

Cape Elizabeth School Department  
K – 12 Math Curriculum Secondary Goals

May, 2010

**K-4 Math Secondary Learning Goals**

	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
<b>Priority/Mastery Knowledge and Skills</b>					
<b>NUMBER SENSE</b>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Use manipulatives to identify and model odd and even numbers</li> <li>Demonstrate proficiency with addition and subtraction facts through 10</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Add and subtract two digit numbers</li> <li>Find equivalent names for numbers (tallies, arrays, numerical expressions)</li> <li>Shade a specific fractional part of a region and name the part</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Compare and order numbers to one million</li> <li>Add and subtract multi-digit numbers</li> <li>Use a variety of strategies to compute multiplication facts through <math>10 * 10</math></li> <li>Solve addition and subtraction number stories</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Compare large numbers</li> <li>Solve addition and subtraction facts</li> <li>Estimate sums, differences, and products</li> <li>Read, write, and order fractions</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Use expanded notation to represent whole numbers</li> <li>Place positive and negative numbers on a number line and determine the distance between them</li> </ul>
<b>DATA</b>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Know and compare the value of pennies, nickels, dimes, quarters, and dollar bills</li> <li>Use a calendar to identify days, weeks, months, and dates</li> <li>Tell the time to the nearest half and quarter hour using an analog clock</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Use equivalent coins to show amounts of money in different ways</li> <li>Measure lengths to the nearest inch and centimeter</li> <li>Compare quantities using a bar graph</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Measure lengths to the nearest half-inch and half centimeter</li> <li>Tell the time to the nearest minute using an analog clock</li> <li>Interpret graphs to ask and answer simple questions</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Collect and organize data and use data to create charts, tables and graphs</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Read, construct, and interpret line graphs</li> </ul>
<b>GEOMETRY</b>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Identify shapes having lines of symmetry</li> <li>Identify two dimensional shapes</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Identify three dimensional shapes</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Create two dimensional symmetrical shapes</li> <li>Locate lines of symmetry</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Name and draw polygons</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Identify, describe and classify solid figures</li> <li>Identify acute, obtuse, and straight angles</li> </ul>
<b>ALGEBRA</b>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Describe some simple patterns</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Use less-than, greater-than, and equal symbols to compare numbers</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Use addition, subtraction, multiplication, division, less-than, greater-than, and equal symbols to represent and analyze numerical relationships</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Write number sentences to model number stories</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Create and evaluate simple expressions</li> </ul>

5-8 Math Secondary Learning Goals

	Grade 5	Grade 6	Rational Math	Transition Math, Part 1
<p><b>Priority/Mastery Knowledge and Skills</b></p> <p><b>NUMBER SENSE</b></p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>• Apply the order of operations to simplify expressions</li> <li>• Identify prime and composite numbers</li> <li>• Multiply a fraction by a whole number</li> <li>• Multiply and divide decimals to the third place</li> <li>• Convert fractions/decimals/percents</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>• Investigate the property that every integer greater than one can be expressed as a unique product of prime numbers</li> <li>• Investigate multiplication and division of fractions</li> <li>• Investigate division “by” a decimal number</li> <li>• Investigate the concept of square root and pi</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>• Apply the order of operations to simplify expressions</li> <li>• Add, subtract, multiply and divide positive and negative numbers</li> <li>• Use a calculator to perform arithmetic operations and solve problems involving rational numbers</li> <li>• Find percents of quantities in various given situations</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>• Use the <b>Putting-Together</b> and <b>Slide</b> models for addition to form sentence involving addition</li> <li>• Use the <b>Take-Away</b> and <b>Comparison</b> models for subtraction to form sentences involving subtraction</li> <li>• Know and apply the <b>Substitution Principle</b></li> <li>• Memorize common fractions to sixteenths</li> <li>• Use the equal fractions property to rewrite equivalent fractions</li> <li>• Convert word names to decimals</li> </ul>
<p><b>DATA</b></p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>• Begin to use appropriate tools to measure capacity and mass</li> <li>• Be introduced to problems related to probability and chance</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>• Have experiences with probability</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>• Name and use customary measures of length in U.S. standard units</li> <li>• Name and use customary measures of mass and volume in the U.S. standard system</li> <li>• Describe given events in various degrees of likelihood, as a fraction, and as a percentage</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>• Read and graph numbers (whole, negative, decimals, fractions, and mixed numbers) on a number line</li> <li>• Illustrate the addition of integers on a number line</li> <li>• Illustrate the subtraction of integers on a number line</li> <li>• Use Venn Diagrams to describe and illustrate overlap</li> <li>• Use the putting together with overlap model to solve subtraction sentences related to probability</li> <li>• Plot and name points on a coordinate graph</li> <li>• Solve and plot solutions to linear equations in the form of <math>y = ax + b</math></li> <li>• Continue to measure lengths and draw line segments to an eighth of an inch, a centimeter, and a millimeter</li> <li>• Convert from inches to centimeters</li> <li>• Use appropriate units for measuring common units of weight and capacity (pound, ton, cup, pint, quart, and gallon) and convert within the US Standard system</li> </ul>

