DELAWARE VALLEY SCHOOL DISTRICT

PLANNED INSTRUCTION

A PLANNED COURSE FOR:

Honors Algebra 2 and Trigonometry

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Grade Level: 10

Date of Board Approval: _____2024_____

Course Weighting: Honors Algebra 2 & Trigonometry

Marking Periods	Quiz	Test	Graded Assignment	Homework/ Participation	Total Points
MP1 Points	115	200	40	25	380
MP2 Points	115	325	50	25	515
MP3 Points	198	150	15	25	388
MP4 Points	60	380	25	25	495
Total Points	**488**	**1055**	**130**	**100**	**1773**
Total Percentages	**28%**	**60%**	**7%**	**6%**	**100%**

Curriculum Map

Overview:
This rigorous course is designed to continue the study and application of algebraic principles from Algebra 1 and extended in Geometry. Students will be challenged with abstract problems and applications as they study and apply linear and quadratic functions, logarithmic functions, circular trigonometry and trigonometric relationships, matrices, and functions involving real and complex solutions. Students will learn to model real-world situations using the mathematics studied in the course. Material will be covered more deeply and at a faster pace than in the Algebra 2 and Trigonometry course.

Time/Credit for the Course: Full Year, 1 credit, 1 period per day

Goals:

Marking Period One: Overview based on 45 days.

Unit One Fundamentals of Algebra 1: 16 days

- Properties of real numbers
- Solving equations and inequalities in one variable
- Solving absolute value equations and inequalities in one variable

Unit Two Linear Functions: 19 days (includes 1 day for PSAT testing)

- Relations and functions
- Transformations of functions
- Linear functions (graphically and algebraically)
- Applications of linear models
- Absolute value and piece-wise functions

Unit Three Systems of Equations: 10 days

- Solving systems of equations algebraically and graphically
- Solving and graphing systems of inequalities

Marking Period Two: Overview based on 45 days:

Unit Three Systems of Equations (Continued): 4 days

- Linear Programming

Unit Four Introduction to Matrices: 14 days

- Matrices both with and without a graphing calculator (operations, inverses, and matrix solutions with linear systems)
- Solving systems of equations using augmented matrices, matrix inverses, or Cramer's Rule

Unit Five Quadratics: 22 days

- Graphs of quadratic functions, including transformations
- Solving quadratic equations by graphing, factoring, taking the square root, completing the square, and/or quadratic formula
- Real and complex roots of quadratic functions
- Applications of quadratic functions
- Operations with complex numbers

Unit Six Exponents and Radicals: 5 days

- Expressions involving exponents
- Expression involving rational exponents

Marking Period Three: Overview based on 45 days

Unit Six Exponents and Radicals (Continued): 8 days

- Expressions involving rational exponents (continued)
- Roots and radical expressions
- Operations on radical expressions
- Solving radical equations

Unit Seven Exponential and Logarithmic Functions: 21 days

- Function operations, including composition of functions
- Inverse relations and functions
- Graphs of exponential and logarithmic functions

- Properties of logarithms
- Solving exponential and logarithmic equations
- Applications of exponential and logarithmic functions

Unit Eight Polynomials: 16 days

- Operations with polynomials
- Pascal's triangle and binomial expansion
- Real and complex roots of polynomial functions

Marking Period Four: Overview based on 45 days

Unit Nine Rational Functions: 10 days

- Simplifying rational expressions
- Operations on rational expressions
- Solving rational equations
- Graphs of rational functions

Unit Ten Trigonometry: 21 days

- Distance and midpoint formulas
- Describing circles algebraically and graphically
- Measuring angles in degrees and radians
- Trigonometric functions and the Unit Circle
- Applications of Trigonometry
- Analyzing the graphs of trigonometric functions

Unit Eleven Data Analysis: 14 days (includes 4 days to review and take the final exam)

- Calculating probability (both simple and compound probability)
- Analyzing data using measures of center and spread

Big Ideas:

Big Idea #1: Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations.
Big Idea #2: Mathematical relationships among numbers can be represented, compared, and communicated.
Big Idea #3: Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions.
Big Idea #4: Patterns exhibit relationships that can be extended, described, and generalized. Data can be modeled and used to make inferences.

Textbook and Supplemental Resources:

Primary Textbook Used for this Course of Instruction:
Name of Textbook: Algebra and Trigonometry, 5th Edition
Textbook ISBN #: 978-0-13-310116-4
Textbook Publisher & Year of Publication: Pearson Education, Inc., 2014

Supplemental Resources:

- Kuta Software and Teacher Generated Worksheets
- Mathmedic worksheets and assessments
- Desmos interactive activities
- Graphing Calculator: TI-84 and Desmos
- TI Smart View Software
- Teacher developed SAT question bank
- Websites such as College Board and Khan Academy
- Smart Notebook Gallery Essentials
- Blitzer Algebra & Trigonometry textbook

Curriculum Plan

Unit 1: Fundamentals of Algebra 1 **16 days**

Standard(s):
PACS Math: CC.2.1.HS.F.2, CC.2.1.HS.F.4, CC.2.2.HS.D.1, CC.2.2.HS.D.2, CC.2.2.HS.D.6, 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.2.4.HS.B.3

Anchor(s): A1.1.1.1, A1.1.1.5, A1.1.2.1, A1.1.3.1, A2.1.2.1, A2.1.3.1

Eligible Content:
A1.1.1.1.1 Compare and/or order any real numbers (rational and irrational may be mixed).
A1.1.1.5.1 Add, subtract and/or multiply polynomial expressions (express answers in simplest form – nothing larger than a binomial multiplied by a trinomial).
A1.1.2.1.1 Write, solve and/or apply a linear equation (including problem situations).
A1.1.2.1.2 Use and/or identify an algebraic property to justify any step in an equation solving process (linear equations only).
A2.1.2.1.1 Use exponential expressions to represent rational numbers.
A2.1.2.1.2 Simplify/evaluate expressions involving positive and negative exponents and/or roots (may contain all types of real numbers - exponents should not exceed the power of 10).
A2.1.2.2.2 Simplify rational algebraic expressions.
A1.1.3.1.1 Write or solve compound inequalities and/or graph their solution sets on a number line (may include absolute value inequalities).
A1.1.3.1.2 Identify or graph the solution set to a linear inequality on a number line.
A1.1.3.1.3 Interpret solutions to problems in the context of the problem situation (limit to linear inequalities).
A2.1.3.1.2 Solve equations involving rational and/or radical expressions (e.g., $\frac{10}{(x+3)} + \frac{12}{(x+3)} = 1$ or $\sqrt{x^2 + 21x} = 14$).
A2.1.3.2.1 Determine how a change in one variable relates to a change in a second variable (e.g., $y = \frac{4}{x}$, if x doubles, what happens to y?).
A2.1.3.2.2 Use algebraic processes to solve a formula for a given variable (e.g., solve $d = rt$ for r).

