CARLISLE AREA SCHOOL DISTRICT

Carlisle, PA 17013

Integrated Math I

GRADE 9

Date of Board Approval: January 21, 2016

CARLISLE AREA SCHOOL DISTRICT

PLANNED INSTRUCTION COVER PAGE

TITLE OF COURSE:	Integrated Math I	**SUBJECT:**	Mathematics	**GRADE LEVEL:**	9
COURSE LENGTH:	1 academic year	**DURATION:**	50 minutes	**FREQUENCY:**	Daily
PREREQUISITES:	N/A	**CREDIT:**	1	**LEVEL:**	N/A

Course Description/Objectives:

The district shall provide for attainment of the academic standards per Chapter 4, Section 4.12. Each student shall demonstrate proficiency in the following area: numbers, number systems and number relationships; computation and estimation; measurement and estimation; mathematical reasoning and connections, mathematical problem solving and communication; statistics and data analysis; probability and predictions; algebra and functions; geometry; trigonometry; and concepts of calculus.

Text: Math Matters 1: An Integrated Approach

Glencoe/McGraw Hill, 2009

Curriculum Writing Committee: Kathy Schwang and Kelly Brent

COURSE TIME LINE

Unit 1: Data and Graphs — 3 weeks

- Collect and Interpret Data
- Measures of Central Tendency
- Stem-and-Leaf Plots
- Frequency Tables and Pictographs
- Bar Graphs and Line Graphs
- Scatter Plots and Lines of Best Fit
- Box-and-Whisker Plots

Unit 2: Measurement — 5 weeks

- Units of Measure
- Work with Measurements
- Perimeter of Polygons and Circumference of Circles
- Area of Parallelograms, Triangles, and Circles
- Area of Irregular Figures
- Equivalent Ratios, Proportions, and Scale Drawings

Unit 3: Real Numbers and Variable Expressions — 5 weeks

- Add, Subtract, Multiply, and Divide Signed Numbers
- Order of Operations
- Real Number Properties
- Exponents and Scientific Notation
- Laws of Exponents
- Squares and Square Roots

Unit 4: Two- and Three- Dimensional Geometry — 5 weeks

- Language of Geometry
- Polygons and Polyhedra
- Visualize and Name Solids
- Volume of Prisms and Cylinders
- Volume of Pyramids and Cones
- Surface Area of Prisms and Cylinders

Unit 5: Equations and Inequalities

- One-Step Equations
- Two-Step Equations
- Combine Like Terms — 8 weeks
- Use Formulas to Solve Problems
- Graph Open Sentences
- Solve Inequalities

Unit 6: Functions and Graphs

- The Coordinate Plane — 8 weeks
- Relations and Functions
- Linear Graphs
- Slope of a Line
- Slope-Intercept Form of a Line
- Distance and the Pythagorean Theorem
- Solutions of Linear and Nonlinear Equations

Unit 7: Relationships in Geometry

- Angles and Transversals — 2 weeks
- Diagonals and Angles of Polygons

Unit 8: Polynomials

- Introductions to Polynomials — 2 weeks
- Add and Subtract Polynomials
- Multiply Polynomials
- Multiply a Polynomial by a Monomial
- Factor Using Greatest Common Factor
- Divide by a Monomial

TOTAL: 38 weeks

KNOW, UNDERSTAND, DO

COURSE: Integrated Math I **TIME FRAME** 3 weeks

UNIT # 1: Data and Graphs **GRADE:** 9

STANDARDS:

PA Core Standards:

CC.2.4.HS.B.1	• Summarize, represent, and interpret data on a single count or measurable variable.
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.

Keystone Algebra I Eligible Content:

A1.2.2.2.1	• Draw, identify, find, and/or write an equation for a line of best fit for a scatter plot.
A1.2.3.2.2	• Analyze data, make predictions, and/or answer questions based on displayed data (box-and-whisker 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.

Mathematical Practices:

1	• Make sense of problems and persevere in solving them.
4	• Model with mathematics.
5	• Use appropriate tools strategically.