**GEOMETRY**

**Students will:**

- Understand how to find the volume and surface area of rectangular prisms
- Reflect, rotate, and slide plane figures

**Students will:**

- Investigate the use of “nets” to represent cubes, prisms, and square or triangular based pyramids
- Experiment with drawing three-dimensional figures

**Students will:**

- Identify and describe several common polygons by their number of sides
- Measure and draw angles to a certain degree using a protractor
- Know and apply relationships among angles formed by **intersecting lines**

**Students will:**

- Distinguish between acute, right, central, and obtuse angles
- Identify right, isosceles, and scalene triangles
- Calculate magnitudes of turns given angle measures or revolution
- Find perimeter of a polygon

**ALGEBRA**

**Students will:**

- Find the unknown in simple equations
- Use graphs and data to analyze the relationship between quantities

**Students will:**

- Be exposed to solving equations of the form  $ax + b = c$  and  $ax - b = c$ , when  $a$ ,  $b$ , and  $c$  are whole numbers

**Students will:**

- Give instances of a pattern and write a “rule” for a pattern using variables
- Evaluate algebraic expressions given the value of the variable
- Identify and apply the **Addition Property of Equality** to solve algebraic equations

**Students will:**

- Calculate the value of a variable given the values of the other variables in a formula
- Learn to collect like terms

Priority/Mastery Knowledge and Skills	Transition Math, Part 2	Transition Math, Full year	Algebra	Geometry
<b>NUMBER SENSE</b>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Identify the <b>Commutative Property of Multiplication</b></li> <li>Identify the <b>Associative Property of Multiplication</b></li> <li>Use the <b>Commutative Property and Associative Property of Multiplication</b> to simplify expressions</li> <li>Multiply fractions</li> <li>Identify properties of reciprocals</li> <li>Apply the <b>Rate Factor Model</b> of multiplication</li> <li>Multiply positive and negative integers</li> <li>Identify and apply the <b>Multiplication Properties of zero and -1</b></li> <li>Recognize and apply the <b>Repeated Addition Property of Multiplication</b> to simplify expressions</li> <li>Use integer division with real numbers</li> <li>Use the <b>Rate Model for Division</b></li> <li>Know and apply the general properties for dividing positive and negative integers</li> <li>Use the <b>Ratio Comparison Model for Division</b></li> <li>Recognize and solve problems involving proportions</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Use the <b>Putting-Together and Slide</b> models for addition to form sentences involving addition</li> <li>Use the <b>Take-Away and Comparison</b> models for subtraction to form sentences involving subtraction</li> <li>Know and apply the <b>Substitution Principle</b></li> <li>Memorize common fractions to sixteenths</li> <li>Use the equal fractions property to rewrite equivalent fractions</li> <li>Convert word names to decimals</li> <li>Identify the <b>Commutative Property of Multiplication</b></li> <li>Identify the <b>Associative Property of Multiplication</b></li> <li>Use the <b>Commutative Property and Associative Property of Multiplication</b> to simplify expressions</li> <li>Multiply fractions</li> <li>Identify properties of reciprocals</li> <li>Apply the <b>Rate Factor Model</b> of multiplication</li> <li>Multiply positive and negative integers</li> <li>Identify and apply the <b>Multiplication Properties of zero and -1</b></li> <li>Recognize and apply the <b>Repeated Addition Property of Multiplication</b> to simplify expressions</li> <li>Use integer division with real numbers</li> <li>Use the <b>Rate Model for Division</b></li> <li>Know and apply the general properties for dividing positive and negative integers</li> <li>Use the <b>Ratio Comparison Model for Division</b></li> <li>Recognize and solve problems involving proportions</li> </ul>	<p>See <b>Algebra Course</b> under HS Secondary Learning Goals</p>	<p>See <b>Geometry Course</b> under HS Secondary Learning Goals</p>

