PLANNED INSTRUCTION

A PLANNED COURSE FOR:

Algebra I Honors (8th Grade)

Grade Level: 8

Date of Board Approval: _____2017_____

Planned Instruction

Title of Planned Instruction: Algebra I Honors

Subject Area: Mathematics Grade(s): 8

Course Description: This academically demanding course provides a strong foundation in algebra for further study in science and mathematics. The course will cover the theoretical aspects of algebra and realistic applications to science and economics. Topics include variables, linear and quadratic equations, systems of equations, and the properties of real numbers. This course will raise the level of rigor and relevance beyond the standard course for Algebra 1.

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

Curriculum Writing Committee: Christine Marcial

Gradebook Policy for Honors Algebra 1 grade 8

Marking Period	Assessments (95%) Quiz (50 points)	Test (100)	Homework/ Participation (5%)	
MP 1	3-5 quizzes	1-2 Tests	Homework grade represents completion of assignments given throughout the quarter.	Participation grade represents a daily grade.
MP 2	3-5 quizzes	1-2 Tests		
MP 3	3-5 quizzes	1-2 Tests		
MP 4	3-5 quizzes	1-2 Tests		

Curriculum Map

1. **Marking Period One: Foundations for Algebra, Solving Equations & Inequalities**
   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 and inequalities, including absolute value equations and inequalities as well as compound inequalities
   - Ratios and proportions
   - Proportions in similar figures
   - Transformations
   - Volume of Cylinder, Cone and Sphere

2. **Marking Period Two: Data Analysis and Probability**
   Linear Functions and Systems of Equations & Inequalities
   Goals understanding of:
   - Measures of central tendency and variability (excluding standard deviation)
   - Theoretical and experimental probabilities
   - Patterns
   - Relations and functions
   - Linear functions (graphically and algebraically)
   - Real world applications involving linear functions, equations and inequalities
   - Scatter plots and using trend lines to predict

3. **Marking Period Three: Linear Functions and Systems of Equations & Inequalities**
   Exponents, Polynomials and Quadratic Functions
   Goals understanding of:
   - Systems of linear equations and inequalities
   - Real world applications involving systems of linear equations and inequalities
   - Properties of exponents
   - Writing numbers in scientific notation
   - Polynomials (classifying, adding and subtracting)
   - Multiplying polynomials (two binomials or a binomial by a trinomial)
   - Factoring polynomials including GCF

4. **Marking Period Four: Exponents, Polynomials and Quadratic Functions Radical and Rational Expressions and Equations**
   Goals understanding of:
   - Solving quadratic equations by factoring
   - Simplify radicals and complete operations with radical expressions
   - Solve equations involving radicals
   - Simplify and complete operations with rational expressions
   - Solve rational equations

Curriculum Plan

UNIT 1:

Big Idea # 1:

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

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.

Mathematical Standard Areas: Pennsylvania Core State Standards for Mathematics

Standards Addressed: 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;

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

Overview: Foundations for Algebra, Solving Equations & Inequalities including those of geometric shapes

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.

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. (DOK – Level Two)
11. Students will be able to solve inequalities, compound inequalities, and absolute value equations and inequalities. (DOK – Level Three)
12. Students will apply the concepts of volume of cylinders, cones, and spheres to solve real world and mathematical problems. (DOK – Level Four)
13. Students will construct geometric transformations. (DOK – Level Three)

Curriculum Plan

UNIT 2:

Big Idea #1:

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

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.

Big Idea #3:

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

Big Idea #4:

- Data can be modeled and used to make inferences

Mathematical Standard Areas: Pennsylvania Core State Standards for Mathematics

Standards Addressed: CC.2.4.HS.B.1, DD.2.4.HS.B.5, CC.2.4.HS.B.6, CC.2.4.HS.B.7, CC.2.4.HS.F.3, 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

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

Overview: Data Analysis and Probability, Linear Functions and Systems of Equations & Inequalities

Goals: 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. 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.

Objectives:

1. Students will be able to make and interpret frequency tables and histograms. (DOK – Level Two)
2. Students will be able to determine the mean, median, mode, and range.

(DOK – Level Two)

3. Students will be able to create and interpret box-and-whisker plots as well as find quartiles and percentiles. (DOK – Level Three)
4. Students will be able to determine theoretical and experimental probabilities. (DOK – Level Three)
5. Students will be able to find the probabilities of mutually exclusive and overlapping events as well as independent and dependent events. (DOK – Level Three)
6. Students will be able to represent mathematical relationships using graphs. (DOK – Level Two)
7. Students will be able to identify and represent patterns that describe linear functions. (DOK – Level Two)
8. Students will be able to write equations that represent functions. (DOK – Level Three)
9. Students will be able to determine whether a relation is a function, find the domain and range and use function notation. (DOK – Level Two)
10. 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)
11. Students will be able to write and graph linear equations in slope-intercept form, point-slope form, and standard form. (DOK – Level Two)
12. 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)
13. Students will be able to solve a system of linear equations by graphing, using substitution, or using the elimination method. (DOK – Level Two)
14. Students will be able to apply their understanding of systems of equations to solve real world problems. (DOK – Level Four)
15. Students will be able to graph linear inequalities in two variables and use linear inequalities to model real world situations. (DOK – Level Three)
16. 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)

Curriculum Plan

UNIT 3:

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 and inequalities.

