Mathematics Long Term Transfer Goals *Transfer goals highlight the effective uses of understanding, knowledge, and skill that we seek in the long run; i.e., what we want students to be able to do when they confront new challenges – both in and outside of school.*	
Students will be able to independently use their learning to: 1. Make sense of and persevere in solving complex and novel mathematical problems. 2. Use effective mathematical reasoning to construct viable arguments and critique the reasoning of others. 3. Communicate precisely when making mathematical statements and express answers with a degree of precision appropriate for the context of the problem/situation. 4. Apply mathematical knowledge to analyze and model situations/relationships using multiple representations and appropriate tools in order to make decisions, solve problems, and draw conclusions. 5. Make use of structure and repeated reasoning to gain a mathematical perspective and formulate generalized problem solving strategies	
Big Ideas	**Essential Questions**
Mathematical relationships can be represented as expressions, equations, and inequalities in mathematical situations.	How are relationships represented mathematically? How can expressions, equations, and inequalities be used to quantify, solve, model and/or analyze mathematical situations?
Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.	What does it mean to estimate or analyze numerical quantities? When is it is appropriate to estimate versus calculate? What makes a tool and/or strategy appropriate for a given task?
Data can be modeled and used to make inferences.	How does the type of data influence the choice of display? How can probability and data analysis be used to make predictions?
Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.	How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems? How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving? How can geometric properties and theorems be used to describe, model, and analyze situations?
Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions.	How can data be organized and represented to provide insight into the relationship between quantities?
Mathematical relationships among numbers can	How is mathematics used to quantify, compare, represent, and model numbers?

Mathematics Long Term Transfer Goals *Transfer goals highlight the effective uses of understanding, knowledge, and skill that we seek in the long run; i.e., what we want students to be able to do when they confront new challenges – both in and outside of school.*	
Students will be able to independently use their learning to: 1. Make sense of and persevere in solving complex and novel mathematical problems. 2. Use effective mathematical reasoning to construct viable arguments and critique the reasoning of others. 3. Communicate precisely when making mathematical statements and express answers with a degree of precision appropriate for the context of the problem/situation. 4. Apply mathematical knowledge to analyze and model situations/relationships using multiple representations and appropriate tools in order to make decisions, solve problems, and draw conclusions. 5. Make use of structure and repeated reasoning to gain a mathematical perspective and formulate generalized problem solving strategies	
be represented, compared, and communicated.	How can mathematics support effective communication?
Measurement attributes can be quantified and estimated using customary and non-customary units of measure	Why does “what” we measure influence “how” we measure? In what ways are the mathematical attributes of objects or processes measured, calculated, and/or interpreted? How precise do measurements and calculations need to be?
Patterns exhibit relationships that can be extended, described, and generalized.	How can patterns be used to describe relationships in mathematical situations? How can recognizing repetition or regularity assist in solving problems more efficiently?

PA Core Standards For Mathematics
Curriculum Framework
Grade Level PRE-K

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
Pre-K	Mathematical relationships among numbers can be represented, compared, and communicated.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication?	Numerical Sequence	Rote count to 20. Name numerals up to 10. Represent a number of objects with a written numeral 0-10.	CC.2.1.PREK.A.1		Above Addition Below Beside Between Circle Cone Cube Cylinder Equal Greater than Length Less than Measure Numeral Rectangle Sphere Square Subtraction Three dimensional shapes Triangle Two dimensional shapes Weight
Pre-K	Mathematical relationships among numbers can be represented, compared, and communicated. Patterns exhibit relationships that can be extended, described, and generalized.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How can patterns be used to describe relationships in mathematical situations?	Object Quantity	Recognize small quantities up to 6. Use a one-to-one correspondence when counting to 10. State the total number of objects counted, demonstrating understanding that that number named tells the number of objects counted.	CC.2.1.PREK.A.2		
Pre-K	Mathematical relationships among numbers can be represented, compared, and communicated.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication?	Number Comparison	Identify whether the number of objects in one group is greater than, less than or equal to the number of objects in another group up to 10. Compare two numbers between 1 and 5 when presented as written numerals.	CC.2.2.PREK.A.3		
Pre-K	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically? How can recognizing repetition or	Addition and Subtraction	Represent addition and subtraction with objects, fingers, mental images, and drawings, sounds, acting out situations, verbal explanations, expressions, or equations. Explain adding and subtracting sets of objects up to and including six.	CC.2.2.PREK.A.1		

PA Core Standards For Mathematics
Curriculum Framework
Grade Level PRE-K

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	Patterns exhibit relationships that can be extended, described, and generalized.	regularity assist in solving problems more efficiently?					
Pre-K	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Patterns exhibit relationships that can be extended, described, and generalized.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically? How can recognizing repetition or regularity assist in solving problems more efficiently?	Addition and Subtraction	Represent addition and subtraction with objects, fingers, mental images, and drawings, sounds, acting out situations, verbal explanations, expressions, or equations. Explain adding and subtracting sets of objects up to and including six.	CC.2.3.PREK.A.1		
Pre-K	Patterns exhibit relationships that can be extended, described, and generalized. Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.	How can patterns be used to describe relationships in mathematical situations? How can recognizing repetition or regularity assist in solving problems more efficiently? How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems? How can the application of the attributes of geometric shapes support mathematical reasoning and	Shape Identification and Description	Identify shapes as two-dimensional or three-dimensional. Describe objects in the environment using names of shapes and describe the relative positions of these objects.	CC.2.3.PREK.A.2		

PA Core Standards For Mathematics
Curriculum Framework
Grade Level PRE-K

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
		problem solving? How can geometric properties and theorems be used to describe, model, and analyze situations?					
Pre-K	Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Measurement attributes can be quantified, and estimated using customary and non-customary units of measure. Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions.	What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy appropriate for a given task? Why does "what" we measure influence "how" we measure? In what ways are the mathematical attributes of objects or processes measured, calculated and/or interpreted? How can data be organized and represented to provide insight into the relationship between quantities?	Measureable Attributes	Describe measurable attributes of objects, such as length and weight. Sort and order by one attribute. Compare two objects with a measureable attribute in common and describe the difference.	CC.2.4.PREK.A.1		
Pre-K	Numerical quantities, calculations, and measurements can be estimated or analyzed by	What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy	Object Classification and Count	Classify up to 10 objects using one attribute into categories; display the number of objects in each category; count and	CC.2.4.PREK.A4		

PA Core Standards For Mathematics
Curriculum Framework
Grade Level PRE-K

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	using appropriate strategies and tools. Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions. Data can be modeled and used to make inferences.	appropriate for a given task? How can data be organized and represented to provide insight into the relationship between quantities? How does the type of data influence the choice of display?		compare the quantities of each category.			

PA Core Standards For Mathematics
Curriculum Framework
Grade Level K

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
K	Mathematical relationships among numbers can be represented, compared, and communicated. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? What does it mean to estimate or analyze numerical quantities?	Numerical Sequence	Rote count to 100. Count forward beginning from a given number within the known sequence (instead of having to begin at 1). Name numerals 0 – 20. Represent a number of objects with a written numeral 0-20.	CC.2.1.K.A.1		Addition Area Capacity Circle Cone Corners (vertices) Cube Cylinder Digit Equal Greater than Length Less than Ones Place value Quantity Rectangle Sides Sphere Square Subtraction Tens Total Triangle Weight
K	Mathematical relationships among numbers can be represented, compared, and communicated. Patterns exhibit relationships that can be extended, described, and generalized.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How can patterns be used to describe relationships in mathematical situations?	Object Quantity	Uses one-to-one correspondence when counting to 20. State the total number of objects counted, demonstrating understanding that that last number named tells the number of objects counted. Understand that each successive number name refers to a quantity that is one larger.	CC.2.1.K.A.2		

PA Core Standards For Mathematics
Curriculum Framework
Grade Level K

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
K	Mathematical relationships among numbers can be represented, compared, and communicated. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? When is it is appropriate to estimate versus calculate? What makes a tool and/or strategy appropriate for a given task?	Number Comparison	Identify whether the number of objects in one group is greater than, less than, or equal to the number of objects in another group, e.g., by using matching and counting strategies. Compare two numbers between 1 and 10 presented as written numerals.	CC.2.1.K.A.3		
K	Mathematical relationships among numbers can be represented, compared, and communicated. Patterns exhibit relationships that can be extended, described, and generalized.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How can recognizing repetition or regularity assist in solving problems more efficiently?	Place Value	Compose and decompose numbers up to 19 into ten and ones by using objects or drawings, and record each composition or decomposition by a drawing or equation.	CC.2.1.K.B.1		
K	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Patterns exhibit relationships that can be extended, described, and generalized.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically? How can recognizing repetition or regularity assist in solving problems more efficiently?	Addition and Subtraction	Represent addition and subtraction with objects, fingers, mental images, and drawings, sounds acting out situations, verbal explanations, expressions, or equations. Decompose numbers less than or equal to 10 into pairs in more than one way, by using objects or drawings, and record each decomposition by a drawing or equation. Find the number that makes 10, for any number from 1 to 9,	CC.2.2.K.A.1		

PA Core Standards For Mathematics
Curriculum Framework
Grade Level K

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
				when added to the given number, by using objects or drawings, and record the answer with a drawing or equation. Solve addition and subtraction word problems, and add and subtract within 10, by using objects or drawings to represent the problem.			
K	Patterns exhibit relationships that can be extended, described, and generalized.	How can patterns be used to describe relationships in mathematical situations? How can recognizing repetition or regularity assist in solving problems more efficiently?	Two- and Three-Dimensional Shapes	Identify shapes as two-dimensional or three-dimensional. Name shapes regardless of their orientations or overall size. Use simple shapes to compose larger shapes.	CC.2.3.K.A.1		
K	Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.	How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems? How can geometric properties and theorems be used to describe, model, and analyze situations? How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving?	Two- and Three-Dimensional Shapes	Describe objects in the environment using names of shapes and describe the relative positions of these objects using terms such as above, below, beside, in front, behind, and next to. Analyze and compare two-and three-dimensional shapes, in different sizes and orientations, using informal language to describe their similarities, differences, parts and other attributes.	CC.2.3.K.A.2		