**DATA**

**Students will:**

- Determine **mean, median, range,** and **mode** of a given set of numbers and use them to solve problems involving raw data and data displays
- Know the reasons for using graphs to display data
- Represent data using a **Stem and Leaf Display**
- Interpret and display information using bar graphs
- Interpret and display information using coordinate graphs
- Calculate the probability of Independent Events
- Represent data using **Box Plots and Quartiles**
- Graph equations of the form  $y=ax$
- Find the line on which numerators and denominators of equal fractions lie

**Students will:**

- Read and graph numbers (whole, negative, decimals, fractions, and mixed numbers) on a number line
- Illustrate the addition of integers on a number line
- Illustrate the subtraction of integers on a number line
- Use Venn Diagrams to describe and illustrate overlap
- Use the putting together with overlap model to solve subtraction sentences related to probability
- Plot and name points on a coordinate graph
- Solve and plot solutions to linear equations in the form of  $y = ax + b$
- Continue to measure lengths and draw line segments to an eighth of an inch, a centimeter, and a millimeter
- Convert from inches to centimeters
- Use appropriate units for measuring common units of weight and capacity (pound, ton, cup, pint, quart, and gallon) and convert within the US Standard system
- Determine **mean, median, range,** and **mode** of a given set of numbers and use them to solve problems involving raw data and data displays
- Know the reasons for using graphs to display data
- Represent data using a **Stem and Leaf Display**
- Interpret and display information using bar graphs
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- Calculate the probability of Independent Events
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See Algebra Course under HS Secondary Learning Goals

See Geometry Course under HS Secondary Learning Goals

**GEOMETRY**

- Students will:
- Apply the relationships between figures and their reflection images
  - Create an original Tessellation
  - Find the area of a rectangle or right triangle
  - Determine the number of elements in rectangular arrays
  - Picture multiplication using arrays or areas of rectangles
  - Represent the **Distributive Property of Multiplication** using the areas of rectangles
  - Choose appropriate units in measurement situations
  - Find the area of any triangle
  - Graph formulas for perimeter, area, and other quantities that involve two variables

- Students will:
- Distinguish between acute, right, central, and obtuse angles
  - Identify right, isosceles, and scalene triangles
  - Calculate magnitudes of turns given angle measures or revolution
  - Find perimeter of a polygon
  - Apply the relationships between figures and their reflection images
  - Create an original Tessellation
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  - Represent the **Distributive Property of Multiplication** using the areas of rectangles
  - Choose appropriate units in measurement situations
  - Find the area of any triangle
  - Graph formulas for perimeter, area, and other quantities that involve two variables

See **Algebra Course** under HS Secondary Learning Goals

See **Geometry Course** under HS Secondary Learning Goals

**ALGEBRA**

- Students will:
- Represent equations of the form  $Ax = B$  with a "Balance-Scale" diagram or through the use of manipulatives or technology
  - Represent equations of the form  $Ax+B = C$  with a "Balance-Scale" diagram or through the use of manipulatives or tech.
  - Translate situations of constant increase or constant decrease that lead to sentences of the form  $ax+b = cx+d$
  - Explore the concept of parabolas and solving equations of the form  $y = Ax^2$
  - Begin to understand that the graph of an equation in the form  $y = ax+b$  is a line with slope "a" and y-intercept "b"

- Students will:
- Calculate the value of a variable given the values of the other variables in a formula
  - Learn to collect like terms
  - Represent equations of the form  $Ax = B$  with a "Balance-Scale" diagram or through the use of manipulatives or technology
  - Represent equations of the form  $Ax+B = C$  with a "Balance-Scale" diagram or through the use of manipulatives or technology
  - Translate situations of constant increase or constant decrease that lead to sentences of the form  $ax+b = cx+d$
  - Explore the concept of parabolas and solving equations of the form  $y = Ax^2$
  - Begin to understand that the graph of an equation in the form  $y = ax+b$  is a line with slope "a" and y-intercept "b"

