DELAWARE VALLEY SCHOOL DISTRICT

PLANNED INSTRUCTION

A PLANNED COURSE FOR:

_____Mathematical Modeling_____

Grade Level:

Date of Board Approval: _____2017_____

DELAWARE VALLEY SCHOOL DISTRICT

Planned Instruction

Title of Planned Instruction: Mathematical Modeling

Subject Area: Mathematics Grade(s): 11/12

Course Description: This class is being offered for the student who has completed the Algebra 1A, Algebra 1B, Informal Geometry and Algebra 2 sequence. This class is a collection of mathematical situations drawn from real life. It is a class that will foster collaborating with classmates, working as a team member and drawing conclusions from data. Appropriate technology through the use of the graphing calculator will be accessed to model and analyze data. Students will explore problem solving skills, linear function models, quadratic function models, exponential function models, geometric models, statistical and graphical models, financial models, and probability models.

Time/Credit for the Course: 2 SEMESTERS, 1 CREDIT, 180 days, meeting 1 period per day

Curriculum Writing Committee: Kimberly Orben, Susan West

Gradebook Policy for Mathematical Modeling

Marking Period	Quiz	Test	Homework + Class Participation	Projects
MP1	10%	40%	10%	40%
MP 2	10%	40%	10%	40%
MP 3	10%	40%	10%	40%
MP 4	10%	40%	10%	40%
Total Percents	10%	40%	10%	40%

Curriculum Map

1. **Marking Period One -Overview based on 45 days:**
   Mathematical Models and Problem Solving

   Marking Period One -Goals:
   Understanding of:

- Polya's four-step process for solving problems
- Basic principles of algebra to solve real-world problems
- Proportional reasoning as a problem-solving strategy
- Functional relationships graphically and algebraically
- Mathematical models to solve problems
- Linear functions (graphically and algebraically)

2. **Marking Period Two -Overview based on 45 days:**
   Mathematical Models and Problem Solving
   Mathematical Modeling with Quadratic Functions, Logarithmic and Exponential Functions

   Marking Period Two -Goals:
   Understanding of:

- Linear functions (graphically and algebraically) continued
- Applications of linear models
- Systems of linear equations and inequalities as a mathematical model
- Graphs of quadratic and exponential functions
- Maximum and minimum values of a function
- Methods to solve quadratic equations
- Exponential growth and decay
- Applications of quadratic and exponential models

3. **Marking Period Three -Overview based on 45 days:**
   Using Geometric Models to Solve Problems
   Problem Solving with Statistical and Probability Models

   Marking Period Three -Goals
   Understanding of:

- Area verses perimeter of polygons
- Area and circumference of circles
- Differences between similar and congruent figures
- Applications of Pythagorean Theorem
- Trigonometric ratios (sine, cosine and tangent ratios)
- Applications involving trigonometry
- Volume and surface area of 3-dimensional figures
- Applications of geometric formulas to solve problems
- Scale factors and proportional relationships
- Analysis of data displays (bar graphs, stem and leaf plots, etc…)
- Organizing data with tables and graphs
- Measures of central tendencies (mean, median and mode)
- Measures of variability (range and standard deviation)

4. **Marking Period Four –Overview based on 45 days:**
   Problem Solving with Statistical and Probability Models
   Problem Solving with Financial Models

   Marking Period Four -Goals:
   Understanding of:

- Measures of variability (range and standard deviation) continued
- Normal distributions and properties of the normal curve
- Random sampling and bias
- Theoretical verses experimental probability
- Probability of simple and compound events
- Applications of probability
- Personal finances
- Simple verses compound interest
- Financing a mortgage

UNIT 1: Mathematical Models and Problem Solving

Big Idea # 1: Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations.

Essential Questions:

- How are relationships represented mathematically?
- How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations?

Concepts:

- Equations and Inequalities

Competencies:

- Create and/or solve equations both algebraically and graphically.
- Determine how a change in one variable relates to a change in the second variable.
- Use and/or explain reasoning while solving equations, and justify the solution method.

Big Idea #2: Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions.

Essential Questions:

- How can patterns be used to describe relationships in mathematical situations?

Concepts:

- Functions

Competencies:

- Use the concept and notation of function to interpret and apply them in terms of their context.
- Interpret functions in terms of the situations they model.
- Create and/or analyze functions using multiple representations (graph, table, and equation).
- Create a function and/or sequence that model a relationship between two quantities.

Curriculum Plan

Unit 1: Mathematical Models and Problem Solving **Time Range in Days: 50-60**

Standard(s):
PA Academic Standards: CC.2.1. HS.F.2, CC.2.1. HS.F.3, CC.2.1. HS.F.4, CC.2.2. HS.D.1, CC.2.2. HS.D.2, CC.2.2. HS.D.7, CC.2.2. HS.D.8, CC.2.2. HS.D.9, CC.2.2. HS.D.10, CC.2.2. HS.C.1, CC.2.2. HS.C.2, CC.2.2. HS.C.3, CC.2.2. HS.C.5, CC.2.2. HS.C.6.

http://static.pdesas.org/content/documents/PA%20Core%20Standards%20Mathematics%20PreK-12%20March%202014.pdf

Anchor(s):
A1.1.2.1.1, A1.1.2.1.2, A1.1.2.1.3, A1.1.2.2.1, A1.1.2.2.2, A1.1.3.1.1, A1.1.3.1.2, A1.1.3.1.3, A1.1.3.2.1, A1.1.3.2.2, A1.2.1.1.1, A1.2.1.1.2, A1.2.1.1.3, A1.2.1.2.1, A1.2.1.2.2, A1.2.2.1.1, A1.2.2.1.2, A1.2.2.1.3, A1.2.2.1.4, A1.2.2.2.1, A2.1.3.2.1, A2.1.3.2.2, A2.2.1.1.3, A2.2.3.1.1, A2.2.3.1.2

http://static.pdesas.org/content/documents/Algebra%20I%20Assessment%20Anchors%20and%20Eligible%20Content%20April%202014.pdf

http://static.pdesas.org/content/documents/Algebra%20II%20Assessment%20Anchors%20and%20Eligible%20Content%20April%202014.pdf

Overview: Introduction to Problem Solving and Mathematical Models (Linear Functions)

Focus Questions: How can we use algebraic processes to solve problems? How can we model real world relationships both graphically and algebraically as linear functions or inequalities?

Goals: Students will be able to apply Polya's four-step process for solving problems. Students will be able to create a mathematical model given a real world scenario. Students will be able to choose and apply problem solving strategies which include charts, tables, graphs, proportions, algebraic expressions, linear functions, linear inequalities and systems of linear equations and inequalities. Students will be able to assess the reasonableness of their solution to the problem.

