

DELAWARE VALLEY SCHOOL DISTRICT

PLANNED INSTRUCTION

A PLANNED COURSE FOR:

Pre-Algebra

Grade Level 9

Date of Board Approval: _____ **2018** _____

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Planned Instruction

Title of Planned Instruction: Pre-Algebra

Subject Area: Mathematics

Grade(s): 9

Course Description:

This course is designed for students who are proficient in arithmetic skills but are not ready for Algebra 1. This will allow more time to develop both conceptual and procedural understanding of topics for successful completion of Algebra 1. The topics covered include properties of real numbers, solving equations and inequalities, graphing and writing linear equations, graphing and writing linear inequalities, and data analysis.

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

Curriculum Writing Committee: Laurie Oszczepinski, Sara Walsh

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Curriculum Map

1. Marking Period One - Foundations for Algebra

Overview based on 45 days:

Goals:

- Simplifying numerical expressions using the order of operations
- Constructing and evaluating algebraic expressions
- Classifying, graphing, and comparing real numbers
- Properties of real numbers
- Operations with real numbers
- Least common multiple and Greatest Common Factor

2. Marking Period Two - Solving Equations

Overview based on 45 days:

Goals:

- Ratios and Proportions
- Percentages
- Solving one-step, two-step, and multi-step equations, including fractions as a coefficient of the variable to reinforce multiplying by the reciprocal
- Real world applications involving percentages and/or equations

3. Marking Period Three - Absolute Value Equations, Inequalities, and Compound Inequalities, Relations vs. Functions

Overview based on 45 days:

Goals:

- Solving inequalities and compound inequalities
- Solving absolute value equations and inequalities
- Keystone constructed response questions involving solving equations and inequalities, including those that have absolute value
- Relations and functions

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4. Marking Period Four - Linear Functions, Data Analysis and Probability Overview based on 45 days:

Goals:

- Linear functions (graphically and algebraically)
- Measures of central tendency and variability (excluding standard deviation)
- Theoretical and experimental probabilities, including mutually exclusive and overlapping events as well as independent and dependent events

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UNIT 1: Foundations for Algebra

Marking Period: 1

Standards: Pennsylvania Core State Standards for Mathematics

Link to Standards in SAS:

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

Standards Addressed: CC.2.2.HS.D.1, CC.2.2.HS.D.2, CC.2.1.HS.F.2

Anchors Addressed: A1.1.1.1, A1.1.1.2, A1.1.1.3, A1.1.1.5;

Big Idea # 1:

Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms.

Essential Questions:

- How can we show that algebraic properties and processes are extensions of arithmetic properties and processes, and how can we use algebraic properties and processes to solve problems?

Concepts:

- Functions and multiple representations

Competencies:

- Use algebraic properties and processes in mathematical situations and apply them to solve real world problems.

Overview: Foundations for Algebra

Goals: Students will explore foundations of algebra through classifying, simplifying, graphing and comparing real numbers. Students will also construct and evaluate algebraic expressions, emphasizing on use of order of operations and properties of real numbers.

Objectives:

1. Students will be able to construct algebraic expressions given a word phrase or by identifying a pattern. (DOK – Level Two)
2. Students will be able to evaluate expressions by applying the order of operations which includes grouping symbols and exponents. (DOK – Level Three)

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3. Students will be able to classify, graph and compare real numbers which includes square roots. (DOK – Level Two)
4. Students will be able to compare and order any real numbers. (DOK – Level One)
5. Students will be able to simplify square roots. (DOK – Level Two)
6. Students will be able to identify and apply properties of real numbers. (DOK – Level Two)
7. Students will be able to calculate the sum, difference, product and quotient of real numbers. (DOK – Level One)
8. Students will be able to use tables, equations and graphs to describe relationships. (DOK – Level Two)
9. Students will find the Greatest Common Factor and the Least Common Multiple for sets of monomials. (DOK – Level Two).

