



InspireData™ Standards Match

PENNSYLVANIA



Academic Standards for Mathematics

Meeting curriculum standards is a major focus in education today. This document highlights the correlation of **InspireData™** with the **Pennsylvania Academic Standards for Mathematics**.

The Inspired Standards Match is designed to demonstrate the many ways InspireData supports the standards and to give educators ideas for using this tool to meet learning goals.

How to read the InspireData Standards Match:

- ▶ **Yellow** highlight indicates a standard or objective that can be supported by the use of InspireData databases, database templates, user generated databases, lesson plans or program features.
- ▶ **Green** notes list details about how InspireData can be used to meet the standards, including examples of specific databases, lesson plans or features that support them.

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Academic Standards for Mathematics



Pennsylvania Department of Education

Academic Standards For Mathematics

V. INTRODUCTION

This document includes Mathematics Standards:

- ◇ 2.1. Numbers, Number Systems and Number Relationships
- ◇ 2.2. Computation and Estimation
- ◇ 2.3. Measurement and Estimation
- ◇ 2.4. Mathematical Reasoning and Connections
- ◇ 2.5. Mathematical Problem Solving and Communication
- ◇ 2.6. Statistics and Data Analysis
- ◇ 2.7. Probability and Predictions
- ◇ 2.8. Algebra and Functions
- ◇ 2.9. Geometry
- ◇ 2.10. Trigonometry
- ◇ 2.11. Concepts of Calculus


The Mathematics Standards describe what students should know and be able to do at four grade levels (third, fifth, eighth and eleventh). They reflect the increasing complexity and sophistication that students are expected to achieve as they progress through school.

This document avoids repetition of learned skills, making an obvious progression across grade levels less explicit. Teachers shall expect that students know and can apply the concepts and skills expressed at the preceding level. Consequently, previous learning is reinforced but not retaught.

Students who achieve these mathematical standards will be able to communicate mathematically. Although it is an interesting and enjoyable study for its own sake, mathematics is most appropriately used as a tool to help organize and understand information from other academic disciplines. Because our capacity to deal with all things mathematical is changing rapidly, students must be able to bring the most modern and effective technology to bear on their learning of mathematical concepts and skills.

A glossary is included to assist the reader in understanding terminology contained in the standards.


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2.1. Numbers, Number Systems and Number Relationships			
2.1.3. GRADE 3	2.1.5. GRADE 5	2.1.8. GRADE 8	2.1.11. GRADE 11
<i>Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:</i>			
<ul style="list-style-type: none"> A. Count using whole numbers (to 10,000) and by 2's, 3's, 5's, 10's, 25's and 100's. B. Use whole numbers and fractions to represent quantities. C. Represent equivalent forms of the same number through the use of concrete objects, drawings, word names and symbols. D. Use drawings, diagrams or models to show the concept of fraction as part of a whole. E. Count, compare and make change using a collection of coins and one-dollar bills. F. Apply number patterns (even and odd) and compare values of numbers on the hundred board. G. Use concrete objects to count, order and group. H. Demonstrate an understanding of one-to-one correspondence. 	<ul style="list-style-type: none"> A. Use expanded notation to represent whole numbers or decimals. B. Apply number theory concepts to rename a number quantity (e.g., six, $6\frac{12}{2}$, 3×2, $10 - 4$). C. Demonstrate that mathematical operations can represent a variety of problem situations. <li style="background-color: yellow;">D. Use models to represent fractions and decimals.  E. Explain the concepts of prime and composite numbers. F. Use simple concepts of negative numbers (e.g., on a number line, in counting, in temperature). G. Develop and apply number theory concepts (e.g., primes, factors, multiples, composites) to represent numbers in various ways. 	<ul style="list-style-type: none"> A. Represent and use numbers in equivalent forms (e.g., integers, fractions, decimals, percents, exponents, scientific notation, square roots). B. Simplify numerical expressions involving exponents, scientific notation and using order of operations. C. Distinguish between and order rational and irrational numbers. D. Apply ratio and proportion to mathematical problem situations involving distance, rate, time and similar triangles. E. Simplify and expand algebraic expressions using exponential forms. F. Use the number line model to demonstrate integers and their applications. G. Use the inverse relationships between addition, subtraction, multiplication, division, exponentiation and root extraction to determine unknown quantities in equations. 	<ul style="list-style-type: none"> A. Use operations (e.g., opposite, reciprocal, absolute value, raising to a power, finding roots, finding logarithms).