Objectives:

1. Students will practice communication skills and write a solution in sentences. (DOK – Level One)
2. Students will organize information and develop problem-solving skills (draw a picture, recognize a pattern, do a simpler problem). (DOK – Level Two)

3. Students will translate verbal statements into algebraic equations and use formulas to solve problems. (DOK – Level Three)
4. Students will use the basic principles of algebra to solve real-world problems. (DOK – Level Three)
5. Students will use proportional reasoning as a problem-solving strategy. (DOK – Level Three)
6. Students will apply rates directly to solve problems. (DOK – Level Two)
7. Students will use unit or dimensional analysis to solve problems. (DOK – Level Three)
8. Students will identify input and output in situations involving two variable quantities and identify a functional relationship between two variables. (DOK – Level One)
9. Students will identify independent and dependent variables and use a table to numerically represent a functional relationship between two variables. (DOK–Level One)
10. Students will represent a functional relationship graphically and identify trends in data pairs. (DOK – Level One)
11. Students will determine the equation that defines a function and identify the domain and range of a function. (DOK – Level Two)
12. Students will represent and solve functions numerically and graphically using technology. (DOK – Level Three)
13. Students will solve problems using formulas as models. (DOK – Level Two)
14. Students will identify and develop a mathematical model in the form of an equation and use the model to solve problems. (DOK – Level Four)
15. Students will recognize patterns between two variables and develop a mathematical model to solve a problem. (DOK – Level Two)
16. Students will use problem solving skills to make decisions based on solutions of mathematical models. (DOK – Level Four)
17. Students will determine the average rate of change and interpret slope, including zero and undefined slopes. (DOK – Level Two)
18. Students will identify whether a situation can be modeled by a linear function and determine the practical meaning of the x and y intercepts. (DOK – Level Three)
19. Students will write the equation of a line from different sets of given information in slope intercept form, in point slope form and in standard form. (DOK – Level Two)
20. Students will determine the equation of a horizontal or vertical line. (DOK – Level Two)
21. Students will construct scatterplots from sets of data pairs and identify whether a positive, negative or no correlation exists. (DOK – Level Four)
22. Students will identify outliers in a given data set. (DOK – Level One)
23. Students will estimate and draw a line of best fit through a set of points in a scatterplot. (DOK – Level Two)
24. Students will use a graphing calculator to determine a line of best fit. (DOK – Level Two)

25. Students will collect and organize data in a table, plot data in a scatterplot, recognize linear patterns, and determine a linear regression equation (DOK – Level Four)
26. Students will solve a system of two linear equations numerically, graphically, using the substitution method, or the elimination method. (DOK – Level Two)
27. Students will interpret the solution to a system of two linear equations in terms of the problem's content. (DOK – Level Four)
28. Students will determine the break-even point of a linear system algebraically and graphically and interpret break-even points in contextual situations. (DOK – Level Two)
29. Students will solve linear inequalities including compound inequalities algebraically and graphically. (DOK – Level Two)
30. Students will solve a system of linear inequalities in two variables graphically. (DOK– Level Two)

Core Activities and Corresponding Instructional Methods:

1. Expose students' prior knowledge of algebraic processes and operations/properties of real numbers, as well as other Algebra 1 and Algebra 2 fundamental skills, such as: solving algebraic equations, writing equations of linear functions, solving a system of two linear equations or inequalities.
    a. Diagnostic assessment, questioning
    b. Direct instruction as needed using Smart Technology and online textbook and resources
    c. Guided practice
    d. Cooperative learning groups

2. Develop students' ability to communicate mathematically, building math language/vocabulary including relation, function, domain and range.
    a. Teachers will use appropriate language to identify algebraic terms and processes.
    b. During class discussions and investigations, teachers will encourage and guide students to use appropriate math terminology.
    c. Writing activities incorporating appropriate math language

3. Develop students' problem solving skills and their ability to identify, create, and use mathematical models to solve problems.
    a. Direct instruction using Smart Technology and online textbook and resources
    b. Guided practice
    c. Cooperative learning groups
4. Develop students' ability to model situations graphically and identify trends.

a. Diagnostic assessment, questioning
b. Cooperative learning groups
c. Direct instruction as needed using Smart Technology and online textbook and resources
d. Guided practice

5. Expose students' prior knowledge of graphing linear functions and writing equations of lines in slope-intercept form, point-slope form, and standard form, including the line of best fit.
    a. Diagnostic assessment, questioning
    b. Cooperative learning groups
    c. Direct instruction as needed using Smart Technology and online textbook and resources
    d. Guided practice

6. Develop students' skills in solving a system of linear equations both graphically and algebraically as well as a system of linear inequalities (graphically).
    a. Direct instruction using Smart Technology and online textbook and resources.
    b. Guided practice
    c. Cooperative learning groups

7. Develop students' ability to solve real world problems by applying their understanding of linear functions, systems of linear equations and inequalities.
    a. Guided practice
    b. Cooperative learning groups

Assessments:

Diagnostic:

Teacher prepared pre-test/diagnostic test
Teacher questioning and observation

Formative:

Teacher observations, questions, discussions
Textbook exercises following each activity
Chapter 1: Gateway Review (select problems)
Chapter 2: Gateway Review (select problems)

Summative:

Project 1.12 Summer Job Opportunities (use problem solving skills with mathematical

models)

Project 2.10 Measuring Up (scatterplots)

Project 2.12 Modeling a Business (systems of two linear equations)

Extensions:

Activity 1.4 Proportional Reasoning and Scale Pgs. 23-27 (Questions 13-19)

Activity 1.5 Fuel Economy Pg. 37 (Unit Conversion: Questions 7 and 8)

Activity 1.6 Florida Heat Pgs. 52-55 (Questions 9 – 12)

Activity 1.7 Fill 'er Up Pgs. 63-64 (Questions 6 – 9)

Activity 2.1 How Fast Did You Lose? Pgs. 171-173 (Questions 5 - 10)

Activity 2.2 The Snowy Tree Cricket Pgs. 183 – 186 (Questions 10 – 17)

Activity 2.9 College Tuition Pgs. 255-257 (Questions 1 - 6)

Activity 2.15 Will Trees Grow Pgs. 311-320 (Questions 1 – 12)

Correctives:

Activities 1.1 – 1.5 (What Have I Learned? How Can I Practice?)

Activities 2.1 – 2.10 (What Have I Learned? How Can I Practice?)

Chapter 1 Summary

Chapter 2 Summary

Practice worksheets generated through Kuta Software

(textbook resources)

Materials and Resources:

Applied Mathematics for College and Career, Consortium of Mathematics, Pearson (2016) – Chapter 1 (Activities 1.1 – 1.11) and Chapter 2 (Activities 2.1 – 2.14 excluding 2.5, 2.6 and 2.9)

Resource Pack for Applied Mathematics for College and Career, Pearson (2016)

TI – 84 Graphing calculators and Desmos.com

Teacher Generated Worksheets (Kuta Software)

TI SmartView software

Geometer's Sketchpad

Smart Notebook Gallery Essentials

Websites for ASVAB preparation (see Appendix)

Websites for Community College Placement Exams (see Appendix)

Website for SAT prep (collegeboard.org)

UNIT 2: Mathematical Modeling with Quadratic Functions, Logarithmic and Exponential Functions

Big Idea # 1: Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations.