Objectives:
1. Students will be able to identify and apply properties of real numbers. (DOK – Level 1)
2. Students will be able to apply the order of operations to simplify numerical expressions and to simplify and/or evaluate algebraic expressions. (DOK – Level 2)
3. Students will be able to apply how algebraic, set, and interval notation can be used to describe collections of objects, specifically numbers. (DOK - Level 2)
4. Students will be able to determine the values that are included and excluded given a visual or algebraic expression. (DOK - Level 2)

5. Students will be able to solve algebraic equations or inequalities in one variable, including compound inequalities, graphing the solution on a number line when required. (DOK – Level 2)
6. Students will be able to solve absolute value equations and inequalities, graphing the solution on a number line when required. (DOK – Level 2)

Core Activities and Corresponding Instructional Methods:

1. Expose students' prior knowledge of properties of real numbers, as well as other fundamental Algebra 1 skills (simplifying and/or evaluating algebraic expressions, solving equations, inequalities, including absolute value equations and 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
    e. IXL and/or Deltamath
    f. Suggested activity: Desmos: Solving Equations Escape Room
2. Develop students' ability to express solutions in interval and set notations.
    a. Suggested notes and practice exercises: "What are the Rules at Zaxby's?"
    b. Direct instruction using Smart Technology and resources.
    c. Guided practice using online resources and worksheets.
    d. Cooperative learning groups
    e. IXL and/or Deltamath
3. Develop students' skills in solving absolute value equations and inequalities, compound inequalities and solving problems by applying algebraic processes.
    a. Suggested notes and practice exercises: Exploring Absolute Value
    b. Direct instruction using Smart Technology and resources
    c. Guided practice using online resources and worksheets.
    d. Cooperative learning groups
    e. IXL and/or Deltamath
4. Develop students' ability to solve real world applications by applying their understanding of various equations, inequalities, and functions.
    a. Suggested notes and practice exercises:
        i. Notes: Functions in the Real World
        ii. Notes/Practice: Models and Applications
    b. Direct instruction using Smart Technology and online textbook and resources
    c. Guided practice using online resources and worksheets.
    d. Cooperative learning groups
    e. IXL and/or Deltamath

Assessments:

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

  - Keystone Algebra 1 Exam
- **Formative:**
  - Teacher observations, questioning techniques, and discussions
  - Homework
  - Exit tickets
  - Group activities
  - IXL/Deltamath
  - Teacher prepared assessments (quizzes, tests, and graded assignments)
- **Summative:**
  - Common Assessment for Unit 1

Unit 2: Linear Functions **19 days**

Standard(s): CC.2.1.HS.F.3, 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, CC.2.2.HS.B.2, CC.2.2.HS.B.3

Anchor(s): A1.2.1.1, A1.2.1.2, A1.2.2.1, A1.2.3.2, A2.1.3.2, A2.2.1.1, A2.2.3.1, A2.2.3.2

Eligible Content:

A1.2.1.1.1 Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically.
A1.2.1.1.2 Determine if a relation is a function given a set of points or a graph.
A1.2.1.1.3 Identify the domain or range of a relation (may be presented as ordered pairs, a graph, or a table).
A1.2.1.2.1 Create, interpret and/or use the equation, graph, or table of a linear function.
A1.2.1.2.2 Translate from one representation of a linear function to another (graph, table, and equation).
A1.2.2.1.1 Identify, describe and/or use constant rates of change.
A1.2.2.1.2 Apply the concept of linear rate of change (slope) to solve problems.
A1.2.2.1.3 Write or identify a linear equation when given the graph of the line,
2 points on the line, or the slope and a point on a line, (Linear equation may be in point-slope, standard and/or slope-intercept form).
A1.2.2.1.4 Determine the slope and/or y-intercept represented by a linear equation or graph.
A2.2.1.1.1 Analyze a set of data for the existence of a pattern and represent the pattern with a rule algebraically and/or graphically.
A2.2.1.1.3 Determine the domain, range, or inverse of a relation.
A1.2.2.2.1 Draw, find and/or write an equation for a line of best fit for a scatter plot.
A1.2.3.2.1 Estimate or calculate to make predictions based on a circle, line, bar graph, measures of central tendency, or other representations.
A1.2.3.2.2 Analyze data, make predictions, and/or answer questions based on displayed data (box-and-whisker plots, stem-and-leaf plots, scatter plots, measures of central tendency, or other representations).
A1.2.3.2.3 Make predictions using the equations or graphs of best-fit lines of scatter plots.
A2.2.3.1.2 Make predictions using the equations or graphs of regression models (lines and curves of best fit) of scatter plots.
A2.2.3.1.1 Draw, identify, find and/or write an equation for a regression model (lines and curves of best fit) for a scatter plot.

Objectives:

1. Students will be able to graph an equation by plotting points on a coordinate plane, correctly identifying/labeling both axes, the origin, and the appropriate quadrant. (DOK – Level 2)
2. Students will be able to use graphing calculators to graph equations as they begin to explore the features of a graphing calculator. (DOK – Level 2)
3. Students will be able to interpret story graphs and to sketch the graph given a real-world situation with two related variables. (DOK – Level 2)
4. Students will identify the independent and dependent variables of a model. (DOK - Level 2)
5. Students will be able to solve linear equations or rational equations (multiplying by the common denominator), recognizing equations with no solution or equations classified as identities. (DOK – Level 3)
6. Students will be able to apply their skills to develop mathematical models to solve real-world problems. (DOK – Level 4)
7. Students will be able to solve a literal equation for the designated variable, i.e. solve for one variable in terms of another. (DOK – Level 2)
8. Students will be able to identify the domain and/or range of a relation and to determine whether a given relation is a function. (DOK – Level 3)
9. Students will be able to evaluate a function. (DOK – Level 2)
10. Students will be able to analyze the graph of a function by identifying the intercepts, zeros and maximum (or minimum) values of the function, determining where the function is increasing, decreasing, or constant, and whether the function is even or odd. (DOK – Level 4)
11. Students will be able to graph piece-wise functions and to write the equation of a piece-wise function given the graph. (DOK – Level 2)
12. Students will be able to determine the slope of a line given the graph, a linear equation in any form, or two points. (DOK – Level 2)

Core Activities and Corresponding Instructional Methods

1. Build math language/vocabulary including *relation, function, domain, range.*
    a. Use appropriate language to identify algebraic terms and processes.
    b. Encourage and guide students to use appropriate math terminology during class discussions and investigations
    c. Writing activities incorporating appropriate math language
    d. IXL and/or Deltamath
2. Build students' ability to analyze graphs of functions, specifically by identifying significant points on the graph and through transformation of the function.
    a. Direct instruction using Smart Technology and online textbook and resources
    b. Guided practice using the TI-84 graphing calculator, Desmos
    c. Cooperative learning groups

