halide/electronic leak detector to locate potential leakage.

PA908 - Diagnose a blower speed control issue and determine the cause.

PA909 - Locate and interpret the circuit diagrams for an air conditioning control circuit.

PA910 - Leak test a heater core and determine service procedures.

PA911 - Back-flush a heater core and radiator.

PA912 - Drain, refill and bleed the air from a cooling system.

Chapter 75: Heating and Air Conditioning Fundamentals

Objectives Standards:

- Explain the principles of refrigeration.
- Describe the four cycles of refrigeration.
- Describe the high- and low-pressure sides of an air conditioning system.
- Explain the basic function and construction of each major part of a typical heating and air conditioning system.
- Summarize the operation and interaction of heating, ventilation, and air conditioning systems. Describe safety precautions to be observed when working on heating and air conditioning systems. Correctly answer ASE certification test questions requiring a knowledge of modern heating and air conditioning systems.

Chapter 76: Heating and Air Conditioning Service

Objectives Standards:

- Visually inspect a heating and air conditioning system and locate obvious troubles.
- Diagnose common heating and air conditioning problems.
- Describe the functions and uses of air conditioning test equipment.
- Locate air conditioning and heating system leaks.
- Explain how to replace major heating and air conditioning components.
- Describe the general procedures for evacuating and charging an air conditioning system.
- Demonstrate safe working practices when servicing heating and air conditioning equipment. Correctly answer ASE certification test questions about the diagnosis and repair of heating and air conditioning systems.

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- 3.5.9-12.L Interpret laws, regulations, policies, and other factors that impact the development and use of technology.
- 3.5.9-12.3 Strand: Integration of Knowledge, Technologies, and Practices.
- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Focus Anchor/Standard #2:

MATH/SCIENCE

Supporting Anchor/Standards:

- S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.
- S11.A.1.1.3 Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).
- S11.A.2.1.2 Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate and communicate results) applicable to a specific technological design.
- S11.C.2.2.2 Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion)
- 3.5.9-12.P Apply a broad range of design skills to a design thinking process.

Connecting Anchor/Standard:

Career Education & Work

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
- 13.1.11.G Assess the implements of the individualized career plan through the ongoing development of the career portfolio.
- 13.1.11.H Review personal high school plan against current personal career goals and select postsecondary opportunities based upon personal career interests.
- 13.3.11.A Evaluate personal attitudes and work habits that support career retention and advancement.

Instructional Activities:

- K-W-L with a twist
- Read the questions at the end of the chapter
- Read the summary information first

- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills:

- The student will explain the function and operation of an expansion valve and constant run compressor system in automotive air conditioning.
- The student will describe the operation of a capillary tube and cycling compressor system in automotive air conditioning.
- The student will explain the environmental impact of refrigerant leakage, specifically R-12, from air conditioning systems in vehicles manufactured before 1996.
- The student will compare and contrast the properties of R-134A refrigerant used in modern automobiles with R-12 refrigerant used in vehicles built before 1996.
- The student will demonstrate how to use a recycling machine to recover refrigerant from an automotive air conditioning system.
- The student will perform a 30-minute static vacuum test on an empty automotive air conditioning system to check for leaks.
- The student will demonstrate how to use a halide or electronic leak detector to locate potential refrigerant leaks in an air conditioning system.
- The student will diagnose a blower speed control issue in an automotive HVAC system and determine the root cause of the problem.
- The student will locate and interpret circuit diagrams related to the air conditioning control circuits in automotive systems.
- The student will perform a leak test on a heater core and determine the appropriate service procedures based on the test results.
- The student will demonstrate the proper technique for back-flushing a heater core and radiator to remove debris or blockages.
- The student will drain, refill, and properly bleed air from an automotive cooling system to ensure proper function.

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating

- Directions/Comprehension Check (frequent checks for understanding)
- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
- Taking Tests in Alternate Setting (or if requested)
- Drill and Practice (Repetition of Material)
- Copy of Teacher/Student Notes/Skeleton Notes
- Use of Daily Planner/Assignment Book (monitor use of)
- Positive Reinforcement
- Have Student Repeat Directions
- Positive Reinforcement
- Provide Frequent Feedback
- Regular Notebook Check
- Communication Regarding Behavior & Consequences (PBS)
- Clear Language for Directions
- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills
- Provide Verbal and Written Directions
- All Vocabulary to be Defined Before Testing

Safety:

- Safety glasses must be worn at all times by students in the Auto Shop.
- Students must always wear their work uniform in the Auto Shop.
- Work shoes must be always worn by students in the Auto Shop.
- Students will follow the safety rules as they apply to each tool or piece of equipment.
- Students will conduct themselves in a safe and professional manner.

Assessment:

THEORY EVALUATION

- Traditional tests - multiple choice, matching, true/false, short answer completion
- Traditional quizzes - multiple choice, matching, true/false, short answer completion
- Graded homework
- Graded math practice assignments

- Graded reading assignments
- Notebook checks
- Class oral responses
- Business and industry credentialing tests
- Exit slips/timecards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
- The teacher will assess students' understanding through discussions, quizzes, or practical demonstrations.
- The teacher will ensure scores are given on projects when they are completed.
- The teacher will observe and score when a job is completed.
- The teacher will observe and assess the quality of work being done by a student on an assigned job.
- The teacher will determine if students use the appropriate terminology for particular jobs.
- The teacher will determine if the student has the skills to work independently on an assigned job.
- The teacher will evaluate students' ability to maintain their work areas throughout the duration of the course.
- The teacher will evaluate student communication in group activities and projects.
- The teacher will evaluate that the PA Program of Study tasks are being achieved as expected.
- The teacher will evaluate the students' class participation.
- The teacher will assess the students' ability to work within a team when teamwork is necessary.
- The teacher will evaluate the student's responsibility to complete work logs as expected.
- The teacher will evaluate if students work without hindering other students' progress.
- The teacher will assess if students stay on task in accordance with the job expectation.
- The teacher will observe students' ability to track tools, parts, and equipment efficiently.

- The teacher will account if students are prepared for class each day.
- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5
- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- Electude Learning Management System (LMS)
- ASE Certification
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: DRIVE TRAINS

Number: 1000 **Days:** 15

Description/Objectives:

The student will learn the basic skills necessary to maintain and make basic repairs to the drive train components. Written examinations, worksheets, review questions and evaluation of psychomotor (hands-on) skills shall be used to evaluate the student's ability based on ASE and NOCTI Guidelines.

Tasks:

PA1001 Check the fluid level of an automatic transmission.

PA1002 - Drain, change filter, and refill an automatic transmission

PA1003 - Check the fluid level on a manual transmission.

PA1004 - Replace a clutch on a vehicle with a manual transmission.

PA1005 - Bleed a hydraulic clutch system of air.

PA1006 Check the fluid in a transfer case.

PA1007 - Check the fluid in a differential housing. (Rear or 4 wheel drive)

PA1008 - Check gear backlash using a dial indicator on a differential.

PA1009 - Check ring gear back face runout using a dial indicator.

PA1010 - Check gear tooth contact drive and coast side with marking compound and determine corrective action.

Chapter 53: Clutch Fundamentals

Objectives Standards:

- List the basic parts of an automotive clutch.
- Explain the operation of a clutch.
- Describe the construction of major clutch components.
- Compare clutch design differences.
- Explain the different types of clutch release mechanisms.
- Correctly answer ASE certification test questions that require a knowledge of clutch designs and operation.

Chapter 54: Clutch Diagnosis and Repair

Objectives Standards:

- Troubleshoot common clutch problems.
- Describe symptoms of typical clutch troubles.
- Adjust a clutch.
- Remove, repair, and install a clutch.
- Inspect clutch parts for wear and damage.
- Cite safety rules and demonstrate safe work procedures.
- Correctly answer ASE certification test questions on clutch diagnosis and repair.

Chapter 55: Manual Transmission Fundamentals

Objectives Standards:

- Describe gear operating principles.
- Identify and define all of the major parts of a manual transmission.
- Explain the fundamental operation of a manual transmission.
- Trace the power flow through transmission gears.
- Compare the construction of different types of manual transmissions.
- Explain the purpose and operation of a transmission overdrive ratio.
- Correctly answer ASE certification test questions requiring a knowledge of manual transmission operating principles.

Chapter 56: Manual Transmission Diagnosis and Repair (Optional Time Permitting)

Objectives Standards:

- Diagnose common manual transmission problems.
- Remove a standard transmission from a vehicle.
- Disassemble and inspect a manual transmission.
- Assemble a manual transmission.
- Install a manual transmission.
- Adjust manual transmission linkage.
- Cite and observe safety rules for transmission service.
- Correctly answer ASE certification test questions on manual transmission diagnosis and repair.

Chapter 57: Automatic Transmission Fundamentals

Objectives Standards:

- Identify the basic components of an automatic transmission.
- Describe the function and operation of the major parts of an automatic transmission.
- Trace the flow of power through an automatic transmission.
- Explain how an automatic transmission shifts gears.
- Compare the different types of automatic transmissions.
- Correctly answer ASE certification test questions requiring a knowledge of automatic transmission operation and construction.

Chapter 58: Automatic Transmission Service

Objectives Standards:

- Troubleshoot an automatic transmission.
- Explain the types of problems common to an automatic transmission.
- Describe the tests needed to locate automatic transmission problems.
- Change automatic transmission oil and filter.
- Make basic external adjustments on an automatic transmission.
- Locate and repair automatic transmission leaks.
- Cite and observe safety rules while working on transmissions.
- Troubleshoot electronically controlled automatic transmissions.
- Remove and replace an automatic transmission.
- Correctly answer ASE Certification test questions about automatic transmission service.

Chapter 59: Drive Shafts and Transfer Cases

Objectives Standards:

- Identify and describe the parts of a modern drive shaft assembly.
- Explain the functions of a drive shaft.
- Describe the different types of universal joints.
- List the different types of drivelines.
- Identify the major parts of a four-wheel-drive driveline.
- Explain the basic operation of a transfer case.

- Correctly answer ASE certification test questions that require a knowledge of drive shafts and transfer cases.

Chapter 61: Differential and Rear Drive Axle Fundamentals

Objectives Standards:

- Identify the major parts of a rear drive axle assembly.
- List the functions of a rear axle assembly.
- Describe the operation of a differential.
- Explain differential design variations.
- Compare different types of axles.
- Describe the principles of a limited-slip differential.
- Relate rear axle ratios to vehicle performance.
- Correctly answer ASE certification test questions requiring a knowledge of differential and rear drive axle fundamentals.

Chapter 63: Transaxle and Front Drive Axle Fundamentals

Objectives Standards:

- Identify the major parts of a transaxle assembly.
- Explain the operation of a manual transaxle.
- Explain the operation of an automatic transaxle.
- Trace the flow of power through manual and automatic transaxles.
- Describe design differences in transaxles.
- Identify the parts of constant velocity drive axles.
- Compare design differences in CV-joints.
- Correctly answer ASE certification test questions requiring a knowledge of transaxle and front drive axle designs.

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- 3.5.9-12.L Interpret laws, regulations, policies, and other factors that impact the development and use of technology.

- 3.5.9-12.3 Strand: Integration of Knowledge, Technologies, and Practices.
- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Focus Anchor/Standard #2:

MATH/SCIENCE

Supporting Anchor/Standards:

- S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.
- S11.A.1.1.3 Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).
- S11.A.2.1.2 Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate and communicate results) applicable to a specific technological design.
- S11.C.2.2.2 Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion)
- 3.5.9-12.P Apply a broad range of design skills to a design thinking process.

Connecting Anchor/Standard:

Career Education & Work

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
- 13.1.11.G Assess the implements of the individualized career plan through the ongoing development of the career portfolio.
- 13.1.11.H Review personal high school plan against current personal career goals and select postsecondary opportunities based upon personal career interests.
- 13.3.11.A Evaluate personal attitudes and work habits that support career retention and advancement.

Instructional Activities:

- K-W-L with a twist

- Picture story
- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills:

- The student will check the fluid level of an automatic transmission using the proper method and tools.
- The student will drain, change the filter, and refill an automatic transmission with the correct fluid according to manufacturer specifications.
- The student will check the fluid level of a manual transmission using the appropriate method and tools.
- The student will replace the clutch on a vehicle with a manual transmission, ensuring proper alignment and installation.
- The student will bleed a hydraulic clutch system to remove air and ensure proper clutch operation.
- The student will check the fluid level and condition in a transfer case, ensuring it meets manufacturer specifications.
- The student will check the fluid level and condition in a differential housing (rear or 4-wheel drive) and determine if maintenance is needed.
- The student will check the gear backlash using a dial indicator on a differential and interpret the measurements to assess gear set alignment.
- The student will check the ring gear back face runout using a dial indicator and evaluate the results for proper gear alignment.
- The student will check the gear tooth contact on both the drive and coast sides using marking compound and determine the necessary corrective action if gear wear or misalignment is detected.

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)

- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
- Taking Tests in Alternate Setting (or if requested)
- Drill and Practice (Repetition of Material)
- Copy of Teacher/Student Notes/Skeleton Notes
- Use of Daily Planner/Assignment Book (monitor use of)
- Positive Reinforcement
- Have Student Repeat Directions
- Positive Reinforcement
- Provide Frequent Feedback
- Regular Notebook Check
- Communication Regarding Behavior & Consequences (PBS)
- Clear Language for Directions
- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills
- Provide Verbal and Written Directions
- All Vocabulary to be Defined Before Testing

Safety:

- Safety glasses must be worn at all times by students in the Auto Shop.
- Students must always wear their work uniform in the Auto Shop.
- Work shoes must be always worn by students in the Auto Shop.
- Students will follow the safety rules as they apply to each tool or piece of equipment.
- Students will conduct themselves in a safe and professional manner.

Assessment:

THEORY EVALUATION

- Traditional tests - multiple choice, matching, true/false, short answer completion
- Traditional quizzes - multiple choice, matching, true/false, short answer completion
- Graded homework
- Graded math practice assignments
- Graded reading assignments

- Notebook checks
- Class oral responses
- Business and industry credentialing tests
- Exit slips/timecards
- Student handheld response systems
- Textbook computer-generated tests

SKILL EVALUATION

- The teacher will evaluate the student's ability to accurately check the fluid level of an automatic transmission using the correct procedures and tools.
- The teacher will assess the student's proficiency in draining, changing the filter, and refilling an automatic transmission with the appropriate fluid according to manufacturer specifications.
- The teacher will evaluate the student's ability to check the fluid level of a manual transmission using the proper method and tools to ensure the transmission is adequately lubricated.
- The teacher will assess the student's skill in replacing a clutch on a vehicle with a manual transmission, ensuring proper alignment and installation according to manufacturer guidelines.
- The teacher will evaluate the student's ability to properly bleed a hydraulic clutch system to remove air and ensure that the system is functioning correctly.
- The teacher will assess the student's ability to check the fluid level and condition in a transfer case and determine if any maintenance or replacement is needed.
- The teacher will evaluate the student's ability to check the fluid level and condition in a differential housing, including rear and 4-wheel drive, and take the necessary steps if maintenance is required.
- The teacher will assess the student's ability to check gear backlash using a dial indicator on a differential and interpret the measurements to ensure proper gear set alignment.
- The teacher will evaluate the student's proficiency in checking the ring gear back face runout using a dial indicator and interpreting the results to ensure proper gear alignment.
- The teacher will assess the student's ability to check gear tooth contact on both the drive and coast sides using marking compound and determine the necessary corrective action for any misalignment or wear.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5

- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- Electude Learning Management System (LMS)
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: ORIENTATION

Number: 100 **Days:** 10

Description/Objectives:

The students will review the following concepts from Level 1 – Orientation: career opportunities, SP2 certifications expectations for safety, hygiene, customer service and shop management skills.

Tasks:

PA101 - Explain and follow all lab rules.

PA102 - Participate in basic shop management.

PA103 - Participate in parts ordering.

PA104 - Demonstrate auto shop safety and hygiene.

PA105 - Demonstrate the use of service information.

PA106 - Demonstrate proper telephone courtesy.

PA107 - Identify vehicle by: sight, V.I.N. and/or ID tag.

PA108 - Identify career paths within the career and technical education program.

Chapter 1: The Automobile

Objectives Standards:

- Identify and locate the most important parts of a vehicle.
- Describe the purpose of the fundamental automotive systems.
- Explain the interaction of automotive systems.
- Describe major automobile design variations.
- Comprehend later text chapters with a minimum amount of difficulty.
- Correctly answer ASE certification test questions that require a knowledge of the major parts and systems of a vehicle.

Chapter 2: Automotive Careers and ASE Certification

Objectives Standards:

- List the most common automotive careers.
- Describe the type of skills needed to be an auto technician.
- Explain the tasks completed by each type of auto technician.
- Summarize the ASE certification program.

Chapter 7: Service Information and Work Orders

Objectives Standards:

- Describe the different types of service manuals.
- Find and use the service manual index and contents sections.
- Explain the different kinds of information and illustrations used in a service manual.
- Describe the three basic types of troubleshooting charts found in service manuals.
- Explain how to use computer-based service information.
- Correctly answer ASE certification test questions concerning service information.

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- 3.5.9-12.L Interpret laws, regulations, policies, and other factors that impact the development and use of technology.
- 3.5.9-12.3 Strand: Integration of Knowledge, Technologies, and Practices.
- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Focus Anchor/Standard #2:

MATH/SCIENCE

Supporting Anchor/Standards:

- S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.
- S11.A.1.1.3 Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).
- S11.A.2.1.2 Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate and communicate results) applicable to a specific technological design.
- S11.C.2.2.2 Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion
- 3.5.9-12.P Apply a broad range of design skills to a design thinking process.

Connecting Anchor/Standard:

CAREER EDUCATION & WORK

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
- 13.1.11.G Assess the implements of the individualized career plan through the ongoing development of the career portfolio.
- 13.1.11.H Review personal high school plan against current personal career goals and select postsecondary opportunities based upon personal career interests.
- 13.3.11.A Evaluate personal attitudes and work habits that support career retention and advancement.

Instructional Activities:

- K-W-L with a twist
- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills:**The students will review the following skills from Level 1 – Orientation:**

- The student will complete and return all first day paperwork.
- The student will complete and return the auto safety contract.
- The student will gain a thorough understanding of the expectations of the class. The student will order all required shop clothing, including a uniform shirt, and PPE.
- The student will complete SP2 Safety and Pollution Certification with a score of 100%.
- The student will complete the CCAR safety unit of Electude LMS with a score of 100%.
- The student will complete shop equipment assignment and familiarize with all equipment, their safety concerns and locations.
- The student will learn the locations of all fire extinguishers, safety shut off switches and eye wash and chemical shower locations specific to the shop.

- The student will understand and explain the importance of lab safety rules.
- The student will demonstrate the ability to follow all posted and verbal safety instructions.
- The student will recognize safety hazards in the lab environment and take appropriate action to avoid injury.
- The student will practice proper handling and use of equipment to ensure a safe working environment.
- The student will demonstrate knowledge of personal protective equipment (PPE) and wear it when necessary.
- The student will understand the roles and responsibilities in an automotive shop environment.
- The student will assist in maintaining an organized and efficient work area.
- The student will demonstrate the ability to communicate effectively with team members and supervisors.
- The student will participate in inventory management by tracking parts and tools.
- The student will assist in scheduling tasks and prioritizing work to meet deadlines.
- The student will identify the parts ordering process and how to accurately identify needed parts.
- The student will use catalogs, computer systems, or online databases to find part numbers and descriptions.
- The student will demonstrate the ability to communicate effectively with vendors for parts ordering.
- The student will track and record orders to ensure timely delivery of parts.
- The student will summarize the importance of verifying part specifications and compatibility before ordering.
- The student will understand and demonstrate basic auto shop safety procedures, including the proper use of tools and machinery.
- The student will maintain a clean and safe work environment by regularly cleaning and organizing tools and workspaces.
- The student will follow proper waste disposal guidelines for hazardous materials such as oil, brake fluid, and other automotive chemicals.
- The student will demonstrate proper fire safety and emergency response procedures in the shop.
- The student will practice good personal hygiene to minimize contamination of parts and surfaces.
- The student will determine how to access service manuals and technical service bulletins (TSBs) for vehicles.
- The student will demonstrate the ability to read and interpret service information to diagnose vehicle issues.
- The student will use online databases and software to retrieve and analyze vehicle service data.
- The student will accurately follow service guidelines and repair procedures to ensure correct repairs.
- The student will demonstrate the ability to update service records and logs for future reference.

- The student will answer the phone in a professional and courteous manner, using appropriate greetings.
- The student will demonstrate active listening skills and take clear, concise messages.
- The student will use professional language and tone when speaking with clients, vendors, or colleagues over the phone.
- The student will follow up on phone inquiries and requests in a timely and efficient manner.
- The student will handle difficult phone calls calmly and professionally, directing them to the appropriate person when necessary.
- The student will identify key vehicle features by sight, including make, model, year, and other distinguishing characteristics.
- The student will understand the importance and location of a Vehicle Identification Number (V.I.N.) and demonstrate the ability to locate and record it.
- The student will recognize and interpret manufacturer ID tags, labels, and other identifiers commonly found on vehicles.
- The student will use the V.I.N. to retrieve vehicle history, specifications, and recall information.
- The student will cross-reference vehicle identification information with service records to ensure accuracy.
- The student will understand and explain the various career paths within the automotive industry, such as automotive service technician, parts specialist, or service advisor.
- The student will research and identify education and certification requirements for different career opportunities.
- The student will demonstrate knowledge of potential advancement opportunities within the automotive field.
- The student will discuss the skills and competencies required for success in various automotive careers.
- The student will explore industry trends and emerging career opportunities in automotive technology.

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)
- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
- Taking Tests in Alternate Setting (or if requested)
- Drill and Practice (Repetition of Material)
- Copy of Teacher/Student Notes/Skeleton Notes
- Use of Daily Planner/Assignment Book (monitor use of)
- Positive Reinforcement

- Have Student Repeat Directions
- Provide Frequent Feedback
- Regular Notebook Check
- Communication Regarding Behavior & Consequences (PBS)
- Clear Language for Directions
- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills
- Provide Verbal and Written Directions
- All Vocabulary to be Defined Before Testing

Safety:

Student Safety Pledge:

I, _____, understand that the automotive
(Print name)

shop is an inherently dangerous place to work. I pledge to:

1. Follow all school regulations listed in the student handbook at all times.
2. Follow all safety regulations as they pertain to the shop and its equipment at all times.
3. I will wear work clothes as specified, work shoes, and safety glasses at all times.
4. Avoid horseplay or other distracting behavior.
5. Perform all work in a careful and safe manner.
6. Receive instruction and permission before using any equipment.
7. Never work in the shop without the instructor present.
8. Pass a general safety test, as well as demonstrate the safe use of all equipment.

I agree to the above terms of the safety pledge and understand that failure to live up to the terms above is grounds for discipline, as spelled out in the student handbook. Repeat offenses may result in removal from the program. Failure to follow these rules may result in serious injury or death. By signing below, I agree to all the terms above.

(Signed by Student)

(Today's date)

Assessment:

THEORY EVALUATION

- Traditional Tests - multiple choice, matching, true/false, short answer completion
- Traditional Quizzes - multiple choice, matching, true/false, short answer completion
- Graded Homework
- Graded Math practice assignments
- Graded Reading assignments
- Notebook checks
- Class oral responses
- Business and Industry Credentialing Tests
- Exit Slips/Time Cards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
- The teacher will assess students' understanding through discussions, quizzes, or practical demonstrations.
- The teacher will ensure scores are given on projects when they are completed.
- The teacher will observe and score when a job is completed.
- The teacher will observe and assess the quality of work being done by a student on an assigned job.
- The teacher will determine if students use the appropriate terminology for particular jobs.
- The teacher will determine if the student has the skills to work independently on an assigned job.
- The teacher will evaluate students' ability to maintain their work areas throughout the duration of the course.
- The teacher will evaluate student communication in group activities and projects.
- The teacher will evaluate that the PA Program of Study tasks are being achieved as expected.
- The teacher will evaluate the students' class participation.
- The teacher will assess the students' ability to work within a team when teamwork is necessary.
- The teacher will evaluate the student's responsibility to complete work logs as expected.

- The teacher will evaluate if students work without hindering other students' progress.
- The teacher will assess if students stay on task in accordance with the job expectation.
- The teacher will observe students' ability to track tools, parts, and equipment efficiently.
- The teacher will account if students are prepared for class each day.
- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5
- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- Electude Learning Management System (LMS)
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: SAFETY

Number: 200 **Days:** 10

Description/Objectives:

The student will review their knowledge of safety and show they are able to implement general, shop and equipment specific safety rules. The student will also review the location MSDS (Material Safety Data Sheets) forms, fire extinguishers and first aid equipment. The knowledge component shall be evidenced by passing SP-2 certification. Written examinations, worksheets, review questions and evaluation of psychomotor (hands-on) skills shall be used to evaluate the student's ability based on ASE and NOCTI Guidelines.

Tasks:

PA201 - Identify and follow all safety rules.

PA202 - Demonstrate the ability to secure vehicles on jack stands and hydraulic lifts.

PA203 - Demonstrate the ability to safely set-up/shut-down oxygen acetylene welding equipment.

PA204 - Identify chemical safety, 'Right-To-Know Laws' and MSDS (Material Safety Data Sheets).

PA205 - Identify and demonstrate the safe use of hand tools.

PA206 - Identify and demonstrate the safe use of power tools.

PA207 - Identify and demonstrate the safe use of protective clothing and equipment.

PA208 - Identify and demonstrate the safe use of fire protection equipment.

PA209 - Identify and demonstrate the safe use of shop equipment.

PA206 - Identify and demonstrate the safe use of power tools.

PA207 - Identify and demonstrate the safe use of protective clothing and equipment.

PA208 - Identify and demonstrate the safe use of fire protection equipment.

PA209 - Identify and demonstrate the safe use of shop equipment.

PA210 - Explain EPA and OSHA regulations.

Chapter 5: The Auto Shop and Safety

Objectives Standards:

- Describe the typical layout and sections of an auto shop.
- List the types of accidents that can occur in an auto shop.
- Explain how to prevent auto shop accidents.
- Describe general safety rules for the auto shop.

Standards / Assessment Anchors***Focus Anchor/Standard #1:*****LITERACY*****Supporting Anchor/Standards:***

- R11.B.3.3.3 Explain, interpret, and/or analyze graphics and charts, and/or make connections between text and the content of graphics and charts.
- R11.B.3.3.2 Explain, interpret, and/or analyze the author's purpose for decisions about text organization and content.
- R11.B.3.3.1 Explain, interpret, and/or analyze the effect of text organization, including the use of headers.
- R11.B.3.3 Identify, compare, explain, interpret, describe, and analyze how text organization clarifies meaning of nonfictional text.
- R11.B.3.3.4 Identify, explain, compare, interpret, describe, and/or analyze the sequence of steps in a list of directions.

Focus Anchor/Standard #2:**MATH/SCIENCE*****Supporting Anchor/Standards:***

- CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.
- CC.2.1.8.E.4 Estimate irrational numbers by comparing them to rational numbers.
- CC.2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers.
- S11.A.1.3.1 Use appropriate quantitative data to describe or interpret change in systems (e.g., biological indices, electrical circuit data, automobile diagnostic systems data).

- S11.A.2.1.1 Critique the elements of an experimental design (e.g., raising questions, formulating hypotheses, developing procedures, identifying variables, manipulating variables, interpreting data, and drawing conclusions) applicable to a specific experimental design.
- M11.D.2 Represent and/or analyze mathematical situations using numbers, symbols, words, tables/or graphs.
- M11.E.4.1.2 Use probability to predict outcomes.

Connecting Anchor/Standard:

CAREER EDUCATION & WORK

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.

Instructional Activities:

- K-W-L with a twist
- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills

The student will review the following skills from Level 1 – Safety:

- The student will demonstrate understanding of workplace safety guidelines and regulations.