PA Core Standards For Mathematics
Curriculum Framework
Grade Level K

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
		How can geometric properties and theorems be used to describe, model, and analyze situations?		Model shapes in the world by building shapes from components and drawing shapes.			
K	Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Measurement attributes can be quantified, and estimated using customary and non-customary units of measure. Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions. Data can be modeled and used to make inferences.	What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy appropriate for a given task? Why does "what" we measure influence "how" we measure? In what ways are the mathematical attributes of objects or processes measured, calculated and/or interpreted? How can data be organized and represented to provide insight into the relationship between quantities? How does the type of data influence the choice of display? How can probability and data analysis be used to make predictions?	Measureable Attributes	Describe measurable attributes of objects, such as length, weight, area or capacity. Describe several measurable attributes of a single object. Compare two objects with a measureable attribute in common and describe the difference.	CC.2.4.K.A.1		
K	Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Mathematical relations and	What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy appropriate for a given task? How can data be organized and represented to provide insight into	Object Classification and Count	Classify up to 20 objects using one attribute into categories; display the number of objects in each category; count and compare the quantities of each category and describe the difference.	CC.2.4.K.A.4		

PA Core Standards For Mathematics
Curriculum Framework
Grade Level K

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	functions can be modeled through multiple representations and analyzed to raise and answer questions. Data can be modeled and used to make inferences.	the relationship between quantities? How does the type of data influence the choice of display?					

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 1

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
1	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically? What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy appropriate for a given task?	Numerical Sequence	Count to 120, starting at any number less than 120. Read and write numerals up to 120 and represent a number of objects with a written numeral.	CC.2.1.1.B.1		Addend Addition Analog Circle Compare compose/ Cone Counting on Cube Cylinder Data decompose Equal to Fourths Fractions – Greater than Half circles Half-hour Halves Hour Length Less than Making ten Ones Place value Quarter-circles Quarters Rectangle Rectangular Prism Square Subtraction Sum Tens Trapezoids Triangle
1	Mathematical relationships among numbers can be represented, compared, and	How is mathematics used to quantify, compare, represent, and model numbers?	Place Value	Compare two two-digit numbers based on meanings of the tens and ones digits,	CC.2.1.1.B.2 CC.2.1.1.B.3		

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 1

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Patterns exhibit relationships that can be extended, described, and generalized.	How can mathematics support effective communication? How are relationships represented mathematically? What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy appropriate for a given task? How can recognizing repetition or regularity assist in solving problems more efficiently?		recording the results of comparisons with the symbols >, =, and <. Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10 using concrete models or drawings. Relate the strategy to a written method and explain the reasoning used. Subtract multiples of 10 in the range 10-90, using concrete models or drawings. Relate the strategy to a written method and explain the reasoning used.			
1	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Patterns exhibit relationships that can be extended, described, and generalized.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically? How can expressions, equations and inequalities be used to quantify, solve, model, and/or analyze mathematical situations? How can recognizing repetition or regularity assist in solving problems more efficiently?	Addition and Subtraction	Use addition and subtraction within 20 to solve word problems by using objects, drawings, and equations with a symbol for the unknown number to represent the problem. Add and subtract within 20. Use strategies such as counting on; making ten; decomposing a number leading to a ten; using the relationship between addition and subtraction and creating equivalent but easier or known sums. Solve word problems that call for addition of three whole numbers whose sum is less than	CC.2.2.1.A.1		

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 1

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
				or equal to 20.			
1	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Patterns exhibit relationships that can be extended, described, and generalized.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically? How can expressions, equations and inequalities be used to quantify, solve, model, and/or analyze mathematical situations? How can patterns be used to describe relationships in mathematical situations?	Properties of Operations	Apply properties of operations as strategies to add and subtract (commutative property of addition; associative property of addition). Understand subtraction as an unknown-addend problem. For example, subtract 10 – 8 by finding the number that makes 10 when added to 8.	CC.2.2.1.A.2		
1	Patterns exhibit relationships that can be extended, described, and generalized. Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.	How can recognizing repetition or regularity assist in solving problems more efficiently? How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems? How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving? How can geometric properties and theorems be used to describe, model, and analyze situations?	Two – and Three – Dimensional	Compose two and three-dimensional shapes and distinguish between attributes. Build and draw shapes to possess attributes.	CC.2.3.1.A.1		

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 1

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
1	Patterns exhibit relationships that can be extended, described, and generalized. Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.	How can patterns be used to describe relationships in mathematical situations? How can recognizing repetition or regularity assist in solving problems more efficiently? How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems? How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving?	Fractions	Partition circles and rectangles into two and four equal shares. Understand that decomposing into more equal shares creates smaller shares.	CC.2.3.1.A.2		
1	Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Measurement attributes can be quantified, and estimated using customary and non-customary units of measure.	What does it mean to estimate or analyze numerical quantities? When is it is appropriate to estimate versus calculate? What makes a tool and/or strategy appropriate for a given task? Why does "what" we measure influence "how" we measure? In what ways are the mathematical attributes of objects or processes measured, calculated and/or	Measurement	Order three objects by length; compare the lengths of two objects indirectly by using a third object. Use standard and non-standard units of measure to express the length of an objects a whole number of length units. Understand that the length measurement of an object is the number of same-size length units. Understand that the length measurement of an object is	CC.2.4.1.A.1		

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 1

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
		interpreted? How precise do measurements and calculations need to be?		the number of same-size length units.			
1	Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.	What does it mean to estimate or analyze numerical quantities? When is it is appropriate to estimate versus calculate? What makes a tool and/or strategy appropriate for a given task? How precise do measurements and calculations need to be?	Time	Tell and write time in hours and half hours using analog and digital clocks.	CC.2.4.1.A.2		
1	Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions. Data can be modeled and used to make inferences.	What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy appropriate for a given task? Why does “what” we measure influence “how” we measure? How can data be organized and represented to provide insight into the relationship between quantities? How does the type of data influence the choice of display? How can probability and data analysis be used to make predictions?	Represent and Interpret Data	Organize, represent, and interpret data with up to three categories. Ask and answer questions about the data.	CC.2.4.1.A.4		

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 2

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
2	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Patterns exhibit relationships that can be extended, described, and generalized.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically? What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy appropriate for a given task? How can recognizing repetition or regularity assist in solving problems more efficiently?	Place Value	Understand that the three digits of a three-digit number represent amounts of hundreds, tens, and ones. Compare two three-digit numbers based on meanings of the hundreds, tens, and ones digits, using >, =, and < symbols to record the results of comparisons. Count within 1000; skip-count by 5s, 10s, and 100s. Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.	CC.2.1.2.B.1 CC.2.1.2.B.2		A.M. Addend Analog/digital Angles Bar graph Centimeter Compose Decompose Dime Dollar Equation Equivalent Estimate Even Expanded form Faces Feet Fractions – Thirds Hexagon Hundreds Inch Line plot Meter Money Nickel Odd P.M. Penny Pentagon Picture graph Place value Quadrilateral Quarter Sum
2	Mathematical relationships among numbers can be represented, compared, and communicated.	How is mathematics used to quantify, compare, represent, and model numbers?	Addition and Subtraction	Add up to four two-digit numbers using strategies based on place value and properties of operations.	CC.2.1.2.B.3		

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 2

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.	How can mathematics support effective communication? How are relationships represented mathematically? What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy appropriate for a given task?		Add and subtract within 1000. Understand that in adding or subtracting three-digit numbers, one adds or subtracts hundreds and hundreds, tens and tens, ones and ones; and sometimes it is necessary to compose or decompose tens or hundreds. Explain why addition and subtraction strategies work, using place value and the properties of operations.			
2	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Patterns exhibit relationships that can be extended, described, and generalized.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically? How can expressions, equations and inequalities be used to quantify, solve, model, and/or analyze mathematical situations? How can recognizing repetition or regularity assist in solving problems more efficiently?	Addition and Subtraction	Use addition and subtraction within 100 to solve one- and two-step word problems by using drawings and equations with a symbol for the unknown number to represent the problem. Solve word problems that call for addition of three whole numbers whose sum is less than or equal to 20. Understand subtraction as an unknown-addend problem. For example, subtract 10 – 8 by finding the number that makse 10 when added to 8. Add and subtract within 20. Use strategies such as counting on; making ten; decomposing a	CC.2.2.2.A.1		

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 2

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
				number leading to a ten; using the relationship between addition and subtraction; and creating equivalent but easier or known sums.			
2	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Patterns exhibit relationships that can be extended, described, and generalized.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically? How can expressions, equations and inequalities be used to quantify, solve, model, and/or analyze mathematical situations? How can patterns be used to describe relationships in mathematical situations?	Properties of Operations	Fluently add and subtract within 20 using mental strategies. Apply properties of operations as strategies to add and subtract (commutative property of addition; associative property of addition).	CC 2.2.2.A.2		
2	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Patterns exhibit relationships that can be extended, described, and generalized.	How is mathematics used to quantify, compare, represent, and model numbers? How are relationships represented mathematically? How can patterns be used to describe relationships in mathematical situations? How can patterns be used to describe relationships in mathematical situations?	Equal Groups of Objects	Determine whether a group of objects (up to 20) has an odd or even number of members and write an equation to express an even number as a sum of two equal addends. Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.	CC.2.2.2.A.3		
2	Patterns exhibit relationships	How can patterns be used to describe	Shape	Recognize and draw shapes	CC.2.3.2.A.1		

