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

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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	

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	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	

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	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	

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		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	