Core Activities and Corresponding Instructional Methods:

1. Expose students' prior knowledge of the real number system, including operations with and properties of real numbers, as well as other arithmetic skills (simplifying and/or evaluating algebraic expressions).
 - a. Diagnostic assessment, questioning
 - b. Cooperative learning groups
 - c. Direct instruction as needed using Smart Technology and online textbook and resources, manipulatives (such as Algebra Tiles), Venn Diagrams
 - d. Guided practice
 - e. Online resource materials (listed below)
2. Build math language/vocabulary.
 - a. Teachers will use appropriate language to identify algebraic terms and processes.
 - b. Writing activities incorporating appropriate math language

Extensions:

Greatest common factor and least common multiple, including variables

Simplify radicals and complete operations with radical expressions

SAT Practice Problems (Question of the Day)

Enrichment Worksheets (Textbook Supplement and Kuta Software)

USA Test preparation for Keystone Algebra 1 Assessment

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UNIT 2: Solving Equations

Marking Period: 2

Standards: Pennsylvania Core State Standards for Mathematics

Link to Standards in SAS:

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

Standards Addressed: CC.2.2.HS.D.8, CC.2.2.HS.D.9, CC.2.1.HS.F.4

Anchors Addressed: A1.1.1.4, A1.1.2.1, A1.1.2.2, A1.1.3.1;

Big Idea #1:

There are some mathematical relationships that are always true and these relationships are used as the rules of arithmetic and algebra and are useful for writing equivalent forms of expressions and solving equations.

Essential Questions:

- How can we show that algebraic properties and processes are extensions of arithmetic properties and processes, and how can we use algebraic properties and processes to solve problems?

Concepts:

- Functions and multiple representations
- Algebraic properties and processes

Competencies:

- Use algebraic properties and processes in mathematical situations and apply them to solve real world problems.
- Write, solve, graph, and interpret linear equations and inequalities to model relationships between quantities.

Overview: Solving Equations

Goals: Students will be able to write and solve equations or inequalities using their understanding of operations with and properties of real numbers. Students will apply these skills to solve real-world problems.

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Objectives:

1. Students will be able to compare quantities using ratios and unit rates as well as be able to convert units and rates (unit analysis). (DOK – Level Four)
2. Students will be able to solve proportions and use these concepts to solve non-routine problems. (DOK – Level Three)
3. Students will be able to solve equations (one-step in one variable, two-step in one variable, multi-step in one variable which includes equations with variables on both sides, identities and equations with no solution, and literal equations). (DOK – Level Three)
4. Students will be able to use estimation to solve problems. (DOK – Level Three)
5. Students will be able to write, graph, and identify solutions of equations. (DOK – Level Two)
6. Students will be able to create equations based on real world situations. (DOK – Level Three)
7. Students will be able to interpret solutions to problems in the context of the linear function problem situation. (DOK – Level Three)

Core Activities and Corresponding Instructional Methods:

1. Develop students' skills in solving equations, inequalities (including absolute value), and compound inequalities.
 - a. Direct instruction using Smart Technology and online textbook and resources.
 - b. Guided practice
 - c. Cooperative learning groups
2. Develop students' ability to solve problems by applying algebraic processes.
 - a. Guided practice
 - b. Cooperative learning groups
3. Develop students' ability to solve real world problems by applying their understanding of solving one-step, two-step, or multi-step equations.
 - a. Guided practice
 - b. Cooperative learning groups

Extensions:

SAT Practice Problems (Question of the Day)

Enrichment Worksheets (Textbook Supplement and Kuta Software)

USA Test preparation for Keystone Algebra 1 Assessment

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UNIT 3: Absolute Value Equations, Inequalities, and Compound Inequalities, Relations vs. Functions

Marking Period: 3

Standards: Pennsylvania Core State Standards for Mathematics

Link to Standards in SAS:

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

Standards Addressed: CC.2.1.HS.F.2, CC.2.1.HS.F.4, CC.2.2.HS.D.8, CC.2.2.HS.D.9, CC.2.2.HS.D.10, CC.2.2.HS.C.2, CC.2.2.HS.C.3

Anchors Addressed: A1.1.1.1, A1.1.1.2, A1.1.1.3, A1.1.1.4, A1.1.2.1, A1.1.2.2, A1.1.3.1, A1.1.3.2, A1.2.1.1, A1.2.1.2, A1.2.2.1;

Big Idea #1:

There are some mathematical relationships that are always true, and these relationships are used as the rules of arithmetic and algebra and are useful for writing equivalent forms of expressions and solving inequalities.

Essential Questions:

- How can we show that algebraic properties and processes are extensions of arithmetic properties and processes, and how can we use algebraic properties and processes to solve problems?

Concepts:

- Algebraic properties and processes

Competencies:

- Use algebraic properties and processes in mathematical situations and apply them to solve real world problems.