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 2

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	that can be extended, described, and generalized. Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.	relationships in mathematical situations? How can recognizing repetition or regularity assist in solving problems more efficiently? How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems?	Attributes	having specified attributes. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.			
2	Patterns exhibit relationships that can be extended, described, and generalized. Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.	How can patterns be used to describe relationships in mathematical situations? How can recognizing repetition or regularity assist in solving problems more efficiently? How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems? How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving? How can geometric properties and theorems be used to describe, model, and analyze situations?	Fractions	Partition circles and rectangles into two, three, or four equal shares, recognize that equal shares of identical wholes need not have the same shape.	CC.2.3.2.A.2		
2	Numerical quantities,	What does it mean to estimate or	Measuremen	Measure the length of an object	CC.2.4.2.A.1		

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 2

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Measurement attributes can be quantified, and estimated using customary and non-customary units of measure.	analyze numerical quantities? When is it is appropriate to estimate versus calculate? What makes a tool and/or strategy appropriate for a given task? Why does "what" we measure influence "how" we measure? In what ways are the mathematical attributes of objects or processes measured, calculated and/or interpreted? How precise do measurements and calculations need to be?	t	by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes. Measure the same length with different-sized units then discuss the measurement made with the smaller unit is more than the measurement made with the larger unit and vice versa. Estimate lengths using units of inches, feet, centimeters, and meters. Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.			
2	Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.	What does it mean to estimate or analyze numerical quantities? When is it is appropriate to estimate versus calculate? What makes a tool and/or strategy appropriate for a given task?	Time and Money	Tell and write time from analog and digital clocks to the nearest five minutes. Solve word problems involving dollar bills, quarters, dimes, nickels, and pennies, using $ and ¢ symbols appropriately.	CC.2.4.2.A.2		
2	Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.	What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy appropriate for a given task? How can data be organized and	Represent and Interpret Data	Make a line plot to show measurement data of the lengths of several objects to the nearest whole-number unit. Draw a picture graph and a bar graph (with single-unit scale) to	CC.2.4.2.A.3		

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 2

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions. Data can be modeled and used to make inferences.	represented to provide insight into the relationship between quantities? How does the type of data influence the choice of display? How can probability and data analysis be used to make predictions?		represent a data set with up to four categories. Solve simple put together, take-apart, and compare problems using information presented in the graph.			
2	Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Measurement attributes can be quantified, and estimated using customary and non-customary units of measure.	What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy appropriate for a given task? In what ways are the mathematical attributes of objects or processes measured, calculated and/or interpreted? How precise do measurements and calculations need to be?	Addition and Subtraction	Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units by using drawings and equations with a symbol for the unknown number to represent the problem. Represent whole numbers as lengths from 0 on a number line diagram with equally spaced points corresponding to the numbers 0, 1, 2, and represent whole-number sums and differences within 100 on a number line diagram.	CC.2.4.2.A.4		

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 3

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
3	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Patterns exhibit relationships that can be extended, described, and generalized.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically? What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy appropriate for a given task? When is it is appropriate to estimate versus calculate? How can patterns be used to describe relationships in mathematical situations?	Place Value and Properties of Operations	Perform multi-digit arithmetic. Demonstrate fluency of addition and subtraction. Round whole numbers to the nearest ten or hundred.	CC.2.1.3.B.1	M03.A-T.1.1.1 M03.A-T.1.1.2 M03.A-T.1.1.3 M03.A-T.1.1.4	Area Denominator Division Equivalent fractions Estimate Fraction Linear Liquid Volume Mass Numerator Pattern Pentagon Perimeter Pictograph Polygon Quadrilateral Rhombus Round Square Unit Tally Chart Temperature
3	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically? What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy appropriate for a given task?	Fractions	Develop an understanding of fractions as numbers. Represent fractions on a number line. Represent and generate equivalent fractions. Compare fractions with the same numerator or same denominator.	CC.2.1.3.C.1	M03.A-F.1.1.1 M03.A-F.1.1.2 M03.A-F.1.1.3 M03.A-F.1.1.4 M03.A-F.1.1.5	
3	Mathematical relationships	How is mathematics used to quantify,	Multiplication	Demonstrate an understanding	CC.2.2.3.A.1	M03.B-O.1.1.1	

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 3

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations.	compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically? How can expressions, equations and inequalities be used to quantify, solve, model, and/or analyze mathematical situations?	and Division	of properties of multiplication. Demonstrate an understanding of the relationship between multiplication and division. Demonstrate fluency.	CC.2.2.3.A.2 CC.2.2.3.A.3	M03.B-O.1.1.2 M03.B-O.1.2.1 M03.B-O.1.2.2 M03.B-O.2.1.1 M03.B-O.2.1.2 M03.B-O.2.2.1	
3	Mathematical relationships among numbers can be represented, compared, and communicated. Patterns exhibit relationships that can be extended, described, and generalized. Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions. Data can be modeled and used to make inferences.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How can patterns be used to describe relationships in mathematical situations? How can recognizing repetition or regularity assist in solving problems more efficiently? How can data be organized and represented to provide insight into the relationship between quantities? How can probability and data analysis be used to make predictions?	Patterns	Represent and solve problems. Identify and explain patterns in arithmetic (including addition and subtraction).	CC.2.2.3.A.4	M03.B-O.3.1.1 M03.B-O.3.1.2 M03.B-O.3.1.3 M03.B-O.3.1.4 M03.B-O.3.1.5 M03.B-O.3.1.6 M03.B-O.3.1.7	
3	Patterns exhibit relationships that can be extended, described, and generalized. Geometric relationships can	How can patterns be used to describe relationships in mathematical situations? How can recognizing repetition or	Two- and Three-Dimensional Figures	Identify and classify shapes and their attributes. Compare shapes.	CC.2.3.3.A.1	M03.C-G.1.1.1 M03.C-G.1.1.2	

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 3

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	be described, analyzed, and classified based on spatial reasoning and/or visualization.	regularity assist in solving problems more efficiently? How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving? How can geometric properties and theorems be used to describe, model, and analyze situations?					
3	Patterns exhibit relationships that can be extended, described, and generalized. Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.	How can patterns be used to describe relationships in mathematical situations? How can recognizing repetition or regularity assist in solving problems more efficiently? How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems? How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving? How can geometric properties and theorems be used to describe, model, and analyze situations?	Fractions and Area	Partition two-dimensional shapes into equal parts. Express the area of a partition as a unit fraction of the whole.	CC.2.3.3.A.2	M03.C-G.1.1.3	
3	Numerical quantities,	What does it mean to estimate or	Measuremen	Solve problems.	CC.2.4.3.A.1	M03.D-M.1.2.1	

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 3

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Measurement attributes can be quantified, and estimated using customary and non-customary units of measure.	analyze numerical quantities? When is it is appropriate to estimate versus calculate? What makes a tool and/or strategy appropriate for a given task? Why does "what" we measure influence "how" we measure? In what ways are the mathematical attributes of objects or processes measured, calculated and/or interpreted? How precise do measurements and calculations need to be?	t	Make estimations. Determine the area of a rectangle as it relates to multiplication and addition. Determine perimeter or side lengths of various polygons. Distinguish between linear and area measurements.	CC.2.4.3.A.5 CC.2.4.3.A.6	M03.D-M.1.2.2 M03.D-M.1.2.3 M03.D-M.3.1.1 M03.D-M.3.1.2 M03.D-M.4.1.1	
3	Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Measurement attributes can be quantified, and estimated using customary and non-customary units of measure.	What does it mean to estimate or analyze numerical quantities? When is it is appropriate to estimate versus calculate? How precise do measurements and calculations need to be?	Time	Solve problems. Make estimations. Tell and write time to nearest minute. Calculate time intervals.	CC.2.4.3.A.2	M03.D-M.1.1.1 M03.D-M.1.1.2	
3	Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Measurement attributes can be quantified, and estimated using customary and non-	What does it mean to estimate or analyze numerical quantities? When is it is appropriate to estimate versus calculate? What makes a tool and/or strategy appropriate for a given task? How precise do measurements and	Money (Coins and Bills)	Solve problems. Make estimations. Make change using combination of coins and bills.	CC.2.4.3.A.3	M03.D-M.1.3.1 M03.D-M.1.3.2 M03.D-M.1.3.3	

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 3

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	customary units of measure.	calculations need to be?					
3	Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions. Data can be modeled and used to make inferences.	What does it mean to estimate or analyze numerical quantities? When is it is appropriate to estimate versus calculate? How can data be organized and represented to provide insight into the relationship between quantities? How does the type of data influence the choice of display? How can probability and data analysis be used to make predictions? What makes a tool and/or strategy appropriate for a given task?	Data Displays	Solve problems. Make estimations. Represent and interpret data using various displays.	CC.2.4.3.A.4	M03.D-M.2.1.1 M03.D-M.2.1.2 M03.D-M.2.1.3 M03.D-M.2.1.4	

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 4

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
4	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Patterns exhibit relationships that can be extended, described, and generalized.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically? What does it mean to estimate or analyze numerical quantities? When is it is appropriate to estimate versus calculate? What makes a tool and/or strategy appropriate for a given task? How can patterns be used to describe relationships in mathematical situations?	Place Value and Properties of Operations	Demonstrate an understanding of multi-digit whole numbers. Compare and round multi-digit numbers. Perform multi-digit arithmetic.	CC.2.1.4.B.1 CC.2.1.4.B.2	M04.A-T.1.1.1 M04.A-T.1.1.2 M04.A-T.1.1.3 M04.A-T.1.1.4 M04.A-T.2.1.1 M04.A-T.2.1.2 M04.A-T.2.1.3 M04.A-T.2.1.4	Acute Angle Angle Decimal Decimal Fraction Equivalence Factor Line Line of symmetry Line Segment Mixed Number Multiple Obtuse Triangle Point Ray Right Angle Symmetry Unit Fraction Weight
4	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically? What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy appropriate for a given task?	Fractions	Demonstrate an understanding of fraction equivalence. Compare and order fractions. Solve problems involving fractions and mixed numbers.	CC.2.1.4.C.1 CC.2.1.4.C.2	M04.A-F.1.1.1 M04.A-F.1.1.2 M04.A-F.2.1.1 M04.A-F.2.1.2 M04.A-F.2.1.3 M04.A-F.2.1.4 M04.A-F.2.1.5 M04.A-F.2.1.6 M04.A-F.2.1.7	