Essential Questions:

- How are relationships represented mathematically?
- How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations?

Concepts:

- Polynomial Expressions

Competencies:

- Simplify expressions involving polynomials.
- Understand the relationship between zeros and factors of polynomials.

Big Idea #2: Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations.

Essential Questions:

- How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations.

Concepts:

- Equations and Inequalities

Competencies:

- Create and/or solve equations (including polynomial and exponential) both algebraically and graphically.
- Use exponents and roots to represent equivalent forms or to solve problems.
- Use and/or explain reasoning while solving equations, and justify the solution method.

Big Idea #3: Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions.

Essential Questions:

- How are relationships represented mathematically?
- How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations?

Concepts:

- Functions

Competencies:

- Interpret functions in terms of the situations they model.
- Create and/or analyze functions using multiple representations (graph, table, and equation).
- Create a function and/or sequence that model a relationship between two quantities.

Curriculum Plan

Unit 2: Mathematical Modeling with Quadratic Functions and Exponential Functions

Time Range in Days: 25-30

Standard(s):
PA Academic Standards: CC.2.1. HS.F.1, CC.2.1. HS.F.2, CC.2.1. HS.F.3, CC.2.2. D.1. CC.2.2. HS.D.2, CC.2.2. HS.D.7, CC.2.2. HS.D.8, CC.2.2. HS.D.9, CC.2.2. HS.C.2, CC.2.2. HS.C.3, CC.2.2. HS.C.5, CC.2.2. HS.C.6

http://static.pdesas.org/content/documents/PA%20Core%20Standards%20Mathematics%20PreK-12%20March%202014.pdf

Anchor(s):
A2.1.2.1.1, A2.1.2.1.2, A2.1.2.1.3, A2.1.2.2.1, A2.1.3.1.1, A2.1.3.1.3, A2.1.3.1.4, A2.1.3.2.2, A2.2.1.1.1, A2.2.1.1.3, A2.2.1.1.4, A2.2.2.1.1, A2.2.2.1.2, A2.2.2.1.3, A2.2.2.1.4,

http://static.pdesas.org/content/documents/Algebra%20II%20Assessment%20Anchors%20and%20Eligible%20Content%20April%202014.pdf

Overview: Mathematical Modeling with Quadratic Functions and Exponential Functions

Focus Questions: How can we use quadratic or exponential functions to model real world situations?

Goals: Students will be able to graph quadratic and exponential functions, identifying properties of the graph, and solve quadratic and exponential equations using various algebraic methods.

Objectives:

1. Students will evaluate and graph functions in the form $y = ax^2$. (DOK – Level One)
2. Students will interpret the coordinates of points on the graph of $y = ax^2$ in context. (DOK – Level Two)
3. Students will solve a quadratic equation numerically, graphically and algebraically by taking square roots and using the quadratic formula. (DOK – Level Two)
4. Students will define growth factor, and determine the growth factor from percent increases as well as apply growth factors to problems involving percent increases. (DOK – Level Two)

5. Students will define decay factor, and determine the decay factor from percent decreases as well as apply decay factors to problems involving percent decreases. (DOK – Level Two)
6. Students will recognize and graph an exponential function (growth or decay) from numerical data or equations. (DOK – Level Two)
7. Students will determine the growth or decay factor of an exponential function represented by a table of values or an equation. (DOK – Level One)
8. Students will analyze the exponential function representing the given data set to determine the amount of time required to double or half the dependent variable (national debt, population, etc…) (DOK – Level Four)

Core Activities and Corresponding Instructional Methods:

1. Expose students' prior knowledge of functions and graphing in the coordinate plane, guiding students to graph quadratic functions. Investigate the properties of quadratic functions.
    a. Diagnostic assessment, questioning
    b. Direct instruction as needed using Smart Technology and online textbook and resources, Venn Diagrams
    c. Guided practice
    d. Cooperative learning groups

2. Develop students' skills in solving quadratic functions by graphing, taking square roots and using the quadratic formula.
    a. Direct instruction using Smart Technology and online textbook and resources.
    b. Graphing activity using TI-Smartview, guiding students to find the appropriate window to view the graph and identifying properties of the graph
    c. Guided practice
    d. Cooperative learning groups

3. Develop students' ability to solve real world problems involving quadratic functions.
    a. Direct instruction using Smart Technology and online textbook and resources.
    b. Guided practice
    c. Cooperative learning groups

4. Develop students' ability to solve real world problems, specifically problems involving exponential growth or decay.
    a. Guided practice
    b. Cooperative learning groups

Assessments:

Diagnostic:

Teacher prepared pre-test/diagnostic test

Teacher questioning and observation

Formative:

Teacher observations, questions, discussions

Textbook exercises following each activity

Chapter 3: Gateway Review (select problems)

Chapter 4: Gateway Review (select problems)

Summative:

Mathematical Modeling Project on Quadratic Functions (see Appendix)

Mathematical Modeling Project on Exponential Functions (see Appendix)

Extensions:

Activity 3.2 Baseball and the Willis Tower Pgs. 362 – 368 (Questions 1 – 16)
Activity 3.3 The Shot Put Pgs. 372 – 380 (Questions 1 – 16)
Activity 3.5 Sir Isaac Newton (factoring quadratics) Pgs. 389 – 393 (Questions 1 – 9)
Activity 3.8 A Thunderstorm (direct variation) Pgs. 417 – 419 (Questions 1 – 9)
Activity 4.4 The Summer Job Pgs. 482 – 489 (Questions 1 – 16)
Activity 4.8 The Diameter of Spheres (logarithms) Pgs. 532 – 537 (Questions 1 – 14)
Activity 4.9 Walking Speed of Pedestrians (natural log) Pgs. 540 – 543 (Questions 1 – 7)
Activity 4.11 The Elastic Ball (change of base) Pgs. 557 – 563 (Questions 1 – 17)
Activity 4.12 Changing Demographics Pgs. 567 – 570 (Questions 1 – 9)
Activity 4.13 Frequency and Pitch (log equations) Pgs. 575 – 576 (Questions 1 – 6)

Correctives:

Activities 3.1 – 3.7 (What Have I Learned? How Can I Practice?)
Activities 4.1 – 4.7 (What Have I Learned? How Can I Practice?)
Chapter 3 Summary
Chapter 4 Summary
Practice worksheets generated through Kuta Software
(textbook resources)

Materials and Resources:

Applied Mathematics for College and Career, Consortium of Mathematics, Pearson (2016) – Chapter 3 (Activities 3.1, 3.4, 3.6) and Chapter 4 (Activities 4.1, 4.3, 4.5, 4.6)
Resource Pack for Applied Mathematics for College and Career, Pearson (2016)

TI – 84 Graphing calculators and Desmos.com
Teacher Generated Worksheets (Kuta Software)
TI SmartView software
Geometer's Sketchpad
Smart Notebook Gallery Essentials
Websites for ASVAB preparation (see Appendix)
Websites for Community College Placement Exams (see Appendix)
Website for SAT prep (collegeboard.org)

UNIT 3: Using Geometric Models to Solve Problems

Big Idea # 1: Patterns exhibit relationships that can be extended, described, and generalized.

