Curriculum Map: Common Core Math 7

Course: CORE MATH 7 Subtopic: General

Grade(s): 7

Course Description:	Students in Common Core Math 7 formalize and extend the math they learned in the elementary and sixth grades. Common Core Math 7 is aligned to Pennsylvania Common Core Math Standards. Units of study focus primarily on Ratios and Proportional Relationships, The Number System, Expressions and Equations, Geometry, and Statistics and Probability. Students learn the essential skills for success in today's world: such as critical thinking, problem solving, communication and collaboration.
Course Textbooks, Workbooks, Materials Citations:	Bailey. Glencoe Mathematics: Applications and Concepts: Course 2. New York: Glencoe/McGraw - Hill, 2004. Print.
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Unit: Unit 1: Standards for Mathematical Practice

Unit/Module Description:	The Standards for Mathematical Practice describe varieties of expertise that mathematics educators at all levels should seek to develop in their students. These practices rest on important "processes and proficiencies" with longstanding importance in mathematics education. The first of these are the NCTM process standards of problem solving, reasoning and proof, communication, representation, and connections. The second are the strands of mathematical proficiency specified in the National Research Council's report Adding It Up: adaptive reasoning, strategic competence, conceptual understanding (comprehension of mathematical concepts, operations and relations), procedural fluency (skill in carrying out procedures flexibly, accurately, efficiently and appropriately), and productive disposition (habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy).
Unit/Module Big Ideas:	1. Mathematically proficient students at all levels are able to meet success in mathematics.
Unit/Module Essential Questions:	1. How do we make sense of problems? 2. How do we persevere in solving problems? 3. How do we reason abstractly? 4. How do we reason quantitatively? 5. How do we construct viable arguments? 6. How do we critique the reasoning of others? 7. How do we model with mathematics? 8. How do we use appropriate tools strategically? 9. How do we attend to precision? 10. How do we look for and make use of structure? 11. How do we look for and express regularity in repeated reasoning?
Unit/Module Student Learning Outcomes:	1. Explain the meaning of a problem. 2. Look for entry points to the solution of a problem. 3. Analyze givens, constraints, relationships, and goals of a problem. 4. Make conjectures about the form and meaning of a solution. 5. Plan a solution pathway rather than simply jumping into a solution attempt. 6. Monitor and evaluate progress in problem solving and change course if necessary. 7. Explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. 8. Check answers to problems using a different method, and determine if it makes sense. 9. Understand the approaches of others to solving complex problems and identify correspondences between different approaches. 10. Make sense of quantities and their relationships in problem situations. 11. Decontextualize problems. (abstract a given situation and represent it symbolically and manipulate the representing symbols.)

12. Contextualize problems. (pause as needed during the manipulation process in order to probe into the referents for the symbols involved.)
13. Create a coherent representation of the problem at hand.
14. Consider the units involved in solving a problem.
15. Attend to the meaning of quantities.
16. Know and be flexible in using different properties of operations and objects.
17. Understand and use stated assumptions, definitions, and previously established results in constructing arguments.
18. Make conjectures and build a logical progression of statements to explore the truth of their conjectures.
19. Analyze situations by breaking them into cases, and can recognize and use counterexamples.
20. Justify conclusions.
21. Communicate conclusions and respond to the arguments about them.
22. Reason inductively and make arguments about data.
23. Compare the effectiveness of two plausible arguments.
24. Distinguish correct logic or reasoning form that which is flawed.
25. Listen or read the arguments of others.
26. Decide whether arguments of others make sense.
27. Ask useful questions to clarify or improve the arguments.
28. Apply known mathematics to solve problems arising in everyday life, society, and the workplace.
29. Make assumptions and approximations to simplify a complicated situation.
30. Apply knowledge of mathematics to solve problems.
31. Identify important quantities in a practical situation.
32. Map relationships using diagrams, two-way tables, graphs, flowcharts and formulas.
33. Analyze relationships mathematically to draw conclusions.
34. Interpret mathematical results in the context of the situation.
35. Reflect on whether results make sense.
36. Consider the available tools when solving a mathematical problem.
37. Become sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful.
38. Recognize both the insight to be gained and their limitations.
39. Identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems.
40. Use technological tools to explore and deepen their understanding of concepts.
41. Communicate precisely to others.
42. Use clear definitions in discussion with others and in their own reasoning.
43. State the meaning of the symbols chosen, including using the equal sign consistently and appropriately.
44. Specify units of measures.
45. Label axes to clarify the correspondence with quantities in a problem.
46. Calculate accurately and efficiently.
47. Express numerical answers with a degree of precision appropriate for the problem context.
48. Look closely to discern a pattern or structure.
49. Recognize the significance of an existing line in a geometric figure.
50. Use the strategy of drawing an auxiliary line for solving problems.
51.Notice if calculations are repeated.
52. Look for general methods and for shortcuts.
53. Maintain oversight of the process as they work to solve a problem while attending to the details.
54. Evaluate the reasonableness of their intermediate results.

Unit/Module Notes: Taken from Common Core State Standards for Mathematics by the Common Core State Standards Initiative.

Lesson Topic: Core Lesson 1: Make sense of problems and persevere in solving them.

Core Lesson/Topic Description: Mathematically proficient students start by explaining to themselves the meaning of a problem and looking for entry points to its solution. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than simply jumping into a solution attempt. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They monitor and evaluate their progress and change course if necessary. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draws diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can understand the approaches of others to solving complex problems and identify correspondences between different approaches.

Core Lesson/Topic Big Ideas:	1. Mathematically proficient students at all levels are able to meet success in mathematics.
Core Lesson/Topic Essential Questions:	1. How do we make sense of problems? 2. How do we persevere in solving them?
Core Lesson/Topic Student Learning Outcomes:	1. Explain the meaning of a problem. 2. Look for entry points to the solution of a problem. 3. Analyze givens, constraints, relationships, and goals of a problem. 4. Make conjectures about the form and meaning of a solution. 5. Plan a solution pathway rather than simply jumping into a solution attempt. 6. Monitor and evaluate progress in problem solving and change course if necessary. 7. Explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. 8. Check answers to problems using a different method, and determine if it makes sense. 9. Understand the approaches of others to solving complex problems and identify correspondences between different approaches.

Lesson Topic: Core Lesson 2: Reason abstractly and quantitatively.

Core Lesson/Topic Description:	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize- to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents- and the ability to contextualize, to pause as needed during the manipulation process in order to probe into the referents for the symbols involved. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.
Core Lesson/Topic Big Ideas:	1. Mathematically proficient students at all levels are able to meet success in mathematics.
Core Lesson/Topic Essential Questions:	1. How do we reason abstractly? 2. How do we reason quantitatively?
Core Lesson/Topic Student Learning Outcomes:	1. Make sense of quantities and their relationships in problem situations. 2. Decontextualize problems (abstract a given situation and represent it symbolically and manipulate the representing symbols). 3. Contextualize problems (pause as needed during the manipulation process in order to probe into the referents for the symbols involved). 4. Create a coherent representation of the problem at hand. 5. Consider the units involved in solving a problem. 6. Attend to the meaning of quantities. 7. Knowing and be flexible in using different properties of operations and objects.

Lesson Topic: Core Lesson 3: Construct viable arguments and critique the reasoning of others.

