CARLISLE AREA SCHOOL DISTRICT

Carlisle, PA 17013

MATH

GRADE 7

Date of Board Approval: March 1, 2018

CARLISLE AREA SCHOOL DISTRICT

PLANNED INSTRUCTION COVER PAGE

TITLE OF COURSE:	Math Course 2	**SUBJECT:**	Math	**GRADE LEVEL:**	7
COURSE LENGTH:	Year	**DURATION:**	50 min	**FREQUENCY:**	Daily
PREREQUISITES:	Math – Grade 6	**CREDIT:**	NA	**LEVEL:**	NA

Course Description/Objectives: The mathematics curriculum is correlated to the common core standards. These standards have identified the main ideas as proportional relationships, operations with rational numbers, algebra, geometry and probability. This curriculum uses a sequence of topics that helps students build solid conceptual understanding in the identified areas through an emphasis on problem solving.

Text: Math in Focus - Singapore Math Houghton Mifflin Harcourt 2013

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COURSE TIME LINE

Unit 1: Integers 20 days

- Ordering integers
- Adding integers
- Subtracting integers
- Multiplying and dividing integers
- Order of operations with integers

Unit 2: Real Numbers 25 days

- Ordering rational numbers
- Writing rational numbers as decimals
- Adding and subtracting fractions
- Adding and subtracting decimals
- Multiplying and dividing fractions
- Multiplying and dividing decimals
- Operations with fractions
- Operations with decimals

Unit 3: Expressions 20 days

- Combining like terms
- Distributive property
- Factoring algebraic expressions
- Real world problems

Unit 4: Equations and Inequalities 18 days

- One-step and two-step equations with rational numbers
- Multi-step equations
- Real world problems
- Solving algebraic inequalities
- Real world problems with inequalities

Unit 5: Ratios and Proportional Relationships 20 days

- Direct proportion
- Direct proportion graphically
- Solving direct proportion problems
- Proportional relationships involving ratio and percent problems, discounts and sales tax
- Scale drawings and similar figures including indirect measurement

Unit 6: Geometry 20 days

- Angles and lines
- Complementary, supplementary and adjacent angles
- Angles that share vertex
- Alternate interior, alternate exterior and corresponding angles
- Interior and exterior angles
- Classifying triangles
- Triangle inequality theorem

Unit 7: Area and Volume of Figures 20 days

- Area and circumference of circles
- Area of compound figures
- Recognizing cylinder, cone, sphere, prism and pyramids
- Slicing three-dimensional figures
- Volume and surface area of prisms

Unit 8: Statistics 18 days

- Interpreting quartiles and interquartile range
- Stem and leaf plots
- Box plots and mean absolute deviation
- Random sampling methods
- Making inferences about population

Unit 9: Probability 18 days

- Defining outcomes, events and sample spaces
- Finding probability of events
- Approximating probability and relative frequency
- Developing probability models

KNOW, UNDERSTAND, DO

COURSE:	Math Course 2	**TIME FRAME:**	20 days
UNIT #1:	Integers	**GRADE:**	7

STANDARDS:

PA Common Core, Mathematics Grade 7:

CC.2.1.7.E.1 Apply and extend previous understandings of operations with fractions to operations with rational numbers.

Assessment Anchor/Eligible Content:

M07.A-N.1 Apply and extend previous understandings of operations to add, subtract, multiply, and divide rational numbers.

M07.A-N.1.1.1 Apply properties of operations to add and subtract rational numbers, including real-world contexts.

M07.A-N.1.1.2 Represent addition and subtraction on a horizontal or vertical number line.

Standards of 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.

6 Attend to precision.

7 Look for and make use of structure.

8 Look for and express regularity in repeated reasoning.

KNOW, UNDERSTAND, DO

COURSE:	Math Course 2	**TIME FRAME:**	20 days
UNIT #1:	Integers	**GRADE:**	7

UNDERSTANDINGS

Negative numbers are used in the real world to represent quantities less than zero, therefore, it is necessary to know how to add, subtract, multiply and divide negative numbers.

COMMON ASSESSMENTS/CULMINATING ACTIVITY

KNOW

- Context that requires a negative number (temperature, debt, etc.)
- Subtraction is adding the opposite number.
- The absolute value of a number is its distance from zero.
- The absolute value of a number is non-negative.