3. 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. Suggested notes and practice problems:
        i. Linear Relationships
        ii. Point-Slope Form
        iii. Standard Form
        iv. Parallel and Perpendicular Lines
        v. Linear Models
        vi. Linear Regression
    e. Suggested Activity: Scatter Plot Labs - Create and analyze a scatter plot by finding the line of best fit.
        i. Gather student data, ex. height vs wingspan
        ii. Create and describe the scatter plot for two-variable data.
        iii. Interpret the slope and y-intercept of a line of best fit.
        iv. Make a prediction using the line of best fit.
    f. Guided practice
4. Expose students' prior knowledge of functions and notation, guiding students to add, subtract, multiply and divide functions as well as find the composition of two functions.
    a. Suggested notes and practice problems: Function Composition
    b. Direct instruction as needed using Smart Technology and online textbook and resources
    c. Guided practice
    d. Cooperative learning groups
5. Develop students' ability to graph and write piecewise functions.
    a. Diagnostic assessment, questioning
    b. Cooperative learning groups
    c. Direct instruction, as needed, using Smart Technology and online textbook and resources
    d. Suggested notes and practice problems: Piecewise Functions
    e. Guided practice

Assessments:

- **Diagnostic:**
    - Teacher prepared pre-test/diagnostic test
    - Teacher questioning and observation
    - Keystone Algebra 1 Exam
- **Formative:**
    - Teacher observations, questioning techniques, and discussions

  - Homework
  - Exit tickets
  - Group activities
  - IXL/Deltamath
  - Teacher prepared assessments (quizzes, tests, and graded assignments)
- **Summative:**
  - Common Assessment for Unit 2

Unit 3: Systems of Equations & Inequalities **10 days**

Standards: CC.2.1.HS.F.3, CC.2.1.HS.F.4, CC.2.2.HS.C.2, CC.2.2.HS.C.3, CC.2.2.HS.D.7, CC.2.2.HS.D.8, CC.2.2.HS.D.9, CC.2.2.HS.10

Anchors: A1.1.2.1, A1.1.2.2, A1.1.3.1, A1.1.3.2, A1.2.1.2, A1.2.2.1, A2.1.1.1, A2.1.3.2,

Eligible Content:

A1.1.2.1.1 Write, solve and/or apply a linear equation (including problem situations).
A1.1.2.1.2 Use and/or identify an algebraic property to justify any step in an equation solving process (linear equations only).
A1.1.2.1.3 Interpret solutions to problems in the context of the problem situation (linear equations only).
A1.1.2.2.1 Write and/or solve a system of linear equations (including problem situations) using graphing, substitution and/or elimination (limit systems to 2 linear equations).
A1.1.2.2.2 Interpret solutions to problems in the context of the problem situation (systems of 2 linear equations only).
A1.1.2.1.3 Interpret solutions to problems in the context of the problem situation (linear equations only).
A1.1.3.1.3 Interpret solutions to problems in the context of the problem situation (limit to linear inequalities).
A1.1.3.2.1 Write and/or solve a system of linear inequalities using graphing (limit systems to 2 linear inequalities).
A1.1.3.2.2 Interpret solutions to problems in the context of the problem situation (systems of 2 linear inequalities only).
A1.2.2.1.4 Determine the slope and/or y-intercept represented by a linear equation or graph.
A1.2.1.2.1 Create, interpret and/or use the equation, graph, or table of a linear function.
A1.2.1.2.2 Translate from one representation of a linear function to another (graph, table, and equation).
A2.2.1.1.1 Analyze a set of data for the existence of a pattern and represent the pattern with a rule algebraically and/or graphically.
A2.1.3.2.1 Determine how a change in one variable relates to a change in a second variable (e.g., $y = \frac{4}{x}$, if x doubles, what happens to y?).

Objectives:

1. Students will be able to graph a linear equation in two variables or linear inequality in two variables from any form (slope-intercept form, point-slope form, or standard form). (DOK – Level 2)
2. Students will be able to write the equation of a line in slope-intercept form, point-slope form, or standard form given the graph, a point, and the slope, or two points. (DOK – Level 2)

3. Students will be able to produce and use the line of best fit given a scatterplot. They will also be able to use graphing calculators to graph the data and produce the regression equation. (DOK – Level 2)
4. Students will be able to write the equations of lines that are parallel or perpendicular to a given line and to determine whether two given lines are parallel, perpendicular, or neither. (DOK – Level 2)
5. Students will be able to determine whether a linear system of equations is consistent or inconsistent, dependent, or independent. (DOK – Level 2)
6. Students will be able to solve a system of linear equations both graphically and algebraically (substitution or elimination method). (DOK – Level 2)
7. Students will be able to solve a system of linear inequalities by graphing. (DOK – Level 2)
8. Students will be able to model a real-world situation using linear programming by developing an objective function and its constraints, graphing the feasible region, and finding the points of intersection of these constraints which will be the maximum and minimum values of the objective function. (DOK – Level 4)

Core Activities and Corresponding Instructional Methods

1. Develop students' skills in solving a system of linear equations by graphing, using the substitution method, or using the elimination method.
    a. Direct instruction using Smart Technology, online textbook, and resources
    b. Suggested notes and practice:
        i. Graphing and Substitution
        ii. Elimination
        iii. Three Variable Systems
    c. Guided practice
    d. Cooperative learning groups
    e. IXL and/or Deltamath
2. Develop students' ability to solve real world problems by applying their understanding of linear functions, systems of linear equations, and systems of linear inequalities.
    a. Cooperative learning groups
    b. Guided practice
3. Linear Programming Lab: Find the maximum and minimum of an objective function given linear constraints given a real-world situation.
    a. Suggested Activity: Linear Programming
    b. Write the constraints and the objective function given the situation
    c. Find the feasible region using graph paper or Desmos
    d. Find the optimization point (maximum or minimum) using the vertices and the objective function.