Big Idea #2:

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

Mathematical Standard Areas: Pennsylvania Core State Standards for Mathematics

Standards Addressed: CC.2.1.HS.F.1, CC.2.2.HS.D.1, CC.2.2.HS.D.2, CC.2.2.HS.D.3

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

Overview: Exponents, Polynomials and Quadratic Functions

Goals: Students will be able to apply properties of exponents as they multiply and factor polynomials. Students will be able to solve quadratic equations by factoring.

Objectives:

1. Students will be able to simplify expressions involving zero and negative exponents (DOK – Level Two)
2. Students will understand and apply properties of exponents (DOK – Level Three)
3. Students will be able to classify, add and subtract polynomials. (DOK – Level Two)
4. Students will be able to multiply two binomials or a binomial by a trinomial. (DOK – Level Two)
5. Students will be able to factor trinomials, including those with a GCF. (DOK – Level Two)
6. Students will be able to solve quadratic equations by factoring. (DOK – Level Four)
7. Students will solve real world problems involving quadratic functions. (DOK – Level Three and Four)
8. Students will explore the graphs of quadratic functions. (DOK – Level Two)

Curriculum Plan

UNIT 4:

Big Idea # 1:

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

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.

Standard(s): Pennsylvania Core State Standards for Mathematics

Standards Addressed: (Number Only- See Appendix for Description)
PACCS Math: CC.2.1.HS.F.2, CC.2.2.HS.D.6, 2.1.A1.A, 2.1.A1.B, 2.1.A1.F, 2.2.A1.C, 2.8.A1.B

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

Overview: Radical and Rational Expressions and Equations

Focus Question(s): How can we solve equations involving radicals or rational equations?

Goals: Students will be able to simplify and complete operations with radical and rational expressions. They will also be able to solve equations involving radicals or rational equations.

Objectives:

1. Students will be able to simplify radicals involving products and quotients. (DOK – Level Two)
2. Students will be able to add, subtract, multiply and divide radical expressions. (DOK – Level Two)
3. Students will be able to solve equations involving radicals. (DOK – Level Three)
4. Students will be able to simplify rational expressions. (DOK – Level Two)
5. Students will be able to multiply and divide rational expressions as well as simplify complex fractions. (DOK – Level Two)
6. Students will be able to add and subtract rational expressions. (DOK – Level Two)
7. Students will be able to solve rational equations. (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.
    a. Teachers and students will use appropriate language to identify concepts
    b. Writing activities incorporating appropriate math language

3. Develop student's 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. Cooperative learning groups
    b. Direct instruction as needed using Smart Technology and online textbook and resources
    c. Guided Practice

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

5. Develop students' ability to solve real world problems by applying there understanding of linear functions, system of linear equations and inequalities.
    a. Cooperative learning groups
    b. Direct instruction as needed using Smart Technology and online textbook and resources
    c. Guided Practice

6. Expose students' prior knowledge of exponents, specifically in scientific notation. Introduce (or review) zero and negative exponents. Guide students to develop the properties of exponents using the definition of an exponent.
    a. Diagnostic assessment, questioning
    b. Cooperative learning groups
    c. Direct instruction as needed using Smart Technology and online textbook and resources
    d. Guided Practice

7. Develop student's skills in adding and subtracting, factoring polynomials followed by multiplying polynomials (two binomials or a binomial by a trinomial).
    a. Cooperative learning groups
    b. Direct instruction as needed using Smart Technology and online textbook and resources
    c. Guided Practice

8. Develop student's ability to solve quadratic equations by factoring.
    a. Cooperative learning groups
    b. Direct instruction as needed using Smart Technology and online textbook and resources
    c. Guided Practice

Assessments:

Diagnostic:
Textbook/Online Resources
Teacher prepared pre-test/diagnostic test
Teacher questioning and observation
CDT/Benchmark Assessment

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

Summative:
Common Assessment for Units
Chapter Tests and Quizzes
CDT

Extensions:
SAT Practice Problems (Question of the Day)
Enrichment Worksheets (Textbook Supplement and Kuta Software)
Study Island – preparation for Keystone Algebra 1 Assessment and PSSA
USATestPrep online guided practice

Correctives:
Re-teaching and practice worksheets available with textbook
Practice worksheets generated through Kuta Software
Study Island– preparation for Keystone Algebra 1 Assessment and PSSA
USATestPrep online guided practice

Materials and Resources:
Algebra 1 Common Core by Pearson Education, Inc. (2012)
Glencoe Algebra 1 (2018)
Textbooks Online Resources
Teacher Generated Worksheets (Kuta Software)
USA Test Prep
Study Island – preparation for Keystone Algebra 1 Assessment and PSSA
CDT

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

Name of Textbook: Glencoe Algebra 1

Textbook ISBN #: 978-0-07-903989-7

Textbook Publisher & Year of Publication: McGraw-Hill Education, 2018

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