DELAWARE VALLEY SCHOOL DISTRICT

PLANNED INSTRUCTION

A PLANNED COURSE FOR:

Algebra IA

_____

Grade Level: 8

Date of Board Approval: _____2015_____

DELAWARE VALLEY SCHOOL DISTRICT

Planned Instruction

Title of Planned Instruction: Algebra IA

Subject Area: Mathematics Grade(s): 8

Course Description: This course is designed for students who are proficient in arithmetic skills, but are not ready for Algebra 1. Only the first half of the Algebra 1 Curriculum is covered. This will allow more time to develop both conceptual and procedural understanding of topics for successful completion of Algebra 1 and the PSSA's. The topics covered include properties of real numbers, solving equations and inequalities, graphing and writing linear equations, graphing linear inequalities, geometry, probability, and solving systems of equations and inequalities.

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

Curriculum Writing Committee: Kevin DeVizia, Lori Simonelli, Susan West

DELAWARE VALLEY SCHOOL DISTRICT

Curriculum Map

1. **Marking Period One -Overview with time range in days:**
   Foundations for Algebra, Solving Equations & Inequalities, 75 – 90 days

   Marking Period One -Goals:
   Understanding of:
   - 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
   - Solving equations

2. **Marking Period Two -Overview with time range in days:**
   Continue Foundations for Algebra, Solving Equations & Inequalities (from Marking Period One)

   Marking Period Two -Goals:
   Understanding of:
   - Solving equations and inequalities, including absolute value equations and inequalities as well as compound inequalities
   - Ratios and proportions
   - Area, circumference, surface are and volume
   - Types of triangles

3. **Marking Period Three -Overview with time range in days:**
   Linear Functions and Systems of Equations & Inequalities, 75 – 90 days

   Marking Period Three -Goals
   Understanding of:
   - Patterns
   - Relations and functions
   - Linear functions (graphically and algebraically)
   - Probability of independent compound events

4. **Marking Period Four –Overview with time range in days:**
   Continue Linear Functions and Systems of Equations & Inequalities (from Marking Period Three)

   Marking Period Four -Goals:
   Understanding of:
   - Linear functions (graphically and algebraically)
   - Systems of linear equations and inequalities
   - Real world applications involving linear functions and systems of linear equations and inequalities

DELAWARE VALLEY SCHOOL DISTRICT

UNIT 1:

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.

Big Idea #2:

- 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 and 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:

- 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.

DELAWARE VALLEY SCHOOL DISTRICT

Big Idea #3:

- Similarity relationships between objects are a form of proportional relationships. Congruence describes a special similarity relationship between objects and is a form of equivalence.

Essential Questions:

- How can the decomposition of 3-dimensional shapes aid in the understanding of surface areas and volumes? How can we use the relationship between surface area and volume to help us draw, construct, model, and represent real situations and/or solve problems of surface area and volume?

Concepts:

- Area, Volume, Surface Area, Circumference, Perimeter

Competencies:

- Extend previous understandings of the characteristics of two and three dimensional shapes to develop an understanding of, and use formulas to determine surface areas and volumes.

DELAWARE VALLEY SCHOOL DISTRICT

Curriculum Plan

Unit 1: **Time Range in Days: 75 – 90 days**

Standard(s): Pennsylvania Core State Standards for Mathematics

Standards Addressed: (Number Only- See Appendix for Description)
PACS Math: CC.2.1.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, CC2.1.HS.F.2, CC.2.1.HS.F.4; 2.1.A1.A, 2.1.A1.C, 2.1.A1.D, 2.1.A1.F, 2.2.A1.C, 2.3. A1. C, 2.3.A1.E, 2.4.A1.A, 2.4.A1.B, 2.5.A1.A, 2.8.A1.C, 2.8.A1.F

Overview: Foundations for Algebra, Solving Equations & Inequalities

Focus Question(s): How can we use algebraic processes to solve problems?

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. Students will be able to apply properties of geometric transformations to verify congruence or similarity.