Assessments:

- **Diagnostic:**
    - Teacher prepared pre-test/diagnostic test
    - Teacher questioning and observation
    - Keystone Algebra 1 Exam

- **Formative:**
  - Teacher observations, questioning techniques, and discussions
  - Homework
  - Exit tickets
  - Group activities
  - IXL/Deltamath
  - Teacher prepared assessments (quizzes, tests, and graded assignments)
- **Summative:**
  - Common Assessment for Unit 3

Unit 4: Introduction to Matrices **14 days**

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

Anchor(s): A1.1.2.1, A1.2.1.2, A2.2.2.1

Eligible Content:
A1.1.2.1.1 Write, solve and/or apply a linear equation (including problem situations).
A1.1.2.1.2 Use and/or identify an algebraic property to justify any step in an equation solving process (linear equations only).
A1.1.2.1.3 Interpret solutions to problems in the context of the problem situation (linear equations only).
A1.2.1.2.1 Create, interpret and/or use the equation, graph, or table of a linear function.
A1.2.1.2.2 Translate from one representation of a linear function to another (graph, table, and equation).
A2.2.2.1.1 Create, interpret and/or use the equation, graph, or table of a polynomial function (including quadratics).
A2.2.2.1.4 Translate a polynomial, exponential or logarithmic function from one representation to another (graph, table, and equation).

Objectives:
1. Students will be able to use an augmented matrix to solve a system of equations in more than two variables, including systems with no solution or systems with infinite solutions. (DOK – Level 3)
2. Students will be able to determine the dimension (order) of a matrix and the element in a specified row and column and to recognize the zero matrix, the identity matrix, and square matrices. (DOK – Level 1)
3. Students will be able to complete operations with matrices (addition, scalar multiplication, and multiplication). (DOK – Level 2)
4. Students will be able to find the multiplicative inverse of a matrix using row operations to transform the given matrix to the identity matrix. (DOK – Level 2)
5. Students will be able to find the determinant of a 2×2 matrix. (DOK – Level 1)
6. Students will be able to solve matrix equations. (DOK – Level 2)
7. Students will be able to solve a linear system using matrix inverses or Cramer's Rule. (DOK – Level 2)
8. Students will be able to use graphing calculators to complete operations with matrices, find the determinant or inverse, and solve systems using matrices. (DOK – Level 2)
9. Students will be able to mathematically model a real-world situation using a system of linear equations and to solve that problem using any of the following methods:

graphing, substitution, elimination, augmented matrices, matrix inverses, or Cramer's Rule. (DOK – Level 4)

Core Activities and Corresponding Instructional Methods:

1. Develop students' skills and understanding of matrices both with and without a calculator (operations with matrices, determinant, inverses, matrix equations, and matrix solutions to linear systems which includes Cramer's Rule).
    a. Direct instruction using Smart Technology, online textbook, and resources
    b. Suggested notes and practice problems:
        i. Introduction to Matrices
        ii. Matrix Addition
        iii. Matrix Multiplication
        iv. Identities and Inverse Matrices
        v. Cramer's Rule
    c. Guided practice
    d. Cooperative learning groups
    e. Suggested Activity: Cryptography Project
        i. Code and decode secret messages using the inverse of function

Assessments:

- **Diagnostic:**
    - Teacher prepared pre-test/diagnostic test
    - Teacher questioning and observation
    - Keystone Algebra 1 Exam
- **Formative:**
    - Teacher observations, questioning techniques, and discussions
    - Homework
    - Exit tickets
    - Group activities
    - IXL/Deltamath
    - Teacher prepared assessments (quizzes, tests, and graded assignments)
- **Summative:**
    - Common Assessment for Unit 4

Unit 5 Quadratic Functions: **22 days**

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

Anchor(s): A1.1.1.5, A1.2.1.1, A2.1.1.1, A2.1.1.2, A2.1.2.2, A2.1.3.1, A2.2.1.1, A2.2.2.1, A2.2.2.2,

Eligible Content:
A1.1.1.5.2 Factor algebraic expressions, including difference of squares and trinomials (trinomials limited to the form ax^2+bx+c where a is equal to 1 after factoring out all monomial factors)
A2.1.1.1.1 Simplify square roots in terms of i. (e.g., $\sqrt{-24} = 2i\sqrt{6}$).
A2.1.1.1.2 Simplify/evaluate expressions involving imaginary numbers powers of i (e.g., $i^6 + i^3 = 1 + i$).
A2.1.1.2.1 Add and subtract complex numbers (e.g., $(7 - 3i) - (2 + i) = 5 - 4i$).
A2.1.1.2.2 Multiply and divide complex numbers (e.g., $(7 - 3i)(2 + i) = 17 + i$).
representation to another (graph, table, and equation).
A2.1.2.2.1 Factor algebraic expressions, including difference of squares and trinomials (trinomials limited to the form $ax^2 + bx + c$ where a is not equal to 0).
A2.1.3.1.1 Write and/or solve quadratic equations (including factoring and using the Quadratic Formula).
A2.2.1.1.1 Analyze a set of data for the existence of a pattern and represent the pattern with a rule algebraically and/or graphically.
A2.2.1.1.3 Determine the domain, range, or inverse of a relation.
A2.2.1.1.4 Identify and/or determine the characteristics of an exponential, quadratic, or polynomial function (e.g., intervals of increasing/decreasing, intercepts, zeros, and asymptotes).
A2.2.2.1.1 Create, interpret and/or use the equation, graph, or table of a polynomial function (including quadratics).
A2.2.2.1.3 Determine, use and/or interpret minimum and maximum values over a specified interval of a graph of a polynomial, exponential or logarithmic function.
A2.2.2.1.4 Translate a polynomial, exponential or logarithmic function from one.
A2.2.2.2.1 Identify or describe the effect of changing parameters within a family of functions (e.g., $y = x^2$ and $y = x^2 + 3$, or $y = x^2$ and $y = 3x^2$).
Objectives:

1. Students will be able to graph a quadratic function in standard form or vertex form without a calculator (identifying the vertex, orientation, axis of symmetry, intercepts, and maximum or minimum values). (DOK – Level 3)
2. Students will be able to use the graphing calculator to identify key features of a quadratic function. (DOK – Level 2)

3. Students will be able to identify specific transformations (horizontal shift, vertical shift, stretch or compression) of a quadratic function with or without a graphing calculator. (DOK – Level 2)
4. Students will be able to factor quadratic equations (greatest common factor, factor by grouping, trinomials including those with a leading coefficient other than one, recognizing special cases such as the difference of two perfect squares or perfect square trinomials). (DOK – Level 3)
5. Students will be able to solve a quadratic equation by factoring or by taking the square root of both sides. (DOK – Level 3)
6. Students will be able to simplify radicals (specifically square roots), rationalizing the denominator when necessary. (DOK – Level 2)
7. Students will be able to simplify, add, subtract, multiply, and divide complex numbers, using the complex conjugate when required. (DOK – Level 2)
8. Students will be able to solve quadratic equations by completing the square or using the quadratic formula. (DOK – Level 3)
9. Students will be able to use the discriminant to describe the type of solutions (real or imaginary, rational, or irrational) of a quadratic equation. (DOK – Level 2)
10. Students will be able to write the quadratic equation in vertex form given points on the graph, the vertex, or the x-intercepts. (DOK – Level 4)
11. Students will be able to convert from vertex form to standard form as well as from standard form to vertex form of a quadratic function by completing the square. (DOK – Level 3)
12. Students will be able to write the quadratic equation given three points on the function using a system of equations and matrices. (DOK – Level 4)
13. Students will be able to apply their understanding of quadratic functions to model real-world situations and solve word problems. (DOK – Level 4)