Core Lesson/Topic Description:	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and -if there is a flaw in an argument-explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
Core	

Lesson/Topic Big Ideas:	1. Mathematically proficient students at all levels are able to meet success in mathematics.
Core Lesson/Topic Essential Questions:	1. How do we construct viable arguments? 2. How do we critique the reasoning of others?
Core Lesson/Topic Student Learning Outcomes:	1. Understand and use stated assumptions, definitions, and previously established results in constructing arguments. 2. Make conjectures and build a logical progression of statements to explore the truth of their conjectures. 3. Analyze situations by breaking them into cases, and can recognize and use counterexamples. 4. Justify conclusions. 5. Communicate conclusions and respond to the arguments about them. 6. Reason inductively and make arguments about data. 7. Compare the effectiveness of two plausible arguments. 8. Distinguish correct logic or reasoning from that which is flawed. 9. Listen or read the arguments of others. 10. Decide whether arguments of others make sense. 11. Ask useful questions to clarify or improve the arguments.

Lesson Topic: Core Lesson 4: Model with mathematics.

Core Lesson/Topic Description:	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revisions later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.
Core Lesson/Topic Big Ideas:	1. Mathematically proficient students at all levels are able to meet success in mathematics.
Core Lesson/Topic Essential Questions:	1. How do we model with mathematics?
Core Lesson/Topic Student Learning Outcomes:	1. Apply known mathematics to solve problems arising in everyday life, society, and the workplace. 2. Make assumptions and approximations to simplify a complicated situation. 3. Apply knowledge of mathematics to solve problems. 4. Identify important quantities in a practical situation. 5. Map relationships using diagrams, two-way tables, graphs, flowcharts and formulas. 6. Analyze relationships mathematically to draw conclusions. 7. Interpret mathematical results in the context of the situation. 8. Reflect on whether results make sense.

Lesson Topic: Core Lesson 5: Use appropriate tools strategically.

Core Lesson/Topic Description:	Mathematically proficient students consider the available tools when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to use technological tools to explore and deepen their understanding of concepts.

Core Lesson/Topic Big Ideas:	1. Mathematically proficient students at all levels are able to meet success in mathematics.
Core Lesson/Topic Essential Questions:	1. How do we use appropriate tools strategically?
Core Lesson/Topic Student Learning Outcomes:	1. Consider the available tools when solving a mathematical problem. 2. Become sufficiently familiar with tools appropriate for their grades or course to make sound decisions about when each of these tools might be helpful. 3. Recognize both the insight to be gained and their limitations. 4. Identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. 5. Use technological tools to explore and deepen their understanding of concepts.

Lesson Topic: Core Lesson 6: Attend to precision.

Core Lesson/Topic Description:	Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussions with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measures, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.
Core Lesson/Topic Big Ideas:	1. Mathematically proficient students at all levels are able to meet success in mathematics.
Core Lesson/Topic Essential Questions:	1. How do we attend to precision?
Core Lesson/Topic Student Learning Outcomes:	1. Communicate precisely to others. 2. Use clear definitions in discussion with others and in their own reasoning. 3. State the meaning of the symbols chosen, including using the equal sign consistently and appropriately. 4. Specify units of measures. 5. Label axes to clarify the correspondence with quantities in a problem. 6. Calculate accurately and efficiently. 7. Express numerical answers with a degree of precision appropriate for the problem context.

Lesson Topic: Core Lesson 7: Look for and make use of structure.

Core Lesson/Topic Description:	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shape have. Later, students will see 7 x 8 equals the well remembered 7 x 5 + 7 x 3, in preparation for learning about the distributive property. In the expression x^2 + 9x + 14, older students can see the 14 as 2 x 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can use $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
Core Lesson/Topic Big Ideas:	1. Mathematically proficient students at all levels are able to meet success in mathematics.
Core Lesson/Topic Essential Questions:	1. How do we look for and make use of the structure?

Core Lesson/Topic Student Learning Outcomes:	1. Look closely to discern a pattern or structure. 2. Recognize the significance of an existing line in a geometric figure. 3. Use the strategy of drawing an auxiliary line for solving problems.

Lesson Topic: Core Lesson 8: Look for and express regularity in repeated reasoning.

Core Lesson/Topic Description:	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with 3, middle school students might abstract the equation (y - 2) / (x - 1) = 3. Noticing the regularity in the way terms are cancel when expanding (x - 1)(x + 1), (x - 1) (x^3 + x^2 + x +1) might lead them to the general formula for the sum of geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.
Core Lesson/Topic Big Ideas:	1. Mathematically proficient students at all levels are able to meet success in mathematics.
Core Lesson/Topic Essential Questions:	1. How do we look for and express regularity in repeating reasoning?
Core Lesson/Topic Student Learning Outcomes:	1. Notice if calculations are repeated. 2. Look for general methods and for shortcuts. 3. Maintain oversight of the process as they work to solve a problem while attending to the details. 4. Evaluate the reasonableness of their intermediate results.

Unit: Unit 2: The Number System

Unit/Module Description:	Students apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide.
Unit/Module Big Ideas:	1. Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms. 2. Numerical quantities and calculations can be estimated by using numbers that are close to the actual values, but easier to compute. 3. The set of real numbers has infinite subsets including the sets of whole numbers, integers, rational, and irrational numbers.
Unit/Module Essential Questions:	1. How is computation with rational numbers similar and different to whole number computation?
Unit/Module Key Terminology & Definitions :	1. numerator - top part of a fraction. 2. denominator - bottom part of a fraction. 3. common denominator - a common multiple of the denominators. 4. simplest form - the GCF of the numerator and the denominator is 1. 5. multiplicative inverse/reciprocal - two numbers who product is 1. 6. exponents - tells how many times the base is used as a factor. 7. power - numbers expressed using exponents. 8. base - the common factor 9. squared - to the second power. 10.cubed - to the third power. 11. evaluate - find the value. 12. exponential form - numbers written with exponents. 13. numerical expression - expressions using numbers only. 14. order of operations - rules agreed upon to evaluate expressions. 15. integer - any number from the set. 16. graph - to place a point on the number line at its location. 17. negative integer - integers less than zero. 18. positive integer - integers greater than zero. 19. absolute value - the distance a number is from zero on a number line.

20. coordinate plane - used to locate points.
21. coordinate grid - another name for a coordinate plane.
22. x-axis - the horizontal number line.
23. y-axis - the vertical number line.
24. origin - the point at which the number lines intersect.
25. ordered pair - a pair of numbers such as (5,-2).
26. x-coordinate - the first number, and it corresponds to a number on the x-axis.
27. y-coordinate - the second number, and it corresponds to a number on the y-axis.
28. quadrants - the four sections of the coordinate plane.
29. terminating decimal - is made when the division in a fraction ends.
30. repeating decimal - is made when the division in a fraction has a pattern in the digits that repeats forever.
31. bar notation - used to indicate in a decimal that number(s) repeat forever.
32. ratio - a comparison of two numbers by division.

Unit/Module Student Learning Outcomes:

Concepts:
1. Understand properties of operations.
2. Know that decimals terminate or eventually repeat.

Competencies:
1. Apply properties of operations to add and subtract rational numbers, including real-world contexts.
2. Represent addition and subtraction on a horizontal or vertical number line.
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.
4. Solve real-world and mathematical problems involving the four operations with rational numbers.

STANDARDS

STATE: PA Common Core Anchors and Eligible Content (May 2012)

M07.A-N.1.1.1 (Advanced)	Apply properties of operations to add and subtract rational numbers, including real-world contexts.
M07.A-N.1.1.2 (Advanced)	Represent addition and subtraction on a horizontal or vertical number line.
M07.A-N.1.1.3 (Advanced)	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.