- The student will recognize potential hazards in the automotive repair environment.
- The student will apply appropriate personal safety measures (PPE) at all times.
- The student will follow proper safety protocols when working with vehicles, tools, and equipment.
- The student will identify safety hazards and report them to the appropriate authorities.
- The student will properly inspect hydraulic lifts, and jack stands for functionality before use.
- The student will safely raise and secure vehicles on jack stands following manufacturer's specifications.
- The student will understand and apply weight distribution principles when positioning the vehicle.
- The student will follow procedures for lifting and securing a vehicle safely to prevent accidents.
- The student will safely inspect oxygen and acetylene tanks and regulators for leaks or damage.
- The student will set up oxygen-acetylene welding equipment according to safety guidelines.
- The student will properly adjust pressure settings for the welding process.
- The student will demonstrate the correct procedure for shutting down welding equipment to prevent accidents.
- The student will understand the importance of ventilation and safe working areas when using welding equipment.
- The student will identify hazardous chemicals commonly used in the automotive industry.
- The student will understand and apply 'Right-to-Know' laws regarding hazardous materials.
- The student will demonstrate the ability to read and interpret MSDS (Material Safety Data Sheets) for chemicals.
- The student will use appropriate protective measures (PPE) when handling hazardous materials.
- The student will properly store and dispose of hazardous chemicals as per safety regulations.
- The student will correctly identify various hand tools and their specific uses in automotive repair.
- The student will inspect hand tools for defects before use, ensuring they are in good working condition.
- The student will demonstrate proper handling and technique to avoid accidents and injuries.

- The student will safely store hand tools after use to prevent misuse or damage.
- The student will use tools for their intended purpose to maintain safety standards.
- The student will identify various power tools and their intended functions in the automotive repair process.
- The student will conduct pre-operation inspections to ensure power tools are in safe working order.
- The student will use power tools with appropriate safety precautions (e.g., guards, protective eyewear, hearing protection).
- The student will demonstrate proper handling and control to prevent accidents.
- The student will follow manufacturer instructions for safe operation and maintenance.
- The student will recognize the need for protective clothing and equipment in various automotive repair tasks.
- The student will select and wear appropriate PPE (e.g., gloves, goggles, aprons, ear protection) based on the task.
- The student will inspect PPE for wear and damage before use.
- The student will demonstrate proper care and maintenance of protective gear.
- The student will understand the limitations of PPE and when additional safety equipment is required.
- The student will identify the different types of fire extinguishers and their uses (e.g., Class A, B, C, D, K).
- The student will demonstrate the proper technique for using a fire extinguisher (PASS method: Pull, Aim, Squeeze, Sweep).
- The student will identify fire hazards in the automotive shop and take preventive measures.
- The student will understand emergency fire evacuation procedures.
- The student will demonstrate how to safely handle flammable materials in the workshop.
- The student will identify and describe various shop equipment (e.g., air compressors, diagnostic machines, tire changers).
- The student will demonstrate safe operation and maintenance of shop equipment.
- The student will conduct regular safety checks to ensure equipment is in working order.
- The student will follow correct operating procedures to avoid accidents and injuries.
- The student will understand and follow the manufacturer's instructions for shop equipment usage.

- The student will understand the role of the Environmental Protection Agency (EPA) and Occupational Safety and Health Administration (OSHA) in the workplace.
- The student will explain how EPA regulations govern environmental safety, including waste disposal and emissions standards.
- The student will identify OSHA regulations that apply to automotive shops and maintenance areas.
- The student will follow OSHA's guidelines to ensure a safe working environment.
- The student will understand the reporting procedures for safety violations under EPA and OSHA regulations.

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)
- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
- Taking Tests in Alternate Setting (or if requested)
- Drill and Practice (Repetition of Material)
- Copy of Teacher/Student Notes/Skeleton Notes
- Use of Daily Planner/Assignment Book (monitor use of)
- Positive Reinforcement
- Have Student Repeat Directions
- Positive Reinforcement
- Provide Frequent Feedback
- Regular Notebook Check
- Communication Regarding Behavior & Consequences (PBS)
- Clear Language for Directions
- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills
- Provide Verbal and Written Directions
- All Vocabulary to be Defined Before Testing

Safety:

- The teacher will distribute the Safety Pledge to the students.
- The teacher will have students and parent complete and return the Safety Pledge.
- The teacher will review personal safety rules & clothing requirements with students.
- The teacher will review shop safety rules with students.
- The teacher will review equipment specific safety rules with the students.
- The teacher will review Material Safety Data Sheets (MSDS) / Right to Know with the students.
- The teacher will review fire extinguishers and types of fires with students.
- The teacher will review first aid procedures with students.

Assessment:

THEORY EVALUATION

- Traditional tests - multiple choice, matching, true/false, short answer completion
- Traditional quizzes - multiple choice, matching, true/false, short answer completion
- Graded homework
- Graded math practice assignments
- Graded reading assignments
- Notebook checks
- Class oral responses
- Business and industry credentialing tests
- Exit slips/timecards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
- The teacher will assess students' understanding through discussions, quizzes, or practical demonstrations.
- The teacher will ensure scores are given on projects when they are completed.
- The teacher will observe and score when a job is completed.

- The teacher will observe and assess the quality of work being done by a student on an assigned job.
- The teacher will determine if students use the appropriate terminology for particular jobs.
- The teacher will determine if the student has the skills to work independently on an assigned job.
- The teacher will evaluate students' ability to maintain their work areas throughout the duration of the course.
- The teacher will evaluate student communication in group activities and projects.
- The teacher will evaluate that the PA Program of Study tasks are being achieved as expected.
- The teacher will evaluate the students' class participation.
- The teacher will assess the students' ability to work within a team when teamwork is necessary.
- The teacher will evaluate the student's responsibility to complete work logs as expected.
- The teacher will evaluate if students work without hindering other students' progress.
- The teacher will assess if students stay on task in accordance with the job expectation.
- The teacher will observe students' ability to track tools, parts, and equipment efficiently.
- The teacher will account if students are prepared for class each day.
- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5
- Tests read aloud
- Word bank with no more than 10 options

- Word bank with no more than 5 options
- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- SP2 Pollution Program
- Electude Learning Management System (LMS)
- MSDS (Material Safety Data Sheets) forms
- CCAR Safety Unit
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: CERTIFICATIONS

Number: 400 **Days:** 15

Description/Objectives:

The student will be given the opportunity to receive the following industry certifications. Achieving certification is dependent upon the student's ability to meet the criteria set up by the issuing corporation, governmental agency or bureau. (Many agencies require the student to be a minimum of 18 years of age. As a result, each student may not meet the guidelines.)

Tasks:

PA401 - Prepare to obtain PA Safety Inspection Certification.

PA402 - Prepare to obtain EPA 609 Refrigerant Recovery, Recycling Certification.

PA403 - Prepare to obtain Emission Inspection Certification.

PA404 - S/P-2 Safety & Environmental Protection Certification

PA405 - Pro-Cut Factory Certification - Brake Lathe

PA406 - Prepare to take the NOCTI Written Exam

PA407 - Prepare to take the NOCTI Psychomotor Skills Exam

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- R11.B.3.3.3 Explain, interpret, and/or analyze graphics and charts, and/or make connections between text and the content of graphics and charts.
- R11.B.3.3.2 Explain, interpret, and/or analyze the author's purpose for decisions about text organization and content.
- R11.B.3.3.1 Explain, interpret, and/or analyze the effect of text organization, including the use of headers.

- R11.B.3.3 Identify, compare, explain, interpret, describe, and analyze how text organization clarifies meaning of nonfictional text.
- R11.B.3.3.4 Identify, explain, compare, interpret, describe, and/or analyze the sequence of steps in a list of directions.

Focus Anchor/Standard #2:

MATH/SCIENCE

Supporting Anchor/Standards:

- CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.
- CC.2.1.8.E.4 Estimate irrational numbers by comparing them to rational numbers.
- CC.2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers.
- S11.A.1.3.1 Use appropriate quantitative data to describe or interpret change in systems (e.g., biological indices, electrical circuit data, automobile diagnostic systems data).
- S11.A.2.1.1 Critique the elements of an experimental design (e.g., raising questions, formulating hypotheses, developing procedures, identifying variables, manipulating variables, interpreting data, and drawing conclusions) applicable to a specific experimental design.
- M11.D.2 Represent and/or analyze mathematical situations using numbers, symbols, words, tables/or graphs.
- M11.E.4.1.2 Use probability to predict outcomes.

Connecting Anchor/Standard:

CAREER EDUCATION & WORK

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.

Instructional Activities:

- K-W-L with a twist

- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills:

- The student will understand the Pennsylvania Vehicle Safety Inspection Manual and relevant state regulations.
- The student will identify components of a vehicle that need to be inspected under state law (e.g., brakes, tires, lights, suspension).
- The student will perform a basic safety inspection on a vehicle, including checks on the braking system, lights, exhaust system, tires, and more.
- The student will demonstrate knowledge of proper inspection procedures and protocols.
- The student will understand how to accurately document inspection results and report findings.
- The student will understand the importance of proper refrigerant handling and its environmental impact.
- The student will identify the types of refrigerants used in automotive air conditioning systems and their respective regulations.
- The student will demonstrate the ability to recover, recycle, and recharge refrigerant in an automotive air conditioning system using proper tools and techniques.
- The student will follow safety procedures related to refrigerant recovery and system repairs.
- The student will complete the necessary paperwork and comply with EPA regulations regarding refrigerant handling.
- The student will understand the principles and purpose of emission inspections for vehicles.
- The student will identify the key components and systems involved in vehicle emissions (e.g., exhaust system, catalytic converter, oxygen sensors).

- The student will conduct basic emission testing on vehicles using the required equipment.
- The student will identify and troubleshoot common emission-related problems and suggest potential repairs.
- The student will comply with state and federal environmental regulations when performing emissions testing.
- The student will understand and demonstrate the importance of workplace safety in the automotive repair environment.
- The student will identify potential safety hazards in an automotive service facility and demonstrate proper hazard mitigation strategies.
- The student will understand the principles of environmental protection related to automotive repair, including waste disposal and handling of hazardous materials.
- The student will implement safety protocols such as Personal Protective Equipment (PPE) usage, fire safety procedures, and emergency response techniques.
- The student will apply OSHA and EPA guidelines in daily practices within the automotive shop.
- The student will understand the function and importance of brake lathes in automotive repair.
- The student will demonstrate proper operation of a Pro-Cut brake lathe, including setup and adjustment.
- The student will identify when to use a brake lathe for resurfacing rotors and drums.
- The student will follow safety procedures when operating the brake lathe to avoid injury and ensure quality work.
- The student will complete brake lathe procedures, including measuring, cutting, and finishing brake components to manufacturer specifications.
- The student will review key automotive systems and concepts, including engine performance, brakes, electrical systems, and more.
- The student will demonstrate knowledge of automotive diagnostics, repair, and service techniques.
- The student will prepare for multiple-choice and short-answer questions covering theory, procedures, and industry standards.
- The student will review and practice the relevant terminology, tools, and equipment commonly used in the automotive field.
- The student will use study guides and practice tests to assess readiness for the written exam.
- The student will perform practical tasks in automotive diagnostics, repair, and maintenance, including engine performance, electrical systems, suspension, and brakes.

- The student will demonstrate the ability to use tools and equipment safely and effectively in various automotive tasks.
- The student will complete hands-on exercises such as diagnosing a fault, repairing components, and servicing vehicles according to industry standards.
- The student will follow safety protocols and work in a professional, efficient manner.
- The student will maintain accurate records of performed tasks, including parts used, time spent, and repair procedures.

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)
- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
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- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills
- Provide Verbal and Written Directions
- All Vocabulary to be Defined Before Testing

Safety:

- Safety glasses must be worn at all times by students in the Auto Shop.
- Students must always wear their work uniform in the Auto Shop.

- Work shoes must be always worn by students in the Auto Shop.
- Students will follow the safety rules as they apply to each tool or piece of equipment.
- Students will conduct themselves in a safe and professional manner.

Assessment:

THEORY EVALUATION

- Traditional tests - multiple choice, matching, true/false, short answer completion
- Traditional quizzes - multiple choice, matching, true/false, short answer completion
- Graded homework
- Graded math practice assignments
- Graded reading assignments
- Notebook checks
- Class oral responses
- Business and industry credentialing tests
- Exit slips/timecards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
- The teacher will assess students' understanding through discussions, quizzes, or practical demonstrations.
- The teacher will ensure scores are given on projects when they are completed.
- The teacher will observe and score when a job is completed.
- The teacher will observe and assess the quality of work being done by a student on an assigned job.
- The teacher will determine if students use the appropriate terminology for particular jobs.
- The teacher will determine if the student has the skills to work independently on an assigned job.
- The teacher will evaluate students' ability to maintain their work areas throughout the duration of the course.

- The teacher will evaluate student communication in group activities and projects.
- The teacher will evaluate that the PA Program of Study tasks are being achieved as expected.
- The teacher will evaluate the students' class participation.
- The teacher will assess the students' ability to work within a team when teamwork is necessary.
- The teacher will evaluate the student's responsibility to complete work logs as expected.
- The teacher will evaluate if students work without hindering other students' progress.
- The teacher will assess if students stay on task in accordance with the job expectation.
- The teacher will observe students' ability to track tools, parts, and equipment efficiently.
- The teacher will account if students are prepared for class each day.
- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5
- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- Electude Learning Management System (LMS)
- ASE Certification

- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: BRAKES

Number: 600 **Days:** 28

Description/Objectives:

The student will review the knowledge of brake systems, ABS, TCC Systems and the repair and maintenance of the components. Written examinations, worksheets, review questions and evaluation of psychomotor (hands-on) skills shall be used to evaluate the student's knowledge and ability based on ASE and NOCTI Guidelines.

Tasks:

PA601 - Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.

PA602 - Identify and interpret brake system concern; determine necessary action.

PA603 - Research applicable vehicle and service information, such as brake system operation, vehicle service history, service precautions, and technical service bulletins.

PA604 - Locate and interpret vehicle and major component identification numbers.

PA605 - Measure brake pedal height, travel, and free play (as applicable); determine necessary action.

PA606 - Check master cylinder for internal/external leaks and proper operation; determine necessary action.

PA607 - Remove, bench bleed, and reinstall master cylinder.

PA608 - Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and supports; determine necessary action.

PA609 - Replace brake lines, hoses, fittings, and supports.

PA610 - Fabricate brake lines using proper material and flaring procedures (double flare and ISO types).

PA611 - Select, handle, store, and fill brake fluids to proper level.

PA612 - Inspect, test, and/or replace components of brake warning light system.

PA 613 Bleed and/or flush brake system.

PA614 - Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action.

PA615 - Remove, clean, inspect, and measure brake drums; determine necessary action.

PA616 - Refinish brake drum; measure final drum diameter.

PA617 - Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.

PA618 - Inspect and install wheel cylinders.

PA619 - Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings.

PA620 - Install wheel, torque lug nuts, and make final checks and adjustments.

PA621 - Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pulsation concerns; determine necessary action.

PA622 - Remove caliper assembly; inspect for leaks and damage to caliper housing; determine necessary action.

PA623 - Clean and inspect caliper mounting and slides/pins for operation, wear, and damage; determine necessary action.

PA624 - Reassemble, lubricate, and reinstall caliper, pads, and related hardware; seat pads, and inspect for leaks.

PA625 - Clean, inspect, and measure rotor thickness, lateral runout, and thickness variation; determine necessary action.

PA626 - Remove and reinstall rotor.

PA627 - Refinish rotor on vehicle; measure final rotor thickness.

PA628 - Refinish rotor off vehicle; measure final rotor thickness.

PA629 - Install wheel, torque lug nuts, and make final checks and adjustments.

PA630 - Check brake pad wear indicator system operation; determine necessary action.

PA631 - Test pedal free travel; check power assist operation.

PA632 - Check vacuum supply to vacuum-type power booster.

PA633 - Remove, clean, inspect, repack, and install wheel bearings and replace seals; install hub and adjust bearings.

PA634 - Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed.

PA635 - Check parking brake and indicator light system operation; determine necessary action.

PA636 - Check operation of brake stop light system; determine necessary action.

PA637 - Replace wheel bearing and race.

PA638 - Inspect and replace wheel studs.

PA639 - Remove and reinstall sealed wheel bearing assembly.

PA640 - Identify and inspect electronic brake control system components; determine necessary action.

PA641 - Diagnose electronic brake control system electronic control(s) and components by retrieving diagnostic trouble codes, and/or using recommended test equipment; determine necessary action.

PA642 - Depressurize high-pressure components of the electronic brake control system.

PA643 - Bleed the electronic brake control system hydraulic circuits.

PA644 - Identify traction control/vehicle stability control system components.

Chapter 71: Brake System Fundamentals

Objectives Standards:

- Explain the hydraulic and mechanical principles of a brake system.
- Identify the major parts of an automotive brake system.
- Define the basic functions of the major parts of a brake system.
- Compare drum and disc brakes.
- Describe the operation of parking brakes.
- Explain the operation of power brakes.
- Correctly answer ASE certification test questions requiring a knowledge of automotive brake systems.

Chapter 72: Brake System Diagnosis and Repair

Objectives Standards:

- Diagnose common brake system problems.
- Inspect and maintain a brake system.
- Describe basic procedures for servicing a master cylinder and a brake booster.
- Explain how to service a disc brake assembly.
- Explain how to service a drum brake assembly.
- Describe the procedures for both manual and pressure bleeding of a brake system.
- Cite the safety rules that should be followed when servicing brake systems.
- Correctly answer ASE certification test questions about the diagnosis and repair of brake systems.

Chapter 73: Anti-Lock Brakes, Traction Control, and Stability Control

Objectives Standards:

- Identify the major parts of a typical anti-lock brake system.
- Describe the operation of anti-lock brake systems.
- Compare anti-lock brake design variations.
- Diagnose problems in anti-lock brake systems.
- Repair anti-lock brake systems.
- Describe the purpose and operation of traction control and stability control systems.
- Diagnose and repair traction control and stability control systems.
- Correctly answer ASE certification test questions requiring a knowledge of anti-lock brake systems, traction control systems, and stability control systems.

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- 3.5.9-12.L Interpret laws, regulations, policies, and other factors that impact the development and use of technology.
- 3.5.9-12.3 Strand: Integration of Knowledge, Technologies, and Practices.
- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Focus Anchor/Standard #2:

MATH/SCIENCE

Supporting Anchor/Standards:

- S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.
- S11.A.1.1.3 Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).
- S11.A.2.1.2 Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate and communicate results) applicable to a specific technological design.
- S11.C.2.2.2 Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion
- 3.5.9-12.P Apply a broad range of design skills to a design thinking process.

Connecting Anchor/Standard:

CAREER EDUCATION & WORK

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
- 13.1.11.G Assess the implements of the individualized career plan through the ongoing development of the career portfolio.
- 13.1.11.H Review personal high school plan against current personal career goals and select postsecondary opportunities based upon personal career interests.
- 13.3.11.A Evaluate personal attitudes and work habits that support career retention and advancement.

Instructional Activities:

- K-W-L with a twist
- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills:

The students will review the following skills from Level 2 – Brakes:

- The student will accurately document customer information, vehicle identifying details, customer concerns, related service history, and the cause and correction of issues.
- The student will ensure proper communication of vehicle concerns and service requirements in work orders.
- The student will identify common brake system issues such as poor stopping, noise, vibration, or pedal pulsation.
- The student will assess the situation to determine necessary action for brake system concerns, using diagnostic skills.
- The student will use service manuals, technical service bulletins, and vehicle-specific information to diagnose brake system issues.
- The student will identify service precautions and follow manufacturer recommendations when addressing brake system concerns.
- The student will identify major vehicle components using vehicle identification numbers (VIN) and other component identifiers.
- The student will ensure correct identification and traceability of components for service or replacement.
- The student will use proper tools to measure brake pedal height, travel, and free play (as applicable).
- The student will determine necessary action based on measurements and diagnose possible concerns.
- The student will inspect the master cylinder for internal and external leaks and verify its proper operation.
- The student will determine necessary corrective actions based on inspection results.
- The student will safely remove the master cylinder, bench bleed, and reinstall it while ensuring proper alignment and function.

- The student will inspect brake lines, flexible hoses, and fittings for signs of wear, leaks, dents, kinks, rust, cracks, or bulging.
 - The student will tighten loose fittings and supports, and determine necessary corrective actions.
 - The student will properly replace brake lines, hoses, and fittings while adhering to manufacturer specifications.
 - The student will ensure secure connections and leak-free operation after installation.
 - The student will fabricate brake lines using the proper material, flaring procedures (double flare and ISO types), and tools.
 - The student will ensure fabricated lines meet specifications and are leak-free.
 - The student will select the appropriate brake fluid for the vehicle.
 - The student will safely handle, store, and fill brake fluids to the proper level without contamination.
 - The student will inspect brake warning light systems for functionality.
 - The student will replace faulty components to restore system operation.
 - The student will perform brake system bleeding and flushing procedures to remove air and contaminants, ensuring optimal brake system performance.
 - The student will identify issues such as poor stopping, noise, vibration, pulling, grabbing, dragging, or pedal pulsation in the brake system.
 - The student will diagnose and determine necessary actions based on system concerns.
 - The student will remove, clean, inspect, and measure brake drums for wear and damage.
 - The student will determine necessary corrective actions based on inspection results.
 - The student will refinish brake drums to manufacturer specifications and measure the final diameter for correct fitment.
 - The student will inspect, clean, and measure brake shoes, springs, clips, and other brake hardware.
 - The student will lubricate and reassemble components as needed.
 - The student will inspect wheel cylinders for leaks and damage.
 - The student will install replacement wheel cylinders as needed for proper brake function.
 - The student will pre-adjust brake shoes and parking brakes, install brake drums or drum/hub assemblies, and wheel bearings.
 - The student will properly install the wheel, torque lug nuts to specifications, and perform final checks and adjustments for safety and performance.
-
- The student will use diagnostic skills to address issues related to poor stopping, noise, vibration, pulling, grabbing, dragging, or pulsation in the brake system.
 - The student will remove caliper assembly, inspect it for leaks or damage, and determine necessary corrective actions.
 - The student will clean and inspect caliper mounting, slides, and pins for wear and proper function.
 - The student will determine necessary actions based on condition.

- The student will reassemble, lubricate, and reinstall caliper components, ensuring pads are properly seated and the system is leak-free.
- The student will clean, inspect, and measure rotor thickness, lateral runout, and thickness variation.
- The student will determine necessary corrective actions based on measurements.
- The student will safely remove and reinstall brake rotors, ensuring proper fit and operation.
- The student will refinish rotors while on the vehicle, ensuring that they meet thickness specifications and are free of defects.
- The student will refinish rotors off the vehicle and measure final rotor thickness for proper fitment.
- The student will install the wheel, torque the lug nuts, and make necessary final checks and adjustments.
- The student will inspect and test brake pad wear indicator systems for functionality.
- The student will determine necessary action to restore system performance if needed.
- The student will test brake pedal free travel and check the operation of the power assist system.
- The student will verify the vacuum supply to vacuum-type power boosters and troubleshoot as needed.
- The student will remove, clean, inspect, repack, and install wheel bearings, ensuring proper bearing adjustment and seal installation.
- The student will inspect parking brake cables and components for wear, binding, or corrosion.
- The student will clean, lubricate, adjust, or replace components as necessary.
- The student will inspect and test the parking brake system and related indicator light functionality.
- The student will determine necessary corrective action.
- The student will inspect and verify brake stop light operation.
- The student will diagnose and correct any issues with the brake light system.
- The student will remove, inspect, and replace wheel bearings and races, ensuring proper installation and adjustment.
- The student will inspect and replace damaged or worn wheel studs, ensuring proper wheel fitment.
- The student will safely remove and reinstall sealed wheel bearing assemblies, ensuring proper operation and fit.
- The student will identify components of the electronic brake control system and perform inspection for faults or damage.
- The student will determine necessary actions based on inspection findings.
- The student will diagnose issues with the electronic brake control system using diagnostic trouble codes (DTCs) and recommended testing equipment.
- The student will determine and implement necessary corrective actions.
- The student will safely depressurize high-pressure components of the electronic brake control system in accordance with safety protocols.

- The student will perform hydraulic bleeding of the electronic brake control system's circuits, ensuring air removal and proper fluid flow.
- The student will identify and inspect components of the traction control and vehicle stability control systems, ensuring proper functionality.

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)
- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
- Taking Tests in Alternate Setting (or if requested)
- Drill and Practice (Repetition of Material)
- Copy of Teacher/Student Notes/Skeleton Notes
- Use of Daily Planner/Assignment Book (monitor use of)
- Positive Reinforcement
- Have Student Repeat Directions
- Positive Reinforcement
- Provide Frequent Feedback
- Regular Notebook Check
- Communication Regarding Behavior & Consequences (PBS)
- Clear Language for Directions
- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills
- Provide Verbal and Written Directions
- All Vocabulary to be Defined Before Testing

Safety:

- Safety glasses must be worn at all times by students in the Auto Shop.
- Students must always wear their work uniform in the Auto Shop.
- Work shoes must be always worn by students in the Auto Shop.
- Students will follow the safety rules as they apply to each tool or piece of equipment.
- Students will conduct themselves in a safe and professional manner.

Assessment:

THEORY EVALUATION

- Traditional tests - multiple choice, matching, true/false, short answer completion
- Traditional quizzes - multiple choice, matching, true/false, short answer completion
- Graded homework
- Graded math practice assignments
- Graded reading assignments
- Notebook checks
- Class oral responses
- Business and industry credentialing tests
- Exit slips/timecards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
- The teacher will assess students' understanding through discussions, quizzes, or practical demonstrations.
- The teacher will ensure scores are given on projects when they are completed.
- The teacher will observe and score when a job is completed.
- The teacher will observe and assess the quality of work being done by a student on an assigned job.
- The teacher will determine if students use the appropriate terminology for particular jobs.
- The teacher will determine if the student has the skills to work independently on an assigned job.
- The teacher will evaluate students' ability to maintain their work areas throughout the duration of the course.
- The teacher will evaluate student communication in group activities and projects.
- The teacher will evaluate that the PA Program of Study tasks are being achieved as expected.
- The teacher will evaluate the students' class participation.

- The teacher will assess the students' ability to work within a team when teamwork is necessary.
- The teacher will evaluate the student's responsibility to complete work logs as expected.
- The teacher will evaluate if students work without hindering other students' progress.
- The teacher will assess if students stay on task in accordance with the job expectation.
- The teacher will observe students' ability to track tools, parts, and equipment efficiently.
- The teacher will account if students are prepared for class each day.
- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5
- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- Electude Learning Management System (LMS)
- ASE Certification
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: ELECTRICAL/ELECTRONIC SYSTEMS

Number: 700 **Days:** 28

Description/Objectives:

The students will review the knowledge and ability to repair electrical and electronic components on a vehicle. Written examinations, worksheets, review questions and evaluation of psychomotor (hands-on) skills shall be used to evaluate the student's knowledge and ability based on ASE and NOCTI Guidelines.

Tasks:

PA701 - Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.

PA702 - Identify and interpret electrical/electronic system concern; determine necessary action.

PA703 - Research applicable vehicle and service information, such as electrical/electronic system operation, vehicle service history, service precautions, and technical service bulletins.

PA704 - Locate and interpret vehicle and major component identification numbers.

PA705 - Use wiring diagrams during diagnosis of electrical circuit problems.

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PA706 - Check electrical circuits with a test light; determine necessary action.

PA707 - Check electrical circuits using fused jumper wires; determine necessary action.

PA708 - Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action.

PA709 - Measure and diagnose the cause(s) of excessive parasitic draw; determine necessary action.

PA710 - Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.

PA711 - Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; perform necessary action.

PA712 - Remove and replace terminal end from connector; replace connectors and terminal ends.

PA713 - Repair wiring harness (including CAN/BUS systems).

PA714 - Perform solder repair of electrical wiring.

PA715 - Identify location of hybrid vehicle high voltage circuit disconnect (service plug) location and safety procedures.

PA716 - Perform battery state-of-charge test; determine necessary action.

PA717 - Perform battery capacity test; confirm proper battery capacity for vehicle application; determine necessary action.

PA718 - Maintain or restore electronic memory functions.

PA719 - Inspect, clean, fill, and/or replace battery, battery cables, connectors, clamps, and hold-downs.

PA720 - Perform battery charge.

PA721 - Start a vehicle using jumper cables or an auxiliary power supply.

PA722 - Identify electronic modules, security systems, radios, and other accessories that require reinitialization or code entry following battery disconnect.

PA723 - Perform starter current draw tests; determine necessary action.