Essential Questions:

- How can patterns be used to describe relationships in mathematical situations?

Concepts:

- Similarity

Competencies:

- Use properties of similarity involving 2- and 3-dimensional figures.
- Apply non-rigid transformations to determine and explain similarity.
- Make geometric constructions.

Big Idea #2: Geometric relationships can be described, analyzed, and classified based on special reasoning and/or visualization.

Essential Questions:

- How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving?
- How can geometric properties and theorems be used to describe, model, and analyze situations?
- How are special relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems?

Concepts:

- Measurement and dimension
- Trigonometry

Competencies:

- Use and/or develop procedures to determine, describe, or estimate measures of perimeter, circumference, area, surface area and/or volume.
- Describe how a change in the linear dimension can effect perimeter, circumference, area, surface area and/or volume.
- Visualize the relation between 2- and 3-dimensional objects.
- Apply geometric concepts in modeling situations.
- Define and/or apply trigonometric ratios.
- Solve involving right triangles (Pythagorean theorem, right triangle trigonometry).

Curriculum Plan

Unit 3: Using Geometric Models to Solve Problems **Time Range in Days: 30-35**

Standard(s):
PA Academic Standards: CC.2.3. HS.A.5, CC.2.3. HS.A.6, CC.2.3. HS.A.7, CC.2.3. HS.A.12, CC.2.3. HS.A.13, CC.2.3. HS.A.14

http://static.pdesas.org/content/documents/PA%20Core%20Standards%20Mathematics%20PreK-12%20March%202014.pdf

Anchor(s):
G.1.1.1.1, G.1.1.1.4, G.1.2.1.1, G.1.2.1.2, G.1.2.1.5, G.1.3.1.1, G.1.3.1.2, G.2.1.1.1, G.2.1.1.2, G.2.2.2.1, G.2.2.2.2, G.2.2.2.4, G.2.2.3.1, G.2.3.1.1, G.2.3.1.2, G.2.3.2.1

http://static.pdesas.org/content/documents/Geometry%20Assessment%20Anchors%20and%20Eligible%20Content%20April%202014.pdf

Overview: Using Geometric Models to Solve Problems

Focus Question(s): How is perimeter different from area? In what ways can perimeter, area, volume and/or surface area be applied in real-world situations? How can we use the Pythagorean theorem and right triangle trigonometry to solve problems?

Goals: They will be able to calculate the area and perimeter of polygons, including combination figures. Students will be able to calculate the circumference and area of a circle. In addition, students will be able to calculate the surface area and volume of three dimensional shapes. Students will be able to use the Pythagorean Theorem or right trigonometry.

Objectives:

1. Students will recognize perimeter as a geometric property of plane figures and derive formulas for and calculate perimeters of squares, rectangles, triangles, parallelograms, trapezoids, kites and polygons. (DOK – Level Three)
2. Students will use unit analysis to solve problems involving perimeter. (DOK – Level Four)
3. Students will write and use formulas for the circumference of a circle. (DOK – Level One)
4. Students will calculate the perimeter of many sided plane figures by determining which combination of formulas to apply. (DOK – Level Two)
5. Students will assess how changes in dimensions affect the perimeter of plane figures. (DOK – Level Three)

6. Students will calculate the area of squares, rectangles, triangles, parallelograms, trapezoids, kites and polygons using appropriate formulas. (DOK – Level Two)
7. Students will assess how changes in dimensions affect the area of plane figures. (DOK – Level Three)
8. Students will develop the formula for the area of a circle and then apply the formula. (DOK – Level Three)
9. Students will solve problems in context using geometric models, distinguishing between problems requiring area verses perimeter. (DOK – Level Three)
10. Students will differentiate between similar and congruent geometric figures. (DOK – Level Three)
11. Students will solve problems involving similar figures. (DOK – Level Three)
12. Students will apply the Pythagorean theorem to solve problems. (DOK – Level Two)
13. Students will identify the sides and corresponding angles of a right triangle. (DOK – Level One)
14. Students will determine the lengths of the sides of similar right triangles using proportions. (DOK – Level Two)
15. Students will determine the sine, cosine and tangent of an angle using a right triangle and a graphing calculator. (DOK – Level Two)
16. Students will write formulas for and calculate surface areas of rectangular prims, right circular cylinders and spheres. (DOK – Level Two)
17. Students will write formulas for and calculate the volume of three dimensional figures. (DOK – Level One)
18. Students will apply geometry formulas to solve problems and include the use of scale drawings in the problem solving process. (DOK – Level Two)

Core Activities and Corresponding Instructional Methods:

1. Expose students' prior knowledge of the perimeter and area of polygons, including the area and circumference of circles.
    a. Diagnostic assessment, questioning
    b. Cooperative learning groups
    c. Direct instruction as needed using Smart Technology, Geometer Sketchpad, online textbook and resources.
    d. Guided practice
2. Develop students' skills in calculating the surface area and volume of prisms, cylinders, pyramids, cones and spheres.
    a. Direct instruction using Smart Technology, Geometer Sketchpad and online textbook and resources.
    b. Guided practice
    c. Cooperative learning groups

3. Develop students' ability to apply their knowledge of surface area and volume in real-world applications.
    a. Guided practice
    b. Cooperative learning groups

4. Expose students' prior knowledge of similarity and the Pythagorean Theorem.
    a. Diagnostic assessment, questioning
    b. Cooperative learning groups
    c. Direct instruction as needed using Smart Technology, Geometer's Sketchpad, online textbook and resources
    d. Guided practice

5. Develop students' skills in determining the side lengths of right triangles, including using the sine, cosine and tangent ratios.
    a. Direct instruction using Smart Technology, Geometer's Sketchpad and online textbook and resources
    b. Guided practice
    c. Cooperative learning groups

6. Develop students' ability to solve problems using the Pythagorean Theorem or trigonometry.
    a. Guided practice
    b. Cooperative learning groups

Assessments:

Diagnostic:
Teacher prepared pre-test/diagnostic test
Teacher questioning and observation

Formative:
Teacher observations, questions, discussions
Textbook exercises following each activity
Chapter 5: Gateway Review (select problems)

Summative:
Project 5.5 A New Pool and Other Home Improvements

Extensions:

Activity 5.10 Tessellations Pgs. 676 – 685 (Questions 1 – 15)
Activity 5.15 Math in Art Pgs. 726 – 728 (Questions 1 – 7)

Correctives:

Activities 5.1 – 5.10 (What Have I Learned? How Can I Practice?)
Activities 5.11 – 5.15 (What Have I Learned? How Can I Practice?)
Chapter 5 Summary
Practice worksheets generated through Kuta Software
(textbook resources)

Materials and Resources:

Applied Mathematics for College and Career, Consortium of Mathematics, Pearson (2016) - Chapter 5 (Activities 5.1 – 5.14 excluding 5.6 and 5.10)
Resource Pack for Applied Mathematics for College and Career, Pearson (2016)
TI – 84 Graphing calculators and Desmos.com
Teacher Generated Worksheets (Kuta Software)
TI SmartView software
Geometer's Sketchpad
Smart Notebook Gallery Essentials
Websites for ASVAB preparation (see Appendix)
Websites for Community College Placement Exams (see Appendix)
Website for SAT prep (collegeboard.org)

UNIT 4: Problem Solving with Statistical and Probability Models

Big Idea # 1: Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.