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)
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 identify and apply properties of real numbers. (DOK – Level Two, DOK – Level Four)
5. Students will be able to calculate the sum, difference, product and quotient of real numbers. (DOK – Level One)
6. Students will be able to use tables, equations and graphs to describe relationships. (DOK – Level Two)
7. 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)
8. 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)

9. Students will be able to solve proportions and use these concepts to solve non-routine problems. (DOK – Level Three)
10. Students will be able to write, graph, and identify solutions of inequalities, compound inequalities, and absolute value equations and inequalities. (DOK – Level Two)
11. Students will be able to identify and apply properties and the effects of rotations, reflections, and translations. (DOK – Level Two)
12. Students will be able to apply the Pythagorean Theorem and its converse to show a triangle is a right triangle. (DOK – Level Two)
13. Students will be able to identify or describe the properties of all types of triangles based on angle and side measures, as well as use the triangle inequality theorem. (DOK – Level Three)
14. Students will be able to solve problems involving circumference of a circle, area, volume, and surface area of two and three-dimensional objects. (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 pre-algebra 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

2. Build math language/vocabulary.
    a. Teachers will use appropriate language to identify algebraic terms and processes.
    b. Writing activities incorporating appropriate math language

3. Develop students' skills in solving equations, inequalities (including absolute value), compound inequalities, and geometry.
    a. Direct instruction using Smart Technology and online textbook and resources.
    b. Guided practice
    c. Cooperative learning groups

4. Develop students' ability to solve problems by applying algebraic processes.
    a. Guided practice
    b. Cooperative learning groups

Assessments:

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

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

Summative:
Common Assessment for Unit 1

Extensions:
Percents (Textbook Section 2-8)
Change Expressed as a Percent (Textbook Section 2-9)
SAT Practice Problems (Question of the Day)
Enrichment Worksheets (Textbook Supplement and Kuta Software) – Chapter 1, Chapter 2 (Sections 1 – 7 only) & Chapter 3 (excluding Sections 5 & 8)
Study Island – preparation for Keystone Algebra 1 Assessment and PSSA

Correctives:
Re-teaching and practice worksheets available with textbook – Chapter 1, Chapter 2 (Sections 1 – 7 only) & Chapter 3 (excluding Sections 5 & 8)
Practice worksheets generated through Kuta Software
Study Island– preparation for Keystone Algebra 1 Assessment and PSSA

Materials and Resources:
Algebra 1 Common Core by Pearson Education, Inc. (2012) – Chapter 1, Chapter 2 (Sections 1 – 7 only) & Chapter 3 (excluding Sections 5 & 8)
Textbook Online Resources
Teacher Generated Worksheets (Kuta Software)

DELAWARE VALLEY SCHOOL DISTRICT

UNIT 2:

Big Idea #1:

- 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:

- 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.

Big Idea #2:

- 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
- Linear system of equations and inequalities

Competencies:

- Write, solve, graph, and interpret linear equations and inequalities to model relationships between quantities.
- Write, solve, and interpret systems of two linear equations and inequalities using graphing and algebraic techniques.

DELAWARE VALLEY SCHOOL DISTRICT

Big Idea # 3:

- The likelihood of an event occurring can be described numerically and used to make predictions.

Essential Questions:

- How do we make predictions based on the outcomes of a probability experiment?

Concepts:

- Theoretical Probability, Experimental Probability

Competencies:

- Determine the sample space for one-stage experiments and determine, when possible, the theoretical probabilities for events defined in the sample space.

DELAWARE VALLEY SCHOOL DISTRICT

Unit 2: **Time Range in Days: 75 – 90 days**

Standard(s): Pennsylvania Core State Standards for Mathematics

Standards Addressed: (Number Only- See Appendix for Description)
PACS Math: CC.2.4.HS.B.2, CC.2.4.HS.B.3, 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, 2.5.A1.A, 2.5.A1.B, 2.6.A1.C, 2.6.A1.E, 2.8.A1.B, 2.8.A1.C, 2.8.A1.D, 2.8.A1.E, 2.8.A1.F

Overview: Linear Functions and Systems of Equations & Inequalities

Focus Question(s): How can we model real world relationships both graphically and algebraically as linear functions?

Goals: Students will be able to represent and describe linear functions in order to model real world situations. They will use this knowledge to solve a system of linear equations algebraically or graphically as well as solve a system of linear inequalities graphically. Students will be able to construct and interpret scatter plots and identify the line of best fit.