PA724 - Perform starter circuit voltage drop tests; determine necessary action.

PA725 - Inspect and test starter relays and solenoids; determine necessary action.

PA726 - Remove and install starter in a vehicle.

PA727 - Inspect and test switches, connectors, and wires of starter control circuits; perform necessary action.

PA728 - Differentiate between electrical and engine mechanical problems that cause a slow-crank or no-crank condition.

PA729 - Perform charging system output test; determine necessary action.

PA730 - Diagnose charging system for the cause of undercharge, no-charge, and overcharge conditions.

PA731 - Inspect, adjust, or replace generator (alternator) drive belts, pulleys, and tensioners; check pulley and belt alignment.

PA732 - Remove, inspect, and install generator (alternator).

PA733 - Perform charging circuit voltage drop tests; determine necessary action.

PA734 - Diagnose the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action.

PA735 - Inspect, replace, and aim headlights and bulbs.

PA736 - Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action.

PA737 - Inspect and test gauges and gauge sending units for cause of abnormal gauge readings; determine necessary action.

PA738 - Inspect and test connectors, wires, and printed circuit boards of gauge circuits; determine necessary action.

PA739 - Diagnose the cause of incorrect operation of warning devices and other driver information systems; determine necessary action.

PA740 - Diagnose incorrect horn operation; perform necessary action.

PA741 - Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action.

PA742 - Diagnose incorrect washer operation; perform necessary action.

PA743 - Diagnose incorrect operation of motor-driven accessory circuits; determine necessary action.

PA745 - Disarm and enable the airbag system for vehicle service.

PA746 - Remove and reinstall door panel.

Chapter 8: Basic Electricity and Electronics

Objectives Standards:

- Explain the principles of electricity.
- Describe the action of basic electric circuits.
- Compare voltage, current, and resistance.
- Describe the principles of magnetism and magnetic fields.
- Identify basic electric and electronic terms and components.
- Explain different kinds of automotive wiring.
- Perform fundamental electrical tests.
- Correctly answer ASE certification test questions that require a basic understanding of electricity and electronics.

Chapter 28: Automotive Batteries

Objectives Standards:

- Explain the operating principles of a lead-acid battery.
- Describe the basic parts of an automotive battery.
- Compare conventional and maintenance-free batteries.
- Explain how temperature and other factors affect battery performance.
- Describe safety practices that should be followed when working with batteries.
- Correctly answer ASE certification test questions that require a basic knowledge of automotive batteries.

Chapter 29: Battery Testing and Service

Objectives Standards:

- Visually inspect a battery for obvious problems.
- Perform common battery tests.
- Clean a battery case and terminals.
- Charge a battery.
- Jump-start a car using a second battery.
- Replace a defective battery.
- Describe safety practices to follow when testing and servicing batteries. Correctly answer ASE certification test questions on battery service.

Chapter 30: Starting System Fundamentals

Objectives Standards:

- Explain the principles of an electric motor.
- Describe the construction and operation of a starting motor.
- Sketch a simple starting system circuit.
- Explain the operation of solenoids.
- List the functions of the main starter drive parts.
- Describe starter drive operation.
- Compare different types of starting motors.
- Describe starting system safety features.
- Correctly answer ASE Certification test questions that require a knowledge of starting system fundamentals.

Chapter 31: Starting System Testing and Repair

Objectives Standards:

- Diagnose common starting system troubles.
- Make orderly starting system tests.
- Remove and replace a starting motor.
- Explain typical procedures for a starting motor rebuild.
- Adjust a neutral safety switch.
- Describe the safety practices that should be followed when testing or repairing a starting system. Correctly answer ASE certification test questions on starting system diagnosis, service, and repair.

Chapter 32: Charging System Fundamentals

Objectives Standards:

- List the basic parts of a charging system.
- Explain charging system operation.
- Describe the construction of major charging system components.
- Compare alternator and voltage regulator design differences.
- Explain charging system indicators.
- Describe safety practices to follow when working with charging systems.
- Correctly answer ASE certification test questions that require a knowledge of charging system fundamentals.

Chapter 33: Charging System Diagnosis, Testing, and Repair

Objectives Standards:

- Diagnose charging system troubles.
- Inspect a charging system.
- Test charging system output with a voltmeter or a load tester.
- Remove, test, repair, and replace an alternator.
- Adjust an alternator belt.
- Remove and replace a voltage regulator.
- Describe safety practices to follow when testing or repairing a charging system.
- Correctly answer ASE certification test questions on charging system diagnosis and repair.

Chapter 36: Lights, Instrumentation, Wipers, and Horns-Operation and Service

Objectives Standards:

- Explain the operating principles of automotive light, wiper, and horn systems.
- Diagnose problems in light, wiper, and horn systems.
- Summarize automatic light and wiper systems.
- Replace burned-out bulbs.
- Explain how to aim headlights.
- Describe the safety practices to follow when working with light, wiper, and horn systems.
- Explain both analog and digital instrumentation.
- Summarize how to remove and service an instrument cluster.
- Correctly answer ASE certification test questions on light, instrumentation, wiper, and horn systems.

Chapter 37: Sound Systems and Power Accessories (Optional Time Permitting)

Objectives Standards:

- Describe the operating principles of a radio.
- Explain the basic difference between AM and FM radios.
- Diagnose basic sound system problems.
- Explain the operation and service of power windows.
- Sketch a rear window defogger circuit.
- Describe and repair a power lock system.
- Summarize the operation and testing of a speed control system.
- Describe safety practices that must be followed when working with electrical accessory circuits. Correctly answer ASE certification test questions on the service of sound systems and power accessories.

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- 3.5.9-12.L Interpret laws, regulations, policies, and other factors that impact the development and use of technology.
- 3.5.9-12.3 Strand: Integration of Knowledge, Technologies, and Practices.

- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Focus Anchor/Standard #2:

MATH/SCIENCE

Supporting Anchor/Standards:

- S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.
- S11.A.1.1.3 Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).
- S11.A.2.1.2 Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate and communicate results) applicable to a specific technological design.
- S11.C.2.2.2 Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion
- 3.5.9-12.P Apply a broad range of design skills to a design thinking process.

Connecting Anchor/Standard:

Career Education & Work

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
- 13.1.11.G Assess the implements of the individualized career plan through the ongoing development of the career portfolio.
- 13.1.11.H Review personal high school plan against current personal career goals and select postsecondary opportunities based upon personal career interests.
- 13.3.11.A Evaluate personal attitudes and work habits that support career retention and advancement.

Instructional Activities:

- K-W-L with a twist

- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills:

The students will review the following skills from Level 2 – Electrical/Electronic Systems:

- The student will accurately gather customer information, vehicle identification numbers (VIN), and service history to complete work orders.
- The student will record customer concerns and document the observed symptoms of vehicle issues.
- The student will analyze and document the cause of vehicle issues and the corrective action taken.
- The student will organize and file work orders, ensuring that all necessary details (service history, cause, correction) are included.
- The student will use diagnostic tools and visual inspection to identify issues in electrical/electronic systems.
- The student will interpret diagnostic trouble codes (DTC) and symptoms to determine necessary actions.
- The student will determine whether an issue is related to electrical components, wiring, or external factors.
- The student will access vehicle manufacturer databases to research system operations and technical specifications.
- The student will review and apply technical service bulletins and vehicle service history to guide diagnosis and repairs.
- The student will identify and interpret manufacturer recommendations and safety precautions relevant to repairs.
- The student will identify and record vehicle and component identification numbers (VIN, engine numbers) accurately.
- The student will use identification numbers to cross-reference parts and ensure correct replacement or service.
- The student will access and interpret wiring diagrams to identify the layout of electrical circuits.

- The student will apply knowledge of wiring diagrams to troubleshoot electrical circuit issues and find the root cause.
- The student will properly use a test light to check for voltage at specified points in an electrical circuit.
- The student will determine circuit continuity and diagnose faults based on test results (e.g., shorts, open circuits).
- The student will safely use fused jumper wires to test the functionality of electrical circuits.
- The student will determine appropriate action (e.g., repair, replace) based on test results from jumper wires.
- The student will use diagnostic tools to locate electrical faults such as shorts, grounds, or open circuits.
- The student will determine the correct course of action to repair or replace faulty components based on diagnostic results.
- The student will use a multimeter to measure current draw and diagnose excessive parasitic draw.
- The student will identify the source of the parasitic draw and recommend corrective action, such as component repair or replacement.
- The student will inspect fusible links, circuit breakers, and fuses for damage or wear.
- The student will test these components and replace as necessary based on test results.
- The student will perform visual and functional tests on switches, connectors, relays, solenoids, and other components.
- The student will identify faulty components and replace or repair as necessary.
- The student will safely remove and replace terminal ends on electrical connectors.
- The student will ensure proper connection and secure fitting after replacement to avoid future issues.
- The student will diagnose issues in the wiring harness, including CAN/BUS systems, and make necessary repairs.
- The student will properly reassemble and secure the repaired wiring harness.
- The student will use proper soldering techniques to repair electrical wiring.
- The student will ensure secure, reliable solder joints that meet industry standards for conductivity and safety.
- The student will accurately locate the high voltage circuit disconnect (service plug) on hybrid vehicles.
- The student will follow safety procedures when working with high-voltage circuits to avoid accidents.
- The student will use appropriate tools to test the battery's state of charge.
- The student will analyze test results and determine whether the battery needs charging or replacement.
- The student will perform battery capacity tests to ensure the battery can handle the vehicle's electrical load.
- The student will recommend corrective action, such as battery replacement, if capacity is insufficient.

- The student will follow procedures to maintain or restore electronic memory functions (e.g., radio settings, vehicle preferences).
- The student will utilize appropriate tools or methods to reset or restore settings after power loss.
- The student will inspect the battery, cables, and connectors for wear, corrosion, or damage.
- The student will clean terminals, replace cables, or secure the battery and hold-downs to ensure proper functioning.
- The student will safely charge a vehicle battery using an appropriate charging device.
- The student will monitor the charging process and ensure the battery is properly charged without overcharging.
- The student will properly connect jumper cables or an auxiliary power supply to start a vehicle.
- The student will follow safety procedures when jump-starting vehicles to avoid damage to electrical systems.
- The student will recognize which vehicle components require reinitialization or code entry after a battery disconnect.
- The student will safely reset or reprogram electronic modules and accessories as needed.
- The student will use a clamp meter to measure the starter motor's current draw during startup.
- The student will analyze the test results and determine if the starter motor needs repair or replacement.
- The student will conduct a voltage drop test on the starter circuit to check for resistance.
- The student will determine corrective action based on test results, such as replacing wiring or connectors.
- The student will inspect and test starter relays and solenoids for proper operation.
- The student will diagnose and replace faulty relays or solenoids as necessary.
- The student will safely remove and install the starter motor, ensuring correct alignment and torque specifications.
- The student will reconnect electrical connections and test the starter for proper operation.
- The student will inspect switches, connectors, and wiring for continuity and proper operation.
- The student will replace or repair faulty components in the starter control circuit.
- The student will use diagnostic tools to differentiate between electrical and mechanical issues.
- The student will accurately diagnose and repair the underlying issue causing the slow-crank or no-crank condition.
- The student will conduct a charging system output test to verify alternator performance.
- The student will analyze test results and determine whether the alternator or associated components require replacement.

- The student will diagnose and identify the cause of charging system issues such as undercharging or overcharging.
- The student will determine the necessary course of action, including repair or replacement of alternators, voltage regulators, or other components.
- The student will inspect generator drive belts, pulleys, and tensioners for wear or damage.
- The student will adjust or replace components as needed to ensure proper charging system operation.
- The student will safely remove and install the alternator, ensuring proper alignment and connection.
- The student will test the new alternator to confirm proper operation.
- The student will perform voltage drop tests on charging circuit wiring to identify any resistance.
- The student will recommend repairs based on test results to restore proper charging functionality.
- The student will use diagnostic tools to assess the cause of lighting issues in the vehicle.
- The student will diagnose and repair the source of light problems, such as faulty bulbs, wiring, or switches.
- The student will inspect and replace headlights and bulbs to ensure proper illumination.
- The student will properly aim headlights according to manufacturer specifications to ensure road safety.
- The student will inspect turn signal and hazard light circuits for issues.
- The student will diagnose the root cause of the malfunction and take corrective actions.
- The student will test gauges and sending units for proper operation.
- The student will diagnose and repair the cause of abnormal readings in gauges (e.g., oil pressure, temperature).
- The student will inspect and test gauge circuit components for continuity and function.
- The student will repair or replace faulty connectors, wires, or circuit boards to restore proper gauge function.
- The student will inspect warning systems for proper function and diagnose faulty components.
- The student will perform necessary repairs or replacements to restore proper operation of warning devices and driver information systems.
- The student will test the vehicle's horn for proper function.
- The student will diagnose the cause of malfunction and repair or replace faulty components.
- The student will inspect and diagnose issues with wiper operation, including speed control and park functionality.
- The student will perform necessary repairs or replace faulty components in the wiper system.
- The student will inspect and diagnose issues with the vehicle's washer system.

- The student will repair or replace components to restore proper washer operation.
- The student will identify issues with motor-driven accessories such as fans, seats, and windows.
- The student will diagnose and perform corrective actions to restore proper accessory operation.
- The student will safely disarm and enable the vehicle's airbag system following manufacturer procedures.
- The student will confirm that the airbag system is correctly reset before the vehicle is returned to service.
- The student will safely remove and reinstall vehicle door panels without damaging trim or internal components.
- The student will ensure proper alignment and reattach components such as switches and handles

Special Adaptations:

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- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)
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- Copies of Text for Home
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- Opportunities for Repeated Practice of MATH Skills
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- The teacher will determine if students use the appropriate terminology for particular jobs.

- The teacher will determine if the student has the skills to work independently on an assigned job.
- The teacher will evaluate students' ability to maintain their work areas throughout the duration of the course.
- The teacher will evaluate student communication in group activities and projects.
- The teacher will evaluate that the PA Program of Study tasks are being achieved as expected.
- The teacher will evaluate the students' class participation.
- The teacher will assess the students' ability to work within a team when teamwork is necessary.
- The teacher will evaluate the student's responsibility to complete work logs as expected.
- The teacher will evaluate if students work without hindering other students' progress.
- The teacher will assess if students stay on task in accordance with the job expectation.
- The teacher will observe students' ability to track tools, parts, and equipment efficiently.
- The teacher will account if students are prepared for class each day.
- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5
- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- Electude Learning Management System (LMS)
- ASE Certification
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: ENGINE PERFORMANCE

Number: 800 **Days:** 28

Description/Objectives:

The student will review the systems and the principles necessary for the repair and maintenance of engine performance related issues. This shall include fuel, ignition and computer related systems. Written examinations, worksheets, review questions and evaluation of psychomotor (hands-on) skills shall be used to evaluate the student's knowledge and ability based on ASE and NOCTI Guidelines.

Tasks:

PA801 - Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.

PA802 - Identify and interpret engine performance concern; determine necessary action.

PA803 - Research applicable vehicle and service information, such as engine management system operation, vehicle service history, service precautions, and technical service bulletins.

PA804 - Locate and interpret vehicle and major component identification numbers.

PA805 - Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.

PA806 - Diagnose abnormal engine noise or vibration concerns; determine necessary action.

PA807 - Diagnose abnormal exhaust color, odor, and sound; determine necessary action.

PA808 - Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.

PA809 - Perform cylinder power balance test; determine necessary action.

PA810 - Perform cylinder cranking and running compression tests; determine necessary action.

PA811 - Perform cylinder leakage test; determine necessary action.

PA812 - Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns; determine necessary action.

PA813 - Verify engine operating temperature; determine necessary action.

PA813 - Verify engine operating temperature; determine necessary action.

PA814 - Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action.

PA815 - Verify correct camshaft timing.

PA816 - Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.

PA817 - Diagnose the causes of emissions or drivability concerns with stored or active diagnostic trouble codes; obtain, graph, and interpret scan tool data.

PA818 - Access and use service information to perform step-by-step diagnosis.

PA819 - Perform active tests of actuators using a scan tool; determine necessary action.

PA820 - Describe the importance of running all OBDII monitors for repair verification.

PA821 - Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor drivability, spark knock, power loss, poor mileage, and emissions concerns; determine necessary action.

PA822 - Inspect and test ignition primary and secondary circuit wiring and solid state components; test ignition coil(s); perform necessary action.

PA823 - Inspect and test crankshaft and camshaft position sensor(s); perform necessary action.

PA824 - Inspect, test, and/or replace ignition control module, powertrain/engine control module; reprogram as necessary.

PA825 - Diagnose hot or cold no-starting, hard starting, poor drivability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems; determine necessary action.

PA826 - Inspect and test fuel pumps and pump control systems for pressure, regulation, and volume; perform necessary action.

PA827 - Replace fuel filters.

PA828 - Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air.

PA830 - Verify idle control operation.

PA831 - Inspect the integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shield(s); perform necessary action.

PA832 - Diagnose oil leaks, emissions, and drivability concerns caused by the positive crankcase ventilation (PCV) system; determine necessary action.

PA833 - Inspect, test and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action.

PA834 - Diagnose emissions and drivability concerns caused by the exhaust gas recirculation (EGR) system; determine necessary action.

PA835 - Inspect, test, service and replace components of the EGR system, including EGR tubing, exhaust passages, vacuum/pressure controls, filters and hoses; perform necessary action.

PA836 - Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; perform necessary action.

PA837 - Inspect and test mechanical components of secondary air injection systems; perform necessary action.

PA838 - Inspect and test electrical/electronically-operated components and circuits of air injection systems; perform necessary action.

PA839 - Inspect and test catalytic converter efficiency.

PA840 - Diagnose emissions and drivability concerns caused by the evaporative emissions control system; determine necessary action.

PA841 - Inspect and test components and hoses of the evaporative emissions control system; perform necessary action.

PA842 - Interpret diagnostic trouble codes (DTCs) and scan tool data related to the emissions control systems; determine necessary action.

PA843 - Remove and replace timing belt; verify correct camshaft timing.

PA844 - Remove and replace thermostat and gasket/seal.

PA845 - Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action.

PA846 - Perform engine oil and filter change.

Chapter 11: Engine Fundamentals

Objectives Standards:

- Identify the major parts of a typical automotive engine.
- Describe the four-stroke cycle.
- Define common engine terms.
- Explain the basic function of the major parts of an automotive engine.
- Cite and demonstrate safe working practices related to engines.
- Correctly answer ASE certification test questions that require knowledge of the basic operation of piston engines.

Chapter 12: Engine Design Classifications

Objectives Standards:

- Describe basic automotive engine classifications.
- Compare gasoline and diesel engines.
- Contrast combustion chamber designs.
- Discuss alternative engine types.
- Compare two- and four-stroke cycle engines.
- Correctly answer ASE certification test questions that require a knowledge of engine classifications and design differences.

Chapter 13: Engine Top End Construction

Objectives Standards:

- Describe the design and construction of an engine cylinder head.
- Explain umbrella and O-ring type oil seals.
- Explain the purpose of valve spring shims, rotators, stem caps, and spring shields.
- Describe the construction and operation of a camshaft.
- Explain hydraulic and mechanical lifters.
- Describe different types of rocker arm assemblies.
- Explain the construction and design of intake and exhaust manifolds.
- Describe safety practices used when working on engine top end components.
- Answer ASE certification test questions that require a knowledge of engine top end construction.

Chapter 14: Engine Bottom End Construction

Objectives Standards:

- Compare the construction of different types of cylinder blocks.
- Explain how piston construction affects engine operation.
- Describe piston ring variations.
- Explain the construction of engine bearings.
- Compare design variations of different engine bottom end components.
- Explain safe practices when working with engine bottom end components.
- Correctly answer ASE certification test questions on engine bottom end construction.

Chapter 39: Cooling System Fundamentals

Objectives Standards:

- Summarize the functions of a cooling system.
- Explain the operation and construction of major cooling system components.
- Compare cooling system design variations.
- Explain the importance of antifreeze.
- Discuss safety procedures to follow when working with cooling systems.
- Correctly answer ASE certification test questions on cooling system construction and operation.

Chapter 40: Cooling System Testing, Maintenance, and Repair

Objectives Standards:

- List common cooling system problems and their symptoms.
- Describe the most common causes of system leakage, overheating, and overcooling.
- Perform a combustion leak test and a system pressure test.
- Check the major parts of a cooling system for proper operation.
- Replace faulty cooling system components.
- Drain, flush, and refill a cooling system.
- Describe safe working practices to use when testing, maintaining, or repairing a cooling system. Correctly answer ASE certification test questions on cooling system troubleshooting and repair.

Chapter 41: Lubrication System Fundamentals

Objectives Standards:

- List the basic parts of a lubrication system.
- Summarize the operation of a lubrication system.
- Describe the construction of lubrication system parts.
- Compare different lubrication system designs.
- Explain the characteristics and ratings of engine oil.
- Discuss safety procedures that should be followed when working with the lubrication system. Correctly answer ASE certification test questions that require a knowledge of lubrication system construction and operation.

Chapter 42: Lubrication System Testing, Service, and Repair

Objectives Standards:

- List common lubrication system problems and symptoms.
- Diagnose lubrication system troubles.
- Measure engine oil pressure.
- Change engine oil and filter.
- Remove and install an oil pan.
- Service an oil pump.
- Test and repair an oil pressure indicating light and gauge.
- Describe safe working practices to use when testing, servicing, or repairing a lubrication system.
- Correctly answer ASE certification test questions on the testing, service, and repair of engine lubrication systems.

Chapter 17: Computer System Fundamentals

Objectives Standards:

- Compare computer systems to the human body's nervous system.
- Describe the input, processing, and output sections of a basic computer system.
- Explain input sensor and output device classifications and operation.
- Summarize computer system signal classifications.
- Sketch a block diagram for a computer system.
- Summarize where computers, control modules, sensors, and actuators are typically located.
- Summarize the flow of data through a computer.

- Explain how a computer uses sensor inputs to determine correct outputs.
- Correctly answer ASE certification test questions that require a knowledge of automotive computer system fundamentals.

Chapter 18: On-Board Diagnostics and Scan Tools

Objectives Standards:

- Discuss the purpose and operation of on-board diagnostic systems. Explain the use of scan tools to simplify reading of trouble codes. Compare OBD I and OBD II system capabilities and procedures.
- Locate the data link connector on most makes and models of cars.
- Activate on-board diagnostics and read trouble codes with and without a scan tool.
- Use a trouble code chart in a service manual or code conversion by a scan tool.
- Erase diagnostic trouble codes.
- Correctly answer ASE certification test questions concerning late-model on-board diagnostics and scan tool use.

Chapter 19: Computer System Service

Objectives Standards:

- Perform a visual inspection of the engine, its sensors, actuators, and the systems they monitor and control.
- Test sensors and their circuits.
- Remove and replace sensors.
- Test and replace actuators.
- Remove and replace a computer.
- Remove and replace a computer PROM.
- Program an EEPROM.
- Demonstrate safe working practices when servicing automotive computers.
- Correctly answer ASE certification test questions on servicing computer system components.

Chapter 20: Automotive Fuels, Gasoline and Diesel Combustion

Objectives Standards:

- Summarize how crude oil is converted into gasoline, diesel fuel, liquefied petroleum gas, and other products.
- Describe properties of gasoline and diesel fuel.
- Explain octane and octane ratings.
- Describe normal and abnormal combustion of gasoline and diesel fuel.
- Summarize the properties of alternative fuels.
- Correctly answer ASE certification test questions on automotive fuels and combustion.

Chapter 21: Fuel Tanks, Pumps, Lines, and Filters

Objectives Standards:

- Define the major parts of a fuel supply system.
- Describe the operation of mechanical and electric fuel pumps.
- Describe the construction and action of air filters.
- Explain the tests used to diagnose problems with fuel pumps, fuel filters, and fuel lines.
- Repair a fuel line or replace a fuel hose.
- Locate and replace fuel filters in both gasoline and diesel fuel systems.
- State safety rules for working on fuel supply systems.
- Correctly answer ASE certification test questions on fuel tanks, fuel pumps, fuel lines, fuel filters, and air filters.

Chapter 22: Gasoline Injection Fundamentals

Objectives Standards:

- List some of the possible advantages of gasoline injection.
- Describe the classifications of gasoline injection.
- Explain the operation of electronic throttle body gasoline injection.
- Explain the operation of electronic multiport gasoline injection.
- Summarize the operation of airflow-sensing, hydraulic-mechanical (continuous), and pressure-sensing gasoline injection systems.
- Compare the various types of gasoline injection systems.
- Correctly answer ASE certification test questions on gasoline injection systems.

Chapter 23: Gasoline Injection Diagnosis and Repair

Objectives Standards:

- Diagnose typical gasoline injection system problems.
- Test a fuel pressure regulator.
- Test both electronic and continuous fuel injectors.
- Explain OBD II testing features used on late-model fuel injection systems.
- Use a service manual when making basic adjustments on gasoline injection systems.
- Cite safety rules for injection system service.
- Correctly answer ASE certification test questions about fuel injection system diagnosis, service, and repair.

Chapter 25: Diesel Injection Fundamentals

Objectives Standards:

- Explain the operating principles of a diesel injection system.
- Summarize the differences between gasoline and diesel engines.
- Describe the major parts of a diesel injection system.
- Compare variations in the design of diesel injection systems.
- Correctly answer ASE certification test questions that require a knowledge of the fundamentals of diesel injection.

Chapter 27: Exhaust Systems, Turbochargers, and Superchargers

Objectives Standards:

- Describe the basic parts of an exhaust system.
- Compare exhaust system design differences.
- Perform exhaust system repairs.
- Explain the fundamental parts of a turbocharging system.
- Describe the construction and operation of a turbocharger and waste gate.
- Remove and replace a turbocharger and waste gate
- Summarize the construction and operation of a supercharging system.
- Demonstrate an understanding of safety procedures for working on exhaust systems, turbochargers, and superchargers.
- Correctly answer ASE certification test questions on exhaust system, turbocharger, and supercharger operation and service.

Chapter 34: Ignition System Fundamentals

Objectives Standards:

- Explain the operating principles of an automotive ignition system.
- Compare contact point, electronic, and computer-controlled ignition systems.
- Describe the function of major ignition system components.
- Explain vacuum, centrifugal, and electronic ignition timing advance.
- Sketch the primary and secondary sections of an ignition system.
- Compare ignition coil, spark plug, and distributor design variations.
- Describe the safety practices that must be followed when working with ignition systems.
- Correctly answer ASE certification test questions that require a knowledge of ignition system fundamentals.

Chapter 35: Ignition System Problems, Testing, and Repair

Objectives Standards:

- Diagnose typical ignition system problems.
- List the symptoms produced by faulty ignition system components.
- Describe common tests used to find ignition system troubles.
- Explain how to replace or repair ignition system parts.
- Summarize contact point and pickup coil adjustments.
- Adjust ignition timing.
- Describe safety practices to follow when testing or repairing an ignition system.
- Correctly answer ASE certification test questions on the diagnosis and repair of ignition systems.

Chapter 38: Hybrid Drive System Operation and Repair

Objectives Standards:

- Identify the major parts of a hybrid drive system.
- Explain the construction and operation of hybrid drive assemblies.
- List the safety measures that must be followed when working on high-voltage hybrid drive systems.
- Use on-board diagnostics to find the source of problems in a hybrid vehicle propulsion system. Identify the most common problems that occur in a hybrid vehicle drive system.
- Perform basic tests to verify hybrid drive trouble codes.
- Safely remove and replace a hybrid battery pack, power control module, power cables, ECUs, and motor-generator assemblies.

Chapter 43: Emission Control Systems

Objectives Standards:

- Define the fundamental terms relating to automotive emission control systems.
- Explain the sources of air pollution.
- Describe the operating principles of emission control systems.
- Compare design differences in emission control systems.
- Explain how a computer or engine control module can be used to operate emission control systems. Summarize how OBD II systems use multiple oxygen sensors to check air-fuel mixture and catalytic converter efficiency.
- Correctly answer ASE certification test questions that require a knowledge of emission control system operation and construction.

Chapter 44: Emission Control System Testing, Service, and Repair

Objectives Standards:

- Explain the use of exhaust gas analyzers.
- Inspect and troubleshoot emission control systems.
- Perform periodic service operations on emission control systems.
- Test individual emission control components.
- Replace or repair major emission control components.
- Demonstrate and practice safe work procedures.
- Correctly answer ASE certification test questions on emission control system testing and service.