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<p>I. Apply place-value concepts and numeration to counting, ordering and grouping.</p> <p>J. Estimate, approximate, round or use exact numbers as appropriate.</p> <p>K. Describe the inverse relationship between addition and subtraction.</p> <p>L. Demonstrate knowledge of basic facts in four basic operations.</p>			
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2.2. Computation and Estimation			
2.2.3. GRADE 3	2.2.5. GRADE 5	2.2.8. GRADE 8	2.2.11. GRADE 11
<i>Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:</i>			
<ul style="list-style-type: none"> A. Apply addition and subtraction in everyday situations using concrete objects. B. Solve single- and double-digit addition and subtraction problems with regrouping in vertical form. C. Demonstrate the concept of multiplication as repeated addition and arrays. D. Demonstrate the concept of division as repeated subtraction and as sharing. E. Use estimation skills to arrive at conclusions. F. Determine the reasonableness of calculated answers. G. Explain addition and subtraction algorithms with regrouping. 	<ul style="list-style-type: none"> A. Create and solve word problems involving addition, subtraction, multiplication and division of whole numbers. B. Develop and apply algorithms to solve word problems that involve addition, subtraction, and/or multiplication with decimals with and without regrouping. C. Develop and apply algorithms to solve word problems that involve addition, subtraction, and/or multiplication with fractions and mixed numbers that include like and unlike denominators. D. Demonstrate the ability to round numbers. E. Determine through estimations the reasonableness of answers to problems involving addition, subtraction, multiplication and division of whole numbers. F. Demonstrate skills for using fraction calculators to verify conjectures, confirm computations and explore complex problem-solving situations. 	<ul style="list-style-type: none"> A. Complete calculations by applying the order of operations. B. Add, subtract, multiply and divide different kinds and forms of rational numbers including integers, decimal fractions, percents and proper and improper fractions. C. Estimate the value of irrational numbers. D. Estimate amount of tips and discounts using ratios, proportions and percents. E. Determine the appropriateness of overestimating or underestimating in computation. F. Identify the difference between exact value and approximation and determine which is appropriate for a given situation. 	<ul style="list-style-type: none"> A. Develop and use computation concepts, operations and procedures with real numbers in problem-solving situations. B. Use estimation to solve problems for which an exact answer is not needed. C. Construct and apply mathematical models, including lines and curves of best fit, to estimate values of related quantities.  D. Describe and explain the amount of error that may exist in a computation using estimates. E. Recognize that the degree of precision needed in calculating a number depends on how the results will be used and the instruments used to generate the measure. F. Demonstrate skills for using computer spreadsheets and scientific and graphing calculators.

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	<p>G. Apply estimation strategies to a variety of problems including time and money.</p> <p>H. Explain multiplication and division algorithms.</p> <p>I. Select a method for computation and explain why it is appropriate.</p>		
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2.3. Measurement and Estimation			
2.3.3. GRADE 3	2.3.5. GRADE 5	2.3.8. GRADE 8	2.3.11. GRADE 11
<i>Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:</i>			
<p>A. Compare measurable characteristics of different objects on the same dimensions (e.g., time, temperature, area, length, weight, capacity, perimeter).</p> <p>B. Determine the measurement of objects with non-standard and standard units (e.g., US customary and metric).</p> <p>C. Determine and compare elapsed times.</p> <p>D. Tell time (analog and digital) to the minute.</p> <p>E. Determine the appropriate unit of measure.</p> <p>F. Use concrete objects to determine area and perimeter.</p> <p>G. Estimate and verify measurements.</p> <p>Demonstrate that a single object has different attributes that can be measured in different ways (e.g., length, mass, weight, time, area, temperature, capacity, perimeter).</p>	<p>A. Select and use appropriate instruments and units for measuring quantities (e.g., perimeter, volume, area, weight, time, temperature).</p> <p>B. Select and use standard tools to measure the size of figures with specified accuracy, including length, width, perimeter and area.</p> <p>C. Estimate, refine and verify specified measurements of objects.</p> <p>D. Convert linear measurements within the same system.</p> <p>E. Add and subtract measurements.</p> <div style="text-align: center; margin-top: 20px;"></div>	<p>A. Develop formulas and procedures for determining measurements (e.g., area, volume, distance).</p> <p>B. Solve rate problems (e.g., rate \times time = distance, principal \times interest rate = interest).</p> <p>C. Measure angles in degrees and determine relations of angles.</p> <p>D. Estimate, use and describe measures of distance, rate, perimeter, area, volume, weight, mass and angles.</p> <p>E. Describe how a change in linear dimension of an object affects its perimeter, area and volume.</p> <p>F. Use scale measurements to interpret maps or drawings.</p> <p>G. Create and use scale models.</p> <div style="text-align: center; margin-top: 20px;"></div>	<p>A. Select and use appropriate units and tools to measure to the degree of accuracy required in particular measurement situations. </p> <p>B. Measure and compare angles in degrees and radians.</p> <p>C. Demonstrate the ability to produce measures with specified levels of precision.</p>