Essential Questions:

- How can data be organized and represented to provide insight into the relationships between quantities?
- How does the type of data influence the choice of display?

Concepts:

- Categorical and quantitative data
- Data

Competencies:

- Summarize, represent, and interpret single-variable data and two-variable data.
- Analyze and/or interpret data displays and/or use them to make predictions (circle graph, line graph, bar graph, box-and-whisker plot, stem-and-leaf plot, scatterplot).

Big Idea #2: Data can be modeled and used to make inferences.

Essential Questions:

- How can probability and data analysis be used to make predictions?

Concepts:

- Probability

Competencies:

- Calculate and/or make predictions based upon measures of central tendency.
- Apply probability to practical situations, including compound events.

Curriculum Plan

Unit 4: Problem Solving with Statistical and Probability Models **Time Range in Days: 35-40**

Standard(s):
PA Academic Standards: CC.2.4.HS.B.1, CC.2.4.HS.B.2, CC.2.4.HS.B.4, CC.2.4.HS.B.5, CC.2.4.HS.B.6, CC.2.4.HS.B.7

http://static.pdesas.org/content/documents/PA%20Core%20Standards%20Mathematics%20PreK-12%20March%202014.pdf

Anchor(s): A2.2.1.1.1, A2.2.3.2.1, A2.2.3.2.3,

http://static.pdesas.org/content/documents/Algebra%20II%20Assessment%20Anchors%20and%20Eligible%20Content%20April%202014.pdf

Overview: Problem Solving with Statistical and Probability Models

Focus Question(s): How can probability and/or statistics be used to model real-world situations and to make predictions?

Goals: Students will be able to analyze data presented in tables and on graphs. Students will be able to calculate measures of central tendency and variability and determine the best representation for the data. Students will be able to compare and contrast situations that require simple, compound, or conditional probabilities. Students will be able to use their knowledge of probability and /or statistics to make predictions in regard to real-world situations.

Objectives:

1. Students will critique graphs to determine how scaling of the axes can misrepresent the data. (DOK – Level Three)
2. Students will analyze data displayed in print and electronic media. (DOK – Level Four)
3. Students will read and interpret tables and bar graphs. (DOK – Level Two)
4. Students will organize data with frequency tables, dot plots, histograms and stem and leaf plots. (DOK – Level Two)
5. Students will determine measures of central tendencies (mean, median, mode). (DOK – Level One)
6. Students will determine measures of variability including range and standard deviation. (DOK – Level One)

7. Students will identify a normal distribution and list the properties of a normal curve. (DOK – Level One)
8. Students will understand the difference between a census and a sample. (DOK – Level One)
9. Students will identify the characteristics of a simple random sample. (DOK – Level One)
10. Students will understand what bias in a sample means and identify how the size of a sample affects the result. (DOK – Level Two)
11. Students will be able to select a simple random sample, when possible. (DOK – Level One)
12. Students will determine relative frequencies for a collection of data. (DOK – Level Two)
13. Students will determine both theoretical and experimental probabilities. (DOK – Level Two)
14. Students will simulate an experiment and observe the connection between experimental and theoretical probabilities. (DOK – Level Four)
15. Students will identify and understand the properties of probabilities. (DOK – Level One)
16. Students will apply the fundamental counting principle. (DOK – Level Two)
17. Students will determine the sample space for a random experiment and display the sample space with a tree diagram or a table. (DOK – Level Two)
18. Students will determine complementary probabilities and use Venn diagrams to illustrate relationships between events. (DOK – Level Two)
19. Students will distinguish between independent and dependent events. (DOK – Level Two)
20. Students will solve probability problems involving “and” and “or” statements. (DOK – Level Three)
21. Students will identify mutually exclusive events. (DOK – Level One)
22. Students will identify a conditional probability problem. (DOK – Level One)
23. Students will determine conditional probabilities using the sample space, data from a table, or formula. (DOK – Level Two)
24. Students will use conditional probabilities to solve problems. (DOK – Level Three)

Core Activities and Corresponding Instructional Methods:

1. Expose students’ prior knowledge of probability (calculating the probability of simple and compound events) and statistics (mean, median, mode).
    a. Diagnostic assessment, questioning
    b. Direct instruction as needed using Smart Technology and online textbook and resources
    c. Guided practice
    d. Cooperative learning groups

2. Develop students' ability to predict based on measures of central tendency and variation. Analyze visual displays of data sets such as box-and-whisker plots and stem-and-leaf plots.
    a. Guided practice
    b. Cooperative learning groups

3. Develop students' skills in calculating and applying simple, compound and/or conditional probabilities of dependent and independent events to real-world situations.
    a. Direct instruction using Smart Technology and online textbook and resources.
    b. Guided practice
    c. Cooperative learning groups

Assessments:

Diagnostic:
Teacher prepared pre-test/diagnostic test
Teacher questioning and observation

Formative:
Teacher observations, questions, discussions
Textbook exercises following each activity
Chapter 6: Gateway Review (select problems)
Chapter 7: Gateway Review (select problems)

Summative:
Project 6.10: Statistical Survey
Project 7.5: Weather Forecasting

Extensions:
Activity 6.3 People and Places Pgs. 773 – 778 (Questions 1 – 8)
Activity 6.5 Class Survey Continued Pgs. 796 – 797 (Questions 12 – 15)
Activity 6.9 Highway Proposal: Yes, or No? Pgs. 835 – 838 (Questions 1 – 12)
Activity 7.6 Selecting and Rearranging Things Pgs. 921 – 924 (Questions 1 – 11)
Activity 7.7 How Many Boys (or Girls)? Pgs. 927 – 932 (Questions 1 – 20)

Correctives:
Activities 6.1 – 6.6 (What Have I Learned? How Can I Practice?)
Activities 6.7 – 6.11 (What Have I Learned? How Can I Practice?)
Activities 7.1 – 7.7 (What Have I Learned? How Can I Practice?)
Chapter 6 Summary

Chapter 7 Summary
Practice worksheets generated through Kuta Software
(textbook resources)

Materials and Resources:

Applied Mathematics for College and Career, Consortium of Mathematics, Pearson (2016) -
Chapter 6 (Activities 6.1 – 6.8 excluding 6.3)
Chapter 7 (Activities 7.1 – 7.5)
Resource Pack for Applied Mathematics for College and Career, Pearson (2016)
TI – 84 Graphing calculators and Desmos.com
Teacher Generated Worksheets (Kuta Software)
TI SmartView software
Geometer's Sketchpad
Smart Notebook Gallery Essentials
Websites for ASVAB preparation (see Appendix)
Websites for Community College Placement Exams (see Appendix)
Website for SAT prep (collegeboard.org)

UNIT 5: Problem Solving with Financial Models

Big Idea # 1: Money management includes setting goals and developing a plan for how to spend, save, and share financial resources.