Chapter 45: Engine Performance and Driveability

Objectives Standards:

- List the most common engine performance problems.
- Describe the symptoms for common engine performance problems.
- Explain typical causes of engine performance problems.
- Use a systematic approach when diagnosing engine performance problems.
- Correctly answer ASE certification test questions on problems affecting engine performance.

Chapter 46: Advanced Diagnostics

Objectives Standards:

- Use advanced diagnostic techniques to troubleshoot difficult problems.
- Use scan tool snapshot and datastream values to find problems not tripping trouble codes.
- Use a breakout box to measure circuit values.
- Explain the principles of an oscilloscope.
- Summarize how to use waveforms to analyze the operation of sensors, actuators, ECU outputs, and other electrical-electronic devices.
- Evaluate ignition system waveforms.
- Summarize how to use an engine analyzer.

Chapter 47: Engine Tune-Up

Objectives Standards:

- Describe the typical difference between a minor tune-up.
- List the basic steps for an engine tune-up.
- Explain service operations commonly performed during a tune-up.
- List the safety precautions that should be remembered during a tune-up.
- Correctly answer ASE certification test questions on engine tune-up and engine problem diagnosis.

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- 3.5.9-12.L Interpret laws, regulations, policies, and other factors that impact the development and use of technology.
- 3.5.9-12.3 Strand: Integration of Knowledge, Technologies, and Practices.
- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Focus Anchor/Standard #2:

MATH/SCIENCE

Supporting Anchor/Standards:

- S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.

- S11.A.1.1.3 Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).
- S11.A.2.1.2 Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate and communicate results) applicable to a specific technological design.
- S11.C.2.2.2 Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion
- 3.5.9-12.P Apply a broad range of design skills to a design thinking process.

Connecting Anchor/Standard:

CAREER EDUCATION & WORK

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
- 13.1.11.G Assess the implements of the individualized career plan through the ongoing development of the career portfolio.
- 13.1.11.H Review personal high school plan against current personal career goals and select postsecondary opportunities based upon personal career interests.
- 13.3.11.A Evaluate personal attitudes and work habits that support career retention and advancement.

Instructional Activities:

- K-W-L with a twist
- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills:

The students will review the following skills from Level 2 – Engine Performance:

- The student will accurately complete work orders by including all necessary details, such as customer information, vehicle identification, service history, customer concerns, cause, and corrective actions.
- The student will identify and interpret engine performance issues using diagnostic tools, and determine the appropriate corrective actions based on their findings.
- The student will research and interpret vehicle-specific information, including engine management system operations, service history, and technical service bulletins, to assist in diagnosing engine concerns.
- The student will locate and accurately interpret vehicle identification numbers (VIN) and major component IDs to ensure proper identification and correct parts are used in service.
- The student will inspect the engine assembly for any signs of fuel, oil, coolant, or other leaks, and determine the necessary steps for repair or replacement.
- The student will diagnose the source of abnormal engine noise or vibration and determine the necessary corrective actions.
- The student will assess abnormal exhaust conditions such as color, odor, and sound to diagnose potential issues and recommend appropriate actions for correction.
- The student will perform engine vacuum/boost manifold pressure tests to evaluate engine performance and determine corrective actions if needed.
- The student will perform a cylinder power balance test to identify engine performance issues and determine necessary corrective actions.
- The student will perform cylinder cranking and running compression tests to assess engine health and determine the necessary course of action for repair.
- The student will perform cylinder leakage tests and determine corrective actions based on the test results.
- The student will diagnose issues related to engine mechanics, electrical systems, electronics, fuel systems, and ignition systems, and determine the appropriate action for repair.
- The student will verify that the engine is operating within the correct temperature range and determine if any corrective action is needed.
- The student will perform cooling system pressure tests, check the coolant condition, inspect and test components such as the radiator, pressure cap, recovery tank, and hoses, and determine the necessary corrective actions.
- The student will verify and adjust the camshaft timing to ensure proper engine function.
- The student will retrieve and accurately record diagnostic trouble codes (DTCs), OBD monitor status, and freeze frame data, and clear codes when applicable.

- The student will diagnose emissions or drivability concerns using stored or active DTCs, obtain scan tool data, and interpret the results to determine corrective actions.
- The student will access and utilize service information to perform systematic and accurate diagnoses of vehicle issues.
- The student will perform active tests of actuators using a scan tool to verify component function and determine necessary repair actions.
- The student will explain the importance of completing all OBDII monitors to verify repairs and ensure that the vehicle is functioning properly.
- The student will diagnose ignition system problems including no-starting, engine misfire, poor drivability, and emissions concerns, and recommend the necessary corrective actions.
- The student will inspect and test ignition circuit wiring and components, including testing ignition coils, and perform necessary repairs or replacements.
- The student will inspect and test crankshaft and camshaft position sensors, and take corrective action if the sensors are found to be faulty.
- The student will inspect, test, and, if necessary, replace the ignition control module or engine control module, and reprogram the system as required.
- The student will diagnose and determine the necessary actions for various engine performance issues including no-starting, rough idling, engine misfire, and poor drivability.
- The student will inspect and test fuel pumps and control systems for pressure, regulation, and volume, and perform necessary corrective actions.
- The student will replace fuel filters to ensure proper fuel flow and engine performance.
- The student will inspect the throttle body, air induction system, intake manifold, and gaskets for vacuum leaks and unmetered air and address any issues found.
- The student will verify the correct operation of idle control systems and determine necessary actions if issues are identified.
- The student will inspect the exhaust system for any damage or faults and perform repairs or replacements as necessary.
- The student will diagnose issues related to oil leaks, emissions, and drivability concerns caused by the PCV system, and take appropriate corrective action.
- The student will inspect, test, and service the PCV system components, including filters, valves, hoses, and orifices, and take necessary action.
- The student will diagnose emissions and drivability concerns stemming from the EGR system and determine the necessary steps for repair.
- The student will inspect, test, service, and replace components of the EGR system, ensuring they are functioning correctly and meeting emissions standards.
- The student will inspect and test the electrical and electronic components of the EGR system and perform the necessary repairs or replacements.
- The student will inspect and test the mechanical components of secondary air injection systems and take corrective action as needed.
- The student will inspect and test the electrical and electronic components of air injection systems and perform necessary actions for repair.

- The student will inspect and test the catalytic converter's efficiency and determine necessary actions to address inefficiency or failure.
- The student will diagnose emissions and drivability concerns caused by the evaporative emissions control system and recommend corrective actions.
- The student will inspect and test the components and hoses of the evaporative emissions control system and perform necessary corrective actions.
- The student will interpret DTCs and scan tool data related to emissions control systems and determine necessary actions based on the diagnostic results.
- The student will remove and replace the timing belt and verify that the camshaft timing is correctly set.
- The student will remove and replace the thermostat, gasket, or seal, ensuring proper engine cooling system function.
- The student will inspect and test mechanical and electrical fans, fan clutches, air dams, and fan control devices, and perform any necessary repairs or replacements.
- The student will perform engine oil and filter changes to ensure proper engine lubrication and function.

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)
- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
- Taking Tests in Alternate Setting (or if requested)
- Drill and Practice (Repetition of Material)
- Copy of Teacher/Student Notes/Skeleton Notes
- Use of Daily Planner/Assignment Book (monitor use of)
- Positive Reinforcement
- Have Student Repeat Directions
- Positive Reinforcement
- Provide Frequent Feedback
- Regular Notebook Check
- Communication Regarding Behavior & Consequences (PBS)
- Clear Language for Directions
- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills
- Provide Verbal and Written Directions

- All Vocabulary to be Defined Before Testing

Safety:

- Safety glasses must be worn at all times by students in the Auto Shop.
- Students must always wear their work uniform in the Auto Shop.
- Work shoes must be always worn by students in the Auto Shop.
- Students will follow the safety rules as they apply to each tool or piece of equipment.
- Students will conduct themselves in a safe and professional manner.

Assessment:

THEORY EVALUATION

- Traditional tests - multiple choice, matching, true/false, short answer, completion
- Traditional quizzes - multiple choice, matching, true/false, short answer completion
- Graded homework
- Graded math practice assignments
- Graded reading assignments
- Notebook checks
- Class oral responses
- Business and industry credentialing tests
- Exit slips/timecards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
- The teacher will assess students' understanding through discussions, quizzes, or practical demonstrations.
- The teacher will ensure scores are given on projects when they are completed.
- The teacher will observe and score when a job is completed.
- The teacher will observe and assess the quality of work being done by a student on an assigned job.

- The teacher will determine if students use the appropriate terminology for particular jobs.
- The teacher will determine if the student has the skills to work independently on an assigned job.
- The teacher will evaluate students' ability to maintain their work areas throughout the duration of the course.
- The teacher will evaluate student communication in group activities and projects.
- The teacher will evaluate that the PA Program of Study tasks are being achieved as expected.
- The teacher will evaluate the students' class participation.
- The teacher will assess the students' ability to work within a team when teamwork is necessary.
- The teacher will evaluate the student's responsibility to complete work logs as expected.
- The teacher will evaluate if students work without hindering other students' progress.
- The teacher will assess if students stay on task in accordance with the job expectation.
- The teacher will observe students' ability to track tools, parts, and equipment efficiently.
- The teacher will account if students are prepared for class each day.
- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5
- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Extended time to complete the assessment

- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- Electude Learning Management System (LMS)
- ASE Certification
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: AUTOMOTIVE HVAC (Optional)

Number: 900 **Days:** 16

Description/Objectives:

The student will review the operating principles of automotive HVAC systems as well as the environmental impact of refrigerants, as well as common procedures need to acquire an EPA609 certification for A/C repair through MACS. (This section is optional.) Written examinations, worksheets, review questions and evaluation of psychomotor (hands-on) skills shall be used to evaluate the student's knowledge and ability based on ASE and NOCTI Guidelines.

Tasks:

PA901 - Explain the operation of an expansion valve, constant run compressor system.

PA902 - Explain the operation of a capillary tube, cycling compressor system.

PA903 - Explain the environmental impact of leaking R-12 from pre-1996 systems.

PA904 - Explain the difference in R-134A compounds used in modern automobiles and R-12 used in pre-1996 vehicles.

PA905 - Demonstrate the use of a recycling machine to recover refrigerant.

PA906 - Perform a 30 minute static vacuum test for system leakage on an empty system.

PA907 - Demonstrate the use of a halide/electronic leak detector to locate potential leakage.

PA908 - Diagnose a blower speed control issue and determine the cause.

PA909 - Locate and interpret the circuit diagrams for an air conditioning control circuit.

PA910 - Leak test a heater core and determine service procedures.

PA911 - Back-flush a heater core and radiator.

PA912 - Drain, refill and bleed the air from a cooling system.

Chapter 75: Heating and Air Conditioning Fundamentals

Objectives Standards:

- Explain the principles of refrigeration.
- Describe the four cycles of refrigeration.
- Describe the high- and low-pressure sides of an air conditioning system.
- Explain the basic function and construction of each major part of a typical heating and air conditioning system.
- Summarize the operation and interaction of heating, ventilation, and air conditioning systems. Describe safety precautions to be observed when working on heating and air conditioning systems. Correctly answer ASE certification test questions requiring a knowledge of modern heating and air conditioning systems.

Chapter 76: Heating and Air Conditioning Service

Objectives Standards:

- Visually inspect a heating and air conditioning system and locate obvious troubles.
- Diagnose common heating and air conditioning problems.
- Describe the functions and uses of air conditioning test equipment.
- Locate air conditioning and heating system leaks.
- Explain how to replace major heating and air conditioning components.
- Describe the general procedures for evacuating and charging an air conditioning system.
- Demonstrate safe working practices when servicing heating and air conditioning equipment. Correctly answer ASE certification test questions about the diagnosis and repair of heating and air conditioning systems.

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- 3.5.9-12.L Interpret laws, regulations, policies, and other factors that impact the development and use of technology.
- 3.5.9-12.3 Strand: Integration of Knowledge, Technologies, and Practices.
- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Focus Anchor/Standard #2:**MATH/SCIENCE****Supporting Anchor/Standards:**

- S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.
- S11.A.1.1.3 Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).
- S11.A.2.1.2 Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate and communicate results) applicable to a specific technological design.
- S11.C.2.2.2 Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion
- 3.5.9-12.P Apply a broad range of design skills to a design thinking process.

Connecting Anchor/Standard:**Career Education & Work****Supporting Anchor/Standards:**

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
- 13.1.11.G Assess the implements of the individualized career plan through the ongoing development of the career portfolio.
- 13.1.11.H Review personal high school plan against current personal career goals and select postsecondary opportunities based upon personal career interests.
- 13.3.11.A Evaluate personal attitudes and work habits that support career retention and advancement.

Instructional Activities:

- K-W-L with a twist
- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading

- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills:

The students will review the following skills from Level 2 – HVAC:

- The student will explain the function and operation of an expansion valve and constant run compressor system in automotive air conditioning.
- The student will describe the operation of a capillary tube and cycling compressor system in automotive air conditioning.
- The student will explain the environmental impact of refrigerant leakage, specifically R-12, from air conditioning systems in vehicles manufactured before 1996.
- The student will compare and contrast the properties of R-134A refrigerant used in modern automobiles with R-12 refrigerant used in vehicles built before 1996.
- The student will demonstrate how to use a recycling machine to recover refrigerant from an automotive air conditioning system.
- The student will perform a 30-minute static vacuum test on an empty automotive air conditioning system to check for leaks.
- The student will demonstrate how to use a halide or electronic leak detector to locate potential refrigerant leaks in an air conditioning system.
- The student will diagnose a blower speed control issue in an automotive HVAC system and determine the root cause of the problem.
- The student will locate and interpret circuit diagrams related to the air conditioning control circuits in automotive systems.
- The student will perform a leak test on a heater core and determine the appropriate service procedures based on the test results.
- The student will demonstrate the proper technique for back-flushing a heater core and radiator to remove debris or blockages.
- The student will drain, refill, and properly bleed air from an automotive cooling system to ensure proper function.

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)

- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
- Taking Tests in Alternate Setting (or if requested)
- Drill and Practice (Repetition of Material)
- Copy of Teacher/Student Notes/Skeleton Notes
- Use of Daily Planner/Assignment Book (monitor use of)
- Positive Reinforcement
- Have Student Repeat Directions
- Positive Reinforcement
- Provide Frequent Feedback
- Regular Notebook Check
- Communication Regarding Behavior & Consequences (PBS)
- Clear Language for Directions
- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills
- Provide Verbal and Written Directions
- All Vocabulary to be Defined Before Testing

Safety:

- Safety glasses must be worn at all times by students in the Auto Shop.
- Students must always wear their work uniform in the Auto Shop.
- Work shoes must be always worn by students in the Auto Shop.
- Students will follow the safety rules as they apply to each tool or piece of equipment.
- Students will conduct themselves in a safe and professional manner.

Assessment:

THEORY EVALUATION

- Traditional tests - multiple choice, matching, true/false, short answer completion
- Traditional quizzes - multiple choice, matching, true/false, short answer completion
- Graded homework
- Graded math practice assignments
- Graded reading assignments

- Notebook checks
- Class oral responses
- Business and industry credentialing tests
- Exit slips/timecards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
- The teacher will assess students' understanding through discussions, quizzes, or practical demonstrations.
- The teacher will ensure scores are given on projects when they are completed.
- The teacher will observe and score when a job is completed.
- The teacher will observe and assess the quality of work being done by a student on an assigned job.
- The teacher will determine if students use the appropriate terminology for particular jobs.
- The teacher will determine if the student has the skills to work independently on an assigned job.
- The teacher will evaluate students' ability to maintain their work areas throughout the duration of the course.
- The teacher will evaluate student communication in group activities and projects.
- The teacher will evaluate that the PA Program of Study tasks are being achieved as expected.
- The teacher will evaluate the students' class participation.
- The teacher will assess the students' ability to work within a team when teamwork is necessary.
- The teacher will evaluate the student's responsibility to complete work logs as expected.
- The teacher will evaluate if students work without hindering other students' progress.
- The teacher will assess if students stay on task in accordance with the job expectation.
- The teacher will observe students' ability to track tools, parts, and equipment efficiently.
- The teacher will account if students are prepared for class each day.

- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5
- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- Electude Learning Management System (LMS)
- ASE Certification
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: DRIVE TRAINS

Number: 1000 **Days:** 15

Description/Objectives:

The student will review the basic skills necessary to maintain and make basic repairs to the drive train components. Written examinations, worksheets, review questions and evaluation of psychomotor (hands-on) skills shall be used to evaluate the student's knowledge and ability based on ASE and NOCTI Guidelines.

Tasks:

PA1001 Check the fluid level of an automatic transmission.

PA1002 - Drain, change filter, and refill an automatic transmission

PA1003 - Check the fluid level on a manual transmission.

PA1004 - Replace a clutch on a vehicle with a manual transmission.

PA1005 - Bleed a hydraulic clutch system of air.

PA1006 Check the fluid in a transfer case.

PA1007 - Check the fluid in a differential housing. (Rear or 4 wheel drive)

PA1008 - Check gear backlash using a dial indicator on a differential.

PA1009 - Check ring gear back face runout using a dial indicator.

PA1010 - Check gear tooth contact drive and coast side with marking compound and determine corrective action.

Chapter 53: Clutch Fundamentals

Objectives Standards:

- List the basic parts of an automotive clutch.
- Explain the operation of a clutch.
- Describe the construction of major clutch components.
- Compare clutch design differences.
- Explain the different types of clutch release mechanisms.

- Correctly answer ASE certification test questions that require a knowledge of clutch designs and operation.

Chapter 54: Clutch Diagnosis and Repair

Objectives Standards:

- Troubleshoot common clutch problems.
- Describe symptoms of typical clutch troubles.
- Adjust a clutch.
- Remove, repair, and install a clutch.
- Inspect clutch parts for wear and damage.
- Cite safety rules and demonstrate safe work procedures.
- Correctly answer ASE certification test questions on clutch diagnosis and repair.

Chapter 55: Manual Transmission Fundamentals

Objectives Standards:

- Describe gear operating principles.
- Identify and define all of the major parts of a manual transmission.
- Explain the fundamental operation of a manual transmission.
- Trace the power flow through transmission gears.
- Compare the construction of different types of manual transmissions.
- Explain the purpose and operation of a transmission overdrive ratio.
- Correctly answer ASE certification test questions requiring a knowledge of manual transmission operating principles.

Chapter 56: Manual Transmission Diagnosis and Repair (Optional Time Permitting)

Objectives Standards:

- Diagnose common manual transmission problems.
- Remove a standard transmission from a vehicle.
- Disassemble and inspect a manual transmission.
- Assemble a manual transmission.
- Install a manual transmission.
- Adjust manual transmission linkage.
- Cite and observe safety rules for transmission service.

- Correctly answer ASE certification test questions on manual transmission diagnosis and repair.

Chapter 57: Automatic Transmission Fundamentals

Objectives Standards:

- Identify the basic components of an automatic transmission.
- Describe the function and operation of the major parts of an automatic transmission.
- Trace the flow of power through an automatic transmission.
- Explain how an automatic transmission shifts gears.
- Compare the different types of automatic transmissions.
- Correctly answer ASE certification test questions requiring a knowledge of automatic transmission operation and construction.

Chapter 58: Automatic Transmission Service

Objectives Standards:

- Troubleshoot an automatic transmission.
- Explain the types of problems common to an automatic transmission.
- Describe the tests needed to locate automatic transmission problems.
- Change automatic transmission oil and filter.
- Make basic external adjustments on an automatic transmission.
- Locate and repair automatic transmission leaks.
- Cite and observe safety rules while working on transmissions.
- Troubleshoot electronically controlled automatic transmissions.
- Remove and replace an automatic transmission.
- Correctly answer ASE Certification test questions about automatic transmission service.

Chapter 59: Drive Shafts and Transfer Cases

Objectives Standards:

- Identify and describe the parts of a modern drive shaft assembly.
- Explain the functions of a drive shaft.
- Describe the different types of universal joints.
- List the different types of drivelines.

- Identify the major parts of a four-wheel-drive driveline.
- Explain the basic operation of a transfer case.
- Correctly answer ASE certification test questions that require a knowledge of drive shafts and transfer cases.

Chapter 61: Differential and Rear Drive Axle Fundamentals

Objectives Standards:

- Identify the major parts of a rear drive axle assembly.
- List the functions of a rear axle assembly.
- Describe the operation of a differential.
- Explain differential design variations.
- Compare different types of axles.
- Describe the principles of a limited-slip differential.
- Relate rear axle ratios to vehicle performance.
- Correctly answer ASE certification test questions requiring a knowledge of differential and rear drive axle fundamentals.

Chapter 63: Transaxle and Front Drive Axle Fundamentals

Objectives Standards:

- Identify the major parts of a transaxle assembly.
- Explain the operation of a manual transaxle.
- Explain the operation of an automatic transaxle.
- Trace the flow of power through manual and automatic transaxles.
- Describe design differences in transaxles.
- Identify the parts of constant velocity drive axles.
- Compare design differences in CV-joints.
- Correctly answer ASE certification test questions requiring a knowledge of transaxle and front drive axle designs.

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- 3.5.9-12.L Interpret laws, regulations, policies, and other factors that impact the development and use of technology.

- 3.5.9-12.3 Strand: Integration of Knowledge, Technologies, and Practices.
- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Focus Anchor/Standard #2:

MATH/SCIENCE

Supporting Anchor/Standards:

- S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.
- S11.A.1.1.3 Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).
- S11.A.2.1.2 Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate and communicate results) applicable to a specific technological design.
- S11.C.2.2.2 Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion
- 3.5.9-12.P Apply a broad range of design skills to a design thinking process.

Connecting Anchor/Standard:

Career Education & Work

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
- 13.1.11.G Assess the implements of the individualized career plan through the ongoing development of the career portfolio.
- 13.1.11.H Review personal high school plan against current personal career goals and select postsecondary opportunities based upon personal career interests.
- 13.3.11.A Evaluate personal attitudes and work habits that support career retention and advancement.

Instructional Activities:

- K-W-L with a twist

- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills:

The students will review the following skills from Level 2 – Drive Trains:

- The student will check the fluid level of an automatic transmission using the proper method and tools.
- The student will drain, change the filter, and refill an automatic transmission with the correct fluid according to manufacturer specifications.
- The student will check the fluid level of a manual transmission using the appropriate method and tools.
- The student will replace the clutch on a vehicle with a manual transmission, ensuring proper alignment and installation.
- The student will bleed a hydraulic clutch system to remove air and ensure proper clutch operation.
- The student will check the fluid level and condition in a transfer case, ensuring it meets manufacturer specifications.
- The student will check the fluid level and condition in a differential housing (rear or 4-wheel drive) and determine if maintenance is needed.
- The student will check the gear backlash using a dial indicator on a differential and interpret the measurements to assess gear set alignment.
- The student will check the ring gear back face runout using a dial indicator and evaluate the results for proper gear alignment.
- The student will check the gear tooth contact on both the drive and coast sides using marking compound and determine the necessary corrective action if gear wear or misalignment is detected.

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating

- Directions/Comprehension Check (frequent checks for understanding)
- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
- Taking Tests in Alternate Setting (or if requested)
- Drill and Practice (Repetition of Material)
- Copy of Teacher/Student Notes/Skeleton Notes
- Use of Daily Planner/Assignment Book (monitor use of)
- Positive Reinforcement
- Have Student Repeat Directions
- Positive Reinforcement
- Provide Frequent Feedback
- Regular Notebook Check
- Communication Regarding Behavior & Consequences (PBS)
- Clear Language for Directions
- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills
- Provide Verbal and Written Directions
- All Vocabulary to be Defined Before Testing

Safety:

- Safety glasses must be worn at all times by students in the Auto Shop.
- Students must always wear their work uniform in the Auto Shop.
- Work shoes must be always worn by students in the Auto Shop.
- Students will follow the safety rules as they apply to each tool or piece of equipment.
- Students will conduct themselves in a safe and professional manner.

Assessment:

THEORY EVALUATION

- Traditional tests - multiple choice, matching, true/false, short answer completion
- Traditional quizzes - multiple choice, matching, true/false, short answer completion
- Graded homework
- Graded math practice assignments

- Graded reading assignments
- Notebook checks
- Class oral responses
- Business and industry credentialing tests
- Exit slips/timecards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
- The teacher will assess students' understanding through discussions, quizzes, or practical demonstrations.
- The teacher will ensure scores are given on projects when they are completed.
- The teacher will observe and score when a job is completed.
- The teacher will observe and assess the quality of work being done by a student on an assigned job.
- The teacher will determine if students use the appropriate terminology for particular jobs.
- The teacher will determine if the student has the skills to work independently on an assigned job.
- The teacher will evaluate students' ability to maintain their work areas throughout the duration of the course.
- The teacher will evaluate student communication in group activities and projects.
- The teacher will evaluate that the PA Program of Study tasks are being achieved as expected.
- The teacher will evaluate the students' class participation.
- The teacher will assess the students' ability to work within a team when teamwork is necessary.
- The teacher will evaluate the student's responsibility to complete work logs as expected.
- The teacher will evaluate if students work without hindering other students' progress.
- The teacher will assess if students stay on task in accordance with the job expectation.
- The teacher will observe students' ability to track tools, parts, and equipment efficiently.

- The teacher will account if students are prepared for class each day.
- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5
- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- Electude Learning Management System (LMS)
- ASE Certification
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: EMPLOYMENT & LEADERSHIP SKILLS (Skills USA -PDP)

Number: 1100 **Days:** 27

Description/Objectives:

The student will gain job seeking, employment and leadership skills through daily implementation of the task activities list below in conjunction with regular class activities.

Tasks:

PA1101 - Complete a self-assessment checklist and identify individual learning styles.

PA1102 Discover self-motivation and establish short term goals.

PA1103 - Determine individual time-management skills.

PA1104 - Define future occupations and opportunities within the trade area.

PA1105 - Develop an awareness of cultural diversity.

PA1106 - Develop an awareness of equity issues.

PA1107 - Identify components of a professional portfolio.

PA1108 - Develop personal financial skills.

PA1109 - Investigate a career in your field.

PA1110 - Measure and modify short term goals.

PA1111 Identify stress sources.

PA1112 - Demonstrate awareness of governmental agencies, professional organizations and trade unions.

PA1113 - Observe and critique a business meeting and demonstrate business meeting skills.

PA1114 - Demonstrate social etiquette.

PA1115 - Identify customer expectations.

PA1116 - Assemble your employment portfolio. (Resume, task list, learning preference inventory, awards, certifications, newspaper articles, etc.)

PA1117 - Self evaluate your proficiency in program competencies.

PA1118 - Develop and write a good set of work ethics.

PA1119 - Update your career goals.

PA1120 - Explore activities for advanced training and write a plan.

PA1121 Create a marketing plan for your instructional program.

PA1122 - Serve as a volunteer in your community.

PA1123 - Create a business plan for your own business.

PA1124 - Explore supervisory and management roles in a business.

PA1125 - Understand and demonstrate customer service in the workplace.

PA1126 - Identify and apply conflict resolution and problem-solving skills in the workplace.

PA1127 - Demonstrate evaluation skills by observing and critiquing a peer in a constructive manner.

PA1128 - Perform a skill demonstration for the class.

PA1129 Research and propose updates to competency list.

PA1130 - Recognize the reasons for pre-employment screenings and assessments and drug and alcohol abuse in the workplace.

PA1131 - Demonstrate effective communication with others.

Chapter 7: Service Information and Work Orders

Objectives Standards:

- Describe the different types of service manuals.
- Find and use the service manual index and contents sections.
- Explain the different kinds of information and illustrations used in a service manual.
- Describe the three basic types of troubleshooting charts found in service manuals.
- Explain how to use computer-based service information.
- Correctly answer ASE certification test questions concerning service information.

Chapter 80: Career Success

Objectives Standards:

List the traits employers look for in their employees.

Summarize the different systems used to pay technicians.

Explain the types of repair facilities.

Explain how to find job openings in the automotive field.