NATIONAL: US Common Core State Standards

MA.7.CFA.2 (Advanced)	Students develop a unified understanding of number, recognizing fractions, decimals (that have a finite or a repeating decimal representation), and percents as different representations of rational numbers.
MA.7.NS.2 (Advanced)	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
MA.7.NS.2.A (Advanced)	Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
MA.7.NS.2.C (Advanced)	Apply properties of operations as strategies to multiply and divide rational numbers.
MA.7.NS.3 (Advanced)	Solve real-world and mathematical problems involving the four operations with rational numbers.

Lesson Topic: Core Lesson 1: Add, Subtract, Multiply, and Divide Fractions

Core Lesson/Topic Description: Students perform addition, subtraction, multiplication, and division of fractions and mixed numbers.

Core Lesson/Topic Big Ideas:
1. The set of real numbers has infinite subsets including the sets of whole numbers, integers, rational, and irrational numbers.
2. Numbers, measures, expressions, equations, and inequalities can represent mathematical

situations and structures in many equivalent forms.

Core Lesson/Topic Essential Questions:	1. How can we add, subtract, multiply, and divide fractions and mixed numbers?
Core Lesson/Topic Key Terminology & Definitions:	1. numerator - top part of a fraction. 2. denominator - bottom part of a fraction. 3. common denominator - a common multiple of the denominators. 4. simplest form - the GCF of the numerator and the denominator is 1. 5. multiplicative inverse/reciprocal - two numbers who product is 1.
Core Lesson/Topic Student Learning Outcomes:	1. Students apply rules of addition of fractions and mixed numbers to numerical and real world problems. 2. Students apply rules of subtraction of fractions and mixed numbers to numerical and real world problems. 3. Students apply rules of multiplication of fractions and mixed numbers to numerical and real world problems. 4. Students apply rules of division of fractions and mixed numbers to numerical and real world problems.

Lesson Topic: Core Lesson 2: Order of Operations

Core Lesson/Topic Description:	Students evaluate powers and expressions using the order of operations.
Core Lesson/Topic Big Ideas:	1. The set of real numbers has infinite subsets including the sets of whole numbers, integers, rational, and irrational numbers.
Core Lesson/Topic Essential Questions:	1. How does a power effect a base? 2. How are the order of operations used to evaluate an expression? 3. How can we write and evaluate an expression from a word problem?
Core Lesson/Topic Key Terminology & Definitions:	1. exponents - tells how many times the base is used as a factor. 2. power - numbers expressed using exponents. 3. base - the common factor 4. squared - to the second power. 5. cubed - to the third power. 6. evaluate - find the value. 7. exponential form - numbers written with exponents. 8. numerical expression - expressions using numbers only. 9. order of operations - rules agreed upon to evaluate expressions.
Core Lesson/Topic Student Learning Outcomes:	1. Use powers and exponents. 2. Evaluate expressions using the order of operations. 3. Write expressions from word problems, then evaluate the problem.

Lesson Topic: Core Lesson 3:Integers and Absolute Value

Core Lesson/Topic Description:	Students classify numbers and real life situations as positive, negative or equal to zero; and recognize the absolute value of a number is its distance from zero.
Core Lesson/Topic Big Ideas:	1. The set of real numbers has infinite subsets including the sets of whole numbers, integers, rational, and irrational numbers.
Core Lesson/Topic Essential Questions:	1. How do we represent an integer from a real life situation? 2. How do we evaluate absolute value?
Core Lesson/Topic Key Terminology &	1. integer - any number from the set. 2. graph - to place a point on the number line at its location. 3. negative integer - integers less than zero. 4. positive integer - integers greater than zero.

Definitions:	5. absolute value - the distance a number is from zero on a number line.
Core Lesson/Topic Student Learning Outcomes:	1. Read and write integers. 2. Find the absoluate value of an integer.

Lesson Topic: Core Lesson 4:The Coordinate Plane

Core Lesson/Topic Description:	Students graph and recognize points on the coordinate plane.
Core Lesson/Topic Big Ideas:	1. The set of real numbers has infinite subsets including the sets of whole numbers, integers, rational, and irrational numbers.
Core Lesson/Topic Essential Questions:	1. How do we use a number lines to graph points on the coordinate plane? 2. How can we name an ordered pair from a graphed point?
Core Lesson/Topic Key Terminology & Definitions:	1. coordinate plane - used to locate points. 2. coordinate grid - another name for a coordinate plane. 3. x-axis - the horizontal number line. 4. y-axis - the vertical number line. 5. origin - the point at which the number lines intersect. 6. ordered pair - a pair of numbers such as (5,-2). 7. x-coordinate - the first number, and it corresponds to a number on the x-axis. 8. y-coordinate - the second number, and it corresponds to a number on the y-axis. 9. quadrants - the four sections of the coordinate plane.
Core Lesson/Topic Student Learning Outcomes:	1. Graph points on the coordinate plane. 2. Name an ordered pair from a graphed point.

Lesson Topic: Core Lesson 5:Fractions, Decimals, and Percents

Core Lesson/Topic Description:	Students convert,compare, and use fractions, decimals, and percent.
Core Lesson/Topic Big Ideas:	1. Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms.
Core Lesson/Topic Essential Questions:	1. How do we change a fraction to a decimal? 2. How do we change a decimal to a fraction? 3. How do we change a percent to a fraction? 4. How do we change a fraction to a percent? 5. How do we change a percent to a decimal? 6. How do we change a decimal to a percent? 7. How do we compare fractions, decimals, and percents? 8. How can we use fractions, decimals, and percents in real life problems?
Core Lesson/Topic Key Terminology & Definitions:	1. terminating decimal - is made when the division in a fraction ends. 2. repeating decimal - is made when the division in a fraction has a pattern in the digits that repeats forever. 3. bar notation - used to indicate in a decimal that number(s) repeat forever. 4. ratio - a comparison of two numbers by division.
Core Lesson/Topic Student Learning Outcomes:	1. Students convert between fractions, decimals, and percents. 2. Students compare and order fractions, decimals, and percents. 3. Students use fractions, decimals, and percents in real life problems.

Unit: Unit 3: Ratios and Proportional Relationships

Unit/Module Description: Students analyze proportional relationships and use them to solve real-world and mathematical problems.

Unit/Module Big Ideas:
1. Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms.
2. Two variable quantities are proportional if their values are in a constant ratio. The relationship between proportional quantities can be represented as a linear function.
3. Relations and functions are mathematical relationships that can be represented and analyzed using words, tables, graphs, and equations.
4. Some questions can be answered by collecting, representing, and analyzing data, and the question to be answered determines the data to be collected, how best to collect it, and how best to represent it.
5. Similarity relationships between objects are a form of proportional relationships.

Unit/Module Essential Questions:
1. How can we use proportionality represented through models of and models for ratio tables, factor-of-change (scale factor), a unit rate, and cross-multiplication to solve real world problems?

Unit/Module Key Terminology & Definitions :
1. Equivalent ratios - two ratios that have the same value.
2. Rate - a ratio that compares two quantities with different kinds of units.
3. Unit rate - when a rate is simplified so that it has a denominator of 1 unit.
4. Proportion -- When 2 ratios are equivalent they form this.
5. Cross Product -- the product of the numerator of one ratio and the denominator of the other ratio.
6. Rate of Change -- is a ratio that shows a change in one quantity with respect to a change in another quantity. How a quantity is changing over time.
7. Rate -- a ratios that compares two quantities with different kinds of units.
8. Unit Rate -- when a rate is simplified so that it has a denominator of 1.
9. Slope -- how steep the line is determined by any two points on the line.
10. Scale Drawings / Scale Model -- represents something that is too large or too small to be drawn at actual size.
11. Scale Factor -- a scale written as a ratio in simplest form.
12. Similar Figures -- figures that have the same shape but not necessarily the same size.
13. Indirect Measurement -- when you can use similar figures to find the length, width or height of objects that are too difficult to measure directly.
14. percent proportion - compares part of a quantity to the whole quantity, called the base, using a percent.
15. percent of change - a ratio that compares the change in a quantity to the original amount.
16. percent of increase - if the original quantity is increased.
17. percent of decrease - if the original quantity is decreased.
18. sales tax - an additional amount of money charged on items that people buy.
19. discount - the amount by which the regular price of an item is reduced.
20. simple interest - the amount paid or earned for the use of money.