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 4

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	and tools.						
4	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically? What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy appropriate for a given task?	Decimals	Use decimal notation for decimal fractions. Compare decimal fractions. Compare decimals.	CC.2.1.4.C.3	M04.A-F.3.1.1 M04.A-F.3.1.2 M04.A-F.3.1.3	
4	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Patterns exhibit relationships that can be extended, described, and generalized.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically? How can patterns be used to describe relationships in mathematical situations?	Number Theory	Represent and solve problems verbally as equations. Use factors to represent numbers in various ways. Recognize that a whole number is a multiple of each of its factors.	CC.2.2.4.A.1 CC.2.2.4.A.2	M04.B-O.1.1.1 M04.B-O.1.1.2 M04.B-O.1.1.3 M04.B-O.1.1.4 M04.B-O.2.1.1	
4	Mathematical relationships among numbers can be represented, compared, and communicated.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support	Patterns	Generate and analyze patterns that follow a single rule.	CC.2.2.4.A.4	M04.B-O.3.1.1 M04.B-O.3.1.2 M04.B-O.3.1.3	

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 4

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	Patterns exhibit relationships that can be extended, described, and generalized. Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions. Data can be modeled and used to make inferences.	effective communication? How can patterns be used to describe relationships in mathematical situations? How can recognizing repetition or regularity assist in solving problems more efficiently? How can data be organized and represented to provide insight into the relationship between quantities? How can probability and data analysis be used to make predictions?					
4	Patterns exhibit relationships that can be extended, described, and generalized. Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.	How can patterns be used to describe relationships in mathematical situations? How can recognizing repetition or regularity assist in solving problems more efficiently? How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems? How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving? How can geometric properties and theorems be used to describe, model,	Geometric Shapes and Figures	Draw and identify lines and angles. Classify shapes by properties of their lines and angles. Recognize symmetric shapes and draw lines of symmetry.	CC.2.3.4.A.1 CC.2.3.4.A.2 CC.2.3.4.A.3	M04.C-G.1.1.1 M04.C-G.1.1.2 M04.C-G.1.1.3	

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 4

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
		and analyze situations?					
4	Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Measurement attributes can be quantified, and estimated using customary and non-customary units of measure.	What does it mean to estimate or analyze numerical quantities? When is it is appropriate to estimate versus calculate? What makes a tool and/or strategy appropriate for a given task? Why does "what" we measure influence "how" we measure? In what ways are the mathematical attributes of objects or processes measured, calculated and/or interpreted? How precise do measurements and calculations need to be?	Measurement	Solve problems involving measurements. Convert larger unit to smaller unit. Measure and draw angles. Apply area and perimeter formulas.	CC.2.4.4.A.1 CC.2.4.4.A.6	M04.D-M.1.1.1 M04.D-M.1.1.2 M04.D-M.1.1.3 M04.D-M.1.1.4 M04.D-M.3.1.1 M04.D-M.3.1.2	
4	Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions. Data can be modeled and used to make inferences.	What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy appropriate for a given task? How can data be organized and represented to provide insight into the relationship between quantities? How does the type of data influence the choice of display? How can probability and data analysis be used to make predictions?	Data Displays	Translate one type of data display to another. Represent and interpret data involving fractions.	CC.2.4.4.A.2 CC.2.4.4.A.4	M04.D-M.2.1.3 M04.D-M.2.1.1 M04.D-M.2.1.2	

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 5

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
5	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations, and inequalities in mathematical situations. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Patterns exhibit relationships that can be extended, described, and generalized.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically? What does it mean to estimate or analyze numerical quantities? When is it is appropriate to estimate versus calculate? What makes a tool and/or strategy appropriate for a given task? How can patterns be used to describe relationships in mathematical situations?	Place Value and Properties of Operations	Demonstrate an understanding of rounding as it pertains to whole numbers and decimals. Read, write and compare decimals. Use whole numbers and decimals to compute accurately.	CC.2.1.5.B.1 CC.2.1.5.B.2	M05.A-T.1.1.1 M05.A-T.1.1.2 M05.A-T.1.1.3 M05.A-T.1.1.4 M05.A-T.1.1.5 M05.A-T.2.1.1 M05.A-T.2.1.2 M05.A-T.2.1.3	Braces Brackets Coordinate Plane Cubic Units Decimal Place Value (through thousandths) Measurement Systems Measurement Units Numerical Expressions Order of Operations Origin Parentheses Scaling (resizing) Unit Fraction Volume X-axis X-coordinate Y-axis Y-coordinate

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 5

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
5	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations, and inequalities in mathematical situations. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically? What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy appropriate for a given task?	Fractions	Add, Subtract, Multiply and Divide fractions to solve problems. Explain operations as they pertain to fractions.	CC.2.1.5.C.1 CC.2.1.5.C.2	M05.A-F.1.1.1 M05.A-F.2.1.1 M05.A-F.2.1.2 M05.A-F.2.1.3 M05.A-F.2.1.4	
5	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations, and inequalities in mathematical situations. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically? What does it mean to estimate or analyze numerical quantities? When is it is appropriate to estimate versus calculate?	Decimals	Read, write and compare decimals. Use whole numbers and decimals to compute accurately.	CC.2.1.5.B.2	M05.A-T.2.1.1 M05.A-T.2.1.2 M05.A-T.2.1.3	
5	Mathematical relationships among numbers can be represented, compared, and communicated.	How is mathematics used to quantify, compare, represent, and model numbers?	Numerical Expressions	Write and interpret numerical expressions.	CC.2.2.5.A.1	M05.B-O.1.1.1 M05.B-O.1.1.2	

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 5

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	Mathematical relationships can be represented as expressions, equations, and inequalities in mathematical situations.	How can mathematics support effective communication? How can expressions, equations, and inequalities be used to quantify, solve, model, and/or analyze mathematical situations?					
5	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations, and inequalities in mathematical situations.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How can expressions, equations, and inequalities be used to quantify, solve, model, and/or analyze mathematical situations?	Order of Operations	Evaluate expressions using the order of operations.	CC.2.2.5.A.1	M05.B-O.1.1.1 M05.B-O.1.1.2	
5	Patterns exhibit relationships that can be extended, described, and generalized. Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions. Data can be modeled and used to make inferences.	How can patterns be used to describe relationships in mathematical situations? How can recognizing repetition or regularity assist in solving problems more efficiently? How can data be organized and represented to provide insight into the relationship between quantities? How does the type of data influence the choice of display? How can probability and data analysis be used to make predictions?	Patterns	Generate, analyze and compare patterns.	CC.2.2.5.A.4	M05.B-O.1.1.2 M05.B-O.2.1.1 M05.B-O.2.1.2	
5	Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or	How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve	Coordinate Plane	Describe and interpret points given an ordered pair.	CC.2.3.5.A.1	M05.C-G.1.1.1 M05.C-G.1.1.2	

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 5

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	visualization.	problems? How can geometric properties and theorems be used to describe, model, and analyze situations?		Plot points in quadrant I. Describe and interpret points given an ordered pair. Identify parts of a coordinate grid.			
5	Patterns exhibit relationships that can be extended, described, and generalized. Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.	How can patterns be used to describe relationships in mathematical situations? How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving? How can geometric properties and theorems be used to describe, model, and analyze situations?	Two-Dimensional Figures	Classify two-dimensional figures based on their properties.	CC.2.3.5.A.2	M05.C-G.2.1.1	
5	Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.	How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems? How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving? How can geometric properties and theorems be used to describe, model, and analyze situations?	Volume and Three-Dimensional Solids	Apply concepts of volume to solve problems. Relate volume to multiplication and to addition.	CC.2.4.5.A.5	M05.D-M.3.1.1 M05.D-M.3.1.2	
5	Numerical quantities, calculations, and measurements can be	What does it mean to estimate or analyze numerical quantities?	Measurement	Solve problems using simple conversions.	CC.2.4.5.A.1	M05.D-M.1.1.1	

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 5

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	estimated or analyzed by using appropriate strategies and tools. Measurement attributes can be quantified, and estimated using customary and non-customary units of measure.	When is it is appropriate to estimate versus calculate? What makes a tool and/or strategy appropriate for a given task? Why does "what" we measure influence "how" we measure? In what ways are the mathematical attributes of objects or processes measured, calculated and/or interpreted? How precise do measurements and calculations need to be?					
5	Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions. Data can be modeled and used to make inferences.	What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy appropriate for a given task? How can data be organized and represented to provide insight into the relationship between quantities? How does the type of data influence the choice of display? How can probability and data analysis be used to make predictions?	Data Displays	Organize and display data in order to answer questions. Represent and interpret data using appropriate scale. Solve problems involving computation with fractions using information obtained from data displays.	CC.2.4.5.A.2 CC.2.4.5.A.4	M05.D-M.2.1.2 M05.D-M.2.1.1	
5	Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies	What makes a tool and/or strategy appropriate for a given task? In what ways are the mathematical attributes of objects or processes measured, calculated, and/or	Volume Three-Dimensional Solids	Apply concepts of volume to solve problems. Relate volume to multiplication and to addition.	CC.2.4.5.A.4 CC.2.4.5.A.5	M05.D-M.2.1.1 M05.D-M.3.1.1 M05.D-M.3.1.2	

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 5

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	and tools. Measurement attributes can be quantified, and estimated using customary and non-customary units of measure.	interpreted?					