KNOW, UNDERSTAND, DO

COURSE: Integrated Math I **TIME FRAME** 3 weeks

UNIT # 1: Data and Graphs **GRADE:** 9

UNDERSTANDINGS

Students will determine the best method for collecting and organizing data to assist the intended audience with making an accurate interpretation of the available data.

COMMON ASSESSMENTS/CULMINATING ACTIVITY

Project: Collect, display, and interpret data in multiple formats

Unit Test

KNOW

- Name the sampling methods.
- Identify the measures of central tendency.
- List types of data displays.
- Define scatter plot and line of best fit.

DO

- Select the sampling method for given specifications.
- Use the measures of central tendency to describe and interpret a set of real world data.
- Determine the best way to display a given set of data.
- Interpret a data display.
- Create and analyze a scatter plot and/or line of best fit.

KNOW, UNDERSTAND, DO

COURSE: Integrated Math I **TIME FRAME:** 5 weeks

UNIT #2: Measurement **GRADE:** 9

STANDARDS:	
PA Core Standards:	
CC.2.1.7.D.1	• Analyze proportional relationships and use them to model and solve real-world and mathematical problems.
Mathematical Practices:	
1	• Make sense of problems and persevere in solving them.
2	• Reason abstractly and quantitatively.
3	• Model with mathematics.
6	• Attend to precision.
7	• Look for and make use of structure.

KNOW, UNDERSTAND, DO

COURSE: Integrated Math I **TIME FRAME:** 5 weeks

UNIT #2: Measurement **GRADE:** 9

UNDERSTANDINGS

Measurement conversions can be used to solve real-life problems.

Geometry concepts, such as circumference and area, can be combined with algebraic formulas to simplify real-life problems.

COMMON ASSESSMENTS/CULMINATING ACTIVITY

Unit Test

Culminating Application Problems

KNOW

- Recall measurement conversion factors.
- Recall area, perimeter, and circumference formulas for a given shape or situation.
- Define the term ratio.

DO

- Convert units of measure.
- Add, subtract, and multiply units of measure.
- Use area formulas to find the area of shapes, including irregular figures.
- Use a ratio and a scale drawing to calculate the actual length of an object.
- Select the appropriate formula to solve a problem: area, perimeter, and circumference.
- State application problem answers in simplest form.

KNOW, UNDERSTAND, DO

COURSE: Integrated Math I **TIME FRAME:** 5 weeks

UNIT #3: Real Numbers and Variable Expressions **GRADE:** 9

STANDARDS:	
PA Core Standards:	
CC.2.1.HS.F.1	• Apply and extend the properties of exponents to solve problems and rational exponents.
CC.2.1.HS.F.2	• Apply properties of rational and irrational numbers to solve real world or mathematical problems.
CC.2.2.8.B.1	• Apply concepts of radicals and integer exponents to generate equivalent expressions.
Keystone Algebra I Eligible Content:	
A1.1.1.1.1	• Compare and/or order any real numbers.
A1.1.1.3.1	• Simplify/evaluate expressions involving properties/laws of exponents, roots, and/or absolute values to solve problems.
Mathematical Practices:	
4	• Model with mathematics.
6	• Attend to precision.
7	• Look for and make use of structure.

KNOW, UNDERSTAND, DO

COURSE: Integrated Math I **TIME FRAME:** 5 weeks

UNIT #3: Real Numbers and Variable Expressions **GRADE:** 9

UNDERSTANDINGS

There are rules for adding, subtracting, multiplying, and dividing signed numbers.
The order of operations establishes a common procedure for evaluating expressions.
The properties of exponents define methods for rewriting expressions containing exponents.

COMMON ASSESSMENTS/CULMINATING ACTIVITY

Unit Test
Culminating Application Problems

KNOW

- List number sets.
- Recall addition, subtraction, multiplication, and division rules for integers.
- List the order of operations.
- Define scientific notation and standard notation.
- Recall the properties of exponents.