DO

- Place integers in order looking for and making use of structure.
- Compare, add, subtract, multiply and divide integers, attending to precision with each operation.
- Use reasoning to distinguish between the procedures for addition, subtraction, multiplication and division.
- Simplify expressions using the order of operations noticing and expressing the regularity in the repeated reasoning.
- Persevere in solving application problems involving integers.
- Model real-world situations with integers.

KNOW, UNDERSTAND, DO

COURSE:	Math Course 2	**TIME FRAME:**	25 days
UNIT #2:	Real Numbers	**GRADE:**	7

STANDARDS:

PA Common Core, Mathematics Grade 7:

CC.2.1.7.E.1	Apply and extend previous understandings of operations with fractions to operations with rational numbers.
CC.2.2.7.B.1	Apply properties of operations to generate equivalent expressions.

Assessment Anchor/Eligible Content:

M07.A-N.1	Apply and extend previous understandings of operations to add, subtract, multiply, and divide rational numbers.
M07.A-N.1.1.1	Apply properties of operations to add and subtract rational numbers, including real-world contexts.
M07.A-N.1.1.2	Represent addition and subtraction on a horizontal or vertical number line.
M07.A.N.1.1.3	Apply properties of operations to multiply and divide rational numbers, including real-world contexts; demonstrate that the decimal form of a rational number terminates or eventually repeats.
M07.B-E.2.1.1	Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate.

Standards of Mathematical Practices:

2 Reason abstractly and quantitatively.

4 Model with mathematics.

5 Use appropriate tools strategically.

6 Attend to precision.

8 Look for and express regularity in repeated reasoning.

KNOW, UNDERSTAND, DO

COURSE:	Math Course 2	**TIME FRAME:**	25 days
UNIT #2:	Real Numbers	**GRADE:**	7

UNDERSTANDINGS

Rational numbers are used to measure, estimate and represent quantities in everyday life and therefore, it is important to know how to add, subtract, multiply and divide them.

COMMON ASSESSMENTS/CULMINATING ACTIVITY

KNOW

- Rational numbers are represented as points on an infinite number line.
- Rational numbers can be written in equivalent forms; decimals and fractions.
- The calculator is a tool that can be used strategically to perform operations with rational numbers.

DO

- Order rational numbers on a number line using quantitative reasoning.
- Attend to precision when converting rational numbers from decimals to fractions and fractions to decimals.
- Add, subtract, multiply and divide rational numbers written as fractions or decimals and express regularity in repeated reasoning.
- Use a calculator to perform operations with rational numbers.
- Persevere in solving real-world problems involving rational numbers.
- Model real-world situations using rational numbers.

KNOW, UNDERSTAND, DO

COURSE:	Math Course 2	**TIME FRAME:**	20 days
UNIT #3:	Expressions	**GRADE:**	7

STANDARDS:

PA Common Core, Mathematics Grade 7:

CC.2.2.7.B.1	• Apply properties of operations to generate equivalent expressions.
CC.2.2.7.B.3	• Model and solve real-world and mathematical problems by using and connecting numerical, algebraic and/or graphical representations.

Assessment Anchor/Eligible Content:

M07.B-E.1.1	• Represent expressions in equivalent forms.
M07.B-E.1.1.1	• Apply properties of operations to add, subtract, factor, and expand linear expressions with rational coefficients.
M07.B-E.2.3	• Solve real-world and mathematical problems using numerical and algebraic expressions, equations and inequalities.
M07.B-E.2.3.1	• Determine the reasonableness of answers or interpret the solutions in the context of the problem.

Standards of 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.
8 Look for and express regularity in reasoning.

KNOW, UNDERSTAND, DO

COURSE:	Math Course 2	**TIME FRAME:**	20 days
UNIT #3:	Expressions	**GRADE:**	7

UNDERSTANDINGS

Expressions contain numbers, variables, and operations and can be written in equivalent forms through simplifying, expanding or factoring.

COMMON ASSESSMENTS/CULMINATING ACTIVITY

KNOW

- Define the distributive property.
- Like terms contain the same variables raised to the same exponents.
- Like terms can be combined by adding or subtracting their coefficients.
- Use variables to represent unknown values.

DO

- Attend to precision when simplifying an algebraic expression.
- Attend to precision when expanding an algebraic expression.
- Factor an algebraic expression looking for and expressing regularity in reasoning.
- Model with mathematics by translating a verbal phrase into an algebraic expression.
- Make sense of real-world problems involving algebraic expressions using reasoning and persevere in solving the problem.