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. Build math language/vocabulary (vertex, axis of symmetry, degree, zeros/roots, etc.).
    a. Use appropriate language to identify algebraic terms and processes
    b. Suggested notes and practice problems: Characteristics of Parabolas
    c. Encourage and guide students to use appropriate math terminology during class discussions and investigations
    d. Writing activities incorporating appropriate math language
    e. Suggested activity: Desmos Activity: Two Truths and a Lie: Parabolas

3. Develop students' skills in solving quadratic functions by graphing, factoring, taking the square root, completing the square, and using the quadratic formula.
    a. Direct instruction using Smart Technology and online textbook and resources
    b. Suggested notes and practice problems:
        i. Graphing Quadratic Functions
        ii. Forms of Quadratic Functions
        iii. Factoring: What is Missing?
        iv. Factoring: A greater than 1
        v. Completing the Square
        vi. Quadratic Formula
        vii. Solving Quadratics using Square Roots
        viii. Solving Using Zero Product Property
    c. Graphing activity using TI-Smartview, guiding students to find the appropriate window to view the graph and identifying properties of the graph
    d. Guided practice
    e. Cooperative learning groups
4. Develop students' ability to solve real world problems involving quadratic functions.
    a. Direct instruction using Smart Technology and online textbook and resources
    b. Suggested notes and practice problems:
        i. Quadratic Modeling
    c. Guided practice
    d. Cooperative learning groups
5. Expose students' prior knowledge of the real number system and introduce the complex number system. Guide students to perform operations with complex numbers.
    a. Diagnostic assessment, questioning
    b. Cooperative learning groups
    c. Direct instruction, as needed, using Smart Technology and online textbook and resources
    d. Suggested notes and practice problems: Imaginary Friends
    e. Guided practice

Assessments:

- **Diagnostic:**
  - Teacher prepared pre-test/diagnostic test
  - Teacher questioning and observation
  - Keystone Algebra 1 Exam
- **Formative:**
  - Teacher observations, questioning techniques, and discussions
  - Homework
  - Exit tickets
  - Group activities
  - IXL/Deltamath
  - Teacher prepared assessments (quizzes, tests, and graded assignments)
- **Summative:**
  - Common Assessment for Unit 5

Unit 6: Exponents and Radicals **13 days**

Standard(s):
PACS Math: CC.2.1.HS.F.1, CC.2.1.HS.F.2, CC.2.2.HS.D.2, CC.2.2.HS.D.3, CC.2.2.HS.D.4, CC.2.2.HS.D.5

Anchor(s): A1.1.1.1.2, A1.1.1.5.1, A1.1.1.5.3, A2.1.2.1.1, A2.1.2.1.2, A2.1.2.1.3, A2.1.2.2.2, A2.1.3.1.2, A2.1.3.1.3

Eligible Content:
A1.1.1.1.2 Simplify square roots (e.g., $\sqrt{24} = 2\sqrt{6}$).
A1.1.1.5.1 Add, subtract and/or multiply polynomial expressions (express answers in simplest form – nothing larger than a binomial multiplied by a trinomial).
A1.1.1.5.3 Simplify/reduce a rational algebraic expression.
A2.1.2.1.1 Use exponential expressions to represent rational numbers.
A2.1.2.1.2 Simplify/evaluate expressions involving positive and negative exponents and/or roots (may contain all types of real numbers - exponents should not exceed power of 10).
A2.1.2.1.3 Simplify/evaluate expressions involving multiplying with exponents (e.g. $x^6 * x^7 = x^{13}$, powers of powers (e.g., $(x^2)^3 = x^6$) and powers of products (e.g., $(2x^2)^3 = 8x^6$) (limit to rational exponents).
A2.1.2.2.2 Simplify rational algebraic expressions.
A2.1.3.1.2 Solve equations involving rational and/or radical expressions (e.g., $\frac{10}{(x+3)} + \frac{12}{(x-2)} = 1 \; or \; \sqrt{x^2 + 21x} = 14$).
A2.1.3.1.3 Write and/or solve a simple exponential or logarithmic equation (including common and natural logarithms).

Objectives:
1. Students will be able to evaluate and simplify expressions involving exponents. (DOK – Level 1)
2. Students will be able to apply the properties of exponents to fractional exponents to simplify or evaluate numerical and algebraic expressions. (DOK – Level 3)
3. Students will be able to connect fractional exponents to radicals. (DOK – Level 2)
4. Students will be able to simplify, add, subtract, multiply, and/or divide radicals with higher indexes including rationalizing the denominator when required. (DOK – Level 2)
5. Students will be able to solve equations involving radicals or rational exponents, checking for extraneous solutions. (DOK – Level 3)
6. Students will be able to apply function operations, including composition of functions. (DOK – Level 2)
7. Students will be able to find the inverse of a function and to verify the inverse by composing with the original function. (DOK – Level 3)

Core Activities and Corresponding Instructional Methods:
6. Expose students' prior knowledge of radicals and properties of exponents, guiding students to make a connection between them.

a. Diagnostic assessment, questioning
b. Direct instruction as needed using Smart Technology and online textbook and resources
c. Suggested notes and practice problems:
    i. Notes: Properties of Exponents
    ii. Properties of Exponents Examples
    iii. Properties of Rational Exponents
d. Guided practice
e. Cooperative learning groups
f. Suggested Activity: Desmos Activity: Laws of Exponents: Escape the Room
g. IXL and/or Delta Math

7. Build math language/vocabulary (index, rationalizing the denominator, etc.)
    a. Use appropriate language to identify algebraic terms and processes
    b. Encourage and guide students to use appropriate math terminology during class discussions and investigations
    c. Writing activities incorporating appropriate math language
    d. IXL and/or Delta Math
8. Develop students' skills in adding, subtracting, multiplying, and dividing radical expressions and expressions with rational exponents as well as solving radical equations or equations involving rational exponents.
    a. Direct instruction using Smart Technology and online textbook and resources
    b. Suggested notes and practice problems: Radical Equations
    c. Guided practice
    d. Cooperative learning groups

Assessments:

- **Diagnostic:**
    - Teacher prepared pre-test/diagnostic test
    - Teacher questioning and observation
    - Keystone Algebra 1 Exam
- **Formative:**
    - Teacher observations, questioning techniques, and discussions
    - Homework
    - Exit tickets
    - Group activities
    - IXL/Deltamath
    - Teacher prepared assessments (quizzes, tests, and graded assignments)
- **Summative:**
    - Common Assessment for Unit 6