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- 3.5.9-12.L Interpret laws, regulations, policies, and other factors that impact the development and use of technology.
- 3.5.9-12.3 Strand: Integration of Knowledge, Technologies, and Practices.
- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Focus Anchor/Standard #2:

MATH/SCIENCE

Supporting Anchor/Standards:

- S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.
- S11.A.1.1.3 Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).
- S11.A.2.1.2 Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate and communicate results) applicable to a specific technological design.
- S11.C.2.2.2 Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion
- 3.5.9-12.P Apply a broad range of design skills to a design thinking process.

Connecting Anchor/Standard:

Career Education & Work

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
- 13.1.11.G Assess the implements of the individualized career plan through the ongoing development of the career portfolio.
- 13.1.11.H Review personal high school plan against current personal career goals and select postsecondary opportunities based upon personal career interests.
- 13.3.11.A Evaluate personal attitudes and work habits that support career retention and advancement.

Instructional Activities:

- K-W-L with a twist
- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills:

- The student will complete a self-assessment checklist to identify their individual learning styles and preferences for optimal learning.
- The student will discover self-motivation techniques and establish short-term, achievable goals for personal and professional growth.
- The student will determine and evaluate their individual time-management skills and develop strategies for improving time efficiency.
- The student will research and define potential future occupations and opportunities within the automotive trade area.
- The student will develop an understanding and awareness of cultural diversity in the workplace and its impact on professional interactions.

- The student will develop an awareness of equity issues in the workplace, including fair treatment and opportunity for all individuals.
- The student will identify and understand the key components of a professional portfolio, including resumes, certifications, and achievements.
- The student will develop personal financial management skills, including budgeting, saving, and managing expenses.
- The student will investigate career opportunities in the automotive field, exploring job responsibilities, required skills, and industry expectations.
- The student will measure their progress toward short-term goals and modify them as needed to stay on track for success.
- The student will identify sources of stress in both personal and professional environments and develop strategies to manage stress effectively.
- The student will demonstrate an understanding of the roles of governmental agencies, professional organizations, and trade unions in the automotive industry.
- The student will observe and critique a business meeting, demonstrating an understanding of business meeting etiquette and skills.
- The student will demonstrate appropriate social etiquette in professional settings, including communication and respectful behavior.
- The student will identify customer expectations in the automotive industry and demonstrate the ability to meet or exceed these expectations.
- The student will assemble a comprehensive employment portfolio that includes a resume, task list, learning preference inventory, certifications, awards, and other relevant documents.
- The student will perform a self-evaluation of their proficiency in the program's competencies and identify areas for improvement.
- The student will develop and write a strong set of personal work ethics that align with industry standards and expectations.
- The student will regularly update their career goals based on changing interests, job market trends, and personal growth.
- The student will explore opportunities for advanced training and create a detailed plan for pursuing these activities to further their career.
- The student will develop a marketing plan for promoting their instructional program, including identifying target audiences and strategies for outreach.
- The student will participate in community volunteer activities, demonstrating the value of community service and professional development.
- The student will create a detailed business plan for starting their own automotive-related business, including financial projections, market analysis, and operational plans.
- The student will explore supervisory and management roles within the automotive industry and understand the responsibilities and challenges of these positions.
- The student will demonstrate effective customer service techniques in the workplace, ensuring customer satisfaction and positive experiences.
- The student will identify common workplace conflicts and apply conflict resolution and problem-solving skills to resolve issues effectively.

- The student will demonstrate evaluation skills by observing and providing constructive feedback to a peer in a professional and helpful manner.
- The student will perform a skill demonstration in front of the class, showcasing proficiency in a specific automotive task.
- The student will research industry trends and propose updates to the program's competency list to ensure it remains relevant to current practices.
- The student will recognize the importance of pre-employment screenings, assessments, and drug and alcohol policies in maintaining a safe and productive workplace.
- The student will demonstrate effective communication skills, including verbal, written, and non-verbal communication, to foster positive interactions in the workplace.

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)
- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
- Taking Tests in Alternate Setting (or if requested)
- Drill and Practice (Repetition of Material)
- Copy of Teacher/Student Notes/Skeleton Notes
- Use of Daily Planner/Assignment Book (monitor use of)
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- Have Student Repeat Directions
- Positive Reinforcement
- Provide Frequent Feedback
- Regular Notebook Check
- Communication Regarding Behavior & Consequences (PBS)
- Clear Language for Directions
- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills
- Provide Verbal and Written Directions
- All Vocabulary to be Defined Before Testing

Safety:

- Safety glasses must be worn at all times by students in the Auto Shop.
- Students must always wear their work uniform in the Auto Shop.
- Work shoes must be always worn by students in the Auto Shop.
- Students will follow the safety rules as they apply to each tool or piece of equipment.
- Students will conduct themselves in a safe and professional manner.

Assessment:

THEORY EVALUATION

- Traditional tests - multiple choice, matching, true/false, short answer completion
- Traditional quizzes - multiple choice, matching, true/false, short answer completion
- Graded homework
- Graded math practice assignments
- Graded reading assignments
- Notebook checks
- Class oral responses
- Business and industry credentialing tests
- Exit slips/timecards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
- The teacher will assess students' understanding through discussions, quizzes, or practical demonstrations.
- The teacher will ensure scores are given on projects when they are completed.
- The teacher will observe and score when a job is completed.
- The teacher will observe and assess the quality of work being done by a student on an assigned job.
- The teacher will determine if students use the appropriate terminology for particular jobs.
- The teacher will determine if the student has the skills to work independently on an assigned job.

- The teacher will evaluate students' ability to maintain their work areas throughout the duration of the course.
- The teacher will evaluate student communication in group activities and projects.
- The teacher will evaluate that the PA Program of Study tasks are being achieved as expected.
- The teacher will evaluate the students' class participation.
- The teacher will assess the students' ability to work within a team when teamwork is necessary.
- The teacher will evaluate the student's responsibility to complete work logs as expected.
- The teacher will evaluate if students work without hindering other students' progress.
- The teacher will assess if students stay on task in accordance with the job expectation.
- The teacher will observe students' ability to track tools, parts, and equipment efficiently.
- The teacher will account if students are prepared for class each day.
- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5
- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- Electude Learning Management System (LMS)
- ASE Certification
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: ORIENTATION

Number: 100 **Days:** 10

Description/Objectives:

The students will review the following concepts from Level 1 – Orientation: career opportunities, SP2 certifications expectations for safety, hygiene, customer service and shop management skills.

Tasks:

PA101 - Explain and follow all lab rules.

PA102 - Participate in basic shop management.

PA103 - Participate in parts ordering.

PA104 - Demonstrate auto shop safety and hygiene.

PA105 - Demonstrate the use of service information.

PA106 - Demonstrate proper telephone courtesy.

PA107 - Identify vehicle by: sight, V.I.N. and/or ID tag.

PA108 - Identify career paths within the career and technical education program.

Chapter 1: The Automobile

Objectives Standards:

- Identify and locate the most important parts of a vehicle.
- Describe the purpose of the fundamental automotive systems.
- Explain the interaction of automotive systems.
- Describe major automobile design variations.
- Comprehend later text chapters with a minimum amount of difficulty.
- Correctly answer ASE certification test questions that require a knowledge of the major parts and systems of a vehicle.

Chapter 2: Automotive Careers and ASE Certification

Objectives Standards:

- List the most common automotive careers.
- Describe the type of skills needed to be an auto technician.
- Explain the tasks completed by each type of auto technician.
- Summarize the ASE certification program.

Chapter 7: Service Information and Work Orders

Objectives Standards:

- Describe the different types of service manuals.
- Find and use the service manual index and contents sections.
- Explain the different kinds of information and illustrations used in a service manual.
- Describe the three basic types of troubleshooting charts found in service manuals.
- Explain how to use computer-based service information.
- Correctly answer ASE certification test questions concerning service information.

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- 3.5.9-12.L Interpret laws, regulations, policies, and other factors that impact the development and use of technology.
- 3.5.9-12.3 Strand: Integration of Knowledge, Technologies, and Practices.
- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Focus Anchor/Standard #2:

MATH/SCIENCE

Supporting Anchor/Standards:

- S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.
- S11.A.1.1.3 Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).
- S11.A.2.1.2 Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate and communicate results) applicable to a specific technological design.
- S11.C.2.2.2 Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion
- 3.5.9-12.P Apply a broad range of design skills to a design thinking process.

Connecting Anchor/Standard:

CAREER EDUCATION & WORK

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
- 13.1.11.G Assess the implements of the individualized career plan through the ongoing development of the career portfolio.
- 13.1.11.H Review personal high school plan against current personal career goals and select postsecondary opportunities based upon personal career interests.
- 13.3.11.A Evaluate personal attitudes and work habits that support career retention and advancement.

Instructional Activities:

- K-W-L with a twist
- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills:**The students will review the following skills from Level 1 – Orientation:**

- The student will complete and return all first day paperwork.
- The student will complete and return the auto safety contract.
- The student will gain a thorough understanding of the expectations of the class. The student will order all required shop clothing, including a uniform shirt, and PPE.
- The student will complete SP2 Safety and Pollution Certification with a score of 100%.
- The student will complete the CCAR safety unit of Electude LMS with a score of 100%.
- The student will complete shop equipment assignment and familiarize with all equipment, their safety concerns and locations.
- The student will learn the locations of all fire extinguishers, safety shut off switches and eye wash and chemical shower locations specific to the shop.

- The student will understand and explain the importance of lab safety rules.
- The student will demonstrate the ability to follow all posted and verbal safety instructions.
- The student will recognize safety hazards in the lab environment and take appropriate action to avoid injury.
- The student will practice proper handling and use of equipment to ensure a safe working environment.
- The student will demonstrate knowledge of personal protective equipment (PPE) and wear it when necessary.
- The student will understand the roles and responsibilities in an automotive shop environment.
- The student will assist in maintaining an organized and efficient work area.
- The student will demonstrate the ability to communicate effectively with team members and supervisors.
- The student will participate in inventory management by tracking parts and tools.
- The student will assist in scheduling tasks and prioritizing work to meet deadlines.
- The student will identify the parts ordering process and how to accurately identify needed parts.
- The student will use catalogs, computer systems, or online databases to find part numbers and descriptions.
- The student will demonstrate the ability to communicate effectively with vendors for parts ordering.
- The student will track and record orders to ensure timely delivery of parts.
- The student will summarize the importance of verifying part specifications and compatibility before ordering.
- The student will understand and demonstrate basic auto shop safety procedures, including the proper use of tools and machinery.
- The student will maintain a clean and safe work environment by regularly cleaning and organizing tools and workspaces.
- The student will follow proper waste disposal guidelines for hazardous materials such as oil, brake fluid, and other automotive chemicals.
- The student will demonstrate proper fire safety and emergency response procedures in the shop.
- The student will practice good personal hygiene to minimize contamination of parts and surfaces.
- The student will determine how to access service manuals and technical service bulletins (TSBs) for vehicles.
- The student will demonstrate the ability to read and interpret service information to diagnose vehicle issues.
- The student will use online databases and software to retrieve and analyze vehicle service data.
- The student will accurately follow service guidelines and repair procedures to ensure correct repairs.
- The student will demonstrate the ability to update service records and logs for future reference.

- The student will answer the phone in a professional and courteous manner, using appropriate greetings.
- The student will demonstrate active listening skills and take clear, concise messages.
- The student will use professional language and tone when speaking with clients, vendors, or colleagues over the phone.
- The student will follow up on phone inquiries and requests in a timely and efficient manner.
- The student will handle difficult phone calls calmly and professionally, directing them to the appropriate person when necessary.
- The student will identify key vehicle features by sight, including make, model, year, and other distinguishing characteristics.
- The student will understand the importance and location of a Vehicle Identification Number (V.I.N.) and demonstrate the ability to locate and record it.
- The student will recognize and interpret manufacturer ID tags, labels, and other identifiers commonly found on vehicles.
- The student will use the V.I.N. to retrieve vehicle history, specifications, and recall information.
- The student will cross-reference vehicle identification information with service records to ensure accuracy.
- The student will understand and explain the various career paths within the automotive industry, such as automotive service technician, parts specialist, or service advisor.
- The student will research and identify education and certification requirements for different career opportunities.
- The student will demonstrate knowledge of potential advancement opportunities within the automotive field.
- The student will discuss the skills and competencies required for success in various automotive careers.
- The student will explore industry trends and emerging career opportunities in automotive technology.

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)
- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
- Taking Tests in Alternate Setting (or if requested)
- Drill and Practice (Repetition of Material)
- Copy of Teacher/Student Notes/Skeleton Notes
- Use of Daily Planner/Assignment Book (monitor use of)
- Positive Reinforcement

- Have Student Repeat Directions
- Provide Frequent Feedback
- Regular Notebook Check
- Communication Regarding Behavior & Consequences (PBS)
- Clear Language for Directions
- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills
- Provide Verbal and Written Directions
- All Vocabulary to be Defined Before Testing

Safety:

Student Safety Pledge:

I, _____, understand that the automotive
(Print name)

shop is an inherently dangerous place to work. I pledge to:

1. Follow all school regulations listed in the student handbook at all times.
2. Follow all safety regulations as they pertain to the shop and its equipment at all times.
3. I will wear work clothes as specified, work shoes, and safety glasses at all times.
4. Avoid horseplay or other distracting behavior.
5. Perform all work in a careful and safe manner.
6. Receive instruction and permission before using any equipment.
7. Never work in the shop without the instructor present.
8. Pass a general safety test, as well as demonstrate the safe use of all equipment.

I agree to the above terms of the safety pledge and understand that failure to live up to the terms above is grounds for discipline, as spelled out in the student handbook. Repeat offenses may result in removal from the program. Failure to follow these rules may result in serious injury or death. By signing below, I agree to all the terms above.

(Signed by Student)

(Today's date)

Assessment:

THEORY EVALUATION

- Traditional Tests - multiple choice, matching, true/false, short answer completion
- Traditional Quizzes - multiple choice, matching, true/false, short answer completion
- Graded Homework
- Graded Math practice assignments
- Graded Reading assignments
- Notebook checks
- Class oral responses
- Business and Industry Credentialing Tests
- Exit Slips/Time Cards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
- The teacher will assess students' understanding through discussions, quizzes, or practical demonstrations.
- The teacher will ensure scores are given on projects when they are completed.
- The teacher will observe and score when a job is completed.
- The teacher will observe and assess the quality of work being done by a student on an assigned job.
- The teacher will determine if students use the appropriate terminology for particular jobs.
- The teacher will determine if the student has the skills to work independently on an assigned job.
- The teacher will evaluate students' ability to maintain their work areas throughout the duration of the course.
- The teacher will evaluate student communication in group activities and projects.
- The teacher will evaluate that the PA Program of Study tasks are being achieved as expected.
- The teacher will evaluate the students' class participation.
- The teacher will assess the students' ability to work within a team when teamwork is necessary.
- The teacher will evaluate the student's responsibility to complete work logs as expected.

- The teacher will evaluate if students work without hindering other students' progress.
- The teacher will assess if students stay on task in accordance with the job expectation.
- The teacher will observe students' ability to track tools, parts, and equipment efficiently.
- The teacher will account if students are prepared for class each day.
- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5
- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- Electude Learning Management System (LMS)
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: SAFETY

Number: 200 **Days:** 10

Description/Objectives:

The student will review their knowledge of safety and show they are able to implement general, shop and equipment specific safety rules. The student will also review the location MSDS (Material Safety Data Sheets) forms, fire extinguishers and first aid equipment. The knowledge component shall be evidenced by passing SP-2 certification. Written examinations, worksheets, review questions and evaluation of psychomotor (hands-on) skills shall be used to evaluate the student's ability based on ASE and NOCTI Guidelines.

Tasks:

PA201 - Identify and follow all safety rules.

PA202 - Demonstrate the ability to secure vehicles on jack stands and hydraulic lifts.

PA203 - Demonstrate the ability to safely set-up/shut-down oxygen acetylene welding equipment.

PA204 - Identify chemical safety, 'Right-To-Know Laws' and MSDS (Material Safety Data Sheets).

PA205 - Identify and demonstrate the safe use of hand tools.

PA206 - Identify and demonstrate the safe use of power tools.

PA207 - Identify and demonstrate the safe use of protective clothing and equipment.

PA208 - Identify and demonstrate the safe use of fire protection equipment.

PA209 - Identify and demonstrate the safe use of shop equipment.

PA206 - Identify and demonstrate the safe use of power tools.

PA207 - Identify and demonstrate the safe use of protective clothing and equipment.

PA208 - Identify and demonstrate the safe use of fire protection equipment.

PA209 - Identify and demonstrate the safe use of shop equipment.

PA210 - Explain EPA and OSHA regulations.

Chapter 5: The Auto Shop and Safety

Objectives Standards:

- Describe the typical layout and sections of an auto shop.
- List the types of accidents that can occur in an auto shop.
- Explain how to prevent auto shop accidents.
- Describe general safety rules for the auto shop.

Standards / Assessment Anchors***Focus Anchor/Standard #1:*****LITERACY*****Supporting Anchor/Standards:***

- R11.B.3.3.3 Explain, interpret, and/or analyze graphics and charts, and/or make connections between text and the content of graphics and charts.
- R11.B.3.3.2 Explain, interpret, and/or analyze the author's purpose for decisions about text organization and content.
- R11.B.3.3.1 Explain, interpret, and/or analyze the effect of text organization, including the use of headers.
- R11.B.3.3 Identify, compare, explain, interpret, describe, and analyze how text organization clarifies meaning of nonfictional text.
- R11.B.3.3.4 Identify, explain, compare, interpret, describe, and/or analyze the sequence of steps in a list of directions.

Focus Anchor/Standard #2:**MATH/SCIENCE*****Supporting Anchor/Standards:***

- CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.
- CC.2.1.8.E.4 Estimate irrational numbers by comparing them to rational numbers.
- CC.2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers.
- S11.A.1.3.1 Use appropriate quantitative data to describe or interpret change in systems (e.g., biological indices, electrical circuit data, automobile diagnostic systems data).

- S11.A.2.1.1 Critique the elements of an experimental design (e.g., raising questions, formulating hypotheses, developing procedures, identifying variables, manipulating variables, interpreting data, and drawing conclusions) applicable to a specific experimental design.
- M11.D.2 Represent and/or analyze mathematical situations using numbers, symbols, words, tables/or graphs.
- M11.E.4.1.2 Use probability to predict outcomes.

Connecting Anchor/Standard:

CAREER EDUCATION & WORK

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.

Instructional Activities:

- K-W-L with a twist
- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills

The student will review the following skills from Level 1 – Safety:

- The student will demonstrate understanding of workplace safety guidelines and regulations.

- The student will recognize potential hazards in the automotive repair environment.
- The student will apply appropriate personal safety measures (PPE) at all times.
- The student will follow proper safety protocols when working with vehicles, tools, and equipment.
- The student will identify safety hazards and report them to the appropriate authorities.
- The student will properly inspect hydraulic lifts, and jack stands for functionality before use.
- The student will safely raise and secure vehicles on jack stands following manufacturer's specifications.
- The student will understand and apply weight distribution principles when positioning the vehicle.
- The student will follow procedures for lifting and securing a vehicle safely to prevent accidents.
- The student will safely inspect oxygen and acetylene tanks and regulators for leaks or damage.
- The student will set up oxygen-acetylene welding equipment according to safety guidelines.
- The student will properly adjust pressure settings for the welding process.
- The student will demonstrate the correct procedure for shutting down welding equipment to prevent accidents.
- The student will understand the importance of ventilation and safe working areas when using welding equipment.
- The student will identify hazardous chemicals commonly used in the automotive industry.
- The student will understand and apply 'Right-to-Know' laws regarding hazardous materials.
- The student will demonstrate the ability to read and interpret MSDS (Material Safety Data Sheets) for chemicals.
- The student will use appropriate protective measures (PPE) when handling hazardous materials.
- The student will properly store and dispose of hazardous chemicals as per safety regulations.
- The student will correctly identify various hand tools and their specific uses in automotive repair.
- The student will inspect hand tools for defects before use, ensuring they are in good working condition.
- The student will demonstrate proper handling and technique to avoid accidents and injuries.

- The student will safely store hand tools after use to prevent misuse or damage.
- The student will use tools for their intended purpose to maintain safety standards.
- The student will identify various power tools and their intended functions in the automotive repair process.
- The student will conduct pre-operation inspections to ensure power tools are in safe working order.
- The student will use power tools with appropriate safety precautions (e.g., guards, protective eyewear, hearing protection).
- The student will demonstrate proper handling and control to prevent accidents.
- The student will follow manufacturer instructions for safe operation and maintenance.
- The student will recognize the need for protective clothing and equipment in various automotive repair tasks.
- The student will select and wear appropriate PPE (e.g., gloves, goggles, aprons, ear protection) based on the task.
- The student will inspect PPE for wear and damage before use.
- The student will demonstrate proper care and maintenance of protective gear.
- The student will understand the limitations of PPE and when additional safety equipment is required.
- The student will identify the different types of fire extinguishers and their uses (e.g., Class A, B, C, D, K).
- The student will demonstrate the proper technique for using a fire extinguisher (PASS method: Pull, Aim, Squeeze, Sweep).
- The student will identify fire hazards in the automotive shop and take preventive measures.
- The student will understand emergency fire evacuation procedures.
- The student will demonstrate how to safely handle flammable materials in the workshop.
- The student will identify and describe various shop equipment (e.g., air compressors, diagnostic machines, tire changers).
- The student will demonstrate safe operation and maintenance of shop equipment.
- The student will conduct regular safety checks to ensure equipment is in working order.
- The student will follow correct operating procedures to avoid accidents and injuries.
- The student will understand and follow the manufacturer's instructions for shop equipment usage.

- The student will understand the role of the Environmental Protection Agency (EPA) and Occupational Safety and Health Administration (OSHA) in the workplace.
- The student will explain how EPA regulations govern environmental safety, including waste disposal and emissions standards.
- The student will identify OSHA regulations that apply to automotive shops and maintenance areas.
- The student will follow OSHA's guidelines to ensure a safe working environment.
- The student will understand the reporting procedures for safety violations under EPA and OSHA regulations.

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)
- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
- Taking Tests in Alternate Setting (or if requested)
- Drill and Practice (Repetition of Material)
- Copy of Teacher/Student Notes/Skeleton Notes
- Use of Daily Planner/Assignment Book (monitor use of)
- Positive Reinforcement
- Have Student Repeat Directions
- Positive Reinforcement
- Provide Frequent Feedback
- Regular Notebook Check
- Communication Regarding Behavior & Consequences (PBS)
- Clear Language for Directions
- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills
- Provide Verbal and Written Directions
- All Vocabulary to be Defined Before Testing

Safety:

- The teacher will distribute the Safety Pledge to the students.
- The teacher will have students and parent complete and return the Safety Pledge.
- The teacher will review personal safety rules & clothing requirements with students.
- The teacher will review shop safety rules with students.
- The teacher will review equipment specific safety rules with the students.
- The teacher will review Material Safety Data Sheets (MSDS) / Right to Know with the students.
- The teacher will review fire extinguishers and types of fires with students.
- The teacher will review first aid procedures with students.

Assessment:

THEORY EVALUATION

- Traditional tests - multiple choice, matching, true/false, short answer completion
- Traditional quizzes - multiple choice, matching, true/false, short answer completion
- Graded homework
- Graded math practice assignments
- Graded reading assignments
- Notebook checks
- Class oral responses
- Business and industry credentialing tests
- Exit slips/timcards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
- The teacher will assess students' understanding through discussions, quizzes, or practical demonstrations.
- The teacher will ensure scores are given on projects when they are completed.
- The teacher will observe and score when a job is completed.

- The teacher will observe and assess the quality of work being done by a student on an assigned job.
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- The teacher will evaluate the students' class participation.
- The teacher will assess the students' ability to work within a team when teamwork is necessary.
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- The teacher will evaluate if students work without hindering other students' progress.
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- The teacher will observe students' ability to track tools, parts, and equipment efficiently.
- The teacher will account if students are prepared for class each day.
- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5
- Tests read aloud
- Word bank with no more than 10 options

- Word bank with no more than 5 options
- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- SP2 Pollution Program
- Electude Learning Management System (LMS)
- MSDS (Material Safety Data Sheets) forms
- CCAR Safety Unit
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: CERTIFICATIONS

Number: 400 **Days:** 15

Description/Objectives:

The student will be given the opportunity to receive the following industry certifications. Achieving certification is dependent upon the student's ability to meet the criteria set up by the issuing corporation, governmental agency or bureau. (Many agencies require the student to be a minimum of 18 years of age. As a result, each student may not meet the guidelines.)

Tasks:

PA401 - Prepare to obtain PA Safety Inspection Certification.

PA402 - Prepare to obtain EPA 609 Refrigerant Recovery, Recycling Certification.

PA403 - Prepare to obtain Emission Inspection Certification.

PA404 - S/P-2 Safety & Environmental Protection Certification

PA405 - Pro-Cut Factory Certification - Brake Lathe

PA406 - Prepare to take the NOCTI Written Exam

PA407 - Prepare to take the NOCTI Psychomotor Skills Exam

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- R11.B.3.3.3 Explain, interpret, and/or analyze graphics and charts, and/or make connections between text and the content of graphics and charts.
- R11.B.3.3.2 Explain, interpret, and/or analyze the author's purpose for decisions about text organization and content.
- R11.B.3.3.1 Explain, interpret, and/or analyze the effect of text organization, including the use of headers.

- R11.B.3.3 Identify, compare, explain, interpret, describe, and analyze how text organization clarifies meaning of nonfictional text.
- R11.B.3.3.4 Identify, explain, compare, interpret, describe, and/or analyze the sequence of steps in a list of directions.

Focus Anchor/Standard #2:

MATH/SCIENCE

Supporting Anchor/Standards:

- CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.
- CC.2.1.8.E.4 Estimate irrational numbers by comparing them to rational numbers.
- CC.2.1.HS.F.6 Extend the knowledge of arithmetic operations and apply to complex numbers.
- S11.A.1.3.1 Use appropriate quantitative data to describe or interpret change in systems (e.g., biological indices, electrical circuit data, automobile diagnostic systems data).
- S11.A.2.1.1 Critique the elements of an experimental design (e.g., raising questions, formulating hypotheses, developing procedures, identifying variables, manipulating variables, interpreting data, and drawing conclusions) applicable to a specific experimental design.
- M11.D.2 Represent and/or analyze mathematical situations using numbers, symbols, words, tables/or graphs.
- M11.E.4.1.2 Use probability to predict outcomes.

Connecting Anchor/Standard:

CAREER EDUCATION & WORK

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.

Instructional Activities:

- K-W-L with a twist

- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills:

- The student will understand the Pennsylvania Vehicle Safety Inspection Manual and relevant state regulations.
- The student will identify components of a vehicle that need to be inspected under state law (e.g., brakes, tires, lights, suspension).
- The student will perform a basic safety inspection on a vehicle, including checks on the braking system, lights, exhaust system, tires, and more.
- The student will demonstrate knowledge of proper inspection procedures and protocols.
- The student will understand how to accurately document inspection results and report findings.
- The student will understand the importance of proper refrigerant handling and its environmental impact.
- The student will identify the types of refrigerants used in automotive air conditioning systems and their respective regulations.
- The student will demonstrate the ability to recover, recycle, and recharge refrigerant in an automotive air conditioning system using proper tools and techniques.
- The student will follow safety procedures related to refrigerant recovery and system repairs.
- The student will complete the necessary paperwork and comply with EPA regulations regarding refrigerant handling.
- The student will understand the principles and purpose of emission inspections for vehicles.
- The student will identify the key components and systems involved in vehicle emissions (e.g., exhaust system, catalytic converter, oxygen sensors).