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2.4. Mathematical Reasoning and Connections

2.4.3. GRADE 3	2.4.5. GRADE 5	2.4.8. GRADE 8	2.4.11. GRADE 11
<p><i>Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:</i></p>			
<p>A. Make, check and verify predictions about the quantity, size and shape of objects and groups of objects.</p> <p>B. Use measurements in everyday situations (e.g., determine the geography of the school building).</p>	<p>A. Compare quantities and magnitudes of numbers.</p> <p>B. Use models, number facts, properties and relationships to check and verify predictions and explain reasoning.</p> <p>C. Draw inductive and deductive conclusions within mathematical contexts.</p> <p>D. Distinguish between relevant and irrelevant information in a mathematical problem.</p> <p>E. Interpret statements made with precise language of logic (e.g., “all”, “or”, “every”, “none”, “some”, “or”, “many”).</p> <p>F. Use statistics to quantify issues (e.g., in social studies, in science). </p>	<p>A. Make conjectures based on logical reasoning and test conjectures by using counter-examples.</p> <p>B. Combine numeric relationships to arrive at a conclusion.</p> <p>C. Use if...then statements to construct simple, valid arguments.</p> <p>D. Construct, use and explain algorithmic procedures for computing and estimating with whole numbers, fractions, decimals and integers.</p> <p>E. Distinguish between inductive and deductive reasoning.</p> <p>F. Use measurements and statistics to quantify issues (e.g., in family, consumer science situations). </p>	<p>A. Use direct proofs, indirect proofs or proof by contradiction to validate conjectures.</p> <p>B. Construct valid arguments from stated facts.</p> <p>C. Determine the validity of an argument.</p> <p>D. Use truth tables to reveal the logic of mathematical statements.</p> <p>E. Demonstrate mathematical solutions to problems (e.g., in the physical sciences).</p>

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2.5. Mathematical Problem Solving and Communication

2.5.3. GRADE 3	2.5.5. GRADE 5	2.5.8. GRADE 8	2.5.11. GRADE 11
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Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:

<p>A. Use appropriate problem-solving strategies (e.g., guess and check, working backwards).</p> <p>B. Determine when sufficient information is present to solve a problem and explain how to solve a problem.</p> <p>C. Select and use an appropriate method, materials and strategy to solve problems, including mental mathematics, paper and pencil and concrete objects.</p>	<p>A. Develop a plan to analyze a problem, identify the information needed to solve the problem, carry out the plan, check whether an answer makes sense and explain how the problem was solved.</p> <p>B. Use appropriate mathematical terms, vocabulary, language symbols and graphs to explain clearly and logically solutions to problems.</p> <p>C. Show ideas in a variety of ways, including words, numbers, symbols, pictures, charts, graphs, tables, diagrams and models.</p> <p>D. Connect, extend and generalize problem solutions to other concepts, problems and circumstances in mathematics.</p> <p>E. Select, use and justify the methods, materials and strategies used to solve problems.</p> <p>F. Use appropriate problem-solving strategies (e.g., solving a simpler problem, drawing a picture or diagram).</p>	<p>A. Invent, select, use and justify the appropriate methods, materials and strategies to solve problems.</p> <p>B. Verify and interpret results using precise mathematical language, notation and representations, including numerical tables and equations, simple algebraic equations and formulas, charts, graphs and diagrams.</p> <p>C. Justify strategies and defend approaches used and conclusions reached.</p> <p>D. Determine pertinent information in problem situations and whether any further information is needed for solution.</p>	<p>A. Select and use appropriate mathematical concepts and techniques from different areas of mathematics and apply them to solving non-routine and multi-step problems.</p> <p>B. Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.</p> <p>C. Present mathematical procedures and results clearly, systematically, succinctly and correctly.</p> <p>D. Conclude a solution process with a summary of results and evaluate the degree to which the results obtained represent an acceptable response to the initial problem and why the reasoning is valid.</p>
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2.6. Statistics and Data Analysis			
2.6.3. GRADE 3	2.6.5. GRADE 5	2.6.8. GRADE 8	2.6.11. GRADE 11
<i>Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:</i>			
<p>A. Gather, organize and display data using pictures, tallies, charts, bar graphs and pictographs.</p> <p>B. Formulate and answer questions based on data shown on graphs.</p> <p>C. Predict the likely number of times a condition will occur based on analyzed data.</p> <p>D. Form and justify an opinion on whether a given statement is reasonable based on a comparison to data.</p>	<p>A. Organize and display data using pictures, tallies, tables, charts, bar graphs and circle graphs. </p> <p>B. Describe data sets using mean, median, mode and range. </p> <p>C. Sort data using Venn diagrams.</p> <p>D. Predict the likely number of times a condition will occur based on analyzed data. </p> <p>E. Construct and defend simple conclusions based on data. </p>	<p>A. Compare and contrast different plots of data using values of mean, median, mode, quartiles and range.</p> <p>B. Explain effects of sampling procedures and missing or incorrect information on reliability.</p> <p>C. Fit a line to the scatter plot of two quantities and describe any correlation of the variables.</p> <p>D. Design and carry out a random sampling procedure.</p> <p>E. Analyze and display data in stem-and-leaf and box-and-whisker plots.</p> <p>F. Use scientific and graphing calculators and computer spreadsheets to organize and analyze data.</p> <p>G. Determine the validity of the sampling method described in studies published in local or national newspapers. </p>	<p>A. Design and conduct an experiment using random sampling. Describe the data as an example of a distribution using statistical measures of center and spread. Organize and represent the results with graphs. (Use standard deviation, variance and t-tests.) </p> <p>B. Use appropriate technology to organize and analyze data taken from the local community. </p> <p>C. Determine the regression equation of best fit (e.g., linear, quadratic, exponential).</p> <p>D. Make predictions using interpolation, extrapolation, regression and estimation using technology to verify them. </p> <p>E. Determine the validity of the sampling method described in a given study.</p> <p>F. Determine the degree of dependence of two quantities specified by a two-way table.</p>