Unit 7: Exponential and Logarithmic Functions **21 days**

Standard(s):
PACS Math: CC.2.1.HS.F.1, CC.2.1.HS.F.2, CC.2.1.HS.F.4, CC.2.1.HS.F.7, CC.2.2.HS.C.1, CC.2.2.HS.C.2, CC.2.2.HS.C.3, CC.2.2.HS.C.4, CC.2.2.HS.C.5, CC.2.2.HS.C.6, CC.2.2.HS.D.10

Anchor(s): A1.1.1.3.1, A2.1.2.1, A2.2.2.1.2, A2.2.2.1.3, A2.2.2.1.4, A2.2.2.2.1

Eligible Content:
A1.1.1.3.1 Simplify/evaluate expressions involving properties/laws of exponents, roots and/or absolute value to solve problems (exponents should be integers from -10 to 10).
A2.1.2.1.1 Use exponential expressions to represent rational numbers.
A2.1.2.1.2 Simplify/evaluate expressions involving positive and negative exponents and/or roots (may contain all types of real numbers - exponents should not exceed power of 10).
A2.1.2.1.3 Simplify/evaluate expressions involving multiplying with exponents (e.g. $x^6 * x^7 = x^{13}$, powers of powers (e.g., $(x^2)^3 = x^6$) and powers of products (e.g.,$(2x^2)^3 = 8x^6$) (limit to rational exponents).
A2.1.2.1.4 Simplify or evaluate expressions involving logarithms and exponents (e.g., $log_2 8 = 3$ or $log_4 2 = \frac{1}{2}$).
A2.2.1.1.3 Determine the domain, range, or inverse of a relation.
A2.2.1.1.4 Identify and/or determine the characteristics of an exponential, quadratic, or polynomial function (e.g., intervals of increasing/decreasing, intercepts, zeros, and asymptotes).
A2.1.3.1.3 Write and/or solve a simple exponential or logarithmic equation (including common and natural logarithms).
A2.1.3.1.4 Write, solve and/or apply linear or exponential growth or decay (including problem situations).
A2.1.3.2.1 Determine how a change in one variable relates to a change in a second variable (e.g., $y = \frac{4}{x}$, if x doubles, what happens to y?).
A2.2.2.1.2 Create, interpret and/or use the equation, graph, or table of an exponential or logarithmic function (including common and natural logarithms).
A2.2.2.1.3 Determine, use and/or interpret minimum and maximum values over a specified interval of a graph of a polynomial, exponential or logarithmic function.
A2.2.2.1.4 Translate a polynomial, exponential or logarithmic function from one representation to another (graph, table, and equation).
A2.2.2.2.1 Identify or describe the effect of changing parameters within a family of functions (e.g., $y = x^2$ and $y = x^2 + 3$, or $y = x^2$ and $y = 3x^2$).

Objectives:
1. Students will be able to graph exponential functions using special characteristics of the graph, including domain, range, and asymptotes. (DOK – Level 2)
2. Students will be able to compare and contrast functions involving exponential growth and exponential decay. (DOK – Level 2)

3. Students will be able to identify specific transformations (reflection, horizontal shift, vertical shift) of an exponential function with or without a graphing calculator. (DOK – Level 2)
4. Students will be able to solve an exponential equation by finding a common base or common exponent. (DOK – Level 3)
5. Students will be able to rewrite exponential expressions (including expressions involving the natural base "e") as logarithms and vice versa. (DOK – Level 2)
6. Students will be able to evaluate logarithms both with and without a calculator. (DOK – Level 2)
7. Students will be able to apply the properties of logarithms to expand or condense an expression. (DOK – Level 2)
8. Students will be able to solve an exponential equation (including equations involving the natural base "e") using logarithms. (DOK – Level 3)
9. Students will be able to solve a logarithmic equation by rewriting as an exponential equation (using properties when needed). (DOK – Level 3)
10. Students will be able to derive and apply the change-of base formula. (DOK – Level 3)
11. Students will be able to use exponential (or logarithmic) models to solve real-world problems such as compound interest, exponential growth, and radioactive decay. (DOK – Level 4)

Core Activities and Corresponding Instructional Methods:

1. Develop students' ability to graph exponential functions
    a. Direct instruction using Smart Technology and online textbook and resources
    b. Suggested notes and practice problems
        i. The Exponential Family
    c. Guided practice
    d. Cooperative learning groups
2. Develop students' skills in evaluating logarithmic expressions using properties of logarithms as well as solving exponential and logarithmic equations.
    a. Direct instruction using Smart Technology and online textbook and resources
    b. Suggested notes and practice problems:
        i. Notes: Introduction to Logarithms
        ii. Logarithms Properties
        iii. Logarithms Puzzle
    c. Guided practice
    d. Cooperative learning groups
    e. IXL and/or Deltamath

2. Develop students' ability to solve real world problems, specifically problems involving exponential growth or decay.
    a. Guided practice
    b. Suggested notes and practice problems:
        i. Solving Exponential Equations

ii. Notes on Exponential Models
iii. Writing Exponential Functions

c. Cooperative learning groups
d. Suggested activity: Desmos Activity: Exponential Growth/Decay Applications

Assessments:

- **Diagnostic:**
  - Teacher prepared pre-test/diagnostic test
  - Teacher questioning and observation
  - Keystone Algebra 1 Exam
- **Formative:**
  - Teacher observations, questioning techniques, and discussions
  - Homework
  - Exit tickets
  - Group activities
  - IXL/Deltamath
  - Teacher prepared assessments (quizzes, tests, and graded assignments)
- **Summative:**
  - Common Assessment for Unit 7

Unit 8 Polynomials **16 days**

Standard(s):
PACS Math: CC.2.1.HS.F.4, CC.2.1.HS.F.7, CC.2.2.HS.C.1, CC.2.2.HS.C.2, CC.2.2.HS.C.3, CC.2.2.HS.C.4, CC.2.2.HS.C.6, CC.2.2.HS.D.3, CC.2.2.HS.D.4, CC.2.2.HS.D.5, CC.2.2.HS.D.10

Anchor(s): A1.1.1.5.1, A1.2.1.2.1, A2.2.1.1.3, A2.2.1.1.4, A2.2.2.1.1, A2.2.2.1.3, A2.2.2.1.4,G.2.2.2.2,

Eligible Content:
A1.1.1.5.1 Add, subtract and/or multiply polynomial expressions (express answers in simplest form – nothing larger than a binomial multiplied by a trinomial).
A1.2.1.1.2 Determine if a relation is a function given a set of points or a graph.
A1.2.1.1.3 Identify the domain or range of a relation (may be presented as ordered pairs, a graph, or a table).
A1.2.1.2.1 Create, interpret and/or use the equation, graph, or table of a linear function.
A2.2.1.1.3 Determine the domain, range, or inverse of a relation.
A2.2.1.1.4 Identify and/or determine the characteristics of an exponential, quadratic, or polynomial function (e.g., intervals of increasing/decreasing, intercepts, zeros, and asymptotes).
A2.2.2.1.1 Create, interpret and/or use the equation, graph, or table of a polynomial function (including quadratics).
A2.2.2.1.3 Determine, use and/or interpret minimum and maximum values over a specified interval of a graph of a polynomial, exponential or logarithmic function.
A2.2.2.1.4 Translate a polynomial, exponential or logarithmic function from one representation to another (graph, table, and equation).
G.2.2.2.2 Find the measurement of a missing length given the perimeter, circumference, or area.