- The student will conduct basic emission testing on vehicles using the required equipment.
- The student will identify and troubleshoot common emission-related problems and suggest potential repairs.
- The student will comply with state and federal environmental regulations when performing emissions testing.
- The student will understand and demonstrate the importance of workplace safety in the automotive repair environment.
- The student will identify potential safety hazards in an automotive service facility and demonstrate proper hazard mitigation strategies.
- The student will understand the principles of environmental protection related to automotive repair, including waste disposal and handling of hazardous materials.
- The student will implement safety protocols such as Personal Protective Equipment (PPE) usage, fire safety procedures, and emergency response techniques.
- The student will apply OSHA and EPA guidelines in daily practices within the automotive shop.
- The student will understand the function and importance of brake lathes in automotive repair.
- The student will demonstrate proper operation of a Pro-Cut brake lathe, including setup and adjustment.
- The student will identify when to use a brake lathe for resurfacing rotors and drums.
- The student will follow safety procedures when operating the brake lathe to avoid injury and ensure quality work.
- The student will complete brake lathe procedures, including measuring, cutting, and finishing brake components to manufacturer specifications.
- The student will review key automotive systems and concepts, including engine performance, brakes, electrical systems, and more.
- The student will demonstrate knowledge of automotive diagnostics, repair, and service techniques.
- The student will prepare for multiple-choice and short-answer questions covering theory, procedures, and industry standards.
- The student will review and practice the relevant terminology, tools, and equipment commonly used in the automotive field.
- The student will use study guides and practice tests to assess readiness for the written exam.
- The student will perform practical tasks in automotive diagnostics, repair, and maintenance, including engine performance, electrical systems, suspension, and brakes.

- The student will demonstrate the ability to use tools and equipment safely and effectively in various automotive tasks.
- The student will complete hands-on exercises such as diagnosing a fault, repairing components, and servicing vehicles according to industry standards.
- The student will follow safety protocols and work in a professional, efficient manner.
- The student will maintain accurate records of performed tasks, including parts used, time spent, and repair procedures.

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)
- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
- Taking Tests in Alternate Setting (or if requested)
- Drill and Practice (Repetition of Material)
- Copy of Teacher/Student Notes/Skeleton Notes
- Use of Daily Planner/Assignment Book (monitor use of)
- Positive Reinforcement
- Have Student Repeat Directions
- Positive Reinforcement
- Provide Frequent Feedback
- Regular Notebook Check
- Communication Regarding Behavior & Consequences (PBS)
- Clear Language for Directions
- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills
- Provide Verbal and Written Directions
- All Vocabulary to be Defined Before Testing

Safety:

- Safety glasses must be worn at all times by students in the Auto Shop.
- Students must always wear their work uniform in the Auto Shop.

- Work shoes must be always worn by students in the Auto Shop.
- Students will follow the safety rules as they apply to each tool or piece of equipment.
- Students will conduct themselves in a safe and professional manner.

Assessment:

THEORY EVALUATION

- Traditional tests - multiple choice, matching, true/false, short answer completion
- Traditional quizzes - multiple choice, matching, true/false, short answer completion
- Graded homework
- Graded math practice assignments
- Graded reading assignments
- Notebook checks
- Class oral responses
- Business and industry credentialing tests
- Exit slips/timecards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
- The teacher will assess students' understanding through discussions, quizzes, or practical demonstrations.
- The teacher will ensure scores are given on projects when they are completed.
- The teacher will observe and score when a job is completed.
- The teacher will observe and assess the quality of work being done by a student on an assigned job.
- The teacher will determine if students use the appropriate terminology for particular jobs.
- The teacher will determine if the student has the skills to work independently on an assigned job.
- The teacher will evaluate students' ability to maintain their work areas throughout the duration of the course.

- The teacher will evaluate student communication in group activities and projects.
- The teacher will evaluate that the PA Program of Study tasks are being achieved as expected.
- The teacher will evaluate the students' class participation.
- The teacher will assess the students' ability to work within a team when teamwork is necessary.
- The teacher will evaluate the student's responsibility to complete work logs as expected.
- The teacher will evaluate if students work without hindering other students' progress.
- The teacher will assess if students stay on task in accordance with the job expectation.
- The teacher will observe students' ability to track tools, parts, and equipment efficiently.
- The teacher will account if students are prepared for class each day.
- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5
- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- Electude Learning Management System (LMS)
- ASE Certification

- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: BRAKES

Number: 600 **Days:** 28

Description/Objectives:

The student will review the knowledge of brake systems, ABS, TCC Systems and the repair and maintenance of the components. Written examinations, worksheets, review questions and evaluation of psychomotor (hands-on) skills shall be used to evaluate the student's knowledge and ability based on ASE and NOCTI Guidelines.

Tasks:

PA601 - Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.

PA602 - Identify and interpret brake system concern; determine necessary action.

PA603 - Research applicable vehicle and service information, such as brake system operation, vehicle service history, service precautions, and technical service bulletins.

PA604 - Locate and interpret vehicle and major component identification numbers.

PA605 - Measure brake pedal height, travel, and free play (as applicable); determine necessary action.

PA606 - Check master cylinder for internal/external leaks and proper operation; determine necessary action.

PA607 - Remove, bench bleed, and reinstall master cylinder.

PA608 - Inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging or wear; tighten loose fittings and supports; determine necessary action.

PA609 - Replace brake lines, hoses, fittings, and supports.

PA610 - Fabricate brake lines using proper material and flaring procedures (double flare and ISO types).

PA611 - Select, handle, store, and fill brake fluids to proper level.

PA612 - Inspect, test, and/or replace components of brake warning light system.

PA 613 Bleed and/or flush brake system.

PA614 - Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pedal pulsation concerns; determine necessary action.

PA615 - Remove, clean, inspect, and measure brake drums; determine necessary action.

PA616 - Refinish brake drum; measure final drum diameter.

PA617 - Remove, clean, and inspect brake shoes, springs, pins, clips, levers, adjusters/self-adjusters, other related brake hardware, and backing support plates; lubricate and reassemble.

PA618 - Inspect and install wheel cylinders.

PA619 - Pre-adjust brake shoes and parking brake; install brake drums or drum/hub assemblies and wheel bearings.

PA620 - Install wheel, torque lug nuts, and make final checks and adjustments.

PA621 - Diagnose poor stopping, noise, vibration, pulling, grabbing, dragging or pulsation concerns; determine necessary action.

PA622 - Remove caliper assembly; inspect for leaks and damage to caliper housing; determine necessary action.

PA623 - Clean and inspect caliper mounting and slides/pins for operation, wear, and damage; determine necessary action.

PA624 - Reassemble, lubricate, and reinstall caliper, pads, and related hardware; seat pads, and inspect for leaks.

PA625 - Clean, inspect, and measure rotor thickness, lateral runout, and thickness variation; determine necessary action.

PA626 - Remove and reinstall rotor.

PA627 - Refinish rotor on vehicle; measure final rotor thickness.

PA628 - Refinish rotor off vehicle; measure final rotor thickness.

PA629 - Install wheel, torque lug nuts, and make final checks and adjustments.

PA630 - Check brake pad wear indicator system operation; determine necessary action.

PA631 - Test pedal free travel; check power assist operation.

PA632 - Check vacuum supply to vacuum-type power booster.

PA633 - Remove, clean, inspect, repack, and install wheel bearings and replace seals; install hub and adjust bearings.

PA634 - Check parking brake cables and components for wear, binding, and corrosion; clean, lubricate, adjust or replace as needed.

PA635 - Check parking brake and indicator light system operation; determine necessary action.

PA636 - Check operation of brake stop light system; determine necessary action.

PA637 - Replace wheel bearing and race.

PA638 - Inspect and replace wheel studs.

PA639 - Remove and reinstall sealed wheel bearing assembly.

PA640 - Identify and inspect electronic brake control system components; determine necessary action.

PA641 - Diagnose electronic brake control system electronic control(s) and components by retrieving diagnostic trouble codes, and/or using recommended test equipment; determine necessary action.

PA642 - Depressurize high-pressure components of the electronic brake control system.

PA643 - Bleed the electronic brake control system hydraulic circuits.

PA644 - Identify traction control/vehicle stability control system components.

Chapter 71: Brake System Fundamentals

Objectives Standards:

- Explain the hydraulic and mechanical principles of a brake system.
- Identify the major parts of an automotive brake system.
- Define the basic functions of the major parts of a brake system.
- Compare drum and disc brakes.
- Describe the operation of parking brakes.
- Explain the operation of power brakes.
- Correctly answer ASE certification test questions requiring a knowledge of automotive brake systems.

Chapter 72: Brake System Diagnosis and Repair

Objectives Standards:

- Diagnose common brake system problems.
- Inspect and maintain a brake system.
- Describe basic procedures for servicing a master cylinder and a brake booster.
- Explain how to service a disc brake assembly.
- Explain how to service a drum brake assembly.
- Describe the procedures for both manual and pressure bleeding of a brake system.
- Cite the safety rules that should be followed when servicing brake systems.
- Correctly answer ASE certification test questions about the diagnosis and repair of brake systems.

Chapter 73: Anti-Lock Brakes, Traction Control, and Stability Control

Objectives Standards:

- Identify the major parts of a typical anti-lock brake system.
- Describe the operation of anti-lock brake systems.
- Compare anti-lock brake design variations.
- Diagnose problems in anti-lock brake systems.
- Repair anti-lock brake systems.
- Describe the purpose and operation of traction control and stability control systems.
- Diagnose and repair traction control and stability control systems.
- Correctly answer ASE certification test questions requiring a knowledge of anti-lock brake systems, traction control systems, and stability control systems.

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- 3.5.9-12.L Interpret laws, regulations, policies, and other factors that impact the development and use of technology.
- 3.5.9-12.3 Strand: Integration of Knowledge, Technologies, and Practices.
- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Focus Anchor/Standard #2:

MATH/SCIENCE

Supporting Anchor/Standards:

- S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.
- S11.A.1.1.3 Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).
- S11.A.2.1.2 Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate and communicate results) applicable to a specific technological design.
- S11.C.2.2.2 Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion
- 3.5.9-12.P Apply a broad range of design skills to a design thinking process.

Connecting Anchor/Standard:

CAREER EDUCATION & WORK

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
- 13.1.11.G Assess the implements of the individualized career plan through the ongoing development of the career portfolio.
- 13.1.11.H Review personal high school plan against current personal career goals and select postsecondary opportunities based upon personal career interests.
- 13.3.11.A Evaluate personal attitudes and work habits that support career retention and advancement.

Instructional Activities:

- K-W-L with a twist
- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills:

The students will review the following skills from Level 2 – Brakes:

- The student will accurately document customer information, vehicle identifying details, customer concerns, related service history, and the cause and correction of issues.
- The student will ensure proper communication of vehicle concerns and service requirements in work orders.
- The student will identify common brake system issues such as poor stopping, noise, vibration, or pedal pulsation.
- The student will assess the situation to determine necessary action for brake system concerns, using diagnostic skills.
- The student will use service manuals, technical service bulletins, and vehicle-specific information to diagnose brake system issues.
- The student will identify service precautions and follow manufacturer recommendations when addressing brake system concerns.
- The student will identify major vehicle components using vehicle identification numbers (VIN) and other component identifiers.
- The student will ensure correct identification and traceability of components for service or replacement.
- The student will use proper tools to measure brake pedal height, travel, and free play (as applicable).
- The student will determine necessary action based on measurements and diagnose possible concerns.
- The student will inspect the master cylinder for internal and external leaks and verify its proper operation.
- The student will determine necessary corrective actions based on inspection results.
- The student will safely remove the master cylinder, bench bleed, and reinstall it while ensuring proper alignment and function.

- The student will inspect brake lines, flexible hoses, and fittings for signs of wear, leaks, dents, kinks, rust, cracks, or bulging.
 - The student will tighten loose fittings and supports, and determine necessary corrective actions.
 - The student will properly replace brake lines, hoses, and fittings while adhering to manufacturer specifications.
 - The student will ensure secure connections and leak-free operation after installation.
 - The student will fabricate brake lines using the proper material, flaring procedures (double flare and ISO types), and tools.
 - The student will ensure fabricated lines meet specifications and are leak-free.
 - The student will select the appropriate brake fluid for the vehicle.
 - The student will safely handle, store, and fill brake fluids to the proper level without contamination.
 - The student will inspect brake warning light systems for functionality.
 - The student will replace faulty components to restore system operation.
 - The student will perform brake system bleeding and flushing procedures to remove air and contaminants, ensuring optimal brake system performance.
 - The student will identify issues such as poor stopping, noise, vibration, pulling, grabbing, dragging, or pedal pulsation in the brake system.
 - The student will diagnose and determine necessary actions based on system concerns.
 - The student will remove, clean, inspect, and measure brake drums for wear and damage.
 - The student will determine necessary corrective actions based on inspection results.
 - The student will refinish brake drums to manufacturer specifications and measure the final diameter for correct fitment.
 - The student will inspect, clean, and measure brake shoes, springs, clips, and other brake hardware.
 - The student will lubricate and reassemble components as needed.
 - The student will inspect wheel cylinders for leaks and damage.
 - The student will install replacement wheel cylinders as needed for proper brake function.
 - The student will pre-adjust brake shoes and parking brakes, install brake drums or drum/hub assemblies, and wheel bearings.
 - The student will properly install the wheel, torque lug nuts to specifications, and perform final checks and adjustments for safety and performance.
-
- The student will use diagnostic skills to address issues related to poor stopping, noise, vibration, pulling, grabbing, dragging, or pulsation in the brake system.
 - The student will remove caliper assembly, inspect it for leaks or damage, and determine necessary corrective actions.
 - The student will clean and inspect caliper mounting, slides, and pins for wear and proper function.
 - The student will determine necessary actions based on condition.

- The student will reassemble, lubricate, and reinstall caliper components, ensuring pads are properly seated and the system is leak-free.
- The student will clean, inspect, and measure rotor thickness, lateral runout, and thickness variation.
- The student will determine necessary corrective actions based on measurements.
- The student will safely remove and reinstall brake rotors, ensuring proper fit and operation.
- The student will refinish rotors while on the vehicle, ensuring that they meet thickness specifications and are free of defects.
- The student will refinish rotors off the vehicle and measure final rotor thickness for proper fitment.
- The student will install the wheel, torque the lug nuts, and make necessary final checks and adjustments.
- The student will inspect and test brake pad wear indicator systems for functionality.
- The student will determine necessary action to restore system performance if needed.
- The student will test brake pedal free travel and check the operation of the power assist system.
- The student will verify the vacuum supply to vacuum-type power boosters and troubleshoot as needed.
- The student will remove, clean, inspect, repack, and install wheel bearings, ensuring proper bearing adjustment and seal installation.
- The student will inspect parking brake cables and components for wear, binding, or corrosion.
- The student will clean, lubricate, adjust, or replace components as necessary.
- The student will inspect and test the parking brake system and related indicator light functionality.
- The student will determine necessary corrective action.
- The student will inspect and verify brake stop light operation.
- The student will diagnose and correct any issues with the brake light system.
- The student will remove, inspect, and replace wheel bearings and races, ensuring proper installation and adjustment.
- The student will inspect and replace damaged or worn wheel studs, ensuring proper wheel fitment.
- The student will safely remove and reinstall sealed wheel bearing assemblies, ensuring proper operation and fit.
- The student will identify components of the electronic brake control system and perform inspection for faults or damage.
- The student will determine necessary actions based on inspection findings.
- The student will diagnose issues with the electronic brake control system using diagnostic trouble codes (DTCs) and recommended testing equipment.
- The student will determine and implement necessary corrective actions.
- The student will safely depressurize high-pressure components of the electronic brake control system in accordance with safety protocols.

- The student will perform hydraulic bleeding of the electronic brake control system's circuits, ensuring air removal and proper fluid flow.
- The student will identify and inspect components of the traction control and vehicle stability control systems, ensuring proper functionality.

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)
- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
- Taking Tests in Alternate Setting (or if requested)
- Drill and Practice (Repetition of Material)
- Copy of Teacher/Student Notes/Skeleton Notes
- Use of Daily Planner/Assignment Book (monitor use of)
- Positive Reinforcement
- Have Student Repeat Directions
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- Regular Notebook Check
- Communication Regarding Behavior & Consequences (PBS)
- Clear Language for Directions
- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills
- Provide Verbal and Written Directions
- All Vocabulary to be Defined Before Testing

Safety:

- Safety glasses must be worn at all times by students in the Auto Shop.
- Students must always wear their work uniform in the Auto Shop.
- Work shoes must be always worn by students in the Auto Shop.
- Students will follow the safety rules as they apply to each tool or piece of equipment.
- Students will conduct themselves in a safe and professional manner.

Assessment:

THEORY EVALUATION

- Traditional tests - multiple choice, matching, true/false, short answer completion
- Traditional quizzes - multiple choice, matching, true/false, short answer completion
- Graded homework
- Graded math practice assignments
- Graded reading assignments
- Notebook checks
- Class oral responses
- Business and industry credentialing tests
- Exit slips/timecards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
- The teacher will assess students' understanding through discussions, quizzes, or practical demonstrations.
- The teacher will ensure scores are given on projects when they are completed.
- The teacher will observe and score when a job is completed.
- The teacher will observe and assess the quality of work being done by a student on an assigned job.
- The teacher will determine if students use the appropriate terminology for particular jobs.
- The teacher will determine if the student has the skills to work independently on an assigned job.
- The teacher will evaluate students' ability to maintain their work areas throughout the duration of the course.
- The teacher will evaluate student communication in group activities and projects.
- The teacher will evaluate that the PA Program of Study tasks are being achieved as expected.
- The teacher will evaluate the students' class participation.

- The teacher will assess the students' ability to work within a team when teamwork is necessary.
- The teacher will evaluate the student's responsibility to complete work logs as expected.
- The teacher will evaluate if students work without hindering other students' progress.
- The teacher will assess if students stay on task in accordance with the job expectation.
- The teacher will observe students' ability to track tools, parts, and equipment efficiently.
- The teacher will account if students are prepared for class each day.
- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5
- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- Electude Learning Management System (LMS)
- ASE Certification
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: ELECTRICAL/ELECTRONIC SYSTEMS

Number: 700 **Days:** 28

Description/Objectives:

The students will review the knowledge and ability to repair electrical and electronic components on a vehicle. Written examinations, worksheets, review questions and evaluation of psychomotor (hands-on) skills shall be used to evaluate the student's knowledge and ability based on ASE and NOCTI Guidelines.

Tasks:

PA701 - Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.

PA702 - Identify and interpret electrical/electronic system concern; determine necessary action.

PA703 - Research applicable vehicle and service information, such as electrical/electronic system operation, vehicle service history, service precautions, and technical service bulletins.

PA704 - Locate and interpret vehicle and major component identification numbers.

PA705 - Use wiring diagrams during diagnosis of electrical circuit problems.

PA705 - Use wiring diagrams during diagnosis of electrical circuit problems.

PA706 - Check electrical circuits with a test light; determine necessary action.

PA707 - Check electrical circuits using fused jumper wires; determine necessary action.

PA708 - Locate shorts, grounds, opens, and resistance problems in electrical/electronic circuits; determine necessary action.

PA709 - Measure and diagnose the cause(s) of excessive parasitic draw; determine necessary action.

PA710 - Inspect and test fusible links, circuit breakers, and fuses; determine necessary action.

PA711 - Inspect and test switches, connectors, relays, solenoid solid state devices, and wires of electrical/electronic circuits; perform necessary action.

PA712 - Remove and replace terminal end from connector; replace connectors and terminal ends.

PA713 - Repair wiring harness (including CAN/BUS systems).

PA714 - Perform solder repair of electrical wiring.

PA715 - Identify location of hybrid vehicle high voltage circuit disconnect (service plug) location and safety procedures.

PA716 - Perform battery state-of-charge test; determine necessary action.

PA717 - Perform battery capacity test; confirm proper battery capacity for vehicle application; determine necessary action.

PA718 - Maintain or restore electronic memory functions.

PA719 - Inspect, clean, fill, and/or replace battery, battery cables, connectors, clamps, and hold-downs.

PA720 - Perform battery charge.

PA721 - Start a vehicle using jumper cables or an auxiliary power supply.

PA722 - Identify electronic modules, security systems, radios, and other accessories that require reinitialization or code entry following battery disconnect.

PA723 - Perform starter current draw tests; determine necessary action.

PA724 - Perform starter circuit voltage drop tests; determine necessary action.

PA725 - Inspect and test starter relays and solenoids; determine necessary action.

PA726 - Remove and install starter in a vehicle.

PA727 - Inspect and test switches, connectors, and wires of starter control circuits; perform necessary action.

PA728 - Differentiate between electrical and engine mechanical problems that cause a slow-crank or no-crank condition.

PA729 - Perform charging system output test; determine necessary action.

PA730 - Diagnose charging system for the cause of undercharge, no-charge, and overcharge conditions.

PA731 - Inspect, adjust, or replace generator (alternator) drive belts, pulleys, and tensioners; check pulley and belt alignment.

PA732 - Remove, inspect, and install generator (alternator).

PA733 - Perform charging circuit voltage drop tests; determine necessary action.

PA734 - Diagnose the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action.

PA735 - Inspect, replace, and aim headlights and bulbs.

PA736 - Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action.

PA737 - Inspect and test gauges and gauge sending units for cause of abnormal gauge readings; determine necessary action.

PA738 - Inspect and test connectors, wires, and printed circuit boards of gauge circuits; determine necessary action.

PA739 - Diagnose the cause of incorrect operation of warning devices and other driver information systems; determine necessary action.

PA740 - Diagnose incorrect horn operation; perform necessary action.

PA741 - Diagnose incorrect wiper operation; diagnose wiper speed control and park problems; perform necessary action.

PA742 - Diagnose incorrect washer operation; perform necessary action.

PA743 - Diagnose incorrect operation of motor-driven accessory circuits; determine necessary action.

PA745 - Disarm and enable the airbag system for vehicle service.

PA746 - Remove and reinstall door panel.

Chapter 8: Basic Electricity and Electronics

Objectives Standards:

- Explain the principles of electricity.
- Describe the action of basic electric circuits.
- Compare voltage, current, and resistance.
- Describe the principles of magnetism and magnetic fields.
- Identify basic electric and electronic terms and components.
- Explain different kinds of automotive wiring.
- Perform fundamental electrical tests.
- Correctly answer ASE certification test questions that require a basic understanding of electricity and electronics.

Chapter 28: Automotive Batteries

Objectives Standards:

- Explain the operating principles of a lead-acid battery.
- Describe the basic parts of an automotive battery.
- Compare conventional and maintenance-free batteries.
- Explain how temperature and other factors affect battery performance.
- Describe safety practices that should be followed when working with batteries.
- Correctly answer ASE certification test questions that require a basic knowledge of automotive batteries.

Chapter 29: Battery Testing and Service

Objectives Standards:

- Visually inspect a battery for obvious problems.
- Perform common battery tests.
- Clean a battery case and terminals.
- Charge a battery.
- Jump-start a car using a second battery.
- Replace a defective battery.
- Describe safety practices to follow when testing and servicing batteries. Correctly answer ASE certification test questions on battery service.

Chapter 30: Starting System Fundamentals

Objectives Standards:

- Explain the principles of an electric motor.
- Describe the construction and operation of a starting motor.
- Sketch a simple starting system circuit.
- Explain the operation of solenoids.
- List the functions of the main starter drive parts.
- Describe starter drive operation.
- Compare different types of starting motors.
- Describe starting system safety features.
- Correctly answer ASE Certification test questions that require a knowledge of starting system fundamentals.

Chapter 31: Starting System Testing and Repair

Objectives Standards:

- Diagnose common starting system troubles.
- Make orderly starting system tests.
- Remove and replace a starting motor.
- Explain typical procedures for a starting motor rebuild.
- Adjust a neutral safety switch.
- Describe the safety practices that should be followed when testing or repairing a starting system. Correctly answer ASE certification test questions on starting system diagnosis, service, and repair.

Chapter 32: Charging System Fundamentals

Objectives Standards:

- List the basic parts of a charging system.
- Explain charging system operation.
- Describe the construction of major charging system components.
- Compare alternator and voltage regulator design differences.
- Explain charging system indicators.
- Describe safety practices to follow when working with charging systems.
- Correctly answer ASE certification test questions that require a knowledge of charging system fundamentals.

Chapter 33: Charging System Diagnosis, Testing, and Repair

Objectives Standards:

- Diagnose charging system troubles.
- Inspect a charging system.
- Test charging system output with a voltmeter or a load tester.
- Remove, test, repair, and replace an alternator.
- Adjust an alternator belt.
- Remove and replace a voltage regulator.
- Describe safety practices to follow when testing or repairing a charging system.
- Correctly answer ASE certification test questions on charging system diagnosis and repair.

Chapter 36: Lights, Instrumentation, Wipers, and Horns-Operation and Service

Objectives Standards:

- Explain the operating principles of automotive light, wiper, and horn systems.
- Diagnose problems in light, wiper, and horn systems.
- Summarize automatic light and wiper systems.
- Replace burned-out bulbs.
- Explain how to aim headlights.
- Describe the safety practices to follow when working with light, wiper, and horn systems.
- Explain both analog and digital instrumentation.
- Summarize how to remove and service an instrument cluster.
- Correctly answer ASE certification test questions on light, instrumentation, wiper, and horn systems.

Chapter 37: Sound Systems and Power Accessories (Optional Time Permitting)

Objectives Standards:

- Describe the operating principles of a radio.
- Explain the basic difference between AM and FM radios.
- Diagnose basic sound system problems.
- Explain the operation and service of power windows.
- Sketch a rear window defogger circuit.
- Describe and repair a power lock system.
- Summarize the operation and testing of a speed control system.
- Describe safety practices that must be followed when working with electrical accessory circuits. Correctly answer ASE certification test questions on the service of sound systems and power accessories.

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- 3.5.9-12.L Interpret laws, regulations, policies, and other factors that impact the development and use of technology.
- 3.5.9-12.3 Strand: Integration of Knowledge, Technologies, and Practices.

- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Focus Anchor/Standard #2:

MATH/SCIENCE

Supporting Anchor/Standards:

- S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.
- S11.A.1.1.3 Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).
- S11.A.2.1.2 Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate and communicate results) applicable to a specific technological design.
- S11.C.2.2.2 Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion
- 3.5.9-12.P Apply a broad range of design skills to a design thinking process.

Connecting Anchor/Standard:

Career Education & Work

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
- 13.1.11.G Assess the implements of the individualized career plan through the ongoing development of the career portfolio.
- 13.1.11.H Review personal high school plan against current personal career goals and select postsecondary opportunities based upon personal career interests.
- 13.3.11.A Evaluate personal attitudes and work habits that support career retention and advancement.

Instructional Activities:

- K-W-L with a twist

- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills:

The students will review the following skills from Level 2 – Electrical/Electronic Systems:

- The student will accurately gather customer information, vehicle identification numbers (VIN), and service history to complete work orders.
- The student will record customer concerns and document the observed symptoms of vehicle issues.
- The student will analyze and document the cause of vehicle issues and the corrective action taken.
- The student will organize and file work orders, ensuring that all necessary details (service history, cause, correction) are included.
- The student will use diagnostic tools and visual inspection to identify issues in electrical/electronic systems.
- The student will interpret diagnostic trouble codes (DTC) and symptoms to determine necessary actions.
- The student will determine whether an issue is related to electrical components, wiring, or external factors.
- The student will access vehicle manufacturer databases to research system operations and technical specifications.
- The student will review and apply technical service bulletins and vehicle service history to guide diagnosis and repairs.
- The student will identify and interpret manufacturer recommendations and safety precautions relevant to repairs.
- The student will identify and record vehicle and component identification numbers (VIN, engine numbers) accurately.
- The student will use identification numbers to cross-reference parts and ensure correct replacement or service.
- The student will access and interpret wiring diagrams to identify the layout of electrical circuits.

- The student will apply knowledge of wiring diagrams to troubleshoot electrical circuit issues and find the root cause.
- The student will properly use a test light to check for voltage at specified points in an electrical circuit.
- The student will determine circuit continuity and diagnose faults based on test results (e.g., shorts, open circuits).
- The student will safely use fused jumper wires to test the functionality of electrical circuits.
- The student will determine appropriate action (e.g., repair, replace) based on test results from jumper wires.
- The student will use diagnostic tools to locate electrical faults such as shorts, grounds, or open circuits.
- The student will determine the correct course of action to repair or replace faulty components based on diagnostic results.
- The student will use a multimeter to measure current draw and diagnose excessive parasitic draw.
- The student will identify the source of the parasitic draw and recommend corrective action, such as component repair or replacement.
- The student will inspect fusible links, circuit breakers, and fuses for damage or wear.
- The student will test these components and replace as necessary based on test results.
- The student will perform visual and functional tests on switches, connectors, relays, solenoids, and other components.
- The student will identify faulty components and replace or repair as necessary.
- The student will safely remove and replace terminal ends on electrical connectors.
- The student will ensure proper connection and secure fitting after replacement to avoid future issues.
- The student will diagnose issues in the wiring harness, including CAN/BUS systems, and make necessary repairs.
- The student will properly reassemble and secure the repaired wiring harness.
- The student will use proper soldering techniques to repair electrical wiring.
- The student will ensure secure, reliable solder joints that meet industry standards for conductivity and safety.
- The student will accurately locate the high voltage circuit disconnect (service plug) on hybrid vehicles.
- The student will follow safety procedures when working with high-voltage circuits to avoid accidents.
- The student will use appropriate tools to test the battery's state of charge.
- The student will analyze test results and determine whether the battery needs charging or replacement.
- The student will perform battery capacity tests to ensure the battery can handle the vehicle's electrical load.
- The student will recommend corrective action, such as battery replacement, if capacity is insufficient.