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			<p>G. Describe questions of experimental design, control groups, treatment groups, cluster sampling and reliability.</p> <p>H. Use sampling techniques to draw inferences about large populations. </p> <p>I. Describe the normal curve and use its properties to answer questions about sets of data that are assumed to be normally distributed.</p>
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2.7. Probability and Predictions			
2.7.3. GRADE 3	2.7.5. GRADE 5	2.7.8. GRADE 8	2.7.11. GRADE 11
<i>Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills needed to:</i>			
<p>A. Predict and measure the likelihood of events and recognize that the results of an experiment may not match predicted outcomes.</p> <p>B. Design a fair and an unfair spinner.</p> <p>C. List or graph the possible results of an experiment.</p> <p>D. Analyze data using the concepts of largest, smallest, most often, least often and middle.</p>	<p>A. Perform simulations with concrete devices (e.g., dice, spinner) to predict the chance of an event occurring.</p> <p>B. Determine the fairness of the design of a spinner.</p> <p>C. Express probabilities as fractions and decimals.</p> <p>D. Compare predictions based on theoretical probability and experimental results.</p> <p>E. Calculate the probability of a simple event.</p> <p>F. Determine patterns generated as a result of an experiment.</p> <p>G. Determine the probability of an event involving “and”, “or” or “not”.</p> <p>H. Predict and determine why some outcomes are certain, more likely, less likely, equally likely or impossible.</p> <div style="text-align: center;"></div>	<p>A. Determine the number of combinations and permutations for an event.</p> <p>B. Present the results of an experiment using visual representations (e.g., tables, charts, graphs).</p> <p>C. Analyze predictions (e.g., election polls).</p> <p>D. Compare and contrast results from observations and mathematical models.</p> <p>E. Make valid inferences, predictions and arguments based on probability.</p> <div style="text-align: center;"></div>	<p>A. Compare odds and probability.</p> <p>B. Apply probability and statistics to perform an experiment involving a sample and generalize its results to the entire population.</p> <p>C. Draw and justify a conclusion regarding the validity of a probability or statistical argument.</p> <p>D. Use experimental and theoretical probability distributions to make judgments about the likelihood of various outcomes in uncertain situations.</p> <p>E. Solve problems involving independent simple and compound events.</p> <div style="text-align: center;"></div>

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| | <p>I. Find all possible combinations and arrangements involving a limited number of variables.</p> <p>J. Develop a tree diagram and list the elements.</p> | | |
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2.8. Algebra and Functions			
2.8.3. GRADE 3	2.8.5. GRADE 5	2.8.8. GRADE 8	2.8.11. GRADE 11
<p><i>Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:</i></p>			
<p>A. Recognize, describe, extend, create and replicate a variety of patterns including attribute, activity, number and geometric patterns.</p> <p>B. Use concrete objects and trial and error to solve number sentences and check if solutions are sensible and accurate.</p> <p>C. Substitute a missing addend in a number sentence.</p> <p>D. Create a story to match a given combination of symbols and numbers.</p> <p>E. Use concrete objects and symbols to model the concepts of variables, expressions, equations and inequalities.</p> <p>F. Explain the meaning of solutions and symbols.</p> <p>G. Use a table or a chart to display information.</p> <p>H. Describe and interpret the data shown in tables and charts.</p> <p>I. Demonstrate simple function rules.</p>	<p>A. Recognize, reproduce, extend, create and describe patterns, sequences and relationships verbally, numerically, symbolically and graphically, using a variety of materials. </p> <p>B. Connect patterns to geometric relations and basic number skills.</p> <p>C. Form rules based on patterns (e.g., an equation that relates pairs in a sequence).</p> <p>D. Use concrete objects and combinations of symbols and numbers to create expressions that model mathematical situations.</p> <p>E. Explain the use of combinations of symbols and numbers in expressions, equations and inequalities.</p> <p>F. Describe a realistic situation using information given in equations, inequalities, tables or graphs.</p> <p>G. Select and use appropriate strategies, including concrete materials, to solve number sentences and explain the method of solution.</p>	<p>A. Apply simple algebraic patterns to basic number theory and to spatial relations</p> <p>B. Discover, describe and generalize patterns, including linear, exponential and simple quadratic relationships.</p> <p>C. Create and interpret expressions, equations or inequalities that model problem situations.</p> <p>D. Use concrete objects to model algebraic concepts.</p> <p>E. Select and use a strategy to solve an equation or inequality, explain the solution and check the solution for accuracy.</p> <p>F. Solve and graph equations and inequalities using scientific and graphing calculators and computer spreadsheets.</p> <p>G. Represent relationships with tables or graphs in the coordinate plane and verbal or symbolic rules. </p>	<p>A. Analyze a given set of data for the existence of a pattern and represent the pattern algebraically and graphically.</p> <p>B. Give examples of patterns that occur in data from other disciplines.</p> <p>C. Use patterns, sequences and series to solve routine and non-routine problems.</p> <p>D. Formulate expressions, equations, inequalities, systems of equations, systems of inequalities and matrices to model routine and non-routine problem situations.</p> <p>E. Use equations to represent curves (e.g., lines, circles, ellipses, parabolas, hyperbolas).</p> <p>F. Identify whether systems of equations and inequalities are consistent or inconsistent.</p> <p>G. Analyze and explain systems of equations, systems of inequalities and matrices.</p>