Unit/Module Student Learning Outcomes:

Concepts:
1. Analyze, recognize, and represent proportional relationships and use them to solve real-world and mathematical problems.

Competencies:
1. Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units. Example: If a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2 / 1/4 miles per hour, equivalently 2 miles per hour.
2. Determine whether two quantities are proportionally related (e.g., by testing for equivalent ratios in a table, graphing on a coordinate plane and observing whether the graph is a straight line through the origin).
3. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
4. Represent proportional relationships by equations. Example: If total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as $t = pn$.
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.
6. Use proportional relationships to solve multi-step ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease.

STANDARDS

STATE: PA Common Core Anchors and Eligible Content (May 2012)

M07.A-R.1.1.1 (Advanced)	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. Example: If a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2 / 1/4 miles per hour, equivalently 2 miles per hour.
M07.A-R.1.1.2 (Advanced)	Determine whether two quantities are proportionally related (e.g., by testing for equivalent ratios in a table, or graphing on a coordinate plane and observing whether the graph is a straight line through the origin).
M07.A-R.1.1.3 (Advanced)	Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
M07.A-R.1.1.4 (Advanced)	Represent proportional relationships by equations. Example: If total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.
M07.A-R.1.1.5 (Advanced)	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 (Advanced)	Use proportional relationships to solve multi-step ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease.
M07.B-E.2.1.1 (Advanced)	Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate. Example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50 (or 1.1 × $25 = $27.50).

NATIONAL: US Common Core State Standards

MA.7.RP.1 (Advanced)	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.
MA.7.RP.2 (Advanced)	Recognize and represent proportional relationships between quantities.
MA.7.RP.2.A (Advanced)	Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
MA.7.RP.2.B (Advanced)	Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
MA.7.RP.2.C (Advanced)	Represent proportional relationships by equations.
MA.7.RP.2.D (Advanced)	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.
MA.7.RP.3 (Advanced)	Use proportional relationships to solve multistep ratio and percent problems.

Lesson Topic: Core Lesson 1:Ratios and Unit Rate

Core Lesson/Topic Description:	Students write ratios, and learn how to convert ratios into unit rates.
Core Lesson/Topic Big Ideas:	1. Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms.
Core Lesson/Topic Essential Questions:	1. How can we write a ratio comparing two quantities? 2. How can we compare two different units in a rate? 3. How can we convert a rate to a unit rate? 4. How can we use unit rates to compare objects?
Core Lesson/Topic Key Terminology & Definitions:	1. equivalent ratios - two ratios that have the same value. 2. rate - a ratio that compares two quantities with different kinds of units. 3. unit rate - when a rate is simplified so that it has a denominator of 1 unit.

Core Lesson/Topic Student Learning Outcomes:	1. Students write ratios as fractions. 2. Students determine whether two ratios are equivalent. 3. Students determine unit rate. 4. Students compare unit rates.

Lesson Topic: Core Lesson 2:Proportions

Core Lesson/Topic Description:	Students learn to set up and us eproportions to prove equivalency of ratios and to solve for unknown values.
Core Lesson/Topic Big Ideas:	1. Two variable quantities are proportional if their values are in a constant ratio. The relationship between proportional quantities can be represented as a linear function.
Core Lesson/Topic Essential Questions:	1. How do we use cross products to identify a proportion? 2. How can we use cross multiplication and inverse operations to solve for a missing variable? 3. How can we set up and solve a proportion from a real life problem?
Core Lesson/Topic Key Terminology & Definitions:	1. Proportion -- When 2 ratios are equivalent they form this. 2. Cross Product -- the product of the numerator of one ratio and the denominator of the other ratio.
Core Lesson/Topic Student Learning Outcomes:	1. Identify a proportion. 2. Solve a proportion. 3. Set up and solve a proportion from a word problem.

Lesson Topic: Core Lesson 3:Rate of Change

Core Lesson/Topic Description:	Students use data to find the difference between two output values, then divide that by the difference between two input values.
Core Lesson/Topic Big Ideas:	1. Relations and functions are mathematical relationships that can be represented and analyzed using words, tables, graphs, and equations.
Core Lesson/Topic Essential Questions:	1. How can we use the information from tables, graphs, equations, diagrams, and verbal descriptions to find rate of change? 2. How can we organize information into ordered pairs to find rate of change?
Core Lesson/Topic Key Terminology & Definitions:	1. Rate of Change -- is a ratio that shows a change in one quantity with respect to a change in another quantity. How a quantity is changing over time. 2. Rate -- a ratios that compares two quantities with different kinds of units. 3. Unit Rate -- when a rate is simplified so that it has a denominator of 1. 4. Slope -- how steep the line is determined by any two points on the line.
Core Lesson/Topic Student Learning Outcomes:	1. Identify the constant of proportionality in tables, graphs, equations, diagrams, and verbal descriptions to find rate of change.

Lesson Topic: Core Lesson 4:Using Proportional Relationships

Core Lesson/Topic Description:	Students learn to set up and use proportions to prove equivalency of ratios and to solve for unknown values.
Core Lesson/Topic Big Ideas:	1. Two variable quantities are proportional if their values are in a constant ratio. The relationship between proportional quantities can be represented as a linear function. 2. Similarity relationships between objects are a form of proportional relationships. 3. Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms.

Core Lesson/Topic Essential Questions:	1. How can we use proportions to find: information in scale drawings, missing sides in similar figures, determine if figures are similar, simple interest, tax, markups and markdowns, gratuities and commission, fees, percent increase and decrease? 2. How can we use a scale to dilate or reduce the dimensions of a figure?
Core Lesson/Topic Key Terminology & Definitions:	1. Scale Drawings / Scale Model -- represents something that is too large or too small to be drawn at actual size. 2. Scale Factor -- a scale written as a ratio in simplest form. 3. Similar Figures -- figures that have the same shape but not necessarily the same size. 4. Indirect Measurement -- when you can use similar figures to find the length, width or height of objects that are too difficult to measure directly. 5. percent proportion - compares part of a quantity to the whole quantity, called the base, using a percent. 6. percent of change - a ratio that compares the change in a quantity to the original amount. 7. percent of increase - if the original quantity is increased. 8. percent of decrease - if the original quantity is decreased. 9. sales tax - an additional amount of money charged on items that people buy. 10. discount - the amount by which the regular price of an item is reduced. 11. simple interest - the amount paid or earned for the use of money.
Core Lesson/Topic Student Learning Outcomes:	1. Set up and solve problems involving scale drawings. 2. Find percent of a number. 3. Solve problems to find the part and the whole. 4. Find the percent of increase or decrease. 5. Solve problems involving sales tax, discounts, commission, and gratuities. 6. Solve problems involving simple interest. 7. Use proportions to determine if figures are similar. 8. Find missing measures in similar figures. 9. Use a scale factor to dilate or reduce the dimensions of a figure.