See **Algebra Course** under HS Secondary Learning Goals

See **Geometry Course** under HS Secondary Learning Goals

**HS Math Secondary Learning Goals**

<p><b>Algebra</b> Priority/Mastery Knowledge and Skills</p>	<p><b>Geometry</b> Priority/Mastery Knowledge and Skills</p>	<p><b>Adv. Algebra</b> Priority/Mastery Knowledge and Skills</p>	<p><b>Functions, Stats, Trig.</b> Priority/Mastery Knowledge and Skills</p>
<p><b>Using Algebra to Describe</b></p> <p>Students will:</p> <ul style="list-style-type: none"> <li>• Determine if two expressions seem equivalent by substituting values or making a table.</li> <li>• Apply the Algebraic Definitions of Subtraction and Division.</li> <li>• Graph ordered pairs from expressions.</li> </ul> <p><b>Using Algebra to Explain</b></p> <p>Students will:</p> <ul style="list-style-type: none"> <li>• Use related facts to solve sentences.</li> </ul> <p><b>Linear Equations and Inequalities</b></p> <p>Students will:</p> <ul style="list-style-type: none"> <li>• Graph horizontal and vertical lines.</li> <li>• Use graphs to solve absolute value inequalities of the form <math> ax + b  &lt; c</math> or <math> ax + b  &gt; c</math>.</li> </ul> <p><b>Division and Proportions in Algebra</b></p> <p>Students will:</p> <ul style="list-style-type: none"> <li>• Multiply and simplify algebraic fractions.</li> <li>• Divide algebraic fractions.</li> </ul> <p><b>Powers and Roots</b></p> <p>Students will:</p> <ul style="list-style-type: none"> <li>• Test a special case to determine whether a pattern is true.</li> <li>• Use powers to count the number of sequences possible for repeated choices.</li> </ul>	<p><b>Points and Lines</b></p> <p>Students will:</p> <ul style="list-style-type: none"> <li>• Draw discrete lines.</li> <li>• Analyze networks.</li> <li>• Make and analyze perspective drawings.</li> <li>• Recognize and use notation for lines, segments, and rays.</li> <li>• Give the dimensions of figures and objects.</li> <li>• Given the property of points and lines, tell whether it is true in each of the four geometries: discrete geometry, synthetic geometry, plane coordinate geometry, graph theory.</li> <li>• Recognize the use of undefined terms and postulates.</li> <li>• Apply the definition of distance to real situations.</li> <li>• Use discrete geometry and graph theory to model real-world situations.</li> <li>• Determine distance on a number line.</li> </ul> <p>Graph points and lines in the coordinate plane.</p> <p><b>The Language of Logic and Geometry</b></p> <p>Students will:</p> <ul style="list-style-type: none"> <li>• Distinguish between convex and non-convex figures.</li> <li>• Draw and identify polygons.</li> <li>• Use and interpret the symbols</li> <li>• Use the definition of midpoint to find lengths of segments.</li> <li>• Write the converse of a conditional.</li> <li>• Apply the properties of a good definition.</li> <li>• Write conditionals and biconditionals.</li> <li>• Evaluate conditionals and conjectures.</li> <li>• Determine the union and intersection of sets.</li> <li>• Determine whether a triangle can be formed with sides of three given lengths.</li> <li>• Apply properties of conditionals in real situations.</li> </ul>	<p><b>Functions</b></p> <p>Students will:</p> <ul style="list-style-type: none"> <li>• Evaluate expressions and formulas, including correct units in answers.</li> <li>• Use function notation.</li> <li>• Rewrite formulas.</li> <li>• Evaluate sequences.</li> <li>• Determine whether a relation defined by a table, a list of ordered pairs, or a simple equation is a function.</li> <li>• Use addition, subtraction, multiplication, and division to write expressions which model real-world problems.</li> <li>• Use functions to solve real-world situations.</li> <li>• Use linear equations to solve real-world problems.</li> <li>• Apply the Vertical-Line Test for a function.</li> </ul> <p><b>Variation and Graphs</b></p> <p>Students will:</p> <ul style="list-style-type: none"> <li>• Translate variation language into formulas and formulas into variation language.</li> <li>• Use the Fundamental Theorem of Variation.</li> <li>• Identify the properties of variation functions.</li> <li>• Solve real-world variation problems.</li> <li>• Identify variation equations from graphs.</li> <li>• Recognize the effects of a change in scale or viewing window on a graph of a variation equation.</li> </ul> <p><b>Linear Functions</b></p> <p>Students will:</p> <ul style="list-style-type: none"> <li>• Determine the slope and intercepts of a line given its equation.</li> <li>• Find an equation for a line given two points on it or given a point on it and its slope.</li> </ul>	<p><b>Exploring Data</b></p> <p>Students will:</p> <ul style="list-style-type: none"> <li>• Calculate measures of center and spread for data sets</li> <li>• Use <math>\Sigma</math>-notation to represent a sum, mean, variance or standard deviation.</li> <li>• Determine relationships and interpret data presented in a table.</li> <li>• Use statistics to describe data sets and to compare or contrast data sets.</li> <li>• Read and interpret bar graphs, circle graphs, and coordinate graphs.</li> <li>• Read and interpret box plots.</li> <li>• Read and interpret dotplots and histograms.</li> <li>• Draw graphs to display.</li> </ul> <p><b>Functions and Models</b></p> <p>Students will:</p> <ul style="list-style-type: none"> <li>• Evaluate functions described with Euler's notation.</li> <li>• Describe properties of quadratic and exponential functions.</li> <li>• Find and interpret linear models.</li> <li>• Find and interpret exponential models.</li> <li>• Find and interpret quadratic models.</li> <li>• Use step functions to model situations.</li> <li>• Graph linear, exponential, quadratic and step functions.</li> <li>• Interpret properties of relations from graphs.</li> </ul>