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<p>J. Analyze simple functions and relationships and locate points on a simple grid.</p>	<p>H. Locate and identify points on a coordinate system.</p> <p>I. Generate functions from tables of data and relate data to corresponding graphs and functions. </p>	<p>H. Graph a linear function from a rule or table.</p> <p>I. Generate a table or graph from a function and use graphing calculators and computer spreadsheets to graph and analyze functions.</p> <p>J. Show that an equality relationship between two quantities remains the same as long as the same change is made to both quantities; explain how a change in one quantity determines another quantity in a functional relationship. </p>	<p>H. Select and use an appropriate strategy to solve systems of equations and inequalities using graphing calculators, symbol manipulators, spreadsheets and other software.</p> <p>I. Use matrices to organize and manipulate data, including matrix addition, subtraction, multiplication and scalar multiplication.</p> <p>J. Demonstrate the connection between algebraic equations and inequalities and the geometry of relations in the coordinate plane.</p> <p>K. Select, justify and apply an appropriate technique to graph a linear function in two variables, including slope-intercept, x- and y-intercepts, graphing by transformations and the use of a graphing calculator.</p> <p>L. Write the equation of a line when given the graph of the line, two points on the line, or the slope of the line and a point on the line.</p> <p>M. Given a set of data points, write an equation for a line of best fit.</p> <p>N. Solve linear, quadratic and exponential equations both symbolically and graphically. </p>
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			<p>O. Determine the domain and range of a relation, given a graph or set of ordered pairs.</p> <p>P. Analyze a relation to determine whether a direct or inverse variation exists and represent it algebraically and graphically.</p> <p>Q. Represent functional relationships in tables, charts and graphs.</p> <p>R. Create and interpret functional models.</p> <p>S. Analyze properties and relationships of functions (e.g., linear, polynomial, rational, trigonometric, exponential, logarithmic).</p> <p>T. Analyze and categorize functions by their characteristics.</p> 
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2.9. Geometry			
2.9.3. GRADE 3	2.9.5. GRADE 5	2.9.8. GRADE 8	2.9.11. GRADE 11
<i>Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:</i>			
<ul style="list-style-type: none"> A. Name and label geometric shapes in two and three dimensions (e.g., circle/sphere, square/cube, triangle/pyramid, rectangle/prism). B. Build geometric shapes using concrete objects (e.g., manipulatives). C. Draw two- and three-dimensional geometric shapes and construct rectangles, squares and triangles on the geoboard and on graph paper satisfying specific criteria. D. Find and describe geometric figures in real life. E. Identify and draw lines of symmetry in geometric figures. F. Identify symmetry in nature. G. Fold paper to demonstrate the reflections about a line. H. Show relationships between and among figures using reflections. 	<ul style="list-style-type: none"> A. Give formal definitions of geometric figures. B. Classify and compare triangles and quadrilaterals according to sides or angles. C. Identify and measure circles, their diameters and their radii. D. Describe in words how geometric shapes are constructed. E. Construct two- and three-dimensional shapes and figures using manipulatives, geoboards and computer software. F. Find familiar solids in the environment and describe them. G. Create an original tessellation. H. Describe the relationship between the perimeter and area of triangles, quadrilaterals and circles. I. Represent and use the concepts of line, point and plane. 	<ul style="list-style-type: none"> A. Construct figures incorporating perpendicular and parallel lines, the perpendicular bisector of a line segment and an angle bisector using computer software. B. Draw, label, measure and list the properties of complementary, supplementary and vertical angles. C. Classify familiar polygons as regular or irregular up to a decagon. D. Identify, name, draw and list all properties of squares, cubes, pyramids, parallelograms, quadrilaterals, trapezoids, polygons, rectangles, rhombi, circles, spheres, triangles, prisms and cylinders. E. Construct parallel lines, draw a transversal and measure and compare angles formed (e.g., alternate interior and exterior angles). F. Distinguish between similar and congruent polygons. 	<ul style="list-style-type: none"> A. Construct geometric figures using dynamic geometry tools (e.g., Geometer's Sketchpad, Cabri Geometre). B. Prove that two triangles or two polygons are congruent or similar using algebraic, coordinate and deductive proofs. C. Identify and prove the properties of quadrilaterals involving opposite sides and angles, consecutive sides and angles and diagonals using deductive proofs. D. Identify corresponding parts in congruent triangles to solve problems. E. Solve problems involving inscribed and circumscribed polygons. F. Use the properties of angles, arcs, chords, tangents and secants to solve problems involving circles. G. Solve problems using analytic geometry.