KNOW, UNDERSTAND, DO

COURSE:	Math Course 2	**TIME FRAME:**	18 days
UNIT #4:	Equations and Inequalities	**GRADE:**	7

STANDARDS:

PA Common Core - Mathematics Grade 7:

CC.2.2.7.B.1	• Apply properties of operations to generate equivalent expressions.
CC.2.2.7.B.3	• Model and solve real-world and mathematical problems by using and connecting numerical, algebraic and/or graphical representations.

Assessment Anchor/Eligible Content:

M07.B-E.1	• Represent expressions in equivalent forms.
M07.B-E.1.1.1	• Apply properties of operations to add, subtract, factor, and expand linear expressions with rational coefficients.
M07.B-E.2	• Solve real-world and mathematical problems using numerical and algebraic expressions.
M07.B-E.2.2.1	• Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p,q and r are specific rational numbers.
M07.B-E.2.2.2	• Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, r are specific rational numbers, and graph the solution set of the inequality.
M.07.B-E.2.3.1	• Determine the reasonableness of answer(s) or interpret the solution(s) in the context of the problem.

Standards of Mathematical Practice:

1 Make sense of problems and persevere in solving them.
2 Reason abstractly and quantitatively.
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:	Math Course 2	**TIME FRAME:**	18 days
UNIT #4:	Equations and Inequalities	**GRADE:**	7

UNDERSTANDINGS

Real-world and mathematical situations can be modeled by algebraic equations and inequalities using variables for unknown quantities, therefore, the ability to solve equations and inequalities is necessary in order to find the unknown quantity.

COMMON ASSESSMENTS/CULMINATING ACTIVITY

KNOW

- Variables are used to represent unknown values.
- Addition and subtraction are inverse operations.
- Multiplication and division are inverse operations.

DO

- Solve multi-step equations with variables on one side using inverse operations.
- Solve multi-step inequalities with variables on one side using inverse operations.
- Graph solutions to inequalities.
- Model and solve real-world situations with algebraic equations.
- Model and solve real-world situations with inequalities.
- Use quantitative reasoning to check if the solution to an equation or inequality makes sense for the situation.
- Make sense of real-world problems involving algebraic equations and inequalities and persevere in solving them.

KNOW, UNDERSTAND, DO

COURSE:	Math Course 2	**TIME FRAME:**	20 days
UNIT #5:	Ratios and Proportional Relationships	**GRADE:**	7

STANDARDS:

PA Common Core, Mathematics Grade 7:

CC.2.1.7.D.1	• Analyze proportional relationships and use them to model and solve real-world and mathematical problems.
CC.2.3.7.A.2	• Visualize and represent geometric figures and describe the relationships between them.

Assessment Anchor/Eligible Content:

M07.A-R.1	• Demonstrate an understanding of proportional relationships.
M07.A-R.1.1.1	• Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units.
M07.A-R.1.1.2	• Determine whether two quantities are proportionally related.
M07.A-R.1.1.3	• Identify the constant of proportionality in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
M07.A-R.1.1.4	• Represent proportional relationships by equations.
M07.A-R.1.1.5	• Explain what a point (x,y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0,0) and (1,r) where r is the unit rate.
M07.A-R.1.1.6	• Use proportional relationships to solve multi-step ratio and percent problems.
M07.C-G.1.1.1	• Solve problems involving scale drawings of geometric figures, including finding lengths and area.

Standards of Mathematical Practice:

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.
5. Use appropriate tools strategically.
6. Attend to precision.

KNOW, UNDERSTAND, DO

COURSE:	Math Course 2	**TIME FRAME:**	20 days
UNIT #5:	Ratios and Proportional Relationships	**GRADE:**	7

UNDERSTANDINGS

Real-world situations can be modeled using a proportion, so recognizing when quantities are proportional is important.

COMMON ASSESSMENTS/CULMINATING ACTIVITY

KNOW

- A proportion is comprised of two equivalent ratios.
- If two ratios are equivalent, then their cross products are equal.
- The constant of proportionality can be a unit rate.
- The graphical representation of a direct proportion is linear and passes through the origin.