## Quadratic Equations and Functions

### Students will:

- Identify and use the properties of solutions to quadratic equations.
- Solve geometric problems involving quadratic equations.

## Linear Systems

### Students will:

- Multiply  $2 \times 2$  matrices by  $2 \times 2$  or  $2 \times 1$  matrices.
- Solve systems using matrices.
- Solve nonlinear systems.
- Determine whether a system has 0, 1 or infinitely many solutions.
- Write a system of inequalities given a graph.

## Polynomials

### Students will:

- Expand squares of binomials.
- Classify polynomials by their degree or number of terms.
- Translate investment situations into polynomials.
- Determine number of permutations.
- Represent polynomials by areas.

- Identify polygons used in the real world.

- Apply the Triangle Inequality Postulate in real situations.

- Draw hierarchies of triangles and polygons.

## Angles and Lines

### Students will:

- Draw and analyze drawings of angles.
- Use algebra to represent and find measures of angles.
- Determine measures of angles formed by parallel lines, perpendicular lines, and transversals.
- Draw parallel lines, bisectors, and perpendicular lines.
- Draw rotation images and find magnitudes of rotations.
- Recognize and use the postulates of equality and inequality.
- Apply parallel and perpendicular lines in real situations.
- Determine the slope of a line from its equation or given two points on it.
- Determine the slope of a line parallel or perpendicular to a given line.

## From Reflections to Congruence

### Students will:

- Draw figures by applying the definition of reflection image.
- Draw reflection images of segments, angles, and polygons over a given line.
- Draw translation and glide-reflection images of figures
- Draw or identify images of figures under composites of two reflections.
- Apply properties of reflections to make conclusions, using one or more of the following justifications: definition of reflection; reflections preserve distance; reflections preserve angle measure; reflections switch orientation; Figure Reflection Theorem.
- Apply the Two-Reflection Theorems for Translations and for Rotations.

- Evaluate expressions based on step functions.
- Recognize properties of linear functions.

- Recognize properties of arithmetic sequences.
- Model constant-increase or constant-decrease situations or situations involving arithmetic sequences.

- Model situations leading to linear combinations.
- In a real-world context, find an equation for a line containing two points.

- Model situations leading to piecewise-linear functions or step functions.

- Graph or interpret graphs of piecewise-linear functions or step functions.

## Matrices

### Students will:

- Add, subtract, and find scalar multiples of matrices.
- Multiply matrices.
- Determine equations of lines of perpendiculars to given lines.
- Recognize properties of matrix operations.
- Recognize relationships between figures and their transformation images.
- Relate transformations to matrices, and vice versa.

- Use matrices to store data.

- Use matrix addition, matrix multiplication, and scalar multiplication to solve real-world problems.

- Graph figures and their transformation images.

## Systems

### Students will:

- Find the determinant and the inverse of a square matrix.
- Graph linear inequalities in two variables.