Essential Questions:

- In what ways does money management impact reaching financial goals?
- What constitutes sound financial decision making?
- What factors impact a person's spending plan?

Concepts:

- Financial goals
- Decision making
- Spending plan
- Purchasing

Competencies:

- Identify goals and determine steps to achieve them.
- Explain how people apply decision-making skills to make financial decisions.
- Discuss earning, spending, and saving for financial stability.
- Compare various payment options for purchase.

Big Idea #2: Borrowing money has costs and benefits.

Essential Questions:

- How do people decide when and how to use credit?

Concepts:

- Credit

Competencies:

- Analyze the total cost of a major purchase loan agreement using fixed and variable interest rates calculated over time.
- Explain the difference between simple and compound interest.

Curriculum Plan

Unit 5: Problem Solving with Financial Models **Time Range in Days: 10-15**

Standard(s):
FCS Standards: 11.1.12.B, 15.1.12.H, 15.6.5.G, 15.6.8.B, 15.6.8.I, 15.6.12.B, 15.6.12.G, 15.6.12.P

http://static.pdesas.org/content/documents/CF-PA_Model_Personal_Finance_Curriculum.pdf

Anchor(s): N/A
Overview: Problem Solving with Financial Models

Focus Question(s): How does the interest rate affect financial planning and personal choices?

Goals: Students will be able to calculate both simple and compound interest in various situations.

Objectives:

1. Students will solve problems involving personal finances. (DOK – Level Two)
2. Students will compare and contrast the formulas for simple and compound interest and apply them to real word applications. (DOK – Level Three)
3. Students will apply the continuous compounding formula $A = Pe^{rt}$. (DOK – Level Two)
4. Students will determine the amount of the down payment and points in a mortgage, the monthly mortgage payment using a table, and the total interest on a mortgage. (DOK – Level Two)

Core Activities and Corresponding Instructional Methods:

1. Expose students to possible personal finance decisions that will impact their future.
    a. Diagnostic assessment, questioning
    b. Direct instruction as needed using Smart Technology and online textbook and resources
    c. Guided practice
    d. Cooperative learning groups
2. Develop students' ability to analyze financial options by calculating and comparing loan options.
    a. Guided practice
    b. Cooperative learning groups

Assessments:

Diagnostic:
Teacher prepared pre-test/diagnostic test
Teacher questioning and observations

Formative:

Teacher observations, questions, discussions

Textbook exercises following each activity

Chapter 8: Gateway Review (select problems)

Summative:

Project 8.8 Renting versus Buying a House

Project 8.12 Which is the Best Option

Extensions:

Activity 8.2 Banking Options Pgs. 956 – 959 (Questions 1 – 7)

Activity 8.3 Time is Money Pgs. 964 – 967 (Questions 5 – 8)

Activity 8.5 Saving for Retirement Pgs. 974 – 978 (Questions 1 – 9)

Activity 8.6 Buy or Lease Pgs. 982 – 985 (Questions 1 – 8)

Activity 8.7 Home Sweet Home Pgs. 990 – 992 (Questions 5 – 8)

Activity 8.10 Insuring the Future Pgs. 1008 – 1014 (Questions 1 – 9)

Activity 8.11 The Stock Market Pgs. 1014 – 1019 (Questions 1 – 7)

Correctives:

Activities 8.1 – 8.12 (What Have I Learned? How Can I Practice?)

Chapter 8 Summary

Practice worksheets generated through Kuta Software

(textbook resources)

Materials and Resources:

Applied Mathematics for College and Career, Consortium of Mathematics, Pearson (2016) - Chapter 8 (Activities 8.1, 8.3, 8.4 and 8.7)

Resource Pack for Applied Mathematics for College and Career, Pearson (2016)

TI – 84 Graphing calculators and Desmos.com

Teacher Generated Worksheets (Kuta Software)

TI SmartView software

Geometer's Sketchpad

Smart Notebook Gallery Essentials

Websites for ASVAB preparation (see Appendix)

Websites for Community College Placement Exams (see Appendix)

Website for SAT prep (collegeboard.org)

www.bankrate.com

Primary Textbook(s) Used for this Course of Instruction

Name of Textbook: *Applied Mathematics for College and Career*

Textbook ISBN #: 978-0-13-405940-2

Textbook Publisher &Year of Publication: Pearson Inc. 2016

Curriculum Textbook is utilized in (title of course): Mathematical Modeling

Please complete one sheet for each primary textbook.

Appendix

Websites for ASVAP preparation:

http://www.military.com/join-armed-forces/asvab

http://www.asvabpracticetests.com/

http://asvabpracticetestonline.com/

https://www.4tests.com/asvab

http://asvabtutor.com/asvab-practice-tests/

Websites for Community College Entrance Exam Preparation:

http://www.mathhelp.com/math-placement-test/

http://www.mathplusfun.com/content/examples/placement/

http://amby.com/tests/math/PPT_a.html

https://www.barton.edu/pdf/math/practice-math-placement-test.pdf

http://sussex.edu/academics/testing/placement/

http://www.mathhelp.com/colleges/orange-county-community-college/

Mathematical Modeling Projects on Quadratic Functions

Name: _____Date: _____

1) A rock club's profit from booking local bands depends on the ticket price. Using past receipts, the owners find that the profit *p* can be modeled by the following function where *t* represents the ticket price in dollars:

$$p = -15t^2 + 600t + 50$$

a) If the ticket price is $10.00, how much profit will the owner make? [Show all work to support your answer.]

b) If the ticket price is $15.00, how much profit will the owner make? [Show all work to support your answer.]

c) If the ticket price is $30.00, how much profit will the owner make? [Show all work to support your answer.]

d) What price yields the maximum profit? [Show all work to support your answer.]

e) What is the maximum profit? [Explain in complete sentences.]

2) The equation for the motion of a projectile fired straight up is given by the function

$$h = -16t^2 + 50t$$

where h is the height in feet and t is the time in seconds.

a) What is the height of the projectile in 1 second? [Show all work to support your answer.]

b) What is the height of the projectile in 2 seconds? [Show all work to support your answer.]

c) Find how many seconds it takes the projectile to reach its maximum height. [Show all work to support your answer.]

d) What is the projectile's maximum height? [Explain in complete sentences.]