DO

- Recognize when two quantities are directly proportional and construct viable arguments to defend the proportionality.
- Find the constant of proportionality of a direct proportion from multiple representations (table, graph, equation) attending to precision.
- Reason abstractly and quantitatively to solve a variety of proportion problems.
- Write a direct proportion equation to model a real-world situation.
- Use a graph as a tool to interpret a direct proportion.
- Use a table, graph or equation to identify a directly proportionate relationship.

KNOW, UNDERSTAND, DO

COURSE:	Math Course 2	**TIME FRAME:**	20 days
UNIT #6:	Geometry	**GRADE:**	7

STANDARDS:

PA Common Core, Mathematics Grade 7:

CC.2.3.7.A.1	• Solve real-world and mathematical problems involving angle measure, area, surface area, circumference and volume.
CC.2.3.7.A.2	• Visualize and represent geometric figures and describe relationships between them.

Assessment Anchor/Eligible Content:

M07.C-G.1	• Demonstrate an understanding of geometric figures and their properties.
M07.C-G.1.1.2	• Identify or describe the properties of all types of triangles based on angle and side measure.
M07.C-G.1.1.3	• Use and apply the triangle inequality theorem.
M07.C-G.2	• Solve real-world and mathematical problems involving angle measure, circumference, area, surface area and volume.
M07.C-G.2.1.1	• Identify and use properties of supplementary, complementary, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.
M07.C-G.2.1.2	• Identify and use properties of angles formed when two parallel lines are cut by a transversal.

Standards of 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.
5 Use appropriate tools strategically.
6 Attend to precision.
8 Look for and express regularity in reasoning.

KNOW, UNDERSTAND, DO

COURSE:	Math Course 2	**TIME FRAME:**	20 days
UNIT #6:	Geometry	**GRADE:**	7

UNDERSTANDINGS

Angles formed on a straight line, or when parallel lines are cut by a transversal, have special properties that are useful in solving real-world problems, especially in fields such as geometry, art, architecture, construction, and engineering for example.

COMMON ASSESSMENTS/CULMINATING ACTIVITY

KNOW

- Corresponding angles, alternate interior angles, and alternate exterior angles are formed when parallel lines are cut by a transversal.
- Corresponding angles are congruent.
- Alternate interior angles are congruent.
- Alternate exterior angles are congruent.
- Vertical angles are congruent.
- Complementary angles add to 90 degrees.
- Supplementary angles add to 180 degrees.
- Adjacent angles share a vertex and one side but have no common interior points.
- The triangle inequality theorem

DO

- Classify angles using a protractor with precision, to verify the classification.
- Use complementary and supplementary angles to solve problems.
- Use vertical angles to solve problems.
- Use alternate interior, alternate exterior, and corresponding angles to persevere in solving problems.
- Construct viable arguments for the value of a missing angle measure in drawings that model real world problems.
- Classify triangles as right, isosceles or equilateral.
- Use and apply the triangle inequality theorem.

KNOW, UNDERSTAND, DO

COURSE:	Math Course 2	**TIME FRAME:**	20 days
UNIT #7:	Area and Volume of Figures	**GRADE:**	7

PA Common Core, Mathematics Grade 7:

CC.2.3.7.A.1	• Solve real-world and mathematical problems involving angle measure, area, surface area, circumference and volume.
CC.2.3.7.A.2	• Visualize and represent geometric figures and describe relationships between them.

Assessment Anchor/Eligible content:

M07.C-G.2	• Solve real-world and mathematical problems involving angle measure, circumference, area, surface area and volume.
M07.C-G.2.2.1	• Find the area and circumference of a circle. Solve problems involving area and circumference of a circle(s).
M07.C-G.2.2.2	• Solve real-world and mathematical problems involving area, volume, and surface area of two and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

Standards of Mathematical Practice:

1 Make sense of problems and persevere in solving them.
3 Construct viable arguments and critique the reasoning of others.
4 Model with mathematics.
6 Attend to precision.
7 Look for and make use of structure.
8 Look for and express regularity in repeated reasoning.

KNOW, UNDERSTAND, DO

COURSE:	Math Course 2	**TIME FRAME:**	20 days
UNIT #7:	Area and Volume of Figures	**GRADE:**	7

UNDERSTANDINGS

Geometric figures exist in the real-world, therefore finding the area, surface area and volume of geometric figures is useful in solving real-world and mathematical problems.