## Transformations of Graphs and Data

### Students will:

- Find formulas and values of composites of functions.
- Find inverses of functions.
- Use the Graph-Translation Theorem or the Graph Scale-Change Theorem to find transformation images.
- Describe the effects of translations or scale changes on functions and their graphs.
- Describe the effects of translations or scale changes on measures of center or spread.
- Describe the symmetries of graphs.
- Identify properties of composites and inverses.
- Identify properties of z-scores.
- Use translations, scale changes, or z-scores to analyze data.
- Apply the Graph-Translation Theorem or the Graph Scale-Change Theorem to make or identify graphs.
- From a graph of a function, determine its symmetries or whether its inverse is a function.
- Graph inverses of functions

## Circular Functions

### Students will:

- Convert between degrees, radians, and revolutions.
- Apply the definitions of the sine, cosine, and tangent functions.
- Apply theorems about sines, cosines, and tangents.
- Identify the amplitude, period, frequency, phase shift, and other properties of circular functions.
- Use equations of circular functions to solve problems about real phenomena.
- Find equations of circular functions to model periodic phenomena.
- Use the unit circle to find values of sines, cosines, and tangents.
- Draw or interpret graphs of the parent sine, cosine, and tangent functions.
- Graph transformation images of circular functions.

<p>• Determine the isometry which maps one figure onto another.</p> <ul style="list-style-type: none"> <li>• Use reflections to find a path from an object to a particular point.</li> <li>• Use congruence in real situations.</li> <li>• Find coordinates of reflection and translation images of points over the coordinate axes.</li> </ul> <p><b>Proofs using Congruence</b></p> <p>Students will:</p> <ul style="list-style-type: none"> <li>• Construct equilateral triangles and construct the circle through three noncollinear points.</li> <li>• Find lengths and angle measures using properties of perpendicular bisectors and alternate interior angles.</li> <li>• Use the Triangle-, Quadrilateral-, and Polygon-Sum Theorems to determine angle measures.</li> <li>• Write proofs using the Transitive Properties of Equalities or Congruence.</li> <li>• Write proof arguments using properties of reflections.</li> <li>• Tell whether auxiliary figures are uniquely determined.</li> <li>• Use the Perpendicular Bisector Theorem and theorems on alternate interior angles in real situations.</li> <li>• Know the history and impact of postulates relating to parallel lines on the development of geometry.</li> </ul> <p><b>Polygons and Symmetry</b></p> <p>Students will:</p> <ul style="list-style-type: none"> <li>• Locate symmetry lines and centers of symmetry of geometric figures. (6-1, 6-2, 6-4, 6-5, 6-6, 6-7)</li> <li>• Draw polygons satisfying various conditions. (6-2, 6-3, 6-7)</li> <li>• Apply theorems about isosceles triangles to find angle measures and segment lengths. (6-2, 6-7)</li> <li>• Apply theorems about quadrilaterals and regular polygons to find angle measures and segment lengths. (6-3, 6-4, 6-5, 6-7)</li> <li>• Apply properties of symmetry to assert and justify conclusions about symmetric figures. (6-1, 6-6)</li> </ul>	<p><b>Quadratic Functions</b></p> <p>Students will:</p> <ul style="list-style-type: none"> <li>• Transform quadratic equations from vertex form to standard form, and <i>visa versa</i>.</li> <li>• Perform operations with complex numbers.</li> <li>• Use quadratic equations to solve area problems or problems dealing with velocity and acceleration.</li> <li>• Fit a quadratic model to data.</li> <li>• Use the Graph-Translation Theorem to interpret equations and graphs.</li> </ul> <p><b>Powers</b></p> <p>Students will:</p> <ul style="list-style-type: none"> <li>• Solve equations of the form <math>x^n = b</math> where <math>n</math> is a rational number.</li> <li>• Solve real-world problems which can be modeled by expressions with <math>n</math>th powers or <math>n</math>th roots.</li> <li>• Apply the compound interest formula.</li> <li>• Solve real-world problems involving geometric sequences.</li> </ul> <p><b>Inverses and Radicals</b></p> <p>Students will:</p> <ul style="list-style-type: none"> <li>• Find the values and rules for composites of functions.</li> <li>• Find the inverse of a relation.</li> <li>• Rewrite or simplify expressions with radicals.</li> <li>• Solve equations with radicals.</li> <li>• Apply properties of the inverse relations and inverse functions.</li> <li>• Make and interpret graphs of inverses of relations.</li> </ul>	<p>• State equations for graphs of circular functions.</p> <p><b>Trigonometric Functions</b></p> <p>Students will:</p> <ul style="list-style-type: none"> <li>• Solve Trigonometric equations.</li> <li>• Interpret the Law of Sines, Law of Cosines, and related theorems.</li> <li>• State properties of inverse trigonometric functions.</li> <li>• Solve problems involving the Law of Sines and Law of Cosines.</li> <li>• Write and solve equations for phenomena described by trigonometric and circular functions.</li> </ul> <p><b>Root, Power, and Logarithm Functions</b></p> <p>Students will:</p> <ul style="list-style-type: none"> <li>• Solve exponential equations.</li> <li>• Use properties of logarithms.</li> <li>• Use rational exponents to model situations.</li> <li>• Use rational power functions or logarithm functions to model data.</li> <li>• Interpret graphs of <math>n</math>th root, rational power, and logarithm functions.</li> </ul> <p><b>Probability and Simulation</b></p> <p>Students will:</p> <ul style="list-style-type: none"> <li>• List sample spaces and events for probabilistic experiments.</li> <li>• Compute probabilities.</li> <li>• Find the number of ways of selecting or arranging objects.</li> <li>• Evaluate expressions using factorials.</li> <li>• Solve equations using factorials.</li> <li>• Use counting principles and theorems to find the number of ways of arranging objects.</li> <li>• Design and conduct simulation with and without technology.</li> <li>• Construct, graph, and interpret probability distributions.</li> </ul>
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- Know the properties of the various types of triangles and regular polygons. (6-2, 6-7)
- Know the properties of the seven special types of quadrilaterals. (6-3, 6-4, 6-5)
- Write proofs using properties of triangles and quadrilaterals. (6-2, 6-3, 6-4, 6-5, 6-7)
- Locate and draw symmetry lines in real-world designs. (6-1, 6-6)
- Make a schedule for a round-robin tournament. (6-8)
- Draw and apply hierarchies of polygons. (6-3)