Objectives:
1. Students will be able to determine the degree and type of polynomial. (DOK – Level 1)
2. Students will be able to add, subtract, and multiply polynomials. (DOK – Level 2)
3. Students will be able to use Pascal's Triangle to expand binomials. (DOK – Level 2)
4. Students will be able to use graphing calculators to identify specific characteristics of the graph of a polynomial such as domain, range, zeros, maximum and/or minimum values. (DOK – Level 3)
5. Students will be able to divide polynomials using long division or synthetic division. (DOK – Level 2)
6. Students will be able to factor polynomials completely, including the sum or difference of two cubes. (DOK – Level 2)

7. Students will be able to find all zeros (including complex zeros) of a polynomial using the Factor Theorem, Remainder Theorem, Rational Zero Theorem, dividing the polynomial, factoring the polynomial, or using the quadratic formula. (DOK – Level 3)

Core Activities and Corresponding Instructional Methods:

1. Expose students' prior knowledge of polynomials (Algebra 1 content). Develop students' skills in adding, subtracting, multiplying, and dividing polynomials.
    a. Direct instruction using Smart Technology and online textbook and resources
    b. Suggested notes and practice problems:
        i. Notes: Polynomials
        ii. Notes: Multiplying and Dividing Polynomials
        iii. Notes: Pascal's Triangle
        iv. Notes: Synthetic Division
    c. Guided practice
    d. Cooperative learning groups
    e. IXL and/or Deltamath
2. Develop students' skills in solving polynomials by graphing or factoring.
    a. Direct instruction using Smart Technology and online textbook and resources
    b. Suggested notes and practice problems:
        i. Notes: Graphing Polynomial Functions
        ii. Notes: Solving Polynomial Equations by Factoring
    c. Guided practice
    d. Cooperative learning groups
    e. IXL and/or Deltamath
3. Develop students' ability to solve real world problems by applying their understanding of polynomials and it's zeros.
    a. Guided practice
    b. Cooperative learning groups

Assessments:

- **Diagnostic:**
    - Teacher prepared pre-test/diagnostic test
    - Teacher questioning and observation
    - Keystone Algebra 1 Exam
- **Formative:**
    - Teacher observations, questioning techniques, and discussions
    - Homework
    - Exit tickets
    - Group activities
    - IXL/Deltamath
    - Teacher prepared assessments (quizzes, tests, and graded assignments)
- **Summative:**
    - Common Assessment for Unit 8

Unit 9: Rational Functions **10 days**

Standard(s):
PACS Math: 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.6, CC.2.2.HS.D.8, CC.2.2.HS.D.10

Anchor(s): A1.1.1.5.3, A1.2.1.1.3, A2.1.3.1.2, A2.1.3.1.2, A2.2.1.1.3,

Eligible Content:
A1.1.1.5.3 Simplify/reduce a rational algebraic expression.
A1.2.1.1.3 Identify the domain or range of a relation (may be presented as ordered pairs, a graph, or a table).
A2.1.2.2.2 Simplify rational algebraic expressions.
A2.1.3.1.2 Solve equations involving rational and/or radical expressions (e.g., $\frac{10}{(x+3)} + \frac{12}{(x-2)} = 1 \; or \; \sqrt{x^2 + 21x} = 14$).
A2.1.3.2.1 Determine how a change in one variable relates to a change in a second variable (e.g., $y = \frac{4}{x}$, if x doubles, what happens to y?).
A2.2.1.1.3 Determine the domain, range, or inverse of a relation.
A2.2.2.2.1, Identify or describe the effect of changing parameters within a family of functions (e.g., $y = x^2 \; and \; y - x^2 + 3 \; or \; y = x^2 and \; y = 3x^2$).

Objectives:
1. Students will be able to use graphing calculators to identify specific characteristics such as domain, range, and asymptotes of rational functions. (DOK – Level 2)
2. Students will be able to describe transformations of a rational function. (DOK – Level 3)
3. Students will be able to simplify rational expressions by factoring, stating restrictions on the domain. (DOK – Level 2)
4. Students will be able to multiply, divide, add and/or subtract rational expressions. (DOK – Level 2)
5. Students will be able to simplify complex fractions. (DOK – Level 2)
6. Students will be able to solve rational equations, checking for extraneous solutions. (DOK – Level 3)
7. Students will be able to apply their knowledge of rational functions to solve real-world problems. (DOK – Level 4)

Core Activities and Corresponding Instructional Methods:
1. Expose students' prior knowledge of rational numbers, guiding students to add, subtract, multiply and divide rational expressions.
    a. Direct instruction as needed using Smart Technology and online textbook and resources
    b. Suggested notes and practice problems:
        i. Taking a Closer Look; Rationals
        ii. Operations with Rational Expressions: Simplifying

iii. Operations with Rational Expressions: Adding and Subtracting
iv. Adding and Subtracting Rational Expressions
v. Multiplying and Dividing Rational Expressions

c. Guided practice
d. Cooperative learning groups
e. IXL and/or DeltaMath

2. Develop students' skills in solving rational equations.
   a. Direct instruction using Smart Technology and online textbook and resources
   b. Suggested notes and practice problems:
      i. Solving Rational Equations
   c. Guided practice
   d. Cooperative learning groups

Assessments:

- **Diagnostic:**
  - Teacher prepared pre-test/diagnostic test
  - Teacher questioning and observation
  - Keystone Algebra 1 Exam
- **Formative:**
  - Teacher observations, questioning techniques, and discussions
  - Homework
  - Exit tickets
  - Group activities
  - IXL/Deltamath
  - Teacher prepared assessments (quizzes, tests, and graded assignments)
- **Summative:**
  - Common Assessment for Unit 9
  - Cumulative Final Assessment

Unit 10: Trigonometric Functions **21 days**

Standard(s):
PACS Math: CC.2.2.HS.C.2, CC.2.2.HS.C.7, CC.2.2.HS.C.8, CC.2.2.HS.D.8, CC.2.2.HS.D.10, CC.2.3.HS.A.7

Anchor(s): A1.2.1.1.3, A2.2.1.1.1, G.2.1.1.1, G.2.1.1.2

Eligible Content:
A1.2.1.1.3 Identify the domain or range of a relation (may be presented as ordered pairs, a graph, or a table).
A2.2.1.1.1 Analyze a set of data for the existence of a pattern and represent the pattern with a rule algebraically and/or graphically.
G.2.1.1.1 Use the Pythagorean Theorem or trigonometric ratios to write and/or solve problems involving right triangles.
G.2.1.1.2 Use trigonometric ratios to write and/or solve problems involving right triangles.