- The student will follow procedures to maintain or restore electronic memory functions (e.g., radio settings, vehicle preferences).
- The student will utilize appropriate tools or methods to reset or restore settings after power loss.
- The student will inspect the battery, cables, and connectors for wear, corrosion, or damage.
- The student will clean terminals, replace cables, or secure the battery and hold-downs to ensure proper functioning.
- The student will safely charge a vehicle battery using an appropriate charging device.
- The student will monitor the charging process and ensure the battery is properly charged without overcharging.
- The student will properly connect jumper cables or an auxiliary power supply to start a vehicle.
- The student will follow safety procedures when jump-starting vehicles to avoid damage to electrical systems.
- The student will recognize which vehicle components require reinitialization or code entry after a battery disconnect.
- The student will safely reset or reprogram electronic modules and accessories as needed.
- The student will use a clamp meter to measure the starter motor's current draw during startup.
- The student will analyze the test results and determine if the starter motor needs repair or replacement.
- The student will conduct a voltage drop test on the starter circuit to check for resistance.
- The student will determine corrective action based on test results, such as replacing wiring or connectors.
- The student will inspect and test starter relays and solenoids for proper operation.
- The student will diagnose and replace faulty relays or solenoids as necessary.
- The student will safely remove and install the starter motor, ensuring correct alignment and torque specifications.
- The student will reconnect electrical connections and test the starter for proper operation.
- The student will inspect switches, connectors, and wiring for continuity and proper operation.
- The student will replace or repair faulty components in the starter control circuit.
- The student will use diagnostic tools to differentiate between electrical and mechanical issues.
- The student will accurately diagnose and repair the underlying issue causing the slow-crank or no-crank condition.
- The student will conduct a charging system output test to verify alternator performance.
- The student will analyze test results and determine whether the alternator or associated components require replacement.

- The student will diagnose and identify the cause of charging system issues such as undercharging or overcharging.
- The student will determine the necessary course of action, including repair or replacement of alternators, voltage regulators, or other components.
- The student will inspect generator drive belts, pulleys, and tensioners for wear or damage.
- The student will adjust or replace components as needed to ensure proper charging system operation.
- The student will safely remove and install the alternator, ensuring proper alignment and connection.
- The student will test the new alternator to confirm proper operation.
- The student will perform voltage drop tests on charging circuit wiring to identify any resistance.
- The student will recommend repairs based on test results to restore proper charging functionality.
- The student will use diagnostic tools to assess the cause of lighting issues in the vehicle.
- The student will diagnose and repair the source of light problems, such as faulty bulbs, wiring, or switches.
- The student will inspect and replace headlights and bulbs to ensure proper illumination.
- The student will properly aim headlights according to manufacturer specifications to ensure road safety.
- The student will inspect turn signal and hazard light circuits for issues.
- The student will diagnose the root cause of the malfunction and take corrective actions.
- The student will test gauges and sending units for proper operation.
- The student will diagnose and repair the cause of abnormal readings in gauges (e.g., oil pressure, temperature).
- The student will inspect and test gauge circuit components for continuity and function.
- The student will repair or replace faulty connectors, wires, or circuit boards to restore proper gauge function.
- The student will inspect warning systems for proper function and diagnose faulty components.
- The student will perform necessary repairs or replacements to restore proper operation of warning devices and driver information systems.
- The student will test the vehicle's horn for proper function.
- The student will diagnose the cause of malfunction and repair or replace faulty components.
- The student will inspect and diagnose issues with wiper operation, including speed control and park functionality.
- The student will perform necessary repairs or replace faulty components in the wiper system.
- The student will inspect and diagnose issues with the vehicle's washer system.

- The student will repair or replace components to restore proper washer operation.
- The student will identify issues with motor-driven accessories such as fans, seats, and windows.
- The student will diagnose and perform corrective actions to restore proper accessory operation.
- The student will safely disarm and enable the vehicle's airbag system following manufacturer procedures.
- The student will confirm that the airbag system is correctly reset before the vehicle is returned to service.
- The student will safely remove and reinstall vehicle door panels without damaging trim or internal components.
- The student will ensure proper alignment and reattach components such as switches and handles

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)
- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
- Taking Tests in Alternate Setting (or if requested)
- Drill and Practice (Repetition of Material)
- Copy of Teacher/Student Notes/Skeleton Notes
- Use of Daily Planner/Assignment Book (monitor use of)
- Positive Reinforcement
- Have Student Repeat Directions
- Positive Reinforcement
- Provide Frequent Feedback
- Regular Notebook Check
- Communication Regarding Behavior & Consequences (PBS)
- Clear Language for Directions
- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills
- Provide Verbal and Written Directions
- All Vocabulary to be Defined Before Testing

Safety:

- Safety glasses must be worn at all times by students in the Auto Shop.
- Students must always wear their work uniform in the Auto Shop.
- Work shoes must be always worn by students in the Auto Shop.
- Students will follow the safety rules as they apply to each tool or piece of equipment.
- Students will conduct themselves in a safe and professional manner.

Assessment:**THEORY EVALUATION**

- Traditional tests - multiple choice, matching, true/false, short answer completion
- Traditional quizzes - multiple choice, matching, true/false, short answer completion
- Graded homework
- Graded math practice assignments
- Graded reading assignments
- Notebook checks
- Class oral responses
- Business and industry credentialing tests
- Exit slips/timecards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
- The teacher will assess students' understanding through discussions, quizzes, or practical demonstrations.
- The teacher will ensure scores are given on projects when they are completed.
- The teacher will observe and score when a job is completed.
- The teacher will observe and assess the quality of work being done by a student on an assigned job.
- The teacher will determine if students use the appropriate terminology for particular jobs.

- The teacher will determine if the student has the skills to work independently on an assigned job.
- The teacher will evaluate students' ability to maintain their work areas throughout the duration of the course.
- The teacher will evaluate student communication in group activities and projects.
- The teacher will evaluate that the PA Program of Study tasks are being achieved as expected.
- The teacher will evaluate the students' class participation.
- The teacher will assess the students' ability to work within a team when teamwork is necessary.
- The teacher will evaluate the student's responsibility to complete work logs as expected.
- The teacher will evaluate if students work without hindering other students' progress.
- The teacher will assess if students stay on task in accordance with the job expectation.
- The teacher will observe students' ability to track tools, parts, and equipment efficiently.
- The teacher will account if students are prepared for class each day.
- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5
- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- Electude Learning Management System (LMS)
- ASE Certification
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: ENGINE PERFORMANCE

Number: 800 **Days:** 28

Description/Objectives:

The student will review the systems and the principles necessary for the repair and maintenance of engine performance related issues. This shall include fuel, ignition and computer related systems. Written examinations, worksheets, review questions and evaluation of psychomotor (hands-on) skills shall be used to evaluate the student's knowledge and ability based on ASE and NOCTI Guidelines.

Tasks:

PA801 - Complete work order to include customer information, vehicle identifying information, customer concern, related service history, cause, and correction.

PA802 - Identify and interpret engine performance concern; determine necessary action.

PA803 - Research applicable vehicle and service information, such as engine management system operation, vehicle service history, service precautions, and technical service bulletins.

PA804 - Locate and interpret vehicle and major component identification numbers.

PA805 - Inspect engine assembly for fuel, oil, coolant, and other leaks; determine necessary action.

PA806 - Diagnose abnormal engine noise or vibration concerns; determine necessary action.

PA807 - Diagnose abnormal exhaust color, odor, and sound; determine necessary action.

PA808 - Perform engine absolute (vacuum/boost) manifold pressure tests; determine necessary action.

PA809 - Perform cylinder power balance test; determine necessary action.

PA810 - Perform cylinder cranking and running compression tests; determine necessary action.

PA811 - Perform cylinder leakage test; determine necessary action.

PA812 - Diagnose engine mechanical, electrical, electronic, fuel, and ignition concerns; determine necessary action.

PA813 - Verify engine operating temperature; determine necessary action.

PA813 - Verify engine operating temperature; determine necessary action.

PA814 - Perform cooling system pressure tests; check coolant condition; inspect and test radiator, pressure cap, coolant recovery tank, and hoses; perform necessary action.

PA815 - Verify correct camshaft timing.

PA816 - Retrieve and record diagnostic trouble codes, OBD monitor status, and freeze frame data; clear codes when applicable.

PA817 - Diagnose the causes of emissions or drivability concerns with stored or active diagnostic trouble codes; obtain, graph, and interpret scan tool data.

PA818 - Access and use service information to perform step-by-step diagnosis.

PA819 - Perform active tests of actuators using a scan tool; determine necessary action.

PA820 - Describe the importance of running all OBDII monitors for repair verification.

PA821 - Diagnose ignition system related problems such as no-starting, hard starting, engine misfire, poor drivability, spark knock, power loss, poor mileage, and emissions concerns; determine necessary action.

PA822 - Inspect and test ignition primary and secondary circuit wiring and solid state components; test ignition coil(s); perform necessary action.

PA823 - Inspect and test crankshaft and camshaft position sensor(s); perform necessary action.

PA824 - Inspect, test, and/or replace ignition control module, powertrain/engine control module; reprogram as necessary.

PA825 - Diagnose hot or cold no-starting, hard starting, poor drivability, incorrect idle speed, poor idle, flooding, hesitation, surging, engine misfire, power loss, stalling, poor mileage, dieseling, and emissions problems; determine necessary action.

PA826 - Inspect and test fuel pumps and pump control systems for pressure, regulation, and volume; perform necessary action.

PA827 - Replace fuel filters.

PA828 - Inspect throttle body, air induction system, intake manifold and gaskets for vacuum leaks and/or unmetered air.

PA830 - Verify idle control operation.

PA831 - Inspect the integrity of the exhaust manifold, exhaust pipes, muffler(s), catalytic converter(s), resonator(s), tail pipe(s), and heat shield(s); perform necessary action.

PA832 - Diagnose oil leaks, emissions, and drivability concerns caused by the positive crankcase ventilation (PCV) system; determine necessary action.

PA833 - Inspect, test and service positive crankcase ventilation (PCV) filter/breather cap, valve, tubes, orifices, and hoses; perform necessary action.

PA834 - Diagnose emissions and drivability concerns caused by the exhaust gas recirculation (EGR) system; determine necessary action.

PA835 - Inspect, test, service and replace components of the EGR system, including EGR tubing, exhaust passages, vacuum/pressure controls, filters and hoses; perform necessary action.

PA836 - Inspect and test electrical/electronic sensors, controls, and wiring of exhaust gas recirculation (EGR) systems; perform necessary action.

PA837 - Inspect and test mechanical components of secondary air injection systems; perform necessary action.

PA838 - Inspect and test electrical/electronically-operated components and circuits of air injection systems; perform necessary action.

PA839 - Inspect and test catalytic converter efficiency.

PA840 - Diagnose emissions and drivability concerns caused by the evaporative emissions control system; determine necessary action.

PA841 - Inspect and test components and hoses of the evaporative emissions control system; perform necessary action.

PA842 - Interpret diagnostic trouble codes (DTCs) and scan tool data related to the emissions control systems; determine necessary action.

PA843 - Remove and replace timing belt; verify correct camshaft timing.

PA844 - Remove and replace thermostat and gasket/seal.

PA845 - Inspect and test mechanical/electrical fans, fan clutch, fan shroud/ducting, air dams, and fan control devices; perform necessary action.

PA846 - Perform engine oil and filter change.

Chapter 11: Engine Fundamentals

Objectives Standards:

- Identify the major parts of a typical automotive engine.
- Describe the four-stroke cycle.
- Define common engine terms.
- Explain the basic function of the major parts of an automotive engine.
- Cite and demonstrate safe working practices related to engines.
- Correctly answer ASE certification test questions that require knowledge of the basic operation of piston engines.

Chapter 12: Engine Design Classifications

Objectives Standards:

- Describe basic automotive engine classifications.
- Compare gasoline and diesel engines.
- Contrast combustion chamber designs.
- Discuss alternative engine types.
- Compare two- and four-stroke cycle engines.
- Correctly answer ASE certification test questions that require a knowledge of engine classifications and design differences.

Chapter 13: Engine Top End Construction

Objectives Standards:

- Describe the design and construction of an engine cylinder head.
- Explain umbrella and O-ring type oil seals.
- Explain the purpose of valve spring shims, rotators, stem caps, and spring shields.
- Describe the construction and operation of a camshaft.
- Explain hydraulic and mechanical lifters.
- Describe different types of rocker arm assemblies.
- Explain the construction and design of intake and exhaust manifolds.
- Describe safety practices used when working on engine top end components.
- Answer ASE certification test questions that require a knowledge of engine top end construction.

Chapter 14: Engine Bottom End Construction

Objectives Standards:

- Compare the construction of different types of cylinder blocks.
- Explain how piston construction affects engine operation.
- Describe piston ring variations.
- Explain the construction of engine bearings.
- Compare design variations of different engine bottom end components.
- Explain safe practices when working with engine bottom end components.
- Correctly answer ASE certification test questions on engine bottom end construction.

Chapter 39: Cooling System Fundamentals

Objectives Standards:

- Summarize the functions of a cooling system.
- Explain the operation and construction of major cooling system components.
- Compare cooling system design variations.
- Explain the importance of antifreeze.
- Discuss safety procedures to follow when working with cooling systems.
- Correctly answer ASE certification test questions on cooling system construction and operation.

Chapter 40: Cooling System Testing, Maintenance, and Repair

Objectives Standards:

- List common cooling system problems and their symptoms.
- Describe the most common causes of system leakage, overheating, and overcooling.
- Perform a combustion leak test and a system pressure test.
- Check the major parts of a cooling system for proper operation.
- Replace faulty cooling system components.
- Drain, flush, and refill a cooling system.
- Describe safe working practices to use when testing, maintaining, or repairing a cooling system. Correctly answer ASE certification test questions on cooling system troubleshooting and repair.

Chapter 41: Lubrication System Fundamentals

Objectives Standards:

- List the basic parts of a lubrication system.
- Summarize the operation of a lubrication system.
- Describe the construction of lubrication system parts.
- Compare different lubrication system designs.
- Explain the characteristics and ratings of engine oil.
- Discuss safety procedures that should be followed when working with the lubrication system. Correctly answer ASE certification test questions that require a knowledge of lubrication system construction and operation.

Chapter 42: Lubrication System Testing, Service, and Repair

Objectives Standards:

- List common lubrication system problems and symptoms.
- Diagnose lubrication system troubles.
- Measure engine oil pressure.
- Change engine oil and filter.
- Remove and install an oil pan.
- Service an oil pump.
- Test and repair an oil pressure indicating light and gauge.
- Describe safe working practices to use when testing, servicing, or repairing a lubrication system.
- Correctly answer ASE certification test questions on the testing, service, and repair of engine lubrication systems.

Chapter 17: Computer System Fundamentals

Objectives Standards:

- Compare computer systems to the human body's nervous system.
- Describe the input, processing, and output sections of a basic computer system.
- Explain input sensor and output device classifications and operation.
- Summarize computer system signal classifications.
- Sketch a block diagram for a computer system.
- Summarize where computers, control modules, sensors, and actuators are typically located.
- Summarize the flow of data through a computer.

- Explain how a computer uses sensor inputs to determine correct outputs.
- Correctly answer ASE certification test questions that require a knowledge of automotive computer system fundamentals.

Chapter 18: On-Board Diagnostics and Scan Tools

Objectives Standards:

- Discuss the purpose and operation of on-board diagnostic systems. Explain the use of scan tools to simplify reading of trouble codes. Compare OBD I and OBD II system capabilities and procedures.
- Locate the data link connector on most makes and models of cars.
- Activate on-board diagnostics and read trouble codes with and without a scan tool.
- Use a trouble code chart in a service manual or code conversion by a scan tool.
- Erase diagnostic trouble codes.
- Correctly answer ASE certification test questions concerning late-model on-board diagnostics and scan tool use.

Chapter 19: Computer System Service

Objectives Standards:

- Perform a visual inspection of the engine, its sensors, actuators, and the systems they monitor and control.
- Test sensors and their circuits.
- Remove and replace sensors.
- Test and replace actuators.
- Remove and replace a computer.
- Remove and replace a computer PROM.
- Program an EEPROM.
- Demonstrate safe working practices when servicing automotive computers.
- Correctly answer ASE certification test questions on servicing computer system components.

Chapter 20: Automotive Fuels, Gasoline and Diesel Combustion

Objectives Standards:

- Summarize how crude oil is converted into gasoline, diesel fuel, liquefied petroleum gas, and other products.
- Describe properties of gasoline and diesel fuel.
- Explain octane and octane ratings.
- Describe normal and abnormal combustion of gasoline and diesel fuel.
- Summarize the properties of alternative fuels.
- Correctly answer ASE certification test questions on automotive fuels and combustion.

Chapter 21: Fuel Tanks, Pumps, Lines, and Filters

Objectives Standards:

- Define the major parts of a fuel supply system.
- Describe the operation of mechanical and electric fuel pumps.
- Describe the construction and action of air filters.
- Explain the tests used to diagnose problems with fuel pumps, fuel filters, and fuel lines.
- Repair a fuel line or replace a fuel hose.
- Locate and replace fuel filters in both gasoline and diesel fuel systems.
- State safety rules for working on fuel supply systems.
- Correctly answer ASE certification test questions on fuel tanks, fuel pumps, fuel lines, fuel filters, and air filters.

Chapter 22: Gasoline Injection Fundamentals

Objectives Standards:

- List some of the possible advantages of gasoline injection.
- Describe the classifications of gasoline injection.
- Explain the operation of electronic throttle body gasoline injection.
- Explain the operation of electronic multiport gasoline injection.
- Summarize the operation of airflow-sensing, hydraulic-mechanical (continuous), and pressure-sensing gasoline injection systems.
- Compare the various types of gasoline injection systems.
- Correctly answer ASE certification test questions on gasoline injection systems.

Chapter 23: Gasoline Injection Diagnosis and Repair

Objectives Standards:

- Diagnose typical gasoline injection system problems.
- Test a fuel pressure regulator.
- Test both electronic and continuous fuel injectors.
- Explain OBD II testing features used on late-model fuel injection systems.
- Use a service manual when making basic adjustments on gasoline injection systems.
- Cite safety rules for injection system service.
- Correctly answer ASE certification test questions about fuel injection system diagnosis, service, and repair.

Chapter 25: Diesel Injection Fundamentals

Objectives Standards:

- Explain the operating principles of a diesel injection system.
- Summarize the differences between gasoline and diesel engines.
- Describe the major parts of a diesel injection system.
- Compare variations in the design of diesel injection systems.
- Correctly answer ASE certification test questions that require a knowledge of the fundamentals of diesel injection.

Chapter 27: Exhaust Systems, Turbochargers, and Superchargers

Objectives Standards:

- Describe the basic parts of an exhaust system.
- Compare exhaust system design differences.
- Perform exhaust system repairs.
- Explain the fundamental parts of a turbocharging system.
- Describe the construction and operation of a turbocharger and waste gate.
- Remove and replace a turbocharger and waste gate
- Summarize the construction and operation of a supercharging system.
- Demonstrate an understanding of safety procedures for working on exhaust systems, turbochargers, and superchargers.
- Correctly answer ASE certification test questions on exhaust system, turbocharger, and supercharger operation and service.

Chapter 34: Ignition System Fundamentals

Objectives Standards:

- Explain the operating principles of an automotive ignition system.
- Compare contact point, electronic, and computer-controlled ignition systems.
- Describe the function of major ignition system components.
- Explain vacuum, centrifugal, and electronic ignition timing advance.
- Sketch the primary and secondary sections of an ignition system.
- Compare ignition coil, spark plug, and distributor design variations.
- Describe the safety practices that must be followed when working with ignition systems.
- Correctly answer ASE certification test questions that require a knowledge of ignition system fundamentals.

Chapter 35: Ignition System Problems, Testing, and Repair

Objectives Standards:

- Diagnose typical ignition system problems.
- List the symptoms produced by faulty ignition system components.
- Describe common tests used to find ignition system troubles.
- Explain how to replace or repair ignition system parts.
- Summarize contact point and pickup coil adjustments.
- Adjust ignition timing.
- Describe safety practices to follow when testing or repairing an ignition system.
- Correctly answer ASE certification test questions on the diagnosis and repair of ignition systems.

Chapter 38: Hybrid Drive System Operation and Repair

Objectives Standards:

- Identify the major parts of a hybrid drive system.
- Explain the construction and operation of hybrid drive assemblies.
- List the safety measures that must be followed when working on high-voltage hybrid drive systems.
- Use on-board diagnostics to find the source of problems in a hybrid vehicle propulsion system. Identify the most common problems that occur in a hybrid vehicle drive system.
- Perform basic tests to verify hybrid drive trouble codes.
- Safely remove and replace a hybrid battery pack, power control module, power cables, ECUs, and motor-generator assemblies.

Chapter 43: Emission Control Systems

Objectives Standards:

- Define the fundamental terms relating to automotive emission control systems.
- Explain the sources of air pollution.
- Describe the operating principles of emission control systems.
- Compare design differences in emission control systems.
- Explain how a computer or engine control module can be used to operate emission control systems. Summarize how OBD II systems use multiple oxygen sensors to check air-fuel mixture and catalytic converter efficiency.
- Correctly answer ASE certification test questions that require a knowledge of emission control system operation and construction.

Chapter 44: Emission Control System Testing, Service, and Repair

Objectives Standards:

- Explain the use of exhaust gas analyzers.
- Inspect and troubleshoot emission control systems.
- Perform periodic service operations on emission control systems.
- Test individual emission control components.
- Replace or repair major emission control components.
- Demonstrate and practice safe work procedures.
- Correctly answer ASE certification test questions on emission control system testing and service.

Chapter 45: Engine Performance and Driveability

Objectives Standards:

- List the most common engine performance problems.
- Describe the symptoms for common engine performance problems.
- Explain typical causes of engine performance problems.
- Use a systematic approach when diagnosing engine performance problems.
- Correctly answer ASE certification test questions on problems affecting engine performance.

Chapter 46: Advanced Diagnostics

Objectives Standards:

- Use advanced diagnostic techniques to troubleshoot difficult problems.
- Use scan tool snapshot and datastream values to find problems not tripping trouble codes.
- Use a breakout box to measure circuit values.
- Explain the principles of an oscilloscope.
- Summarize how to use waveforms to analyze the operation of sensors, actuators, ECU outputs, and other electrical-electronic devices.
- Evaluate ignition system waveforms.
- Summarize how to use an engine analyzer.

Chapter 47: Engine Tune-Up

Objectives Standards:

- Describe the typical difference between a minor tune-up.
- List the basic steps for an engine tune-up.
- Explain service operations commonly performed during a tune-up.
- List the safety precautions that should be remembered during a tune-up.
- Correctly answer ASE certification test questions on engine tune-up and engine problem diagnosis.

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- 3.5.9-12.L Interpret laws, regulations, policies, and other factors that impact the development and use of technology.
- 3.5.9-12.3 Strand: Integration of Knowledge, Technologies, and Practices.
- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Focus Anchor/Standard #2:

MATH/SCIENCE

Supporting Anchor/Standards:

- S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.

- S11.A.1.1.3 Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).
- S11.A.2.1.2 Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate and communicate results) applicable to a specific technological design.
- S11.C.2.2.2 Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion
- 3.5.9-12.P Apply a broad range of design skills to a design thinking process.

Connecting Anchor/Standard:

CAREER EDUCATION & WORK

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
- 13.1.11.G Assess the implements of the individualized career plan through the ongoing development of the career portfolio.
- 13.1.11.H Review personal high school plan against current personal career goals and select postsecondary opportunities based upon personal career interests.
- 13.3.11.A Evaluate personal attitudes and work habits that support career retention and advancement.

Instructional Activities:

- K-W-L with a twist
- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills:**The students will review the following skills from Level 2 – Engine Performance:**

- The student will accurately complete work orders by including all necessary details, such as customer information, vehicle identification, service history, customer concerns, cause, and corrective actions.
- The student will identify and interpret engine performance issues using diagnostic tools, and determine the appropriate corrective actions based on their findings.
- The student will research and interpret vehicle-specific information, including engine management system operations, service history, and technical service bulletins, to assist in diagnosing engine concerns.
- The student will locate and accurately interpret vehicle identification numbers (VIN) and major component IDs to ensure proper identification and correct parts are used in service.
- The student will inspect the engine assembly for any signs of fuel, oil, coolant, or other leaks, and determine the necessary steps for repair or replacement.
- The student will diagnose the source of abnormal engine noise or vibration and determine the necessary corrective actions.
- The student will assess abnormal exhaust conditions such as color, odor, and sound to diagnose potential issues and recommend appropriate actions for correction.
- The student will perform engine vacuum/boost manifold pressure tests to evaluate engine performance and determine corrective actions if needed.
- The student will perform a cylinder power balance test to identify engine performance issues and determine necessary corrective actions.
- The student will perform cylinder cranking and running compression tests to assess engine health and determine the necessary course of action for repair.
- The student will perform cylinder leakage tests and determine corrective actions based on the test results.
- The student will diagnose issues related to engine mechanics, electrical systems, electronics, fuel systems, and ignition systems, and determine the appropriate action for repair.
- The student will verify that the engine is operating within the correct temperature range and determine if any corrective action is needed.
- The student will perform cooling system pressure tests, check the coolant condition, inspect and test components such as the radiator, pressure cap, recovery tank, and hoses, and determine the necessary corrective actions.
- The student will verify and adjust the camshaft timing to ensure proper engine function.
- The student will retrieve and accurately record diagnostic trouble codes (DTCs), OBD monitor status, and freeze frame data, and clear codes when applicable.

- The student will diagnose emissions or drivability concerns using stored or active DTCs, obtain scan tool data, and interpret the results to determine corrective actions.
- The student will access and utilize service information to perform systematic and accurate diagnoses of vehicle issues.
- The student will perform active tests of actuators using a scan tool to verify component function and determine necessary repair actions.
- The student will explain the importance of completing all OBDII monitors to verify repairs and ensure that the vehicle is functioning properly.
- The student will diagnose ignition system problems including no-starting, engine misfire, poor drivability, and emissions concerns, and recommend the necessary corrective actions.
- The student will inspect and test ignition circuit wiring and components, including testing ignition coils, and perform necessary repairs or replacements.
- The student will inspect and test crankshaft and camshaft position sensors, and take corrective action if the sensors are found to be faulty.
- The student will inspect, test, and, if necessary, replace the ignition control module or engine control module, and reprogram the system as required.
- The student will diagnose and determine the necessary actions for various engine performance issues including no-starting, rough idling, engine misfire, and poor drivability.
- The student will inspect and test fuel pumps and control systems for pressure, regulation, and volume, and perform necessary corrective actions.
- The student will replace fuel filters to ensure proper fuel flow and engine performance.
- The student will inspect the throttle body, air induction system, intake manifold, and gaskets for vacuum leaks and unmetered air, and address any issues found.
- The student will verify the correct operation of idle control systems and determine necessary actions if issues are identified.
- The student will inspect the exhaust system for any damage or faults and perform repairs or replacements as necessary.
- The student will diagnose issues related to oil leaks, emissions, and drivability concerns caused by the PCV system, and take appropriate corrective action.
- The student will inspect, test, and service the PCV system components, including filters, valves, hoses, and orifices, and take necessary action.
- The student will diagnose emissions and drivability concerns stemming from the EGR system and determine the necessary steps for repair.
- The student will inspect, test, service, and replace components of the EGR system, ensuring they are functioning correctly and meeting emissions standards.
- The student will inspect and test the electrical and electronic components of the EGR system and perform the necessary repairs or replacements.
- The student will inspect and test the mechanical components of secondary air injection systems and take corrective action as needed.
- The student will inspect and test the electrical and electronic components of air injection systems and perform necessary actions for repair.