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 6

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
6	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Patterns exhibit relationships that can be extended, described, and generalized.	How is mathematics used to quantify, compare, represent and model numbers? How can mathematics support effective communication? How are relationships represented mathematically? How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations? What makes a tool and/or strategy appropriate for a given task? How can patterns be used to describe relationships in mathematical situations?	Ratios, Proportions, and Percent	Represent ratio relationships in various forms. Determine unit rates in context. Interpret and compute quotients of fraction. Solve problems using ratio and rate reasoning. Convert measurement units using equivalent ratios.	CC.2.1.6.D.1 CC.2.1.6.E.1	M06.A-R.1.1.1 M06.A-R.1.1.2 M06.A-R.1.1.3 M06.A-R.1.1.4 M06.A-R.1.1.5 M06.A-R.1.1.3 M06.A-R.1.1.4 M06.A-R.1.1.5 M06.A-N.1.1.1	Absolute value Algebraic expressions Box and whisker plots Coefficient Compound polygon Dependent variable Distributive property Dot plots Exponent Greatest Common Factor Independent variable Inequality Integer Interquartile range Irregular Polygon Least Common Multiple Mean Mean absolute deviation
6	Mathematical relationships among numbers can be represented, compared, and communicated. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy appropriate for a given task?	Number Theory Concepts and Operations	Solve problems and compute fluently with whole numbers and decimals. Find common multiples and factors including greatest common factor and least common multiple. Use the distributive property to express a sum of two numbers.	CC2.1.6.E.2 CC.2.1.6.E.3	M06.A-N.2.1.1 M06.A-N.2.2.1 M06.A-N.2.2.1 M06.A-N.2.2.2	
6	Mathematical relationships among numbers can be represented, compared, and communicated.	How is mathematics used to quantify, compare, represent, and model numbers?	Integers and Other Rational Numbers	Use positive and negative numbers to represent quantities in real world contexts.	CC.2.1.6.E.4	M06.A-N.3.1.1 M06.A-N.3.1.2 M06.A-N.3.1.3 M06.A-N.3.2.1	

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 6

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.	How can mathematics support effective communication? How are relationships represented mathematically? How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations? What makes a tool and/or strategy appropriate for a given task?		Plot integers and other rational numbers on a number line and on a coordinate graph. Interpret the opposite and absolute value of an integer as its distance from zero on a number line Compare and order rational numbers.		M06.A-N.3.2.2 M06.A-N.3.2.3	
6	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Patterns exhibit relationships that can be extended, described, and generalized.	How is mathematics used to quantify, compare, represent, and model numbers? How are relationships represented mathematically? How can mathematics support effective communication? How can recognizing repetition or regularity assist in solving problems more efficiently?	Algebraic Expressions	Write, identify and evaluate numerical expressions involving exponents. Write, read and evaluate algebraic expressions. Apply the properties of operations to generate equivalent expressions.	CC.2.2.6.B.1	M06.B-E.1.1.1 M06.B-E.1.1.2 M06.B-E.1.1.3 M06.B-E.1.1.4 M06.B-E.1.1.5	
6	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically?	Algebraic Equations	Represent and analyze quantitative relationships between Independent and dependent variables. Solve and interpret one variable equations or inequalities in real world and mathematical problems.	CC.2.2.6.B.2 CC.2.2.6.B.3	M06.B-E.2.1.1 M06.B-E.2.1.2 M06.B-E.2.1.3 M06.B-E.2.1.4 M06.B-E.3.1.1 M06.B-E.3.1.2	

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 6

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	Patterns exhibit relationships that can be extended, described, and generalized. Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions.	How can expressions, equations and inequalities be used to quantify, solve, model, and/or analyze mathematical situations? How can recognizing repetition or regularity assist in solving problems more efficiently? How can data be organized and represented to provide insight into the relationship between quantities?					
6	Patterns exhibit relationships that can be extended, described, and generalized. Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.	How can recognizing repetition or regularity assist in solving problems more efficiently? How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems? How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving? How can geometric properties and theorems be used to describe, model, and analyze situations?	Area, Surface Area, and Volume	Determine the area of triangles, quadrilaterals, irregular polygons and compound polygons. Calculate the area of a polygon on a plane given the coordinates of the vertices. Find volumes of right rectangular prisms with fractional edge lengths. Use nets to find surface area of 3 – dimensional figures.	CC.2.3.6.A.1	M06.C-G.1.1.1 M06.C-G.1.1.2 M06.C-G.1.1.3 M06.C-G.1.1.4 M06.C-G.1.1.5 M06.C-G.1.1.6	
6	Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Mathematical relations and	What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy appropriate for a given task? How can data be organized and represented to provide insight into	Data and Distributions	Display data in dot plots, histograms and box-and-whisker plots. Determine quantitative measures of center and variability.	CC.2.4.6.B.1	M06.D-S.1.1.1 M06.D-S.1.1.2 M06.D-S.1.1.3 M06.D-S.1.1.4	

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 6

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	functions can be modeled through multiple representations and analyzed to raise and answer questions. Data can be modeled and used to make inferences.	the relationship between quantities? How does the type of data influence the choice of display? How can probability and data analysis be used to make predictions?		Choose the appropriate measure of center and variability for a set of data.			

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 7

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
7	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Patterns exhibit relationships that can be extended, described, and generalized.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically? How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations? What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy appropriate for a given task? How can recognizing repetition or regularity assist in solving problems more efficiently?	Ratios, Proportions, and Percent	Compute unit rates associated with ratios of fractions. Recognize and represent proportional relationships between quantities. Use proportional relationships to solve multistep ratio and percent problems.	CC.2.1.7.D.1	M07.A-R.1.1.1 M07.A-R.1.1.2 M07.A-R.1.1.3 M07.A-R.1.1.4 M07.A-R.1.1.5 M07.A-R.1.1.6	Acute triangle Adjacent angles Alternate exterior angles Alternate interior angles Chance event Circumference Complementary angles Compound event Corresponding angles Data distribution decrease Equally likely Equilateral triangle Independent event Isosceles triangle Likely event Linear expression Obtuse triangle Outcome Percent increase and Population Probability Process of chance Proportion Random sample Relative frequency Repeating decimal Scale drawing Scalene triangle
7	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as	How can mathematics support effective communication? How are relationships represented mathematically? How can expressions, equations and	Rational Numbers	Solve real-world and mathematical problems involving the four operations with rational numbers.	CC.2.1.7.E.1	M07.A-N.1.1.1 M07.A-N.1.1.2 M07.A-N.1.1.3	

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 7

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	expressions, equations and inequalities in mathematical situations. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Patterns exhibit relationships that can be extended, described, and generalized.	inequalities be used to quantify, solve, model and/or analyze mathematical situations? What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy appropriate for a given task? How can recognizing repetition or regularity assist in solving problems more efficiently?					
7	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Patterns exhibit relationships that can be extended, described, and generalized.	How is mathematics used to quantify, compare, represent, and model numbers? How are relationships represented mathematically? How can expressions, equations and inequalities be used to quantify, solve, model, and/or analyze mathematical situations? How can recognizing repetition or regularity assist in solving problems more efficiently?	Algebraic Expressions	Apply properties of operations to generate equivalent expressions.	CC.2.2.7.B.1	M07.B-E.1.1.1	
7	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented	Algebraic Equations	Model and solve real world and mathematical problems using multiple representations such as algebraic, graphical and using tables. Solve multi-step equations or inequalities with one variable.	CC.2.2.7.B.3	M07.B-E.2.1.1 M07.B-E.2.2.1 M07.B-E.2.2.2 M07.B-E.2.3.1	

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 7

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	inequalities in mathematical situations. Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions. Data can be modeled and used to make inferences.	mathematically? How can expressions, equations and inequalities be used to quantify, solve, model, and/or analyze mathematical situations? How can data be organized and represented to provide insight into the relationship between quantities? How does the type of data influence the choice of display? How can probability and data analysis be used to make predictions?		Solve and interpret multi-step real life and mathematical problems posed with positive and negative rational numbers.			
7	Patterns exhibit relationships that can be extended, described, and generalized. Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.	How can patterns be used to describe relationships in mathematical situations? How can recognizing repetition or regularity assist in solving problems more efficiently? How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems? How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving? How can geometric properties and theorems be used to describe, model,	Area, Volume, Angles, and Circumferenc e	Use properties of angle types and properties of angles formed when two parallel lines are cut by a transversal line to solve problems. Solve problems involving area and circumference of a circle(s). Solve mathematical problems involving area, volume and surface area of two- and three-dimensional objects.	CC.2.3.7.A.1	M07.C-G.2.1.1 M07.C-G.2.1.2 M07.C-G.2.2.1 M07.C-G.2.2.2	

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 7

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
		and analyze situations?					
7	Patterns exhibit relationships that can be extended, described, and generalized. Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.	How can patterns be used to describe relationships in mathematical situations? How can recognizing repetition or regularity assist in solving problems more efficiently? How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems? How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving? How can geometric properties and theorems be used to describe, model, and analyze situations?	Geometric Figures	Solve problems involving scale drawings of geometric figures. Apply the properties of all types of triangles based on angle and side measure including the triangle inequality theorem. Describe the two-dimensional figures that result from slicing three-dimensional figures.	CC.2.3.7.A.2	M07.C-G.1.1.1 M07.C-G.1.1.2 M07.C-G.1.1.3 M07.C-G.1.1.4	
7	Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Mathematical relations and functions can be modeled	What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy appropriate for a given task? How can data be organized and represented to provide insight into the relationship between quantities?	Data, Distributions, and Random Sampling	Draw inferences about two populations based on random sampling concepts. Determine and approximate relative frequencies and probabilities of events.	CC.2.4.7.B.1 CC.2.4.7.B.2	M07.D-S.1.1.1 M07.D-S.1.1.2 M07.D-S.2.1.1	