Unit: Unit 4: Expressions and Equations

Unit/Module Description:	Students use properties of operations to generate equivalent expressions. They solve real-life and mathematical problems using numerical and algebraic expressions and equations.
Unit/Module Big Ideas:	1. Relations and functions are mathematical relationships that can be represented and analyzed using words, tables, graphs, and equations. 2. There are some mathematical relationships that are always true and these relationships are used as the rules of arithmetic and algebra and are useful for writing equivalent forms of expressions and solving equations and inequalities. 3. Numerical quantities and calculations can be estimated by using numbers that are close to the actual values, but easier to compute. 4. The set of real numbers has infinite subsets including the sets of whole numbers, integers, rational, and irrational numbers.
Unit/Module Essential Questions:	1. What are the connections among the different representations of a linear relationship?How does the representation support the linear relationship? (ie. Where in each representation can you find the rate of change, the y-intercept, etc.?) 2. How is computation with rational numbers similar and different to whole number computation?
Unit/Module Key Terminology & Definitions :	1. Variable -- a placeholder that represents a number 2. Algebraic Expression -- contains variables, numbers and at least one operation. 3. Algebra -- branch of mathematics that involves expressions with variables. 4. term -- when a plus or minus sign separate an algebraic expression into parts, each part is a term. 5. Coefficient -- the numerical factor of a term that contains a variable. 6. Constant -- a term that does not contain a variable. 7. Equivalent Expressions -- expressions that have the same value. 8. Distributive Property -- combines addition and multiplication. 9. Expression -- a combination of variables, numbers and at least one operation. 10. Inverse Operations -- operations that undo each other. 11. Two-Step Equation -- has two different operations. 12. Commutative Property -- the order in which two numbers are added or multiplied does not change their sum or product. 13. Associative Property -- The way in which three numbers are grouped when they are added or multiplied does not change their sum or product. 14.Identity Property -- the sum of an addend and zero is the addend. The product of a factor and one is the factor.

Unit/Module Student Learning Outcomes:

Concepts:
1. Use properties of operations to generate equivalent expressions.
2. Solve multi-step real-world and mathematical problems posed with positive and negative rational numbers.
3. Use variables to represent quantities in a real-world or mathematical problem and construct simple equations and inequalities to solve problems.
4. Determine the reasonableness of the answer(s) in problem solving situations.

Competencies:
1. Apply properties of operations to add, subtract, factor, and expand linear expressions with rational coefficients. Example 1: The expression 1/2 • (x + 6) is equivalent to 1/2 • x + 3. Example 2: The expression 5.3 – y + 4.2 is equivalent to 9.5 – y (or –y + 9.5). Example 3: The expression 4w – 10 is equivalent to 2(2w – 5).
2. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate. Example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50 an hour (or 1.1 × $25 = $27.50).
3. 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. Example: The perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?
4. Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers, and graph the solution set of the inequality. Example: A salesperson is paid $50 per week plus $3 per sale. This week she wants her pay to be at least $100. Write an inequality for the number of sales the salesperson needs to make and describe the solutions.
5. Determine the reasonableness of answer(s) or interpret the solution(s) in the context of the problem. Example: If you want to place a towel bar that is 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.

STANDARDS

STATE: PA Common Core Anchors and Eligible Content (May 2012)

M07.B-E.1.1.1 (Advanced)	Apply properties of operations to add, subtract, factor, and expand linear expressions with rational coefficients. Example 1: The expression 1/2 • (x + 6) is equivalent to 1/2 • x + 3. Example 2: The expression 5.3 – y + 4.2 is equivalent to 9.5 – y (or –y + 9.5). Example 3: The expression 4w – 10 is equivalent to 2(2w – 5).
M07.B-E.2.1.1 (Advanced)	Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate. Example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50 (or 1.1 × $25 = $27.50).
M07.B-E.2.2.1 (Advanced)	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. Example: The perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?
M07.B-E.2.2.2 (Advanced)	Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers, and graph the solution set of the inequality. Example: A salesperson is paid $50 per week plus $3 per sale. This week she wants her pay to be at least $100. Write an inequality for the number of sales the salesperson needs to make, and describe the solutions.
M07.B-E.2.3.1 (Advanced)	Determine the reasonableness of an answer(s), or interpret the solution(s) in the context of the problem. Example: If you want to place a towel bar that is 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.

NATIONAL: US Common Core State Standards

MA.7.EE.1 (Advanced)	Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.
MA.7.EE.2 (Advanced)	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.
MA.7.EE.3 (Advanced)	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.

MA.7.EE.4 (Advanced)	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
MA.7.EE.4.A (Advanced)	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. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach.
MA.7.EE.4.B (Advanced)	Solve word problems leading to inequalities of the form px + q > r or px + q < r, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem.

Lesson Topic: Core Lesson 1:Expressions

Core Lesson/Topic Description:	Students become familiar with variables and learn to evaluate, add, multiply, and factor algebraic expressions.
Core Lesson/Topic Big Ideas:	1. Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms.
Core Lesson/Topic Essential Questions:	1. How do we evaluate algebraic expressions? 2. How do we write algebraic expressions from real life problems? 3. How do we use addition and multiplication properties to solve problems? 4. How do we factor a common factor out of an expression?
Core Lesson/Topic Key Terminology & Definitions:	1. Variable -- a placeholder that represents a number 2. Algebraic Expression -- contains variables, numbers and at least one operation. 3. Algebra -- branch of mathematics that involves expressions with variables. term -- when a plus or minus sign separate an algebraic expression into parts, each part is a term. 4. Coefficient -- the numerical factor of a term that contains a variable. 5. Constant -- a term that does not contain a variable. 6. Equivalent Expressions -- expressions that have the same value. 7. Distributive Property -- combines addition and multiplication. 8. Expression -- a combination of variables, numbers and at least one operation. 9. Commutative Property -- the order in which two numbers are added or multiplied does not change their sum or product. 10. Associative Property -- The way in which three numbers are grouped when they are added or multiplied does not change their sum or product. 11. Identity Property -- the sum of an addend and zero is the addend. The product of a factor and one is the factor.
Core Lesson/Topic Student Learning Outcomes:	1. Evaluate simple algebraic expressions. 2. Write simple algebraic expressions from real life problems. 3. Use addition and multiplication properties to solve problems. 4. Discover factors of expressions.

Lesson Topic: Core Lesson 2:Equations

Core Lesson/Topic Description:	Students interpret sentences to algebraic equations and solve equations using inverse operations.
Core Lesson/Topic Big Ideas:	1. Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms. 2. Numerical quantities and calculations can be estimated by using numbers that are close to the actual values, but easier to compute.
Core Lesson/Topic Essential Questions:	1. How do we use inverse operations to solve equations? 2. How do we write equations from real life problems? 3. How can we check our answer to see if it is reasonable?

Core Lesson/Topic Key Terminology & Definitions:

1. Inverse Operations -- operations that undo each other.
2. Two-Step Equation -- has two different operations.

Core Lesson/Topic Student Learning Outcomes:

1. Write and solve algebraic equations from real life problems.
2. Solve addition, subtraction, multiplication, division, and multi-step equations.
3. Determine reasonableness of answers.

Lesson Topic: Core Lesson 3:Inequalities

Core Lesson/Topic Description:

Students apply what they have learned about equations to writing and solving inequalities.

Core Lesson/Topic Big Ideas:

1. Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms.
2. Numerical quantities and calculations can be estimated by using numbers that are close to the actual values, but easier to compute.