- The student will inspect and test the catalytic converter's efficiency and determine necessary actions to address inefficiency or failure.
- The student will diagnose emissions and drivability concerns caused by the evaporative emissions control system and recommend corrective actions.
- The student will inspect and test the components and hoses of the evaporative emissions control system and perform necessary corrective actions.
- The student will interpret DTCs and scan tool data related to emissions control systems and determine necessary actions based on the diagnostic results.
- The student will remove and replace the timing belt and verify that the camshaft timing is correctly set.
- The student will remove and replace the thermostat, gasket, or seal, ensuring proper engine cooling system function.
- The student will inspect and test mechanical and electrical fans, fan clutches, air dams, and fan control devices, and perform any necessary repairs or replacements.
- The student will perform engine oil and filter changes to ensure proper engine lubrication and function.

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)
- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
- Taking Tests in Alternate Setting (or if requested)
- Drill and Practice (Repetition of Material)
- Copy of Teacher/Student Notes/Skeleton Notes
- Use of Daily Planner/Assignment Book (monitor use of)
- Positive Reinforcement
- Have Student Repeat Directions
- Positive Reinforcement
- Provide Frequent Feedback
- Regular Notebook Check
- Communication Regarding Behavior & Consequences (PBS)
- Clear Language for Directions
- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills
- Provide Verbal and Written Directions

- All Vocabulary to be Defined Before Testing

Safety:

- Safety glasses must be worn at all times by students in the Auto Shop.
- Students must always wear their work uniform in the Auto Shop.
- Work shoes must be always worn by students in the Auto Shop.
- Students will follow the safety rules as they apply to each tool or piece of equipment.
- Students will conduct themselves in a safe and professional manner.

Assessment:**THEORY EVALUATION**

- Traditional tests - multiple choice, matching, true/false, short answer completion
- Traditional quizzes - multiple choice, matching, true/false, short answer completion
- Graded homework
- Graded math practice assignments
- Graded reading assignments
- Notebook checks
- Class oral responses
- Business and industry credentialing tests
- Exit slips/timecards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
- The teacher will assess students' understanding through discussions, quizzes, or practical demonstrations.
- The teacher will ensure scores are given on projects when they are completed.
- The teacher will observe and score when a job is completed.
- The teacher will observe and assess the quality of work being done by a student on an assigned job.

- The teacher will determine if students use the appropriate terminology for particular jobs.
- The teacher will determine if the student has the skills to work independently on an assigned job.
- The teacher will evaluate students' ability to maintain their work areas throughout the duration of the course.
- The teacher will evaluate student communication in group activities and projects.
- The teacher will evaluate that the PA Program of Study tasks are being achieved as expected.
- The teacher will evaluate the students' class participation.
- The teacher will assess the students' ability to work within a team when teamwork is necessary.
- The teacher will evaluate the student's responsibility to complete work logs as expected.
- The teacher will evaluate if students work without hindering other students' progress.
- The teacher will assess if students stay on task in accordance with the job expectation.
- The teacher will observe students' ability to track tools, parts, and equipment efficiently.
- The teacher will account if students are prepared for class each day.
- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5
- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Extended time to complete the assessment

- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- Electude Learning Management System (LMS)
- ASE Certification
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: AUTOMOTIVE HVAC (Optional)

Number: 900 **Days:** 16

Description/Objectives:

The student will review the operating principles of automotive HVAC systems as well as the environmental impact of refrigerants, as well as common procedures need to acquire an EPA609 certification for A/C repair through MACS. (This section is optional.) Written examinations, worksheets, review questions and evaluation of psychomotor (hands-on) skills shall be used to evaluate the student's knowledge and ability based on ASE and NOCTI Guidelines.

Tasks:

PA901 - Explain the operation of an expansion valve, constant run compressor system.

PA902 - Explain the operation of a capillary tube, cycling compressor system.

PA903 - Explain the environmental impact of leaking R-12 from pre-1996 systems.

PA904 - Explain the difference in R-134A compounds used in modern automobiles and R-12 used in pre-1996 vehicles.

PA905 - Demonstrate the use of a recycling machine to recover refrigerant.

PA906 - Perform a 30 minute static vacuum test for system leakage on an empty system.

PA907 - Demonstrate the use of a halide/electronic leak detector to locate potential leakage.

PA908 - Diagnose a blower speed control issue and determine the cause.

PA909 - Locate and interpret the circuit diagrams for an air conditioning control circuit.

PA910 - Leak test a heater core and determine service procedures.

PA911 - Back-flush a heater core and radiator.

PA912 - Drain, refill and bleed the air from a cooling system.

Chapter 75: Heating and Air Conditioning Fundamentals

Objectives Standards:

- Explain the principles of refrigeration.
- Describe the four cycles of refrigeration.
- Describe the high- and low-pressure sides of an air conditioning system.
- Explain the basic function and construction of each major part of a typical heating and air conditioning system.
- Summarize the operation and interaction of heating, ventilation, and air conditioning systems. Describe safety precautions to be observed when working on heating and air conditioning systems. Correctly answer ASE certification test questions requiring a knowledge of modern heating and air conditioning systems.

Chapter 76: Heating and Air Conditioning Service

Objectives Standards:

- Visually inspect a heating and air conditioning system and locate obvious troubles.
- Diagnose common heating and air conditioning problems.
- Describe the functions and uses of air conditioning test equipment.
- Locate air conditioning and heating system leaks.
- Explain how to replace major heating and air conditioning components.
- Describe the general procedures for evacuating and charging an air conditioning system.
- Demonstrate safe working practices when servicing heating and air conditioning equipment. Correctly answer ASE certification test questions about the diagnosis and repair of heating and air conditioning systems.

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- 3.5.9-12.L Interpret laws, regulations, policies, and other factors that impact the development and use of technology.
- 3.5.9-12.3 Strand: Integration of Knowledge, Technologies, and Practices.
- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Focus Anchor/Standard #2:**MATH/SCIENCE****Supporting Anchor/Standards:**

- S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.
- S11.A.1.1.3 Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).
- S11.A.2.1.2 Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate and communicate results) applicable to a specific technological design.
- S11.C.2.2.2 Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion
- 3.5.9-12.P Apply a broad range of design skills to a design thinking process.

Connecting Anchor/Standard:**Career Education & Work****Supporting Anchor/Standards:**

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
- 13.1.11.G Assess the implements of the individualized career plan through the ongoing development of the career portfolio.
- 13.1.11.H Review personal high school plan against current personal career goals and select postsecondary opportunities based upon personal career interests.
- 13.3.11.A Evaluate personal attitudes and work habits that support career retention and advancement.

Instructional Activities:

- K-W-L with a twist
- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading

- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills:

The students will review the following skills from Level 2 – HVAC:

- The student will explain the function and operation of an expansion valve and constant run compressor system in automotive air conditioning.
- The student will describe the operation of a capillary tube and cycling compressor system in automotive air conditioning.
- The student will explain the environmental impact of refrigerant leakage, specifically R-12, from air conditioning systems in vehicles manufactured before 1996.
- The student will compare and contrast the properties of R-134A refrigerant used in modern automobiles with R-12 refrigerant used in vehicles built before 1996.
- The student will demonstrate how to use a recycling machine to recover refrigerant from an automotive air conditioning system.
- The student will perform a 30-minute static vacuum test on an empty automotive air conditioning system to check for leaks.
- The student will demonstrate how to use a halide or electronic leak detector to locate potential refrigerant leaks in an air conditioning system.
- The student will diagnose a blower speed control issue in an automotive HVAC system and determine the root cause of the problem.
- The student will locate and interpret circuit diagrams related to the air conditioning control circuits in automotive systems.
- The student will perform a leak test on a heater core and determine the appropriate service procedures based on the test results.
- The student will demonstrate the proper technique for back-flushing a heater core and radiator to remove debris or blockages.
- The student will drain, refill, and properly bleed air from an automotive cooling system to ensure proper function.

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating
- Directions/Comprehension Check (frequent checks for understanding)

- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
- Taking Tests in Alternate Setting (or if requested)
- Drill and Practice (Repetition of Material)
- Copy of Teacher/Student Notes/Skeleton Notes
- Use of Daily Planner/Assignment Book (monitor use of)
- Positive Reinforcement
- Have Student Repeat Directions
- Positive Reinforcement
- Provide Frequent Feedback
- Regular Notebook Check
- Communication Regarding Behavior & Consequences (PBS)
- Clear Language for Directions
- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills
- Provide Verbal and Written Directions
- All Vocabulary to be Defined Before Testing

Safety:

- Safety glasses must be worn at all times by students in the Auto Shop.
- Students must always wear their work uniform in the Auto Shop.
- Work shoes must be always worn by students in the Auto Shop.
- Students will follow the safety rules as they apply to each tool or piece of equipment.
- Students will conduct themselves in a safe and professional manner.

Assessment:

THEORY EVALUATION

- Traditional tests - multiple choice, matching, true/false, short answer completion
- Traditional quizzes - multiple choice, matching, true/false, short answer completion
- Graded homework
- Graded math practice assignments
- Graded reading assignments

- Notebook checks
- Class oral responses
- Business and industry credentialing tests
- Exit slips/timecards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
- The teacher will assess students' understanding through discussions, quizzes, or practical demonstrations.
- The teacher will ensure scores are given on projects when they are completed.
- The teacher will observe and score when a job is completed.
- The teacher will observe and assess the quality of work being done by a student on an assigned job.
- The teacher will determine if students use the appropriate terminology for particular jobs.
- The teacher will determine if the student has the skills to work independently on an assigned job.
- The teacher will evaluate students' ability to maintain their work areas throughout the duration of the course.
- The teacher will evaluate student communication in group activities and projects.
- The teacher will evaluate that the PA Program of Study tasks are being achieved as expected.
- The teacher will evaluate the students' class participation.
- The teacher will assess the students' ability to work within a team when teamwork is necessary.
- The teacher will evaluate the student's responsibility to complete work logs as expected.
- The teacher will evaluate if students work without hindering other students' progress.
- The teacher will assess if students stay on task in accordance with the job expectation.
- The teacher will observe students' ability to track tools, parts, and equipment efficiently.
- The teacher will account if students are prepared for class each day.

- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5
- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- Electude Learning Management System (LMS)
- ASE Certification
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: DRIVE TRAINS

Number: 1000 **Days:** 15

Description/Objectives:

The student will review the basic skills necessary to maintain and make basic repairs to the drive train components. Written examinations, worksheets, review questions and evaluation of psychomotor (hands-on) skills shall be used to evaluate the student's knowledge and ability based on ASE and NOCTI Guidelines.

Tasks:

PA1001 Check the fluid level of an automatic transmission.

PA1002 - Drain, change filter, and refill an automatic transmission

PA1003 - Check the fluid level on a manual transmission.

PA1004 - Replace a clutch on a vehicle with a manual transmission.

PA1005 - Bleed a hydraulic clutch system of air.

PA1006 Check the fluid in a transfer case.

PA1007 - Check the fluid in a differential housing. (Rear or 4 wheel drive)

PA1008 - Check gear backlash using a dial indicator on a differential.

PA1009 - Check ring gear back face runout using a dial indicator.

PA1010 - Check gear tooth contact drive and coast side with marking compound and determine corrective action.

Chapter 53: Clutch Fundamentals

Objectives Standards:

- List the basic parts of an automotive clutch.
- Explain the operation of a clutch.
- Describe the construction of major clutch components.
- Compare clutch design differences.
- Explain the different types of clutch release mechanisms.

- Correctly answer ASE certification test questions that require a knowledge of clutch designs and operation.

Chapter 54: Clutch Diagnosis and Repair

Objectives Standards:

- Troubleshoot common clutch problems.
- Describe symptoms of typical clutch troubles.
- Adjust a clutch.
- Remove, repair, and install a clutch.
- Inspect clutch parts for wear and damage.
- Cite safety rules and demonstrate safe work procedures.
- Correctly answer ASE certification test questions on clutch diagnosis and repair.

Chapter 55: Manual Transmission Fundamentals

Objectives Standards:

- Describe gear operating principles.
- Identify and define all of the major parts of a manual transmission.
- Explain the fundamental operation of a manual transmission.
- Trace the power flow through transmission gears.
- Compare the construction of different types of manual transmissions.
- Explain the purpose and operation of a transmission overdrive ratio.
- Correctly answer ASE certification test questions requiring a knowledge of manual transmission operating principles.

Chapter 56: Manual Transmission Diagnosis and Repair (Optional Time Permitting)

Objectives Standards:

- Diagnose common manual transmission problems.
- Remove a standard transmission from a vehicle.
- Disassemble and inspect a manual transmission.
- Assemble a manual transmission.
- Install a manual transmission.
- Adjust manual transmission linkage.
- Cite and observe safety rules for transmission service.

- Correctly answer ASE certification test questions on manual transmission diagnosis and repair.

Chapter 57: Automatic Transmission Fundamentals

Objectives Standards:

- Identify the basic components of an automatic transmission.
- Describe the function and operation of the major parts of an automatic transmission.
- Trace the flow of power through an automatic transmission.
- Explain how an automatic transmission shifts gears.
- Compare the different types of automatic transmissions.
- Correctly answer ASE certification test questions requiring a knowledge of automatic transmission operation and construction.

Chapter 58: Automatic Transmission Service

Objectives Standards:

- Troubleshoot an automatic transmission.
- Explain the types of problems common to an automatic transmission.
- Describe the tests needed to locate automatic transmission problems.
- Change automatic transmission oil and filter.
- Make basic external adjustments on an automatic transmission.
- Locate and repair automatic transmission leaks.
- Cite and observe safety rules while working on transmissions.
- Troubleshoot electronically controlled automatic transmissions.
- Remove and replace an automatic transmission.
- Correctly answer ASE Certification test questions about automatic transmission service.

Chapter 59: Drive Shafts and Transfer Cases

Objectives Standards:

- Identify and describe the parts of a modern drive shaft assembly.
- Explain the functions of a drive shaft.
- Describe the different types of universal joints.
- List the different types of drivelines.

- Identify the major parts of a four-wheel-drive driveline.
- Explain the basic operation of a transfer case.
- Correctly answer ASE certification test questions that require a knowledge of drive shafts and transfer cases.

Chapter 61: Differential and Rear Drive Axle Fundamentals

Objectives Standards:

- Identify the major parts of a rear drive axle assembly.
- List the functions of a rear axle assembly.
- Describe the operation of a differential.
- Explain differential design variations.
- Compare different types of axles.
- Describe the principles of a limited-slip differential.
- Relate rear axle ratios to vehicle performance.
- Correctly answer ASE certification test questions requiring a knowledge of differential and rear drive axle fundamentals.

Chapter 63: Transaxle and Front Drive Axle Fundamentals

Objectives Standards:

- Identify the major parts of a transaxle assembly.
- Explain the operation of a manual transaxle.
- Explain the operation of an automatic transaxle.
- Trace the flow of power through manual and automatic transaxles.
- Describe design differences in transaxles.
- Identify the parts of constant velocity drive axles.
- Compare design differences in CV-joints.
- Correctly answer ASE certification test questions requiring a knowledge of transaxle and front drive axle designs.

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- 3.5.9-12.L Interpret laws, regulations, policies, and other factors that impact the development and use of technology.

- 3.5.9-12.3 Strand: Integration of Knowledge, Technologies, and Practices.
- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Focus Anchor/Standard #2:

MATH/SCIENCE

Supporting Anchor/Standards:

- S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.
- S11.A.1.1.3 Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).
- S11.A.2.1.2 Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate and communicate results) applicable to a specific technological design.
- S11.C.2.2.2 Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion
- 3.5.9-12.P Apply a broad range of design skills to a design thinking process.

Connecting Anchor/Standard:

Career Education & Work

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
- 13.1.11.G Assess the implements of the individualized career plan through the ongoing development of the career portfolio.
- 13.1.11.H Review personal high school plan against current personal career goals and select postsecondary opportunities based upon personal career interests.
- 13.3.11.A Evaluate personal attitudes and work habits that support career retention and advancement.

Instructional Activities:

- K-W-L with a twist

- Read the questions at the end of the chapter
- Read the summary information first
- Checking for Comparative Knowledge
- Questioning while reading
- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills:

The students will review the following skills from Level 2 – Drive Trains:

- The student will check the fluid level of an automatic transmission using the proper method and tools.
- The student will drain, change the filter, and refill an automatic transmission with the correct fluid according to manufacturer specifications.
- The student will check the fluid level of a manual transmission using the appropriate method and tools.
- The student will replace the clutch on a vehicle with a manual transmission, ensuring proper alignment and installation.
- The student will bleed a hydraulic clutch system to remove air and ensure proper clutch operation.
- The student will check the fluid level and condition in a transfer case, ensuring it meets manufacturer specifications.
- The student will check the fluid level and condition in a differential housing (rear or 4-wheel drive) and determine if maintenance is needed.
- The student will check the gear backlash using a dial indicator on a differential and interpret the measurements to assess gear set alignment.
- The student will check the ring gear back face runout using a dial indicator and evaluate the results for proper gear alignment.
- The student will check the gear tooth contact on both the drive and coast sides using marking compound and determine the necessary corrective action if gear wear or misalignment is detected.

Special Adaptations:

- Extended Time (assignments and/or testing)
- Chunking of Assignments/Material
- Preferential Seating

- Directions/Comprehension Check (frequent checks for understanding)
- Directions and/or Tests Read Aloud
- Adapted Tests and/or Assignments
- Use of Calculator
- Taking Tests in Alternate Setting (or if requested)
- Drill and Practice (Repetition of Material)
- Copy of Teacher/Student Notes/Skeleton Notes
- Use of Daily Planner/Assignment Book (monitor use of)
- Positive Reinforcement
- Have Student Repeat Directions
- Positive Reinforcement
- Provide Frequent Feedback
- Regular Notebook Check
- Communication Regarding Behavior & Consequences (PBS)
- Clear Language for Directions
- Allow Oral Answers for Testing
- Copies of Text for Home
- Encourage Student to Check Work Before Turning In
- Opportunities for Repeated Practice of MATH Skills
- Provide Verbal and Written Directions
- All Vocabulary to be Defined Before Testing

Safety:

- Safety glasses must be worn at all times by students in the Auto Shop.
- Students must always wear their work uniform in the Auto Shop.
- Work shoes must be always worn by students in the Auto Shop.
- Students will follow the safety rules as they apply to each tool or piece of equipment.
- Students will conduct themselves in a safe and professional manner.

Assessment:

THEORY EVALUATION

- Traditional tests - multiple choice, matching, true/false, short answer completion
- Traditional quizzes - multiple choice, matching, true/false, short answer completion
- Graded homework
- Graded math practice assignments

- Graded reading assignments
- Notebook checks
- Class oral responses
- Business and industry credentialing tests
- Exit slips/timecards

SKILL EVALUATION

- The teacher will monitor students' progress to ensure timely completion and submission of all required documents.
- The teacher will review and evaluate students' performance to ensure mastery of safety concepts.
- The teacher will evaluate students' understanding of equipment locations, safety protocols, and handling techniques.
- The teacher will assess students' understanding through discussions, quizzes, or practical demonstrations.
- The teacher will ensure scores are given on projects when they are completed.
- The teacher will observe and score when a job is completed.
- The teacher will observe and assess the quality of work being done by a student on an assigned job.
- The teacher will determine if students use the appropriate terminology for particular jobs.
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- The teacher will evaluate students' ability to maintain their work areas throughout the duration of the course.
- The teacher will evaluate student communication in group activities and projects.
- The teacher will evaluate that the PA Program of Study tasks are being achieved as expected.
- The teacher will evaluate the students' class participation.
- The teacher will assess the students' ability to work within a team when teamwork is necessary.
- The teacher will evaluate the student's responsibility to complete work logs as expected.
- The teacher will evaluate if students work without hindering other students' progress.
- The teacher will assess if students stay on task in accordance with the job expectation.
- The teacher will observe students' ability to track tools, parts, and equipment efficiently.

- The teacher will account if students are prepared for class each day.
- The teacher will ensure students are wearing appropriate clothing when necessary.
- The teacher will evaluate if students make up missed assignments in the established time limit.
- The teacher will provide real-time feedback on their diagnostic and repair processes using service data.
- The teacher will encourage students to explore and discuss potential career advancements and industry trends.

SPECIAL NEEDS ASSESSMENT ADAPTATIONS

- Study guides provided prior to tests
- Use of a scribe
- Use of calculator
- Multiple Choice will include 3 choices instead of 4
- Matching with groups of no more than 10 (depends on IEP)
- Matching with groups of no more than 5
- Tests read aloud
- Word bank with no more than 10 options
- Word bank with no more than 5 options
- Extended time to complete the assessment
- Alternate assessment-project or presentation instead of written assessment

Resources/Equipment:

- SP2 Safety Program
- Electude Learning Management System (LMS)
- ASE Certification
- Chromebook

Course: Auto Mechanics Technology/Technician

Unit Name: EMPLOYMENT & LEADERSHIP SKILLS (Skills USA -PDP)

Number: 1100 **Days:** 27

Description/Objectives:

The student will gain job seeking, employment and leadership skills through daily implementation of the task activities list below in conjunction with regular class activities.

Tasks:

PA1101 - Complete a self-assessment checklist and identify individual learning styles.

PA1102 Discover self-motivation and establish short term goals.

PA1103 - Determine individual time-management skills.

PA1104 - Define future occupations and opportunities within the trade area.

PA1105 - Develop an awareness of cultural diversity.

PA1106 - Develop an awareness of equity issues.

PA1107 - Identify components of a professional portfolio.

PA1108 - Develop personal financial skills.

PA1109 - Investigate a career in your field.

PA1110 - Measure and modify short term goals.

PA1111 Identify stress sources.

PA1112 - Demonstrate awareness of governmental agencies, professional organizations and trade unions.

PA1113 - Observe and critique a business meeting and demonstrate business meeting skills.

PA1114 - Demonstrate social etiquette.

PA1115 - Identify customer expectations.

PA1116 - Assemble your employment portfolio. (Resume, task list, learning preference inventory, awards, certifications, newspaper articles, etc.)

PA1117 - Self evaluate your proficiency in program competencies.

PA1118 - Develop and write a good set of work ethics.

PA1119 - Update your career goals.

PA1120 - Explore activities for advanced training and write a plan.

PA1121 Create a marketing plan for your instructional program.

PA1122 - Serve as a volunteer in your community.

PA1123 - Create a business plan for your own business.

PA1124 - Explore supervisory and management roles in a business.

PA1125 - Understand and demonstrate customer service in the workplace.

PA1126 - Identify and apply conflict resolution and problem-solving skills in the workplace.

PA1127 - Demonstrate evaluation skills by observing and critiquing a peer in a constructive manner.

PA1128 - Perform a skill demonstration for the class.

PA1129 Research and propose updates to competency list.

PA1130 - Recognize the reasons for pre-employment screenings and assessments and drug and alcohol abuse in the workplace.

PA1131 - Demonstrate effective communication with others.

Chapter 7: Service Information and Work Orders

Objectives Standards:

- Describe the different types of service manuals.
- Find and use the service manual index and contents sections.
- Explain the different kinds of information and illustrations used in a service manual.
- Describe the three basic types of troubleshooting charts found in service manuals.
- Explain how to use computer-based service information.
- Correctly answer ASE certification test questions concerning service information.

Chapter 80: Career Success

Objectives Standards:

List the traits employers look for in their employees.

Summarize the different systems used to pay technicians.

Explain the types of repair facilities.

Explain how to find job openings in the automotive field.

Standards / Assessment Anchors

Focus Anchor/Standard #1:

LITERACY

Supporting Anchor/Standards:

- 3.5.9-12.L Interpret laws, regulations, policies, and other factors that impact the development and use of technology.
- 3.5.9-12.3 Strand: Integration of Knowledge, Technologies, and Practices.
- CC.3.5.11-12.C Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.

Focus Anchor/Standard #2:

MATH/SCIENCE

Supporting Anchor/Standards:

- S11.A.1.1 Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.
- S11.A.1.1.3 Evaluate the appropriateness of research questions (e.g., testable vs. not-testable).
- S11.A.2.1.2 Critique the elements of the design process (e.g. identify the problem, understand criteria, create solutions, select solution, test/evaluate and communicate results) applicable to a specific technological design.
- S11.C.2.2.2 Explain the practical use of alternative sources of energy (i.e., wind, solar, and biomass) to address environmental problems (e.g., air quality, erosion
- 3.5.9-12.P Apply a broad range of design skills to a design thinking process.

Connecting Anchor/Standard:

Career Education & Work

Supporting Anchor/Standards:

- 13.1.11.A Relate careers to individual interests, abilities, and aptitudes.
- 13.1.11.C Analyze how the changing roles of individuals in the workplace relate to new opportunities within career choices.
- 13.1.11.G Assess the implements of the individualized career plan through the ongoing development of the career portfolio.
- 13.1.11.H Review personal high school plan against current personal career goals and select postsecondary opportunities based upon personal career interests.
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Instructional Activities:

- K-W-L with a twist
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- Small Group Oral Reading/Questioning
- Using graphic organizers for notes
- Checklist of facts
- Demonstrate what was learned
- Exit slips of learning
- Exit slips of questions
- Test question list

Skills:

- The student will complete a self-assessment checklist to identify their individual learning styles and preferences for optimal learning.
- The student will discover self-motivation techniques and establish short-term, achievable goals for personal and professional growth.
- The student will determine and evaluate their individual time-management skills and develop strategies for improving time efficiency.
- The student will research and define potential future occupations and opportunities within the automotive trade area.
- The student will develop an understanding and awareness of cultural diversity in the workplace and its impact on professional interactions.

- The student will develop an awareness of equity issues in the workplace, including fair treatment and opportunity for all individuals.
- The student will identify and understand the key components of a professional portfolio, including resumes, certifications, and achievements.
- The student will develop personal financial management skills, including budgeting, saving, and managing expenses.
- The student will investigate career opportunities in the automotive field, exploring job responsibilities, required skills, and industry expectations.
- The student will measure their progress toward short-term goals and modify them as needed to stay on track for success.
- The student will identify sources of stress in both personal and professional environments and develop strategies to manage stress effectively.
- The student will demonstrate an understanding of the roles of governmental agencies, professional organizations, and trade unions in the automotive industry.
- The student will observe and critique a business meeting, demonstrating an understanding of business meeting etiquette and skills.
- The student will demonstrate appropriate social etiquette in professional settings, including communication and respectful behavior.
- The student will identify customer expectations in the automotive industry and demonstrate the ability to meet or exceed these expectations.
- The student will assemble a comprehensive employment portfolio that includes a resume, task list, learning preference inventory, certifications, awards, and other relevant documents.
- The student will perform a self-evaluation of their proficiency in the program's competencies and identify areas for improvement.
- The student will develop and write a strong set of personal work ethics that align with industry standards and expectations.
- The student will regularly update their career goals based on changing interests, job market trends, and personal growth.
- The student will explore opportunities for advanced training and create a detailed plan for pursuing these activities to further their career.
- The student will develop a marketing plan for promoting their instructional program, including identifying target audiences and strategies for outreach.
- The student will participate in community volunteer activities, demonstrating the value of community service and professional development.
- The student will create a detailed business plan for starting their own automotive-related business, including financial projections, market analysis, and operational plans.
- The student will explore supervisory and management roles within the automotive industry and understand the responsibilities and challenges of these positions.
- The student will demonstrate effective customer service techniques in the workplace, ensuring customer satisfaction and positive experiences.
- The student will identify common workplace conflicts and apply conflict resolution and problem-solving skills to resolve issues effectively.

- The student will demonstrate evaluation skills by observing and providing constructive feedback to a peer in a professional and helpful manner.
- The student will perform a skill demonstration in front of the class, showcasing proficiency in a specific automotive task.
- The student will research industry trends and propose updates to the program's competency list to ensure it remains relevant to current practices.
- The student will recognize the importance of pre-employment screenings, assessments, and drug and alcohol policies in maintaining a safe and productive workplace.
- The student will demonstrate effective communication skills, including verbal, written, and non-verbal communication, to foster positive interactions in the workplace.

Special Adaptations:

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