DO

- Identify to which sets a number belongs.
- Add, subtract, multiply, and divide signed numbers with an emphasis on integers.
- Use order of operations to evaluate expressions.
- Evaluate a variable expression for a given value.
- Convert scientific notation to standard notation and standard notation to scientific notation.
- Apply properties of exponents.

KNOW, UNDERSTAND, DO

COURSE: Integrated Math I **TIME FRAME:** 5 weeks

UNIT #4: Two-and-Three Dimensional Geometry **GRADE:** 9

STANDARDS:	
PA Core Standards:	
CC.2.3.6.A.1	• Apply appropriate tools to solve real-world and mathematical problems involving area, surface area, and volume.
CC.2.3.7.A.1	• Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume.
CC.2.3.8.A.1	• Apply the concepts of volume of cylinders, cones, and spheres to solve real-world and mathematical problems.
CC.2.3.HS.A.12	• Explain volume formulas and use them to solve problems.
Mathematical Practices:	
1	• Make sense of problems and persevere in solving them.
2	• Reason abstractly and quantitatively.
4	• Model with mathematics.
5	• Use appropriate tools strategically.
6	• Attend to precision.

KNOW, UNDERSTAND, DO

COURSE: Integrated Math I **TIME FRAME:** 5 weeks

UNIT #4: Two-and-Three Dimensional Geometry **GRADE:** 9

UNDERSTANDINGS	
Calculating volume and surface area are extensions of the area formulas. Volume and surface area have multiple real-life applications.	
COMMON ASSESSMENTS/CULMINATING ACTIVITY	
Unit Test Culminating Application Problems	
KNOW	**DO**
• Identify and label geometric figures. • Classify polygons and polyhedral. • Identify three-dimensional figures. • State the formulas for calculating volume and/or surface area.	• Measure angles with a protractor. • Calculate the volume of a prisms, pyramids, and cylinders. • Use a net to determine the three-dimensional figure it represents. • Calculate the surface area of prisms and cylinders. • Apply surface area and volume formulas to real-life applications.

KNOW, UNDERSTAND, DO

COURSE: Integrated Math I **TIME FRAME:** 8 weeks

UNIT #5: Equations and Inequalities **GRADE:** 9

STANDARDS:	
PA Core Standards:	
CC.2.2.6.B.2	• Understand the process of solving a one-variable equation or inequality and apply it to real-world and mathematical problems.
CC.2.2.7.B.1	• Apply and extend previous understandings of arithmetic to algebraic expressions.
CC.2.2.8.B.3	• Represent and analyze quantitative relationships between dependent and independent variables.
CC.2.1.HS.F.4	• Use units as a way to understand problems and to guide the solution of multi-step problems.
CC.2.2.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.10	• Represent, solve, and interpret equations/inequalities and systems of equations/inequalities algebraically and graphically.
CC.2.2.HS.C.3	• Write functions or sequences that model relationships between two quantities.
Keystone Algebra I Eligible Content:	
A1.1.2.1.1	• Write, solve, and/or apply a line equation (including problem situations).
A1.1.2.1.3	• Interpret solutions to problems in the context of the problem situation. (Linear equations only.)
A1.1.2.2.2	• Interpret solutions to problems in the context of the problem situation. (Limit systems to two linear equations.)

KNOW, UNDERSTAND, DO

COURSE: Integrated Math I **TIME FRAME:** 8 weeks

UNIT #5: Equations and Inequalities **GRADE:** 9

STANDARDS:	
Keystone Algebra I Eligible Content:	
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 (Linear inequalities).
Mathematical Practices:	
1	• Make sense of problems and persevere in solving them.
2	• Reason abstractly and quantitatively.
3	• Construct viable arguments and critique the reasoning of others.
4	• Model with mathematics.
7	• Look for and make use of structure.
8	• Look for and express regularity in repeated reasoning.