Core Lesson/Topic Essential Questions:

1. How do we solve an inequality using inverse operations?
2. How do we graph an inequality on a number line?
3. How do we write an inequality from a real life problem?
4. How can we check to see if our answer is reasonable?

Core Lesson/Topic Key Terminology & Definitions:

1. Inequality -- a mathematical sentence that contains the symbols <, >, $\leq$, $\geq$.

Core Lesson/Topic Student Learning Outcomes:

1. Solve inequalities.
2. Graph inequalities on a number line.
3. Write inequalities from real life problems.
4. Determine the reasonableness of the answer.

Unit: Unit 5: Geometry

Unit/Module Description:

Students draw, construct and describe geometrical figures and describe the relationships between them. They solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

Unit/Module Big Ideas:

1. Congruence describes a special similarity relationship between objects and is a form of equivalence.
2. There are some mathematical relationships that are always true and these relationships are used as the rules of arithmetic and algebra and are useful for writing equivalent forms of expressions and solving equations and inequalities.

Unit/Module Essential Questions:

1. How can the decomposition of 3-dimensional shapes aid in the understanding of surface areas and volumes? How can we use the relationship between surface area and volume to help us draw, construct, model, and represent real situations and/or solve problems of surface area and volume?
2. How is computation with rational numbers similar and different to whole number computation?
3. Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms.

Unit/Module Key Terminology & Definitions :

1. Triangle -- a figure with 3 sides and 3 angles.
2. Acute Triangle -- a triangle with all acute angles.
3. Right Triangle -- a triangle with 1 right angle.
4. Obtuse Triangle -- a triangle with 1 obtuse angle.
5. Congruent Segments -- sides with the same length.
6. Scalene Triangle -- a triangle with no congruent sides.
7. Isosceles Triangle -- a triangle with at least 2 congruent sides.
8. Equilateral Triangle -- a triangle with 3 congruent sides.
9. Equiangular Triangle - a triangle with 3 congruent angles.

10. Plane -- a flat surface that extends in all directions.
11. Rectangular Prism -- a solid figure that has two parallel and congruent bases that are rectangles.
12. Angle -- made up of two rays with a common endpoint.
13. Degrees -- units that are used in measuring angles.
14. Vertex -- the point where sides meet.
15. Acute Angle -- an angle that is less than 90º.
16. Right Angle -- an angle that is exactly 90º.
17. Obtuse Angle -- an angle that is between 90º and 180º.
18. Straight Angle -- an angle that is exactly 180º.
19. Vertical Angles -- formed when 2 lines intersect.
20. Congruent Angles -- angles with the same measure.
21. Supplementary Angles -- when 2 angles sum is 180º.
22. Complementary Angles -- when 2 angles sum is 90º.
23. Adjacent Angles -- angles that share a common side and common vertex and do not overlap.
24. Alternate Exterior Angles -- a pair of angles located outside a set of parallel lines and on opposite sides of the transversal.
25. Alternate Interior Angles -- a pair of angles located between a set of parallel lines and on opposite sides of the transversal.
26. Corresponding Angles -- when a transversal intersects two lines, corresponding angles are on the same side of the transversal and on the same side of the given lines. Angles that are in the same relative position in similar or congruent figures.
27. Parallel Lines -- lines that do not intersect.
28. Perpendicular Lines -- lines that intersect and or meet and form a right angle.
29. Transversal -- a line that intersects parallel lines.
30. Surface Area -- the sum of all the surfaces or faces of a three dimensional figure.
31. Circumference -- the distance around a circle.
32. Cylinder -- a solid figure that has 2 congruent, parallel circles as its bases.
33. Volume -- is the measure of space occupied by a solid.
34. Rectangular Prism -- is a solid figure that has 2 parallel and congruent sides, or bases, that are rectangles.
35. Solid -- is a three dimensional figure because it has length, width and depth.
36. Formula -- shows relationship among quantities.
37. Perimeter -- the distance around a geometric figure.
38. Area -- is the measure of the surface enclosed by a figure.

Unit/Module Student Learning Outcomes:

Concepts:
1. Know how to describe and apply properties of geometric figures.
2. Identify, use, and describe properties of angles and their measures.
3. Know how to determine circumference, area, surface area, and volume.

Competencies:
1. Solve problems involving scale drawings of geometric figures, including finding length and area.
2. Identify or describe the properties of all types of triangles based on angle and side measures.
3. Use and apply the triangle inequality theorem.
4. Describe the two-dimensional figures that result from slicing three-dimensional figures. Example: Describe plane sections of right rectangular prisms and right rectangular pyramids.
5. 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.
6. Identify and use properties of angles formed when two parallel lines are cut by a transversal (e.g., angles may include alternate interior, alternate exterior, vertical, corresponding).
7. Find the area and circumference of a circle. Solve problems involving area and circumference of a circle(s). Formulas will be provided.
8. 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. Formulas will be provided.

STANDARDS

STATE: PA Common Core Anchors and Eligible Content (May 2012)

M07.C-G.1.1.1 (Advanced)	Solve problems involving scale drawings of geometric figures, including finding length and area.
M07.C-G.1.1.2 (Advanced)	Identify or describe the properties of all types of triangles based on angle and side measure.
M07.C-G.1.1.3 (Advanced)	Use and apply the triangle inequality theorem.
M07.C-G.1.1.4 (Advanced)	Describe the two-dimensional figures that result from slicing three-dimensional figures. Example: Describe plane sections of rightB rectangular prisms and right rectangular pyramids.
M07.C-G.2.1.1 (Advanced)	Identify and use properties of supplementary, complementary,

	and adjacent angles in a multistep problem to write and solve simple equations for an unknown angle in a figure.
M07.C-G.2.1.2 (Advanced)	Identify and use properties of angles formed when two parallel lines are cut by a transversal (e.g., angles may include alternate interior, alternate exterior, vertical, corresponding).
M07.C-G.2.2.1 (Advanced)	Find the area and circumference of a circle. Solve problems involving area and circumference of a circle(s). Formulas will be provided.
M07.C-G.2.2.2 (Advanced)	Solve real-world and mathematical problems involving area, volume, and surface area of twoand three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. Formulas will be provided.
NATIONAL: US Common Core State Standards	
MA.7.G.1 (Advanced)	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
MA.7.G.2 (Advanced)	Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.
MA.7.G.3 (Advanced)	Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
MA.7.G.4 (Advanced)	Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
MA.7.G.5 (Advanced)	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.
MA.7.G.6 (Advanced)	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.

Lesson Topic: Core Lesson 1:Triangles

Core Lesson/Topic Description:	Students use their knowledge of angles and sides to classify triangles. Also, students apply the triangle inequality theorem to show relationships between sides.
Core Lesson/Topic Big Ideas:	There are some mathematical relationships that are always true and these relationships are used as the rules of arithmetic and algebra and are useful for writing equivalent forms of expressions and solving equations and inequalities.
Core Lesson/Topic Essential Questions:	1. How do we classify triangles based on their sides and angles? 2. How do we apply the triangle inequality theorem?
Core Lesson/Topic Key Terminology & Definitions:	1.Triangle -- a figure with 3 sides and 3 angles. 2. Acute Triangle -- a triangle with all acute angles. 3. Right Triangle -- a triangle with 1 right angle. 4. Obtuse Triangle -- a triangle with 1 obtuse angle. 5. Congruent Segments -- sides with the same length. 6. Scalene Triangle -- a triangle with no congruent sides. 7. Isosceles Triangle -- a triangle with at least 2 congruent sides. 8. Equilateral Triangle -- a triangle with 3 congruent sides. 9. Equiangular Triangle - a triangle with 3 congruent angles.
Core Lesson/Topic Student Learning Outcomes:	1. Identify and classify triangles. 2. Use and apply the triangle inequality theorem.