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 7

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	through multiple representations and analyzed to raise and answer questions. Data can be modeled and used to make inferences.	How does the type of data influence the choice of display? How can probability and data analysis be used to make predictions?		Draw informal comparative inferences about two populations using measures of center and measures of variability.			
7	Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Measurement attributes can be quantified, and estimated using customary and non-customary units of measure. Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions. Data can be modeled and used to make inferences.	What makes a tool and/or strategy appropriate for a given task? In what ways are the mathematical attributes of objects or processes measured, calculated and/or interpreted? How can data be organized and represented to provide insight into the relationship between quantities? How can probability and data analysis be used to make predictions?	Probability	Find probabilities of independent compound events. Predict the approximate relative frequency given the probability. Find the probability of a simple event, including the probability of a simple event not occurring.	CC.2.4.7.B.3	M07.D-S.3.1.1 M07.D-S.3.2.1 M07.D-S.3.2.2 M07.D-S.3.2.3	

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 8

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
8	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Patterns exhibit relationships that can be extended, described, and generalized.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically? How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations? What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy appropriate for a given task? How can patterns be used to describe relationships in mathematical situations?	Rational Numbers and Irrational Numbers	Distinguish between rational and irrational numbers using their properties. Convert a terminating or repeating decimal into a rational number. Use rational approximations of irrational numbers to compare the size of irrational numbers.	CC.2.1.8.E.1 CC.2.1.8.E.4	M08.A-N.1.1.1 M08.A-N.1.1.2 M08.A-N.1.1.3 M08.A-N.1.1.4 M08.A-N.1.1.5	Bivariate data Clustering Coefficient Cone Congruence Congruent figures Cube root Cylinder Dilations Function Irrational number Line of best fit Linear association Linear equation Negative correlation Non-Linear association Outlier Perfect cube Perfect square Positive correlation Pythagorean theorem Rate of change Rational number Reflection Relation Rotation Scatterplot Scientific notation Similarity Simultaneous linear equations Slope Sphere Square root Transformation Translation Two-way table y-intercept

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 8

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
8	Mathematical relationships among numbers can be represented, compared, and communicated.	How is mathematics used to quantify, compare, represent, and model numbers?	Expressions	Apply concepts of integer exponents to generate equivalent expressions. Use and evaluate square roots and cube roots to represent solutions to equations.	CC.2.2.8.B.1	M08.B-E.1.1.1 M08.B-E.1.1.2 M08.B-E.1.1.3 M08.B-E.1.1.4	
8	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions. Data can be modeled and used to make inferences.	How can mathematics support effective communication? How are relationships represented mathematically? How can expressions, equations and inequalities be used to quantify, solve, model, and/or analyze mathematical situations? How can data be organized and represented to provide insight into the relationship between quantities? How does the type of data influence the choice of display?	Linear Equations	Analyze and describe linear relationships between two variables, using slope. Make connections between slope, lines and linear equations. Interpret solutions to a linear equation and systems of two linear equations. Analyze, model and solve linear equations. Analyze and solve pairs of simultaneous equations.	CC.2.2.8.B.2 CC.2.2.8.B.3	M08.B-E.2.1.1 M08.B-E.2.1.2 M08.B-E.2.1.3 M08.B-E.3.1.1 M08.B-E.3.1.2 M08.B-E.3.1.3 M08.B-E.3.1.4 M08.B-E.3.1.5	
8	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How can expressions, equations and inequalities be used to quantify, solve, model, and/or analyze mathematical	Functions	Define, interpret, and compare functions displayed algebraically, graphically, numerically in tables, or by verbal descriptions. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its	CC.2.2.8.C.1 CC.2.2.8.C.2	M08.B-F.1.1.1 M08.B-F.1.1.2 M08.B-F.1.1.3 M08.B-F.2.1.1 M08.B-F.2.1.2	

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 8

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions. Data can be modeled and used to make inferences.	situations? How can data be organized and represented to provide insight into the relationship between quantities? How can probability and data analysis be used to make predictions?		graph or a table of values.			
8	Patterns exhibit relationships that can be extended, described, and generalized. Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.	How can patterns be used to describe relationships in mathematical situations? How can recognizing repetition or regularity assist in solving problems more efficiently? How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems? How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving? How can geometric properties and theorems be used to describe, model, and analyze situations?	Cylinders, Cones, and Spheres	Apply concepts of volume of cylinders, cones, and spheres to solve real-world and mathematical problems.	CC.2.3.8.A.1	M08.C-G.3.1.1	
8	Patterns exhibit relationships that can be extended, described, and generalized. Geometric relationships can	How can patterns be used to describe relationships in mathematical situations?	Congruence and Similarity	Use transformations to demonstrate congruence and similarity of geometric figures. Use various tools to understand	CC.2.3.8.A.2	M08.C-G.1.1.1 M08.C-G.1.1.2 M08.C-G.1.1.3 M08.C-G.1.1.4	

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	be described, analyzed, and classified based on spatial reasoning and/or visualization.	How can recognizing repetition or regularity assist in solving problems more efficiently? How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems? How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving? How can geometric properties and theorems be used to describe, model, and analyze situations?		and apply geometric transformations to geometric figures.			
8	Patterns exhibit relationships that can be extended, described, and generalized. Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.	How can recognizing repetition or regularity assist in solving problems more efficiently? How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems? How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving? How can geometric properties and	Pythagorean Theorem	Apply the Pythagorean Theorem and its converse to solve mathematical problems in two and three dimensions.	CC.2.3.8.A.3	M08.C-G.2.1.1 M08.C-G.2.1.2 M08.C-G.2.1.3	

PA Core Standards For Mathematics
Curriculum Framework
Grade Level 8

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
		theorems be used to describe, model, and analyze situations?					
8	Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions. Data can be modeled and used to make inferences.	What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy appropriate for a given task? How can data be organized and represented to provide insight into the relationship between quantities? How does the type of data influence the choice of display? How can probability and data analysis be used to make predictions?	Data and Distributions	Construct, analyze, and interpret bivariate data displayed in scatter plots. Identify and use linear models to describe bivariate measurement data. Use frequencies to analyze patterns of association seen in bivariate data.	CC.2.4.8.B.1 CC.2.4.8.B.2	M08.D-S.1.1.1 M08.D-S.1.1.2 M08.D-S.1.1.3 M08.D-S.1.2.1	

PA Core Standards For Mathematics
Curriculum Framework
Algebra 1

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
ALG 1	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Patterns exhibit relationships that can be extended, described, and generalized.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically? What does it mean to estimate or analyze numerical quantities? How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations? What makes a tool and/or strategy appropriate for a given task? How can patterns be used to describe relationships in mathematical situations?	Rational and Irrational Numbers	Represent and/or use numbers in equivalent forms (integers, fractions, decimals, percent's, square roots, exponents).	CC.2.1.HS.F.1 CC.2.1.HS.F.2	A1.1.1.1.1 A1.1.1.1.2 A1.1.1.3.1	Absolute Value Additive Inverse Additive Property of Equality Algorithm Arithmetic Sequence Associative Property Asymptote Bar Graph Binomial Bivariate Data Boundary Line Bounded Region Circle Graph Coefficient Commutative Property Composite Number Compound Event Compound Inequality Degree (of polynomial) Dependent Events Domain (of Relation or Function) Equivalent Exponential Equation Exponential Expression Exponential Function Exponential Growth/Decay Extrapolate Frequency Function Geometric Sequence Half-Plane Independent Events Independent Variable Index Interpolate

PA Core Standards For Mathematics
Curriculum Framework
Algebra 1

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
							Interquartile Range Inverse (of a Relation) Inverse Operation Maximum Value (of a Graph) Measure of Central Tendencies Measure of Dispersion Minimum Value (of a Graph) Multiplicative Inverse Multiplicative Property of Equality Multiplicative Property of Zero Mutually Exclusive Event Negative Exponent Odds Outlier Point-Slope Form Polynomial Function Positive Exponents Probability of Compound Events Quadrants Quadratic Functions Quartile Radical Expression Range Rate (of Change) Relation Repeating Decimal Scatterplot Simple Event Simplest form (of an Expression) Slope-Intercept Form

PA Core Standards For Mathematics
Curriculum Framework
Algebra 1

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
							Standard Form (of a Linear Equation) Substitution Method Systems of Linear Equations Systems of Linear Inequalities Terminating Decimal Test Point Trinomial Unbounded Region
ALG 1	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically? How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations? What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy appropriate for a given task?	Real Number System	Apply and extend the properties of exponents to solve problems with rational exponents. Apply number theory concepts to show relationships between real numbers in problem-solving settings. Use exponents, roots, and/or absolute values to solve problems.	CC.2.1.HS.F.1 CC.2.1.HS.F.2 CC.2.1.HS.F.3	A1.1.1.1.1 A1.1.1.1.2 A1.1.1.3.1 A1.1.2.1.1 A1.1.2.1.2 A1.1.2.1.3 A1.2.1.2.1 A1.2.1.2.2	
ALG 1	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented	Equations and Inequalities	Interpret solutions to linear equations and inequalities. Interpret solutions to linear systems of equations and inequalities.	CC.2.1.HS.F.3 CC.2.1.HS.F.4 CC.2.1.HS.F.5	A1.1.2.1.1 A1.1.2.1.2 A1.1.2.1.3 A1.2.1.2.1 A1.2.1.2.2 A1.1.2.2.1 A1.1.2.2.2	