Objectives:
1. Students will be able to derive and apply the distance formula and the midpoint formula. (DOK – Level 3)
2. Students will be able to produce the equation for a circle given the graph, the center and a point on the circle, or the endpoints of a diameter of the circle. (DOK – Level 4)
3. Students will be able to complete the square to convert the equation of a circle from general form to standard form. (DOK – Level 4)
4. Students will be able to represent the sine, cosine, tangent, cosecant, secant, or cotangent of an angle given the sides of a right triangle. (DOK – Level 2)
5. Students will be able to find the unknown side of a special right triangle (45°-45°-90° or 30°-60°-90°). (DOK – Level 2)
6. Students will be able to solve a right triangle (find all angles and side lengths). (DOK – Level 4)
7. Students will be able to solve problems involving the angle of elevation (or depression) using trigonometry. (DOK – Level 2)
8. Students will be able to describe angles in both degrees and radians in a circle (standard position, positive angles, negative angles, coterminal angles, quadrantal angles). (DOK – Level 2)
9. Students will be able to determine the six trigonometric functions for any angle within the circle (in terms of x, y, and r) or for any point in the coordinate plane by constructing a perpendicular segment to the x-axis. (DOK – Level 4)
10. Students will be able to use the unit circle to determine exact values for the six trigonometric functions at special angles (30°, 45°, 60°, 90° in all four quadrants). (DOK – Level 2)
11. Students will be able to determine the appropriate angle given the exact trigonometric value. (DOK – Level 3)

12. Students will be able to use a calculator to approximate the value of the six trigonometric functions given any angle and to identify the angle in both radians and degrees given the trigonometric value. (DOK – Level 2)
13. Students will be able to solve equations involving trigonometric functions. (DOK – Level 2)
14. Students will be able to recognize the graphs of each of the trigonometric functions. (DOK – Level 1)
15. Students will be able to use the values from the unit circle to produce a sine wave and cosine wave. (DOK – Level 2)
16. Students will be able to identify one cycle of a periodic function as well as the period and amplitude of the function. (DOK – Level 1)

Core Activities and Corresponding Instructional Methods:

1. Build math language/vocabulary including *amplitude, period, cycle, radian.*
    a. Use appropriate language to identify algebraic terms and processes
    b. Encourage and guide students to use appropriate math terminology during class discussions and investigations
    c. Writing activities incorporating appropriate math language
2. Develop students' skills in converting between degrees and radians. Guide students to find the exact value of the coordinates for specified angles on the unit circle.
    a. Direct instruction using Smart Technology and online textbook and resources
    b. Suggested notes and practice problems:
        i. How else can you measure angles?
        ii. Angles on the Coordinate Plane
        iii. Radians and the Unit Circle
    c. Guided practice
    d. Cooperative learning groups
    e. IXL and/or DeltaMath
3. Develop students' ability to find trigonometric values for specific angle measures, using the unit circle.
    a. Suggested notes and practice problems:
        i. The Unit Circle
        ii. Trig-a-no-what
    b. Guided practice
    c. Cooperative learning groups
    d. IXL and/or DeltaMath

Assessments:

- **Diagnostic:**
    - Teacher prepared pre-test/diagnostic test
    - Teacher questioning and observation
    - Keystone Algebra 1 Exam

- **Formative:**
  - Teacher observations, questioning techniques, and discussions
  - Homework
  - Exit tickets
  - Group activities
  - IXL/Deltamath
  - Teacher prepared assessments (quizzes, tests, and graded assignments)
- **Summative:**
  - Common Assessment for Unit 10
  - Cumulative Final Assessment

Unit 11: Data Analysis **14 days**

Standard(s):
PACS Math: CC.2.4.HS.B.6, CC.2.4.HS.B.7

Anchor(s): A1.2.3.3.1, A2.2.3.2.1, A2.2.3.2.2, A2.2.3.2.3

Eligible Content:
A1.2.3.3.1 Find probabilities for compound events (e.g., find probability of red and blue, find probability of red or blue) and represent as a fraction, decimal or percent).
A2.2.3.2.1 Use combinations, permutations, and the fundamental counting principle to solve problems.
A2.2.3.2.2 Use odds to find probability and/or use probability to find odds.
A2.2.3.2.3 Use probability for independent, dependent, or compound events to predict outcomes.

Objectives:
1. Students will be able to specify the sample space for a random experiment and calculate the probability that a given event will occur. (DOK – Level 2)
2. Students will be able to determine when to use factorials, the fundamental counting principle, a permutation, or combination of n elements to find the total number of possible outcomes of an experiment. (DOK – Level 3)
3. Students will be able to calculate the probability of mutually exclusive events and of dependent and independent events. (DOK – Level 2)
4. Students will be able to calculate, compare, and interpret mean, median, mode, range, and standard deviation for quantitative variables. (DOK – Level 3)
5. Students will be able to identify a set of data that is normally distributed. (DOK – Level 1)

Core Activities and Corresponding Instructional Methods:
1. Build math language/vocabulary used in Data Analysis including *sample space*, *mutually exclusive events*, *dependent versus independent events*, *factorial*, and *outlier.*
    a. Use appropriate language to describe concepts and processes used in probability and statistics
    b. Encourage and guide students to use appropriate math terminology during class discussions and investigations
    c. Writing activities incorporating appropriate math language
2. Develop students' skills in calculating the probability of both simple and compound events, using factorials, fundamental counting principle, permutations, or combinations when needed to determine the number of total possible outcomes.
    a. Direct instruction as needed using Smart Technology and online textbook and resources
    b. Guided practice

e. Cooperative learning groups

3. Develop students' ability to analyze the characteristics of a data set using measures of center and spread, including data that is normally distributed.
    a. Direct instruction as needed 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
    - Keystone Algebra 1 Exam
- **Formative:**
    - Teacher observations, questioning techniques, and discussions
    - Homework
    - Exit tickets
    - Group activities
    - IXL/Deltamath
    - Teacher prepared assessments (quizzes, tests, and graded assignments)
- **Summative:**
    - Common Assessment for Unit 11
    - Cumulative Final Assessment