KNOW, UNDERSTAND, DO

COURSE: Integrated Math I **TIME FRAME:** 8 weeks

UNIT #5: Equations and Inequalities **GRADE:** 9

UNDERSTANDINGS

The rules for solving more basic algebraic equations can be extended to solve more complex equations.
Solving for a variable has many real-life applications.
Solving equations forms the algebraic foundation needed for more complex math, and proficiency in these complex skills can lead to expanded career opportunities.

COMMON ASSESSMENTS/CULMINATING ACTIVITY

Unit Exam
Culminating Application Problems

KNOW

- Define equation and solution of an equation.
- State the order for inverse operations and identify the inverse of each operation.
- Define and identify like terms.
- Define the process of substitution.
- Recall (or locate) a formula based on the given situation.
- Define open sentence.
- Define inequality and solution of an inequality.

DO

- Determine whether a given number is a solution of the given equation.
- Solve a one-step equation using inverse operations.
- Solve a two-step equation using inverse operations.
- Combine like terms.
- Rewrite more complex equations to make them fit the one-step or two-step equation model. Solve the rewritten equation.
- Use formulas, substitution, and the equation solving process to solve algebraic application problems.
- Graph an open sentence on a number line.
- Determine whether a given number is a solution of the given inequality.
- Use the equation solving process to solve an inequality and change the sign of the inequality when solving the inequality requires multiplying or dividing by a negative number.

KNOW, UNDERSTAND, DO

COURSE: Integrated Math I **TIME FRAME:** 6 weeks

UNIT #6: Functions and Graphs **GRADE:** 9

STANDARDS:	
PA Core Standards:	
CC.2.2.6.B.3	• Represent and analyze quantitative relationships between dependent and independent variables.
CC.2.2.7.B.3	• Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.
CC.2.2.8.B.2	• Understand the connections between proportional relationships, lines, and linear equations.
CC.2.4.HS.B.2	• Summarize, represent, and interpret data on two categorical and quantitative variables.
CC.2.2.HS.C.2	• Graph and analyze functions and use their properties to make connections between the different representations.
Keystone Algebra I 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 whether a relation is a function, given a set of points or a graph.
A1.2.1..3	• Identify the domain or range of a relation (may be represents 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).

KNOW, UNDERSTAND, DO

COURSE: Integrated Math I **TIME FRAME:** 6 weeks

UNIT #6: Functions and Graphs **GRADE:** 9

Mathematical Practices:	
2	• Reason abstractly and quantitatively.
4	• Model with mathematics.
5	• Look for and make use of structure.

KNOW, UNDERSTAND, DO

COURSE: Integrated Math I **TIME FRAME:** 6 weeks

UNIT #6: Functions and Graphs **GRADE:** 9

UNDERSTANDINGS

The graph of a linear equation is a line that can be drawn on the coordinate plane. This graph is based on various forms of given information; however, the slope and y-intercept are integral pieces of information that are either given or calculated from the given information.

The equations of horizontal and vertical lines are linear.

Linear equations have an infinite number of solutions.

COMMON ASSESSMENTS/CULMINATING ACTIVITY

Unit Test

Project: Compare two similar pricing plans using the graphs of the functions, analyze the result, and make a recommendation for purchase.

KNOW

- Define x-coordinate, y-coordinate, ordered pair, and coordinate plane.
- Define relation and function.
- Define solution of an equation in two variables.
- Recall the structure of the equations of horizontal and vertical lines.
- Identify and define x-intercept and y-intercept.
- State formula for calculating the slope of a line.
- Recall slope-intercept form and recognize the slope and y-intercept in the equation.
- Identify the slope and y-intercept on the graph of the equation.
- Recall the Pythagorean Theorem.
- State the distance formula.

DO

- Identify and graph points on a coordinate plane.
- Identify relations and functions.
- Find solutions of a linear equation, and use them to graph the equation.
- Relate the solution of an equation in two variables to a solution of an equation in one variable.
- Graph horizontal and vertical lines based on the given equation.
- Calculate the x-intercept and y-intercept of an equation, and use them to graph the equation.
- Calculate the slope of a line.
- Use-slope-intercept form to graph the equation of a line.
- Write an equation in slope-intercept form given slope and y-intercept, or given the graph of the line.
- Use the Pythagorean Theorem to develop the distance formula.
- Calculate the distance between two points.
- Determine whether an ordered pair is a solution of the equation.