PA Core Standards For Mathematics
Curriculum Framework
Algebra 1

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	expressions, equations and inequalities in mathematical situations. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.	mathematically? How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations? What makes a tool and/or strategy appropriate for a given task?				A1.1.3.1.1 A1.1.3.1.2 A1.1.3.1.3 A1.1.3.2.1 A1.1.3.2.2	
ALG 1	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication?	Polynomial and Rational Expressions	Simplify/factor expressions involving polynomials. Use polynomial identities. Perform arithmetic operations on polynomials. Apply and extend previous understandings of arithmetic to algebraic expressions.	CC.2.2.HS.D.1 CC.2.2.HS.D.2 CC.2.2.HS.D.3 CC.2.2.HS.D.5 CC.2.2.HS.D.6	A1.1.1.5.1 A1.1.1.5.2 A1.1.1.5.3	
ALG 1	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How can expressions, equations and inequalities be used to quantify, solve, model, and/or analyze mathematical situations?	Equations and Inequalities	Write, solve, and/or graph linear equations and inequalities using various methods. Write, solve, and/or graph systems of linear equations and inequalities using various methods. Use and/or identify algebraic properties.	CC.2.2.HS.C.1 CC.2.2.HS.C.2 CC.2.2.HS.C.3	A1.2.1.1.1 A1.2.1.1.2 A1.2.1.1.3 A1.2.2.1.1 A1.2.2.1.2 A1.2.2.1.3 A1.2.2.1.4 A1.2.1.2.1 A1.2.1.2.2 A1.1.2.1.1 A1.1.2.1.2 A1.1.2.1.3	
ALG 1	Mathematical relationships among numbers can be represented, compared, and	How is mathematics used to quantify, compare, represent, and model numbers?	Equations and Inequalities	Understand and apply the Pythagorean Theorem. Write, solve, and/or graph	CC.2.2.HS.C3 CC.2.2.HS.C5 CC.2.2.HS.D7 CC.2.2.HS.D9	A1.1.2.1.1 A1.1.2.1.2 A1.1.2.1.3 A1.2.1.1.1	

PA Core Standards For Mathematics
Curriculum Framework
Algebra 1

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations.	How can mathematics support effective communication? How can expressions, equations and inequalities be used to quantify, solve, model, and/or analyze mathematical situations?		compound inequalities. Write and/or identify linear equations in various forms (slope-intercept, point-slope, standard, etc.). Describe, compute, and/or use linear rate of change (slope).	CC.2.2.HS.D10	A1.2.1.1.2 A1.2.1.1.3 A1.2.1.2.1 A1.2.1.2.2 A1.2.2.1.1 A1.2.2.1.2 A1.2.2.1.3 A1.2.2.1.4 A1.1.2.2.1 A1.1.2.2.2 A1.1.3.1.1 A1.1.3.1.2 A1.1.3.1.3 A1.1.3.2.1 A1.1.3.2.2	
ALG 1	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Patterns exhibit relationships that can be extended, described, and generalized. Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions. Data can be modeled and	How is mathematics used to quantify, compare, represent, and model numbers? How are relationships represented mathematically? How can expressions, equations and inequalities be used to quantify, solve, model, and/or analyze mathematical situations? How can recognizing repetition or regularity assist in solving problems more efficiently? How can patterns be used to describe relationships in mathematical situations? How can data be organized and represented to provide insight into	Patterns, Relations, and Functions	Define, evaluate, and compare functions. Use the concept and notation of function to interpret and apply them in terms of their context. Construct and compare linear, quadratic, and exponential models and solve problems. Create a function and/or sequence that model relationships between two quantities. Create and/or analyze functions using multiple representations (graph, table, and equation). Create new functions from existing functions (transformations of graphs).	CC.2.2.HS.C.1 CC.2.2.HS.C.2 CC.2.2.HS.C.3 CC.2.2.HS.C.4 CC.2.2.HS.C.6	A1.2.1.1.1 A1.2.1.1.2 A1.2.1.1.3 A1.2.2.1.1 A1.2.2.1.2 A1.2.2.1.3 A1.2.2.1.4 A1.2.1.2.1 A1.2.1.2.2 A1.1.2.1.1 A1.1.2.1.2 A1.1.2.1.3	

PA Core Standards For Mathematics
Curriculum Framework
Algebra 1

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	used to make inferences.	the relationship between quantities? How does the type of data influence the choice of display? How can probability and data analysis be used to make predictions?					
ALG 1	Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Measurement attributes can be quantified, and estimated using customary and non-customary units of measure. Patterns exhibit relationships that can be extended, described, and generalized. Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions. Data can be modeled and used to make inferences.	In what ways are the mathematical attributes of objects or processes measured, calculated and/or interpreted? How precise do measurements and calculations need to be? How can patterns be used to describe relationships in mathematical situations? How can recognizing repetition or regularity assist in solving problems more efficiently? How can data be organized and represented to provide insight into the relationship between quantities? How does the type of data influence the choice of display? How can probability and data analysis be used to make predictions?	Categorical and Quantitative Data	Analyze a set of data for a pattern, and represent the pattern with an algebraic rule and/or a graph. Summarize, represent, and interpret single-variable data and two-variable data. Use measures of dispersion to describe a set of data (range, quartiles, interquartile range). Analyze and/or interpret data displays and/or use them to make predictions (circle graph, line graph, bar graph, box-and-whisker plot, stem-and-leaf plot, scatter plot). Make inferences and justify conclusions based on sample surveys, experiments, and observational studies.	CC.2.4.HS.B.1 CC.2.4.HS.B.2 CC.2.4.HS.B.3 CC.2.4.HS.B.5	A1.2.3.1.1 A1.2.3.2.1 A1.2.3.2.2 A1.2.3.2.3 A1.2.1.1.1 A1.2.1.1.2 A1.2.1.1.3 A1.2.1.2.1 A1.2.1.2.2 A1.2.2.2.1	
ALG 1	Numerical quantities, calculations, and measurements can be estimated or analyzed by	In what ways are the mathematical attributes of objects or processes measured, calculated and/or	Probability	Calculate and/or make predictions based upon measures of central tendency.	CC.2.4.HS.B.4 CC.2.4.HS.B.7	A1.2.3.3.1	

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	using appropriate strategies and tools. Measurement attributes can be quantified, and estimated using customary and non-customary units of measure. Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions. Data can be modeled and used to make inferences.	interpreted? How precise do measurements and calculations need to be? How can data be organized and represented to provide insight into the relationship between quantities? How does the type of data influence the choice of display? How can probability and data analysis be used to make predictions?		Apply probability to practical situations, including compound events. Recognize and evaluate random processes underlying statistical experiments Apply the rules of probability to compute probabilities of compound events in a uniform probability model.			

PA Core Standards For Mathematics
Curriculum Framework
Algebra 2

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
ALG 2	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically? How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations? What does it mean to estimate or analyze numerical quantities? What makes a tool and/or strategy appropriate for a given task?	Complex Number System	Represent and/or use imaginary numbers in equivalent forms. Simplify/evaluate expressions involving imaginary numbers. Perform arithmetic operations and apply to complex numbers.	CC.2.1.HS.F.6 CC.2.1.HS.F.7	A2.1.1.1.1 A2.1.1.1.2 A2.1.1.2.1 A2.1.1.2.2	Asymptote Binomial Combination Common Logarithm Complex Number System Compound Events Dependent/Independent Events Dilation Exponential Exponential Decay Exponential Function Exponential Growth Expression Extrema Geometric Sequence Imaginary Number Increasing/Decreasing Intervals Intercept Inverse of a Function Logarithm Natural Logarithm Negative Exponents Observational Study Outcomes Perfect Square Trinomial Permutation Polynomial Polynomial Identity Probability Quadratic Formula Quadratic Function Radical Functions Rational Functions Reflection

PA Core Standards For Mathematics
Curriculum Framework
Algebra 2

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
							Regression Models Root Functions Sample Survey Scatterplot Standard Deviation Statistical Experiment Transformation Translations Trinomial Unit Circle
ALG 2	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically? How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations? What makes a tool and/or strategy appropriate for a given task?	Polynomial and Rational Expressions	Perform arithmetic operations on polynomials. Understand the relationship between zeros and factors of polynomials. Rewrite rational expressions. Simplify/factor expressions involving polynomials.	CC.2.1.HS.F.1 CC.2.1.HS.D.1 CC.2.1.HS.D.2 CC.2.1.HS.D.3 CC.2.1.HS.D.4 CC.2.1.HS.D.5 CC.2.1.HS.D.6	A2.1.2.1.2 A2.1.3.1.2 A2.1.2.2.1 A2.1.2.2.2	
ALG 2	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How are relationships represented mathematically?	Equations and Inequalities	Create and/or solve equations (including literal, polynomial, rational, radical, exponential, and logarithmic) both algebraically and graphically. Use and/or explain reasoning while solving equations, and justify the solution method.	CC.2.1.HS.F.1 CC.2.1.HS.D.1 CC.2.1.HS.D.2	A2.1.2.1.3 A2.1.2.1.4 A2.1.2.2.2 A2.1.3.1.1 A2.1.3.1.3 A2.1.3.1.4 A2.1.3.2.1 A2.1.3.2.2 A2.2.2.1.2	