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<p>I. Predict how shapes can be changed by combining or dividing them.</p>	<p>J. Define the basic properties of squares, pyramids, parallelograms, quadrilaterals, trapezoids, polygons, rectangles, rhombi, circles, triangles, cubes, prisms, spheres and cylinders.</p> <p>K. Analyze simple transformations of geometric figures and rotations of line segments.</p> <p>L. Identify properties of geometric figures (e.g., parallel, perpendicular, similar, congruent, symmetrical).</p>	<p>G. Approximate the value of π (pi) through experimentation.</p> <p>H. Use simple geometric figures (e.g., triangles, squares) to create, through rotation, transformational figures in three dimensions.</p> <p>I. Generate transformations using computer software.</p> <p>J. Analyze geometric patterns (e.g., tessellations, sequences of shapes) and develop descriptions of the patterns.</p> <p>K. Analyze objects to determine whether they illustrate tessellations, symmetry, congruence, similarity and scale.</p>	<p>H. Construct a geometric figure and its image using various transformations.</p> <p>I. Model situations geometrically to formulate and solve problems.</p> <p>J. Analyze figures in terms of the kinds of symmetries they have.</p>
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2.10. Trigonometry			
2.10.3. GRADE 3	2.10.5. GRADE 5	2.10.8. GRADE 8	2.10.11. GRADE 11
<i>Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:</i>			
<ul style="list-style-type: none"> A. Identify right angles in the environment. B. Model right angles and right triangles using concrete objects. 	<ul style="list-style-type: none"> A. Identify and compare parts of right triangles, including right angles, acute angles, hypotenuses and legs. B. Create right triangles on a geoboard. 	<ul style="list-style-type: none"> A. Compute measures of sides and angles using proportions, the Pythagorean Theorem and right triangle relationships. B. Solve problems requiring indirect measurement for lengths of sides of triangles. 	<ul style="list-style-type: none"> A. Use graphing calculators to display periodic and circular functions; describe properties of the graphs. B. Identify, create and solve practical problems involving right triangles using the trigonometric functions and the Pythagorean Theorem.

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2.11. Concepts of Calculus			
2.11.3. GRADE 3	2.11.5. GRADE 5	2.11.8. GRADE 8	2.11.11. GRADE 11
<i>Pennsylvania's public schools shall teach, challenge and support every student to realize his or her maximum potential and to acquire the knowledge and skills to:</i>			
<ul style="list-style-type: none"> A. Identify whole number quantities and measurements from least to most and greatest value. B. Identify least and greatest values represented in bar graphs and pictographs. C. Categorize rates of change as faster and slower. D. Continue a pattern of numbers or objects that could be extended infinitely. 	<ul style="list-style-type: none"> A. Make comparisons of numbers (e.g., more, less, same, least, most, greater than, less than). B. Identify least and greatest values represented in bar and circle graphs.  C. Identify maximum and minimum. D. Describe the relationship between rates of change and time. E. Estimate areas and volumes as the sums of areas of tiles and volumes of cubes. F. Describe the relationship between the size of the unit of measurement and the estimate of the areas and volumes. 	<ul style="list-style-type: none"> A. Analyze graphs of related quantities for minimum and maximum values and justify the findings. B. Describe the concept of unit rate, ratio and slope in the context of rate of change. C. Continue a pattern of numbers or objects that could be extended infinitely.  	<ul style="list-style-type: none"> A. Determine maximum and minimum values of a function over a specified interval. B. Interpret maximum and minimum values in problem situations.  C. Graph and interpret rates of growth/decay. D. Determine sums of finite sequences of numbers and infinite geometric series. E. Estimate areas under curves using sequences of areas.