Lesson Topic: Core Lesson 2:Two and Three Dimensional Figures

Core Lesson/Topic	As students move from two to three dimensional shapes, they learn that there are parts of a three dimensional shape not visiable when viewing straight on. Students recognize the two

Description:	dimensional shapes that are needed to create a three dimensional figure.
Core Lesson/Topic Big Ideas:	1. There are some mathematical relationships that are always true and these relationships are used as the rules of arithmetic and algebra and are useful for writing equivalent forms of expressions and solving equations and inequalities.
Core Lesson/Topic Essential Questions:	1. What distinct characteristics are found in two dimensional figures? 2. What two dimensional figures are needed to create a three dimensional figure? 3. How do we find the sum of the interior angles of a two dimensional figure?
Core Lesson/Topic Key Terminology & Definitions:	1. Plane -- a flat surface that extends in all directions. 2. Rectangular Prism -- a solid figure that has two parallel and congruent bases that are rectangles.
Core Lesson/Topic Student Learning Outcomes:	1. Identify quadrilateral based on characteristics. 2. Describe the two dimensional shapes that make a three dimensional figure. 3. Given a two dimensional figure, find the total number of degrees within the interior angles.

Lesson Topic: Core Lesson 3: Lines and Angles

Core Lesson/Topic Description:	Students explain relationships between angles. Also, students apply angle relationship laws to find missing angles in figures.
Core Lesson/Topic Big Ideas:	1. Numbers, measures, expressions, equations, and inequalities can represent mathematical situations and structures in many equivalent forms. 2. There are some mathematical relationships that are always true and these relationships are used as the rules of arithmetic and algebra and are useful for writing equivalent forms of expressions and solving equations and inequalities.
Core Lesson/Topic Essential Questions:	1. How do angle measurements effect related angles? 2. How do we set up and solve simple equations to find unknown angles in a figure?
Core Lesson/Topic Key Terminology & Definitions:	1. Angle -- made up of two rays with a common endpoint. 2. Degrees -- units that are used in measuring angles. 3. Vertex -- the point where sides meet. 4. Acute Angle -- an angle that is less than 90º. 5. Right Angle -- an angle that is exactly 90º. 6. Obtuse Angle -- an angle that is between 90º and 180º. 7. Straight Angle -- an angle that is exactly 180º. 8. Vertical Angles -- formed when 2 lines intersect. 9. Congruent Angles -- angles with the same measure. 10. Supplementary Angles -- when 2 angles sum is 180º. 11. Complementary Angles -- when 2 angles sum is 90º. 12. Adjacent Angles -- angles that share a common side and common vertex and do not overlap. 13. Alternate Exterior Angles -- a pair of angles located outside a set of parallel lines and on opposite sides of the transversal. 14. Alternate Interior Angles -- a pair of angles located between a set of parallel lines and on opposite sides of the transversal. 15. Corresponding Angles -- when a transversal intersects two lines, corresponding angles are on the same side of the transversal and on the same side of the given lines. Angles that are in the same relative position in similar or congruent figures. 16. Parallel Lines -- lines that do not intersect. 17. Perpendicular Lines -- lines that intersect and or meet and form a right angle. 18. Transversal -- a line that intersects parallel lines.
Core Lesson/Topic Student Learning Outcomes:	1. Identify and apply angle relationships. 2. Use properties of angles to solve simple equations for an unknown angle in a figure.

Lesson Topic: Core Lesson 4:Perimeter, Area, Surface Area, Circumference, and Volume

Core	Students use formulas to find perimeter, area, circumference, volume, and area. Students

Lesson/Topic Description:	determine which measurement is best for a given situation; area, circumference, volume, or surface area.
Core Lesson/Topic Big Ideas:	1. There are some mathematical relationships that are always true and these relationships are used as the rules of arithmetic and algebra and are useful for writing equivalent forms of expressions and solving equations and inequalities.
Core Lesson/Topic Essential Questions:	1. How do we find the area of a figure and what does it represent? 2. How do we find the surface area of a figure and what does it represent? 3. How do we find circumference of a circle and what does it represent? 4. How do we find volume of a figure and what does it represent? 5. How do we find perimeter of a figure and what does it represent?
Core Lesson/Topic Key Terminology & Definitions:	1. Surface Area -- the sum of all the surfaces or faces of a three dimensional figure. 2. Circumference -- the distance around a circle. 3. Cylinder -- a solid figure that has 2 congruent, parallel circles as its bases. 4. Volume -- is the measure of space occupied by a solid. 5. Rectangular Prism -- is a solid figure that has 2 parallel and congruent sides, or bases, that are rectangles. 6. Solid -- is a three dimensional figure because it has length, width and depth. 7. Formula -- shows relationship among quantities. 8. Perimeter -- the distance around a geometric figure. 9. Area -- is the measure of the surface enclosed by a figure.
Core Lesson/Topic Student Learning Outcomes:	1. Find the area of two dimensional figures. 2. Find the circumference of circles. 3. Find the volume of three dimensional figures. 4. Find the surface area of three dimensional figures. 5. Find the perimeter of two dimensional figures.

Unit: Unit 6: Statistics and Probability

Unit/Module Description:	Students use random sampling to draw inferences about a population. They draw informal comparative inferences about two populations. Students investigate chance processes and develop, use, and evaluate probability models.
Unit/Module Big Ideas:	1. Some questions can be answered by collecting, representing, and analyzing data, and the question to be answered determines the data to be collected, how best to collect it, and how best to represent it. 2. Numerical measures describe the center and spread of numerical data. 3. The likelihood of an event occurring can be described numerically and used to make predictions.
Unit/Module Essential Questions:	1. How does the collection, analysis, organization, and interpretation of data help us to answer real world questions? What kind of questions can and cannot be answered from the data set and its display? 2. How do we make predictions based on the outcomes of a probability experiment?
Unit/Module Key Terminology & Definitions :	1. outcomes - one possible result of a probability event. 2. simple event - one outcome or a collection of outcomes. 3. random - by chance. 4. complementary events - two events that are the only ones that can possibly happen. 5. fundamental counting principle - using multiplication to find the number of possible outcomes in a sample space. 6. experimental probability - found using frequencies obtained in an experiment or game. 7. theoretical probability - the expected probability of an event occurring. 8. compound event - consists of two or more simple events. 9. independent events - an event that does not affect choosing another event. 10. dependent events - if the outcome of one event affects the outcomes of a second event. 11. statistics - deals with collecting organizing, and interpreting data. 12. frequency table - shows the number of pieces of data that fall within given intervals. 13. scale - allows you to record all of the data. 14. interval - separates the scale into equal parts. 15. line plot - is a diagram that shows the frequency of data on a number line. 16. cluster - data grouped closely together. 17. outliers - data that is quite separate from the rest of the data. 18. range - difference between the greatest and least numbers in the data set. 19. measures of central tendency - used to describe the center of data. 20. mean - of a set of data is the sum of the data divided by the number of items in the data set.