PA Core Standards For Mathematics
Curriculum Framework
Algebra 2

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	situations. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.	How can expressions, equations and inequalities be used to quantify, solve, model and/or analyze mathematical situations? What makes a tool and/or strategy appropriate for a given task?		Determine how a change in one variable relates to a change in a second variable. Use exponents, roots, and/or absolute values to represent equivalent forms or to solve problems.		A2.2.2.1.3	
ALG 2	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations.	How is mathematics used to quantify, compare, represent, and model numbers? How can mathematics support effective communication? How can expressions, equations and inequalities be used to quantify, solve, model, and/or analyze mathematical situations?	Equations and Inequalities	Create and/or solve equations (including literal, polynomial, rational, radical, exponential, and logarithmic) both algebraically and graphically. Use exponents, roots, and/or absolute values to represent equivalent forms or to solve problems. Use and/or explain reasoning while solving equations, and justify the solution method. Determine how a change in one variable relates to a change in a second variable.	CC.2.2.HS.D.7 CC.2.2.HS.D.8 CC.2.2.HS.D.9 CC.2.2.HS.D.10	A2.1.2.1.3 A2.1.2.1.4 A2.1.2.2.2 A2.1.3.1.1 A2.1.3.1.3 A2.1.3.1.4 A2.1.3.2.1 A2.1.3.2.2 A2.2.2.1.2 A2.2.2.1.3	
ALG 2	Mathematical relationships among numbers can be represented, compared, and communicated. Mathematical relationships can be represented as expressions, equations and inequalities in mathematical situations.	How is mathematics used to quantify, compare, represent, and model numbers? How are relationships represented mathematically? How can expressions, equations and inequalities be used to quantify, solve, model, and/or analyze mathematical situations?	Functions	Use the concept and notation of function to interpret and apply them in terms of their context. Using the unit circle, extend the domain of trigonometric functions to all real numbers. Interpret functions in terms of the situations they model.	CC.2.2.HS.C.1 CC.2.2.HS.C.2 CC.2.2.HS.C.3 CC.2.2.HS.C.4 CC.2.2.HS.C.5 CC.2.2.HS.C.6 CC.2.2.HS.C.7 CC.2.2.HS.C.8 CC.2.2.HS.C.9	A2.2.1.1.3 A2.2.1.1.4 A2.2.2.1.1 A2.2.2.1.2 A2.2.2.1.3 A2.2.2.1.4 A2.2.2.2.1	

PA Core Standards For Mathematics
Curriculum Framework
Algebra 2

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	Patterns exhibit relationships that can be extended, described, and generalized. Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions. Data can be modeled and used to make inferences.	How can recognizing repetition or regularity assist in solving problems more efficiently? How can patterns be used to describe relationships in mathematical situations? How can data be organized and represented to provide insight into the relationship between quantities? How does the type of data influence the choice of display? How can probability and data analysis be used to make predictions?		Use trigonometric functions to model periodic phenomena. Prove the Pythagorean identity and use it to calculate trigonometric ratios. Create and/or analyze functions using multiple representations (graph, table, and equation). Create a function and/or sequence that model a relationship between two quantities. Create new functions from existing functions (transformations and/or inverses of functions). Construct and compare linear, quadratic, exponential, and logarithmic models to solve problems.			
ALG 2	Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Measurement attributes can be quantified, and estimated using customary	What makes a tool and/or strategy appropriate for a given task? In what ways are the mathematical attributes of objects or processes measured, calculated and/or interpreted? How precise do measurements	Data	Analyze a set of data for a pattern, and represent the pattern with an algebraic rule and/or a graph. Summarize, represent, and interpret single-variable data (including standard deviation) and two-variable data.	CC.2.3.HS.B.1 CC.2.4.HS.B.2 CC.2.4.HS.B.3 CC.2.4.HS.B.4 CC.2.4.HS.B.5 CC.2.4.HS.B.6 CC.2.4.HS.B.7	A2.2.1.1.1 A2.2.1.1.2 A2.2.3.1.1 A2.2.3.1.2	

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	and non-customary units of measure. Patterns exhibit relationships that can be extended, described, and generalized. Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions. Data can be modeled and used to make inferences.	and calculations need to be? How can patterns be used to describe relationships in mathematical situations? How can recognizing repetition or regularity assist in solving problems more efficiently? How can data be organized and represented to provide insight into the relationship between quantities? How does the type of data influence the choice of display? How can probability and data analysis be used to make predictions?		Analyze and/or interpret data on a scatter plot and/or use it to make predictions (e.g., regression). Recognize and evaluate random processes underlying statistical experiments. Make inferences and justify conclusions based on sample surveys, experiments, and observational studies. Use the concepts of independence and conditional probability to interpret data.			
ALG 2	Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools. Measurement attributes can be quantified, and estimated using customary and non-customary units of measure.	What makes a tool and/or strategy appropriate for a given task? In what ways are the mathematical attributes of objects or processes measured, calculated and/or interpreted? How precise do measurements and calculations need to be?	Probability	Apply the rules of probability to compute probabilities of compound events. Calculate probability and/or odds. Use combinations, permutations, and the fundamental counting principle to solve problems involving probability.	CC.2.4.HS.F.3 CC.2.4.HS.F.5	A2.2.3.2.1 A2.2.3.2.2 A2.2.3.2.3	

PA Core Standards For Mathematics
Curriculum Framework
Algebra 2

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions. Data can be modeled and used to make inferences.	How can data be organized and represented to provide insight into the relationship between quantities? How does the type of data influence the choice of display? How can probability and data analysis be used to make predictions?					

PA Core Standards For Mathematics
Curriculum Framework
Geometry

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
GEO	Patterns exhibit relationships that can be extended, described, and generalized. Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.	How can patterns be used to describe relationships in mathematical situations? How can recognizing repetition or regularity assist in solving problems more efficiently? How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems? How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving? How can geometric properties and theorems be used to describe, model, and analyze situations?	Congruence and Similarity	Use properties of congruence, correspondence, and similarity involving 2- and 3-dimensional figures. Apply rigid transformations to determine and explain congruence. Apply non-rigid transformations to determine and explain similarity. Using various methods, write formal proofs and/or use logic statements to construct or validate arguments. Make geometric constructions. Prove geometric theorems about lines, angles, triangles, and parallelograms while focusing on validity of underlying reasoning.	CC.2.3.HS.A.1 CC.2.3.HS.A.2 CC.2.3.HS.A.3 CC.2.3.HS.A.4 CC.2.3.HS.A.5 CC.2.3.HS.A.6 CC.2.3.HS.A.11	G.1.3.1.1 G.1.3.1.2 G.1.3.2.1	Acute Angle Adjacent Angles Alternate Interior Angles Altitude Angle Angle Bisector Arc Arc Length Area Chord Circle Circumference Complementary Angles Composite Figure Compound Events Compound Figure Conditional Probability Congruence Correspondence Corresponding Angles Cylinder (Right Circular) Diameter Direct Proof Equilateral Triangle Independence Indirect Proof Isosceles Triangle Line Median Midpoint Non-rigid Transformation Obtuse Angle Parallel Parallelogram Perimeter Perpendicular

PA Core Standards For Mathematics
Curriculum Framework
Geometry

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
							Point Polyhedra Proof Proof by Contradiction Pyramid (Right) Pythagorean Identity Pythagorean Theorem Radius Ray Rectangle Regular Polygon Rhombus Right Triangle Rigid Transformation Scalene Triangle Secant Sector Segment Semicircle Similarity Slope Sphere Square Supplementary Angles Surface Area Tangent Three-Dimensional Trapezoid Trigonometric Ratios Two-Dimensional Vertical Angles Volume
GEO	Patterns exhibit relationships that can be extended, described, and generalized. Geometric relationships can be described, analyzed, and	How can patterns be used to describe relationships in mathematical situations? How can recognizing repetition or regularity assist in solving problems	Trigonometry	Define and/or apply trigonometric ratios. Solve problems involving right triangles (Pythagorean Theorem, right triangle	CC.2.3.HS.A.7 CC.2.2.HS.C.9	G.2.1.1.1 G.2.1.1.2 G.1.3.2.1	

PA Core Standards For Mathematics
Curriculum Framework
Geometry

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	classified based on spatial reasoning and/or visualization.	more efficiently? How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems? How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving? How can geometric properties and theorems be used to describe, model, and analyze situations?		trigonometry).			
GEO	Patterns exhibit relationships that can be extended, described, and generalized. Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.	How can patterns be used to describe relationships in mathematical situations? How can recognizing repetition or regularity assist in solving problems more efficiently? How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems? How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving? How can geometric properties and theorems be used to describe, model,	Circles	Identify, determine, and/or use parts of circles and segments, lines, and angles associated with circles. Extend the concept of similarity to determine arc lengths and areas of sectors. Understand and apply theorems about circles.	CC.2.3.HS.A.3 CC.2.3.HS.A.8 CC.2.3.HS.A.9	G.1.1.1.1 G.1.1.1.2 G.1.1.1.3 G.2.2.2.1 G.2.2.2.2 G.2.2.2.5	

PA Core Standards For Mathematics
Curriculum Framework
Geometry

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
		and analyze situations?					
GEO	Patterns exhibit relationships that can be extended, described, and generalized. Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.	How can patterns be used to describe relationships in mathematical situations? How can recognizing repetition or regularity assist in solving problems more efficiently? How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems? How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving? How can geometric properties and theorems be used to describe, model, and analyze situations?	Analytic Geometry	Use coordinate geometry to prove theorems algebraically. Use coordinate geometry to establish properties of 2-dimensional shapes. Apply coordinate geometry to calculate distance and/or midpoint between two points. Apply coordinate geometry to relate slope to parallel and perpendicular lines.	CC.2.3.HS.A.10 CC.2.3.HS.A.11	G.2.1.2.1 G.2.1.2.2 G.2.1.2.3	
GEO	Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.	How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems? How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving?	Measurement and Dimension	Use and/or compare measurements of angles. Use and/or develop procedures to determine, describe, or estimate measures of perimeter, circumference, area, surface area, and/or volume. Describe how a change in the linear dimension can affect perimeter, circumference, area, surface area, and/or volume. Visualize the relation between	CC.2.3.HS.A.3 CC.2.3.HS.A.8 CC.2.3.HS.A.9 CC.2.3.HS.A.12 CC.2.3.HS.A.13 CC.2.3.HS.A.14	G.2.2.1.1 G.2.2.1.2 G.2.2.2.1 G.2.2.2.2 G.2.2.2.3 G.2.2.2.4 G.2.2.2.5 G.2.2.3.1 G2.3.1.1 G2.3.1.2 G2.3.1.3 G2.3.2.1	

PA Core Standards For Mathematics
Curriculum Framework
Geometry

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
				two-and three-dimensional objects. Apply geometric concepts in modeling situations.			