PA Core Standards For Mathematics
2.3 Geometry PreK-12

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
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 problem solving? How can geometric properties and theorems be used to describe, model, and analyze situations?	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.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	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?	Shape Comparison and Composition	Use simple shapes to compose larger shapes. 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. Model shapes in the world by building shapes from components and drawing shapes.	CC.2.3.PREK.A.2		

PA Core Standards For Mathematics
2.3 Geometry PreK-12

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
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		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	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? How can geometric properties and theorems be used to describe, model, and analyze situations?	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. Model shapes in the world by building shapes from components and drawing shapes.	CC.2.3.K.A.2		
1	Patterns exhibit relationships that can be extended, described, and generalized. Geometric	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	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		Addend Addition Analog Circle Compare compose/ Cone

PA Core Standards For Mathematics
2.3 Geometry PreK-12

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.	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?					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	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		
2	Patterns exhibit relationships that can be extended, described, and generalized. Geometric relationships can be described, analyzed, and classified based	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	Shape Attributes	Recognize and draw shapes having specified attributes. Identify triangles, quadrilaterals, pentagons, hexagons, and cubes.	CC.2.3.2.A.1		A.M. Addend Analog/digital Angles Bar graph Centimeter Compose Decompose Dime Dollar

PA Core Standards For Mathematics
2.3 Geometry PreK-12

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	on spatial reasoning and/or visualization.	situations or solve problems?					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	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		
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 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	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	Area Denominator Division Equivalent fractions Estimate Fraction Linear Liquid Volume Mass Numerator Pattern Pentagon Perimeter

PA Core Standards For Mathematics
2.3 Geometry PreK-12

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
		analyze situations?					Pictograph Polygon Quadrilateral Rhombus Round Square Unit Tally Chart Temperature
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	
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	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	Acute Angle Angle Decimal Decimal Fraction Equivalence Factor Line Line of symmetry Line Segment Mixed Number Multiple Obtuse Triangle Point Ray

PA Core Standards For Mathematics
2.3 Geometry PreK-12

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
		mathematical reasoning and problem solving? How can geometric properties and theorems be used to describe, model, and analyze situations?					Right Angle Symmetry Unit Fraction Weight
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 geometric properties and theorems be used to describe, model, and analyze situations?	Coordinate Plane	Describe and interpret points given an ordered pair. Plot points in quadrant I. Describe and interpret points given an ordered pair. Identify parts of a coordinate grid.	CC.2.3.5.A.1	M05.C-G.1.1.1 M05.C-G.1.1.2	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
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	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	

PA Core Standards For Mathematics
2.3 Geometry PreK-12

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
		solving? How can geometric properties and theorems be used to describe, model, and analyze situations?					
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	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
7	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	Area, Volume, Angles, and Circumference	Use properties of angle types and properties of angles formed when two parallel lines are cut by a transversal line to solve problems.	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	Acute triangle Adjacent angles Alternate exterior angles Alternate interior

PA Core Standards For Mathematics
2.3 Geometry PreK-12

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
	Geometric relationships can be described, analyzed, and classified based on spatial reasoning and/or visualization.	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?		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.			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	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	

PA Core Standards For Mathematics
2.3 Geometry PreK-12

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
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	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
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	Congruence and Similarity	Use transformations to demonstrate congruence and similarity of geometric figures. Use various tools to understand and apply geometric transformations to geometric figures.	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	

PA Core Standards For Mathematics
2.3 Geometry PreK-12

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
		theorems be used to describe, model, and analyze situations?					Translation Two-way table y-intercept
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 theorems be used to describe, model, and analyze situations?	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	
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?	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.	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

PA Core Standards For Mathematics
2.3 Geometry PreK-12

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?		Make geometric constructions. Prove geometric theorems about lines, angles, triangles, and parallelograms while focusing on validity of underlying reasoning.			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 Point Polyhedra Proof Proof by Contradiction Pyramid (Right) Pythagorean Identity Pythagorean Theorem Radius Ray Rectangle
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?	Trigonometry	Define and/or apply trigonometric ratios. Solve problems involving right triangles (Pythagorean Theorem, right triangle trigonometry).	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	
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	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
2.3 Geometry PreK-12

Grade	Big Idea	Essential Questions	Concepts	Competencies	Standard	Eligible Content	Vocabulary
		of geometric shapes support mathematical reasoning and problem solving? How can geometric properties and theorems be used to describe, model, and analyze situations?					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 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.	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
2.3 Geometry PreK-12

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