KNOW, UNDERSTAND, DO

COURSE: Integrated Math I **TIME FRAME:** 2 weeks

UNIT #7: Relationships in Geometry **GRADE:** 9

STANDARDS:	
PA Core Standards:	
CC.2.3.A.1	• Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume.
Mathematical Practices:	
1	• Make sense of problems and persevere in solving them.
2	• Reason abstractly and quantitatively.
7	• Look for and make use of structure.
8	• Look for and express regularity in repeated reasoning.

KNOW, UNDERSTAND, DO

COURSE: Integrated Math I **TIME FRAME:** 2 weeks

UNIT #7: Relationships in Geometry **GRADE:** 9

UNDERSTANDINGS	
Two parallel lines intersected by a transversal create several angle relationships. When given some of the angles measures, these known relationships can be used to calculate the value of the remaining angles.	
COMMON ASSESSMENTS/CULMINATING ACTIVITY	
Stained Glass Window Project: Use constructions to create a stained glass window design. Unit Test	
KNOW	**DO**
• Define and identify complementary angles, supplementary angles, vertical angles, corresponding angles, and alternate interior angles. • Recall procedure for constructions. • Recall the formula for the number of angles in a polygon.	• Calculate the measure of an unknown angle based on given information: complementary angles, supplementary angles, vertical angles, corresponding angles, alternate interior angles. • Construct angle bisectors and perpendicular bisectors. • Determine the number of angles in a polygon.

KNOW, UNDERSTAND, DO

COURSE: Integrated Math I **TIME FRAME:** 2 Weeks

UNIT #8: Introduction to Polynomials **GRADE:** 9

STANDARDS:	
PA Core Standards:	
CC.2.2.HS.D.3	• Extend the Knowledge of arithmetic operations and apply to polynomials.
Mathematical Practices:	
7	• Look for and make sense of structure.
8	• Look for and express regularity in repeated reasoning.

KNOW, UNDERSTAND, DO

COURSE: Integrated Math I **TIME FRAME:** 2 weeks

UNIT #8: Polynomials **GRADE:** 9

UNDERSTANDINGS	
The properties and procedures learned for adding, subtracting, multiplying, and dividing real numbers and monomials apply to adding, subtracting, multiplying, and dividing polynomials.	
COMMON ASSESSMENTS/CULMINATING ACTIVITY	
Unit Test	
KNOW	**DO**
• Recall real number properties, procedure for finding a common denominator, laws of exponents, and rules for combining like terms.	• Apply real number and monomial properties and procedures to add, subtract, multiply, and divide monomials.

Adaptations/Modifications for Students with I.E.P.s

Adaptations or modifications to this planned course will allow exceptional students to earn credits toward graduation or develop skills necessary to make a transition from the school environment to community life and employment. The I.E.P. team has determined that modifications to this planned course will meet the student's I.E.P. needs.

Adaptations/Modifications may include but are not limited to:

INSTRUCTION CONTENT

- Modification of instructional content and/or instructional approaches
- Modification or deletion of some of the essential elements

SETTING

- Preferential seating

METHODS

- Additional clarification of content
- Occasional need for one to one instruction
- Minor adjustments or pacing according to the student's rate of mastery
- Written work is difficult, use verbal/oral approaches
- Modifications of assignments/testing
- Reasonable extensions of time for task/project completion
- Assignment sheet/notebook
- Modified/adjusted mastery rates
- Modified/adjusted grading criteria
- Retesting opportunities

MATERIALS

- Supplemental texts and materials
- Large print materials for visually impaired students
- Outlines and/or study sheets
- Carbonless notebook paper
- Manipulative learning materials
- Alternatives to writing (tape recorder/calculator)