Big Idea #2:

Mathematical functions are relationships that assign each member of one set (domain) to a unique member of another set (range), and the relationship is recognizable across representations.

Essential Questions:

- How do you decide which functional representation to choose when modeling a real-world situation, and how would you explain your solution to the problem?

Concepts:

- Functions and multiple representations

Competencies:

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- Represent functions (linear) in multiple ways, including tables, algebraic rules, graphs, and contextual situations and make connections among these representations. Choose the appropriate functional representation to model a real-world situation and solve problems relating to that situation.

Overview: Absolute Value Equations, Inequalities, and Compound Inequalities, Relations vs. Functions

Goals: Students will be able to write and solve equations or inequalities using an understanding of operations with and properties of real numbers. Students will apply these skills to solve real-world problems.

Objectives:

1. Students will be able to write, graph, and identify solutions of inequalities. (DOK – Level Two)
2. Students will be able to solve inequalities, compound inequalities, and absolute value equations and inequalities. (DOK – Level Three)
3. Students will be able to create equations and inequalities based on real world situations. (DOK – Level Two)
4. Students will be able to identify the domain and range of a relation, as well as be able to identify if a relation is a function. (DOK – Level One)

Core Activities and Corresponding Instructional Methods:

1. Build math language/vocabulary, specifically *absolute value*, *inequalities* and *compound inequalities*.
 - a. Teachers will use appropriate language to identify algebraic terms.
 - b. Writing activities incorporating appropriate math language
2. 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
3. Build math language/vocabulary, specifically *relation*, *function*, *domain*, *range*.
 - a. Teachers will use appropriate language to identify concepts as well as function notation.
 - b. Writing activities incorporating appropriate math language

Extensions:

SAT Practice Problems (Question of the Day)

Enrichment Worksheets - emphasizing word problems (Textbook Supplement and Kuta Software)

USA Test Prep – preparation for Keystone Algebra 1 Assessment

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UNIT 4: Linear Functions, Data Analysis and Probability

Marking Period: 4

Standards: Pennsylvania Core State Standards for Mathematics

Link to Standards in SAS:

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

Standards Addressed: CC.2.2.HS.C.1, CC.2.2.HS.C.2, CC.2.2.HS.C.3, CC.2.2.HS.C.6, CC.2.2.HS.D.7, CC.2.2.HS.D.9, CC.2.2.HS.D.10, CC.2.2.HS.F.4, CC.2.4.HS.B.1, CC.2.4.HS.B.2, CC.2.4.HS.B.3, CC.2.4.HS.B.5, CC.2.4.HS.B.6, CC.2.4.HS.B.7, CC.2.4.HS.F.3

Anchors Addressed: A1.1.1.4, A1.1.2.1, A1.1.2.2, A1.1.3.1, A1.1.3.2, A1.2.1.1, A1.1.3.1, A1.1.3.2, A1.2.1.1, A1.2.1.2, A1.2.2.1, A1.2.2.2, A1.2.3.1, A1.2.3.2, A1.2.3.3

Big Idea #1:

Relations and functions are mathematical relationships that can be represented and analyzed using words, tables, graphs, and equations.

Essential Questions:

- How do you write, solve, graph, and interpret linear equations and inequalities to model relationships between quantities?
- How do you write, solve, and interpret systems of two linear equations and inequalities using graphing and algebraic techniques?

Concepts:

- Linear relationships: Equation and inequalities in one and two variables

Competencies:

- Write, solve, graph, and interpret linear equations and inequalities to model relationships between quantities.

Big Idea #2:

Bivariate data can be modeled with mathematical functions that approximate the data well and help us make predictions based on the data.

Essential Questions:

- How can we use univariate and bivariate data to analyze relationships and make predictions?

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Concepts:

- Analysis of one and two variable (univariate and bivariate) data

Competencies:

- Display, analyze, and make predictions using univariate and bivariate data.

Overview: Data Analysis and Probability and Linear Functions

Goals: Students will be able to represent and describe linear functions to model real world situations. Students will be able to describe a data set using statistical measures and/or displays. They will be able to calculate theoretical and experimental probabilities including compound events.