COMMON ASSESSMENTS/CULMINATING ACTIVITY

KNOW

- The cross-sections that result from slicing a three-dimensional figure.
- Area is the space enclosed in a polygon.
- Circumference of a circle is the distance around the circle, just as perimeter is the distance around a polygon.
- Area of a compound figure is the sum of the areas of its compound parts.
- Three-dimensional figures including pyramids, cylinders, cones, spheres, and prisms.
- Volume represents the space enclosed in a three-dimensional figure.
- Surface area represents the sum of the areas of the faces and curved surfaces of a three-dimensional figure.
- Volume and surface area formulas for prisms

DO

- Use the formulas for the area and circumference of a circle to solve problems, attending to precision when using π in these formulas.
- Distinguish when to use area versus when to use volume.
- Use repeated reasoning to discuss the volume formulas for prisms (Bh – area of the base times the height) and how they compare.
- Decompose compound figures into rectangles and triangles.
- Find the area of compound figures in multiple ways and debate whether there is a "best" method for finding the area of given compound figures.
- Solve real-world problems involving area, volume, and surface area of two and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

KNOW, UNDERSTAND, DO

COURSE:	Math Course 2	**TIME FRAME:**	18 days
UNIT #8:	Statistics	**GRADE:**	7

STANDARDS:

PA Common Core, Mathematics Grade 7:

CC.2.4.7.B.1	• Draw inferences about populations based on random sampling concepts.
CC.2.4.7.B.2	• Draw informal comparative inferences about two populations.

Assessment Anchor/Eligible Content:

M07.D-S.1	• Use random sampling to draw inferences about a population.
M07.D-S.1.1.1	• Determine whether a sample is a random sample given a real-world situation.
M07.D-S.1.1.2	• Use data from a random sample to draw inferences about a population with an unknown characteristic of interest.
M07.D-S.2	• Draw comparative inferences about populations.
M07.D-S.2.1.1	• Compare two numerical data distributions using measures of center and variability.

Standards of 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.
5 Use appropriate tools strategically.
8 Look for and express regularity in repeated reasoning.

KNOW, UNDERSTAND, DO

COURSE:	Math Course 2	**TIME FRAME:**	18 days
UNIT #8:	Statistics	**GRADE:**	7

UNDERSTANDINGS

Statistics can be used to make valid inferences and draw conclusions about populations.

COMMON ASSESSMENTS/CULMINATING ACTIVITY

KNOW

- Measures of central tendencies (averages) of data – mean, median, mode
- Variation of data – range, interquartile range, mean absolute deviation
- The difference between biased and unbiased sampling methods.

DO

- Use data to construct viable arguments and draw conclusions about populations.
- Find the range of data.
- Find the inter-quartile range and quartiles of data.
- Compare populations based on statistics.
- Represent data as a stem and leaf plot.
- Calculate mean absolute deviation.
- Discriminate between measures of central tendencies and variation.
- Create and interpret box-plots.

KNOW, UNDERSTAND, DO

COURSE:	Math Course 2	**TIME FRAME:**	18 days
UNIT #9:	Probability	**GRADE:**	7

STANDARDS:

PA Common Core, Mathematics Grade 7:

CC.2.4.7.B.3 • Investigate chance processes and develop, use, and evaluate probability models.

Assessment Anchor/Eligible Content:

M07.D-S.3 • Investigate chance processes and develop, use, and evaluate probability models.

M07.D-S.3.1.1 • Predict or determine whether some outcomes are certain, more likely, less likely, equally likely, or impossible.

Standards of 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 reasoning.

KNOW, UNDERSTAND, DO

COURSE:	Math Course 2	**TIME FRAME:**	18 days
UNIT #9:	Probability	**GRADE:**	7

UNDERSTANDINGS

Probability is a way to describe how likely an event is to occur.

COMMON ASSESSMENTS/CULMINATING ACTIVITY

KNOW

- Outcomes and favorable outcomes
- Sample space
- Event
- Experimental probability
- Relative frequency
- Theoretical probability
- Probability model
- The complement is the probability of an event NOT occurring.
- The probability of an event and its complement have a sum of one.

DO

- Calculate the probability of an event.
- Interpret relative frequencies as probabilities to make predictions.
- Model an experiment through flipping coins, rolling dice, spinning a spinner, etc., and then calculate the experimental probability.
- Compare experimental and theoretical probabilities and justify the theoretical probabilities accuracy.
- Create probability models and use these models to find the probability of events.
- Find the probability of a complementary event.

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)