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 equations 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 and line of best fit as well as use the trend line or line of best fit to make predictions. (DOK – Level Four)
8. Students will be able to solve a system of linear equations by graphing, using substitution, or using the elimination method. (DOK – Level Two)
9. Students will be able to apply their understanding of systems of equations to solve real world problems. (DOK – Level Four)

10. Students will be able to graph linear inequalities in two variables and use linear inequalities to model real world situations. (DOK – Level Three)
11. Students will be able to solve a system of linear inequalities by graphing and model real world situations using a system of linear inequalities. (DOK – Level Three)
12. Students will be able to construct, interpret scatter plots and identify the line of best fit. (DOK – Level Three)
13. Students will be able to use the equation of a linear model to solve problems, interpreting slope and intercept. (DOK – Level Four)
14. Students will be able to construct and interpret a two-way table and use relative frequencies to describe possible associations. (DOK – Level Three)

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. 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

3. 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.
    a. Direct instruction using Smart Technology and online textbook and resources.
    b. Guided practice
    c. Cooperative learning groups

4. 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

5. 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:
Prentice Hall Algebra 1 Support File
Teacher prepared pre-test/diagnostic test
Teacher questioning and observation
Benchmark Assessment

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

Summative:
Common Assessment for Unit 2

Extensions:
Direct Variation (Textbook Section 5-2)
Writing Equations of Parallel and Perpendicular Lines (Textbook Section 5-6)
Probability and Statistics Supplement if time allows (see Chapter 12)
SAT Practice Problems (Question of the Day)
Enrichment Worksheets (Textbook Supplement and Kuta Software) – Chapter 4 (Sections 1, 2, 5 & 6 only), Chapter 5 (Sections 1, 3, 4, 5 & 7) & Chapter 6
Study Island – preparation for Keystone Algebra 1 Assessment and PSSA

Correctives:
Re-teaching and practice worksheets available with textbook – Chapter 4 (Sections 1, 2, 5 & 6 only), Chapter 5 (Sections 1, 3, 4, 5 & 7) & Chapter 6
Practice worksheets generated through Kuta Software
Study Island– preparation for Keystone Algebra 1 Assessment and PSSA

Materials and Resources:
Algebra 1 Common Core by Pearson Education, Inc. (2012) – Chapter 4 (Sections 1, 2, 5 & 6 only), Chapter 5 (Sections 1, 3, 4, 5 & 7) & Chapter 6

DELAWARE VALLEY SCHOOL DISTRICT

Textbook Online Resources
Teacher Generated Worksheets (Kuta Software)

DELAWARE VALLEY SCHOOL DISTRICT

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 1A

Please complete one sheet for each primary textbook.

Appendix

Pennsylvania Core State Standards for Mathematics:

CC.2.1.HS.F.1 Apply and extend the properties of exponents to solve problems with rational exponents.
CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.
CC.2.1.HS.F.3 Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs and data displays.
CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi-step problems.
CC.2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.

CC.2.1.HS.D.1 Interpret the structure of expressions to represent a quantity in terms of its context.
CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems.
CC.2.2.HS.D.3 Extend the knowledge of arithmetic operations and apply to polynomials.
CC.2.2.HS.D.6 Extend the knowledge of rational functions to rewrite in equivalent forms.
CC.2.2.HS.D.7 Create and graph equations or inequalities to describe numbers or relationships.
CC.2.2.HS.D.8 Apply inverse operations to solve equations or formulas for a given variable.
CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.
CC.2.2.HS.D.10 Represent, solve and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.

CC.2.2.HS.C.1 Use the concept and notation of functions to interpret and apply them in terms of their context.
CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations.
CC.2.2.HS.C.3 Write functions or sequences that model relationships between two quantities.
CC.2.2.HS.C.6 Interpret functions in terms of the situation they model.

CC.2.4.HS.B.1 Summarize, represent, and interpret data on a single count or measurement variable.
CC.2.4.HS.B.2 Summarize, represent, and interpret data on two categorical and quantitative variables.
CC.2.4.HS.B.3 Analyze linear models to make interpretations based on the data.
CC.2.4.HS.B.5 Make inferences and justify conclusions based on sample surveys, experiments, and observational studies.
CC.2.4.HS.B.6 Use the concepts of independence and conditional probability to interpret data.
CC.2.4.HS.B.7 Apply the rules of probability to compute probabilities of compound events in a uniform probability model.