Objectives:

1. Students will be able to represent mathematical relationships using graphs. (DOK – Level Two)
2. Students will be able to identify and represent patterns that describe linear functions. (DOK – Level Two)
3. Students will be able to write equations that represent functions. (DOK – Level Three)
4. Students will be able to determine whether a relation is a function, find the domain and range and use function notation. (DOK – Level Two)
5. Students will be able to find rates of change from tables; they will be able to calculate slope. They will also compare the slopes of parallel lines. (DOK – Level Two)
6. Students will be able to write and graph linear functions in slope-intercept form, point-slope form, and standard form. (DOK – Level Two)
7. Students will be able to write an equation of a trend line/line of best fit, as well as use the trend line or line of best fit to make predictions. (DOK – Level Three)
8. Students will be able to use real world situations to create and model functions using trend lines.
9. Students will be able to make and interpret frequency tables and histograms. (DOK – Level Two)
10. Students will be able to determine the mean, median, mode, and range. (DOK – Level Two)
11. Students will be able to create and interpret box-and-whisker plots as well as find quartiles and percentiles. (DOK – Level Three)
12. Students will be able to determine theoretical and experimental probabilities. (DOK – Level Three)
13. Students will be able to find the probabilities of mutually exclusive and overlapping events as well as independent and dependent events. (DOK – Level Three)

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Core Activities and Corresponding Instructional Methods:

1. Expose students' prior knowledge of the coordinate plane and plotting points. Review graphing a line using a table of values. Identify and represent patterns that form a line.
 - a. Diagnostic assessment, questioning
 - b. Cooperative learning groups
 - c. Direct instruction as needed using Smart Technology and online textbook and resources
 - d. Guided practice
2. Develop students' skills in graphing linear functions and writing equations of lines in slope-intercept form, point-slope form, and standard form, including the line of best fit being sure to incorporate word problems
 - a. Direct instruction using Smart Technology and online textbook and resources.
 - b. Guided practice
 - c. Cooperative learning groups
3. Expose students' prior knowledge of frequency tables, histograms, and measures of central tendency (mean, median and mode) as well as the range of a data set.
 - a. Diagnostic assessment, questioning
 - b. Cooperative learning groups
 - c. Direct instruction as needed using Smart Technology and online textbook and resources
 - d. Guided practice
4. Build math language/vocabulary.
 - a. Teachers will use appropriate language to discuss data displays and measures of central tendency and variability.
 - b. Writing activities incorporating appropriate math language
5. Develop students' skills in creating and interpreting box-and-whisker plots.
 - a. Direct instruction using Smart Technology and online textbook and resources.
 - b. Guided practice
 - c. Cooperative learning groups
5. Develop students' ability to determine theoretical and experimental probabilities, including mutually exclusive and overlapping events as well as independent and dependent events.
 - a. Direct instruction using Smart Technology, manipulatives such as dice, cards or marbles, and online textbook and resources.
 - b. Guided practice
 - c. Cooperative learning groups

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Extensions:

Direct Variation
Patterns
Problem solving and real-world applications involving linear functions
Writing Equations of Parallel and Perpendicular Lines
Linear Inequalities (graphing and algebraically)
Organizing Data using Keystone resources
Samples and Surveys
Enrichment Worksheets (Textbook Supplement and Kuta Software)
USA Test Prep – preparation for Keystone Algebra 1 Assessment
Permutations and Combinations
SAT Practice Problems (Question of the Day)

Assessments:

Diagnostic:

Prentice Hall Algebra 1 Support File
Teacher prepared pre-test/diagnostic test
Teacher questioning and observation
Benchmark Assessment - CDT Exam

Formative:

Teacher observations, questions, discussions
Homework
Teacher prepared assessments (quizzes and chapter tests)

Summative:

Common Assessments

Correctives:

Reteaching and practice worksheets available with textbook
Practice worksheets generated through Kuta Software
Online Resources listed below

Materials and Resources:

Algebra 1 Common Core by Pearson Education, Inc. (2012)
Textbook Online Resources
Teacher Generated Worksheets (Kuta Software)

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Online resources:

<https://quizizz.com/admin>

<https://edpuzzle.com/>

www.curriculumpathways.com/portal/mobile/algebra1/start.html

<https://braingenie.ck12.org>

<https://www.usatestprep.com/home>

Primary Textbook(s) Used for this Course of Instruction

Name of Textbook: Algebra 1 Common Core

Textbook ISBN #: 978-0-13-318548-5

Textbook Publisher & Year of Publication: Pearson Education, Inc.,
2012

Curriculum Textbook is utilized in (title of course): Algebra 1

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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** _____