### Triangle Congruence

Students will:

- Draw triangles satisfying certain conditions and determine whether all such triangles are congruent.
- Determine measures of angles of polygons and exterior angles.
- Determine whether triangles are congruent from given information.
- Apply properties of parallelograms.
- Determine whether conditions are sufficient for parallelograms.
- From given information, deduce which sides or angles of triangles are smallest or largest.
- Use theorems about triangles to explain real situations
- Draw tessellations of real objects.
- Use theorems about parallelograms to explain real situations.

### Perimeters and Areas

Students will:

- Calculate perimeters of parallelograms, kites, and equilateral polygons given appropriate lengths, and vice versa. (8-1)
- Apply the Pythagorean Converse Theorem.
- Relate various formulas for area.
- Apply formulas for areas of squares, rectangles, parallelograms, trapezoids, and triangles to real-world situations. (8-2, 8-4, 8-5)
- Identify cultures in which the Pythagorean Theorem is known to have been studied.

### Exponential and Logarithmic Functions

Students will:

- Determine values of logarithms.
- Recognize properties of exponential functions.
- Identify or apply properties of logarithms.
- Apply exponential growth and decay models.
- Fit an exponential model to data.
- Graph logarithmic curves.

### Trigonometry

Students will:

- Approximate values of trigonometric functions using a calculator.
- Convert angle measures from radians to degrees or from degrees to radians.
- Identify and use definitions and theorems relating sines, cosines, and tangents.
- Solve real-world problems using the Law of Sines or Law of Cosines.
- Find missing parts of a triangle using the Law of Sines or the Law of Cosines.
- Use the properties of a unit circle to find trigonometric values.
- Identify properties of the sine, cosine, and tangent functions using their graphs.

### Polynomials

Students will:

- Use polynomials to describe geometric situations.

### Polynomial Functions

Students will:

- Use finite differences and systems of equations to determine an equation for a polynomial function from the data points.
- Perform operations with complex numbers.
- Apply the vocabulary of polynomials.
- Apply the Fundamental Theorem of Algebra and Conjugate Zeros Theorem.
- Construct and interpret polynomials that model real situations.
- Represent two- or three-dimensional figures with polynomials.
- Relate properties of polynomials functions and their graphs.

### Binomial and Normal Distributions

Students will:

- Use the Standard Normal Distribution to find probabilities.
- Compare and contrast characteristics of different binomial probability distribution graphs.
- Use properties of normal distributions and their parent functions.
- Solve probability problems using binomial or normal distributions.
- Use binomial and normal distributions to test hypotheses.
- Apply the Central Limit Theorem.
- Graph and interpret a binomial probability distribution.
- Graph and interpret normal distributions.