21. median - of a set of data is the middle number of the ordered pair, or the mean of the middle two numbers.
22. mode - or modes of a set of data is the number or numbers that occur most often.
23. stem and leaf plots - a useful way to organize data from least to greatest.
24. bar graph- one method of comparing data by using solid bars to represent quantities.
25. histogram - uses bars to represent the frequency of numerical data that have been organized in intervals.
26. statistics - deals with collecting organizing, and interpreting data.
27. frequency table - shows the number of pieces of data that fall within given intervals.
28. scale - allows you to record all of the data.
29. interval - separates the scale into equal parts.
30. line plot - is a diagram that shows the frequency of data on a number line.
31. cluster - data grouped closely together.
32. outliers - data that is quite separate from the rest of the data.
33. range - difference between the greatest and least numbers in the data set.
34. measures of central tendency - used to describe the center of data.
35. mean - of a set of data is the sum of the data divided by the number of items in the data set.
36. median - of a set of data is the middle number of the ordered pair, or the mean of the middle two numbers.
37. mode - or modes of a set of data is the number or numbers that occur most often.
38. stem and leaf plots - a useful way to organize data from least to greatest.
39. bar graph- one method of comparing data by using solid bars to represent quantities.
40. histogram - uses bars to represent the frequency of numerical data that have been organized in intervals.
41. upper quartile - median of the upper set of data.
42. lower quartile - median of the lower set of data.
43. average absolute deviation of a data set - the average of the absolute deviations and is a summary statistic of statistical dispersion or variability.

Unit/Module Student Learning Outcomes:

Concepts:
1. Know how to use random samples.
2. Know how to use statistical measures to compare two numerical data distributions. 3. Know how to predict or determine the likelihood of outcomes.
4. Know how to use probability to predict outcomes.

Competencies:
1. Determine whether a sample is a random sample given a real-world situation.
2. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Example 1: Estimate the mean word length in a book by randomly sampling words from the book. Example 2: Predict the winner of a school election based on randomly sampled survey data.
3. Compare two numerical data distributions using measures of center and variability. Example 1: The mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team. This difference is equal to approximately twice the variability (mean absolute deviation) on either team. On a line plot, note the difference between the two distributions of heights. Example 2: Decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth grade science book.
4. Predict or determine whether some outcomes are certain, more likely, less likely, equally likely, or impossible (i.e., a probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event).
5. Determine the probability of a chance event given relative frequency. Predict the approximate relative frequency given the probability. Example: When rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times but probably not exactly 200 times.
6. Find the probability of a simple event, including the probability of a simple event not occurring. Example: What is the probability of not rolling a 1 on a number cube?
7. Find probabilities of independent compound events using organized lists, tables, tree diagrams, and simulation.

STANDARDS

STATE: PA Common Core Anchors and Eligible Content (May 2012)

M07.D-S.1.1.1 (Advanced)	Determine whether a sample is a random sample given a real-world situation.
M07.D-S.1.1.2 (Advanced)	Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Example

	1: Estimate the mean word length in a book by randomly sampling words from the book. Example 2: Predict the winner of a school election based on randomly sampled survey data.
M07.D-S.2.1.1 (Advanced)	Compare two numerical data distributions using measures of center and variability.
M07.D-S.3.1.1 (Advanced)	Predict or determine whether some outcomes are certain, more likely, less likely, equally likely, or impossible (i.e., a probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event).
M07.D-S.3.2.1 (Advanced)	Determine the probability of a chance event given relative frequency. Predict the approximate relative frequency given the probability. Example: When rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.
M07.D-S.3.2.2 (Advanced)	Find the probability of a simple event, including the probability of a simple event not occurring. Example: What is the probability of not rolling a 1 on a number cube?
M07.D-S.3.2.3 (Advanced)	Find probabilities of independent compound events using organized lists, tables, tree diagrams, and simulation.
NATIONAL: US Common Core State Standards	
MA.7.SP.1 (Advanced)	Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.
MA.7.SP.2 (Advanced)	Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions.
MA.7.SP.3 (Advanced)	Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability.
MA.7.SP.4 (Advanced)	Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.
MA.7.SP.5 (Advanced)	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
MA.7.SP.6 (Advanced)	Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.
MA.7.SP.7 (Advanced)	Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.
MA.7.SP.7.A (Advanced)	Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.
MA.7.SP.7.B (Advanced)	Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.
MA.7.SP.8 (Advanced)	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.
MA.7.SP.8.A (Advanced)	Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.
MA.7.SP.8.B (Advanced)	Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event.
MA.7.SP.8.C (Advanced)	Design and use a simulation to generate frequencies for compound events.

Lesson Topic: Core Lesson 1:Probability

Core Lesson/Topic Description:	Students begin at basic probability then advance to compound events. They develop confidence in their ability to count outcomes using the Fundamental Counting Principle. Also, students use probability data to draw inferences about a population and tell the likeliness of an event occurring.
Core Lesson/Topic Big Ideas:	1. The likelihood of an event occurring can be described numerically and used to make predictions.
Core Lesson/Topic Essential Questions:	1. How can we use the fundamental counting principle to find outcomes? 2. How can we make inferences about a population using probability and proportions? 3. How can we find probability of simple events? 4. How can we tell how likely it is that an event will occur or will not occur? 5. How can we find probability of compound events?
Core Lesson/Topic Key Terminology & Definitions:	1. outcomes - one possible result of a probability event. 2. simple event - one outcome or a collection of outcomes. 3. random - by chance. 4. complementary events - two events that are the only ones that can possibly happen. 5. fundamental counting principle - using multiplication to find the number of possible outcomes in a sample space. 6. experimental probability - found using frequencies obtained in an experiment or game. 7. theoretical probability - the expected probability of an event occurring. 8. compound event - consists of two or more simple events. 9. independent events - an event that does not affect choosing another event. 10. dependent events - if the outcome of one event affects the outcomes of a second event.
Core Lesson/Topic Student Learning Outcomes:	1. Find simple probability. 2. Use multiplication to count outcomes. 3. Determine random samples given real world problems. 4. Find and compare experimental probabilities. 5. Determine the likeliness of an event occurring or not occuring. 6. Find compound probability.

Lesson Topic: Core Lesson 2:Data Distributions

Core Lesson/Topic Description:	Students broaden their skills analyzing and comparing data sets. Also, students find measures of central tendency.
Core Lesson/Topic Big Ideas:	1. Numerical measures describe the center and spread of numerical data.
Core Lesson/Topic Essential Questions:	1. How can we find the mean, median, and mode of data? 2. How can we analyze data in charts, graphs, and in word problems? 3. How can we compare numerical data?
Core Lesson/Topic Key Terminology & Definitions:	1. statistics - deals with collecting organizing, and interpreting data. 2. frequency table - shows the number of pieces of data that fall within given intervals. 3. scale - allows you to record all of the data. 4. interval - separates the scale into equal parts. 5. line plot - is a diagram that shows the frequency of data on a number line. 6. cluster - data grouped closely together. 7. outliers - data that is quite separate from the rest of the data. 8. range - difference between the greatest and least numbers in the data set. 9. measures of central tendency - used to describe the center of data. 10. mean - of a set of data is the sum of the data divided by the number of items in the data set. 11. median - of a set of data is the middle number of the ordered pair, or the mean of the middle two numbers. 12. mode - or modes of a set of data is the number or numbers that occur most often. 13. stem and leaf plots - a useful way to organize data from least to greatest. 14. bar graph- one method of comparing data by using solid bars to represent quantities. 15. histogram - uses bars to represent the frequency of numerical data that have been organized in intervals. 16. upper quartile - median of the upper set of data.

17. lower quartile - median of the lower set of data.
18. average absolute deviation of a data set - the average of the absolute deviations and is a summary statistic of statistical dispersion or variability.

Core Lesson/Topic Student Learning Outcomes:

1. Find the mean, median, and mode of data.
2. Read and analyze data.
3. Compare numerical distributions using central tendancy.