3) A lighting fixture manufacturer has daily production costs of

$$C = 0.25n^2 - 10n + 800$$

where C is the total daily cost in dollars and n is the number of light fixtures produced.

a) What is the total daily cost in dollars to produce 10 light fixtures? [Show all work to support your answer.]

b) What is the total daily cost in dollars to produce 15 light fixtures? [Show all work to support your answer.]

c) How many fixtures should be produced to yield the minimum cost? [Show all work to support your answer.]

d) What is the minimum cost? [Explain in complete sentences.]

4) The Big Brick Bakery sells more bagels when it reduces its prices, but then its profit changes. The function

$$y = -1000(x - 0.55)^2 + 300$$

models the bakery's daily profit in dollars from selling bagels, where x is the price of a bagel in dollars. The bakery wants to maximize the profit.

a) What is the domain of the function? Can x be negative? [Explain in complete sentences.]

b) Find the daily profit for selling bagels for \$.40 each; for \$.85 each. [Show all work to support your answers.]

c) What price should the bakery charge to maximize its profit from bagels? [Show all work to support your answers.]

d) What is the maximum profit? [Explain in complete sentences.]

Mathematical Modeling Projects on Exponential Functions

Name: _____Date: _____

The **half-life** of a substance is the time required for half of a given sample to disintegrate.

1. Carbon-14 decays exponentially with a half-life of 5730 years. Carbon dating is used to date artifacts or fossils up to 80,000 years old based on the amount of carbon-14 remaining in the fossil or artifact.

    a) If an object has 16 grams of carbon-14 present today, how many grams of carbon-14 will be present in 5730 years?

    b) How many grams of carbon-14 will be present in 11,460 years?

    c) When (how many years from today) will there be only 2 grams of carbon-14 remaining in the object?

    d) Will the amount of carbon-14 in the object eventually equal zero grams? Explain in complete sentences.

2. The half-life of the radioactive element krypton-91 is 10 seconds. If 24 grams of krypton-91 are initially present, how many grams are present after 10 seconds? After 20 seconds? After 30 seconds? After 40 seconds? After 50 seconds? Create a table to record your answers.

3. The half-life of the radioactive element plutonium-239 is 25,000 years. If 16 grams of plutonium-239 are initially present, how many grams are present after 25,000 years? 50,000 years? 75,000 years? 100,000 years? 125,000 years? Create a table to record your answers.

Use the exponential decay model for carbon-14, $A = A_0 e^{-0.000121t}$ for the following two problems involving carbon dating.

4. Prehistoric cave paintings were discovered in a cave in France. The paint contained 15% of the original carbon-14. Estimate the age of the paintings. [Show all work to support your answer.]

5. Skeletons were found at a construction site in San Francisco in 1989. The skeletons contained 88% of the expected amount of carbon-14 found in a living person. In 1989, how old were the skeletons? [Show all work to support your answer.]

6. The half-life of aspirin in your bloodstream is 12 hours. How long will it take for the aspirin to decay to 70% of the original dosage? [Show all work to support your answer.]

DELAWARE VALLEY SCHOOL DISTRICT

Mathematical Modeling: Applied Mathematics
(Sequence of Chapters & Sections)

Unit 1: Mathematical Models and Problem Solving, 50-60 days

Chapter 1: Introduction to Problem Solving and Mathematical Models

Activity 1.1 The Bookstore Pgs. 1-2 (Questions 1 – 4)
Activity 1.2 The Classroom Pgs. 3-5 (Questions 1 – 13)
Activity 1.3 Make Me an Offer ("Night Train" Henson's Contract plus select problems in Formulas)
Activity 1.4 Proportional Reasoning and Scale (Jordan's Relative Free-Throw Performance and/or Field Goal Performance)
Activity 1.5 Fuel Economy Pgs. 32-36 (Questions 1 – 6)
Activity 1.6 Florida Heat Pgs. 47-51 (Questions 1 – 8)
Activity 1.7 Fill 'er Up Pgs. 62-63 and 65-67 (Questions 1 – 5 and 10 – 14)
Activity 1.8 Mathematical Modeling Pgs. 74-79 (Questions 1 – 12)
Activity 1.9 Fund-Raiser Revisited Pgs. 84-88 (Questions 1 – 5)
Activity 1.10 Leasing a Copier Pgs. 92-94 (Questions 1 – 6)
Activity 1.11 Comparing Energy Costs Pgs. 102-105 (Questions 1 - 10)

Extensions:

Activity 1.4 Proportional Reasoning and Scale Pgs. 23-27 (Additional applications: Questions 13-19)
Activity 1.5 Fuel Economy Pg. 37 (Unit Conversion: Questions 7 and 8)
Activity 1.6 Florida Heat Pgs. 52-55 (Questions 9 – 12)
Activity 1.7 Fill 'er Up Pgs. 63-64 (Questions 6 – 9)

Correctives: Exercises following Activity

Chapter 2: Linear Function Models and Problem Solving –

Activity 2.1 How Fast Did You Lose? Pgs. 169-170 (Questions 1 – 4).
Activity 2.2 The Snowy Tree Cricket Pgs. 178 – 182 (Questions 1 – 9)
Activity 2.3 Depreciation Pgs. 193-198 (Questions 1 – 14)
Activity 2.4 Skateboard Heaven Pgs. 204 – 209 (Questions 1 – 9)
Activity 2.7 A New Camera Pgs. 234-238 (Questions 1 – 7)
Activity 2.8 Body Fat Percentage Pgs. 243- 249 (Questions 1 - 3 and 7 – 10)
Activity 2.11 Smart Phone Plan Options Pgs. 277-281 (Questions 1 – 10)

Activity 2.13 Healthy Lifestyle Pgs. 291-294 (Questions 1 – 6)
Activity 2.14 How Long Can You Live? Pgs. 298-303 (Questions 1 – 10)

Extensions:

Activity 2.1 How Fast Did You Lose? Pgs. 171-173 (Questions 5 - 10)
Activity 2.2 The Snowy Tree Cricket Pgs. 183 – 186 (Questions 10 – 17)
Activity 2.9 College Tuition Pgs. 255-257 (Questions 1 - 6)
Activity 2.15 Will Trees Grow Pgs. 311-320 (Questions 1 – 12)

Unit 2: Mathematical Modeling with Quadratic Functions and Exponential Functions, 25-30 days

Chapter 3: Problem Solving with Quadratic and Variation Function Models –

Activity 3.1 The Amazing Property of Gravity Pgs. 353 – 358 (Questions 1 – 19)
Activity 3.4 Per Capita Personal Income Pgs. 38 – 387 (Questions 1 – 8)
Activity 3.6 Ups and Downs Pgs. 396 – 397 (Questions 1 – 4)

Extensions:

Activity 3.2 Baseball and the Willis Tower Pgs. 362 – 368 (Questions 1 – 16)
Activity 3.3 The Shot Put Pgs. 372 – 380 (Questions 1 – 16)
Activity 3.5 Sir Isaac Newton (factoring quadratics) Pgs. 389 – 393 (Questions 1 – 9)
Activity 3.8 A Thunderstorm (direct variation) Pgs. 417 – 419 (Questions 1 – 9)

Correctives: Exercises following Activity

Chapter 4: Modeling with Exponential and Logarithmic Functions –

Activity 4.1 Going Shopping Pgs. 459 – 464 (Questions 1 – 14)
Activity 4.3 Inflation Pgs. 474 – 477 (Questions 1 – 9)
Activity 4.5 National Debt Pgs. 497 – 502 (Questions 1 – 10)
Activity 4.6 Population Growth Pgs. 508 – 512 (Questions 1 – 13)

Extensions:

Activity 4.4 The Summer Job Pgs. 482 – 489 (Questions 1 – 16)
Activity 4.8 The Diameter of Spheres (logarithms) Pgs. 532 – 537 (Questions 1 – 14)
Activity 4.9 Walking Speed of Pedestrians (natural log) Pgs. 540 – 543 (Questions 1 – 7)
Activity 4.11 The Elastic Ball (change of base) Pgs. 557 – 563 (Questions 1 – 17)
Activity 4.12 Changing Demographics Pgs. 567 – 570 (Questions 1 – 9)
Activity 4.13 Frequency and Pitch (log equations) Pgs. 575 – 576 (Questions 1 – 6)

Correctives: Exercises following Activity

Unit 3: Using Geometric Models to Solve Problems, 30-35 days

Chapter 5: Using Geometric Models to Solve Problems –

Activity 5.1 Walking around Bases, Gardens, Trusses, and Other Figures Pgs. 599 – 607 (Questions 1 – 15)
Activity 5.2 Long-Distance Biking Pgs. 614 – 616 (Questions 1 – 5)
Activity 5.3 Walking Around, Revisited Pgs. 621 – 627 (Questions 1 – 19)
Activity 5.4 How Big Is That Circle Pgs. 634 – 635 (Questions 1 – 5)
Activity 5.7 Not Exactly The Same Pgs. 649 – 653 (Questions 1 – 8)
Activity 5.8 How About Pythagoras? Pgs. 657 – 659 (Questions 2 – 5)
Activity 5.9 The Leaning Tower of Pisa Pgs. 663 – 671 (Questions 1 – 10)
Activity 5.11 Painting Your Way Through The Summer Pgs. 701 – 703 (Questions 1 – 7)
Activity 5.12 Truth in Labeling Pgs. 706 – 710 (Questions 1 – 11)
Activity 5.13 Analyzing an Ice Cream Cone Pgs. 714 – 717 (Questions 1 – 9)
Activity 5.14 Summertime Pgs. 721 – 725 (Questions 1 – 18)

Extensions:

Activity 5.10 Tessellations Pgs. 676 – 685 (Questions 1 – 15)
Activity 5.15 Math In Art Pgs. 726 – 728 (Questions 1 – 7)

Correctives: Exercises following Activity

Unit 4: Problem Solving with Statistical and Probability Models, 35-40 days

Chapter 6: Problem Solving with Graphical and Statistical Models –

Activity 6.1 Visualizing Trends Pgs. 757 – 761 (Questions 1 – 6)
Activity 6.2 Bald Eagle Population Pgs. 764 – 769 (Questions 1 – 8)
Activity 6.4 The Class Survey Pgs. 783 – 789 (Questions 1 – 13)
Activity 6.5 Class Survey Continued Pgs. 793 – 795 (Questions 1 – 11)
Activity 6.6 A Switch Decision Pgs. 801 – 804 (Questions 1 – 12)
Activity 6.7 What is Normal Pgs. 817 – 821 (Questions 1 – 5)
Activity 6.8 Sampling a Population Pgs. 828 – 831 (Questions 1 – 10)

Extensions:

Activity 6.3 People and Places Pgs. 773 – 778 (Questions 1 – 8)
Activity 6.5 Class Survey Continued Pgs. 796 – 797 (Questions 12 – 15)
Activity 6.9 Highway Proposal: Yes or No? Pgs. 835 – 838 (Questions 1 – 12)

Correctives: Exercises following Activity

Chapter 7: Problem Solving with Probability Models –

Activity 7.1 Chances Are! Pgs. 871 – 876 (Questions 1 – 11)
Activity 7.2 Choices Pgs. 883 – 888 (Questions 1 – 11)
Activity 7.3 Experimenting with Probabilities Pgs. 893 – 899 (Questions 1 – 12)
Activity 7.4 Conditional Probabilities Pgs. 907 – 911 (Questions 1 – 9)

Extensions:

Activity 7.6 Selecting and Rearranging Things Pgs. 921 – 924 (Questions 1 – 11)
Activity 7.7 How Many Boys (or Girls)? Pgs. 927 – 932 (Questions 1 – 20)

Correctives: Exercises following Activity

Unit 5: Problem Solving with Financial Models, 10-15 days

Chapter 8: Problem Solving with Financial Models -

Activity 8.1 Income and Expenses Pgs. 953 – 955 (Questions 1 – 8)
Activity 8.3 Time is Money Pgs. 962 – 963 (Questions 1 – 4)
Activity 8.4 Continuous Compounding Pgs. 971 – 972 (Questions 1 – 4)
Activity 8.7 Home Sweet Home Pgs. 988 – 990 (Questions 1 – 4)

Extensions:

Activity 8.2 Banking Options Pgs. 956 – 959 (Questions 1 – 7)
Activity 8.3 Time is Money Pgs. 964 – 967 (Questions 5 – 8)
Activity 8.5 Saving for Retirement Pgs. 974 – 978 (Questions 1 – 9)
Activity 8.6 Buy or Lease Pgs. 982 – 985 (Questions 1 – 8)
Activity 8.7 Home Sweet Home Pgs. 990 – 992 (Questions 5 – 8)
Activity 8.10 Insuring the Future Pgs. 1008 – 1014 (Questions 1 – 9)
Activity 8.11 The Stock Market Pgs. 1014 – 1019 (Questions 1 – 7)

Correctives: Exercises following Activity

Checklist to Complete and Submit with Curriculum:

_____ A hard copy of the curriculum using The template entitled "Planned Instruction," available on the district website

_____ Hard copies of all supplemental resources not available electronically

_____ The primary textbook form(s)

_____ The appropriate payment form, in compliance with the maximum curriculum writing hours noted on the first page of this document

_____ A USB/Flash Drive containing a single file that will print the curriculum in its intended sequence from beginning to end and all supplemental resources that are available in electronic format.

Each principal and/or department chair has a schedule of First and Second Readers/Reviewers. Each Reader/Reviewer must sign & date below.

First Reader/Reviewer Printed Name_____

First Reader/Reviewer Signature_____ Date_____

Second Reader/Reviewer Printed Name_____

Second Reader/Reviewer Signature _____ Date_____