### Three-Dimensional Figures

Students will:

- Draw common 3-dimensional shapes. (9-2, 9-3, 9-4, 9-5)
- Draw plane sections of common 3-dimensional shapes. (9-5)
- Give views of a figure from the top, sides, or front. (9-7)
- Given appropriate lengths, calculate areas and lengths in 3-dimensional figures. (9-3, 9-4, 9-5)
- From 2-dimensional views of a figure, determine the 3-dimensional figure. (9-7)
- Apply the properties of planes. (9-1, 9-2)
- Determine symmetry planes in 3-dimensional figures. (9-6)
- Recognize 3-dimensional figures in the real world. (9-3, 9-4, 9-5)
- Apply the Four-Color Theorem to maps. (9-9)
- Make a surface from a net and vice versa. (9-8)
- Interpret maps of the world. (9-9)

### Surface Areas and Volumes

Students will:

- Calculate cube roots. (10-3)
- Develop formulas for specific figures from more general formulas. (10-6)
- Know the conditions under which Cavalieri's Principle can be applied. (10-5)
- Represent products of two (or three) numbers or expressions as areas of rectangles (or volumes of boxes), and vice versa. (10-4) • Calculate cube roots. (10-3)

### Indirect and Coordinate Proofs

Students will:

- Apply the Midpoint Connector Theorem. (11-8)
- Follow the basic laws of reasoning to make

### Quadratic Relations

Students will:

- Rewrite an equation for a conic section in the general form of a quadratic equation in two variables.
- Write equations or inequalities for quadratic relations given sufficient conditions.
- Find the area of an ellipse.
- Solve systems of one linear and one quadratic equation or two quadratic equations by substitution or linear combination.
- Find points on a conic section using the definition of a conic.
- Identify characteristics of parabolas, circles, ellipses, and hyperbolas.
- Classify curves as circles, ellipses, parabolas, or hyperbolas using algebraic or geometric properties.
- Use circles, ellipses, and hyperbolas to solve real-world problems.
- Use systems of quadratic equations to solve real-world problems.
- Graph quadratic relations given sentences from them, and vice versa.
- Solve systems of quadratic equations graphically.

- conclusions. (11-1, 11-2, 11-3, 11-4)
- Write the converse, inverse, or contrapositive of a conditional. (11-2)
  - Write indirect proofs. (11-4, 11-5, 11-6)
  - Use coordinate geometry to deduce properties of figures and prove theorems. (11-5, 11-6, 11-8)
  - Apply laws of reasoning in real situations. (11-1, 11-2, 11-3, 11-4)
  - Graph and write an equation for a circle or a sphere given its center and radius, and vice versa. (11-7, 11-9)
  - Give convenient locations for triangles and quadrilaterals in the coordinate plane. (11-5)

### Similarity

Students will:

- Draw size transformation images of figures. (12-2, 12-3)
- Identify and determine proportional lengths and distances in real situations. (12-4, 12-5)
- Apply the Fundamental Theorem of Similarity in real situations. (12-6, 12-7)
- Perform and analyze size transformations on figures in the coordinate plane. (12-1)

### Similar Triangles and Trigonometry

Students will:

- Find lengths in figures by applying the Side-Splitting Theorem and the Side-Splitting Converse Theorem. (13-3)
- Calculate lengths of sides in isosceles right triangles and in 30-60-90 triangles. (13-5)
- Determine whether of not triangles are similar using the A.A, S.A.S, or S.S.S Similarity Theorems.
- Use the Triangle Similarity and Side-Splitting Theorems to find lengths and distances in real situations. (13-2, 13-3)

### Further Work with Circles

Students will:

- Calculate lengths of chords and arcs.
- Calculate measures of angles between chords, secants, or tangents from measures of intercepted arcs, and vice versa.
- Locate the center of a circle given sufficient information.
- Apply the Secant Length Theorem and the Tangent Square Theorem.
- Make deductions from properties of radii, chords, and tangents, and know sufficient conditions for radii to be perpendicular to them.
- Make deductions from properties of angles formed by chords, tangents, or secants.
- Apply the Isoperimetric Theorems and the Isoperimetric Inequality to determine which figures have the greatest or least area, perimeter, or volume.
- Given the angle width of a lens and the width of an object, determine the set of points from which the object just fits in the picture.
- Determine the maximum distance that can be seen from a particular elevation.
- Apply the Isoperimetric Theorems and the Isoperimetric Inequality in real situations.