

**Key Idea 1
Mathematical Reasoning**

Students use mathematical reasoning to analyze mathematical situations, make conjectures, gather evidence, and construct an argument.

PERFORMANCE INDICATORS	INCLUDES	EXAMPLES
1A. Construct valid arguments.	<ul style="list-style-type: none"> • Truth value of compound sentences (conjunction, disjunction, conditional, related conditionals such as converse, inverse, and contrapositive, and biconditional). • Truth value of simple sentences (closed sentences, open sentences with replacement set and solution set, negations). 	See Assessment Example 1A.
1B. Follow and judge the validity of arguments.	<ul style="list-style-type: none"> • Truth value of compound sentences. 	See Assessment Example 1B.

Key Idea 2 Number and Numeration

Students use number sense and numeration to develop an understanding of the multiple uses of numbers in the real world, the use of numbers to communicate mathematically, and the use of numbers in the development of mathematical ideas.

PERFORMANCE INDICATORS	INCLUDES	EXAMPLES
2A. Understand and use rational and irrational numbers.	<ul style="list-style-type: none"> • Real numbers including irrational numbers such as non-repeating decimals, irrational roots, and pi. 	See Assessment Example 2A.
2B. Recognize the order of real numbers.	<ul style="list-style-type: none"> • Rational approximations of irrational numbers. 	See Assessment Example 2B.
2C. Apply the properties of real numbers to various subsets of numbers.	<ul style="list-style-type: none"> • Properties of real numbers including closure, commutative, associative, and distributive properties, and inverse and identity elements. 	See Classroom Idea 2C.

Key Idea 3 Operations

Students use mathematical operations and relationships among them to understand mathematics.

PERFORMANCE INDICATORS	INCLUDES	EXAMPLES
<p>3A. Use addition, subtraction, multiplication, division, and exponentiation with real numbers and algebraic expressions.</p>	<ul style="list-style-type: none"> Signed numbers. Use of variables: order of operations and evaluating algebraic expressions and formulas. Addition and subtraction of polynomials: combining like terms and fractions with like denominators. Multiplication of polynomials: powers, products of monomials and binomials, equivalent fractions with unlike denominators, and multiplication of fractions. Simplification of algebraic expressions. Division of polynomials by monomials. Operations with radicals: simplification, multiplication and division, and addition and subtraction. Scientific notation. Simplification of fractions. Division of fractions. Prime factorization. Factoring: common monomials, binomial factors of trinomials. Difference of two squares. 	<p>See Assessment Example 3A.</p>
<p>3B. Use integral exponents on integers and algebraic expressions.</p>	<ul style="list-style-type: none"> Powers: positive, zero, and negative exponents. 	<p>See Assessment Example 3B.</p>
<p>3C. Recognize and identify symmetry and transformations on figures.</p>	<ul style="list-style-type: none"> Intuitive notions of line reflection, translation, rotation, and dilation. Line and point symmetry. 	<p>See Assessment Example 3C.</p>
<p>3D. Use field properties to justify mathematical procedures.</p>	<ul style="list-style-type: none"> Distributive and associative field properties as related to the solution of quadratic equations. Distributive field property as related to factoring. 	<p>See Classroom Idea 3D.</p>

Key Idea 4 Modeling/Multiple Representation

Students use mathematical modeling/multiple representation to provide a means of presenting, interpreting, communicating, and connecting mathematical information and relationships.

PERFORMANCE INDICATORS	INCLUDES	EXAMPLES
4A. Represent problem situations symbolically by using algebraic expressions, sequences, tree diagrams, geometric figures, and graphs.	<ul style="list-style-type: none"> • Use of variables/Algebraic representations. • Inequalities. • Formulas and literal equations. • Undefined terms: <i>point</i>, <i>line</i>, and <i>plane</i>. • Parallel and intersecting lines and perpendicular lines. • Angles: degree measure, right, acute, obtuse, straight, supplementary, complementary, vertical, alternate interior and exteriors, and corresponding. • Simple closed curves: polygons and circles. • Sum of interior and exterior angles of a polygon. • Study of triangles: classifications of scalene, isosceles, equilateral, acute, obtuse, and right; triangular inequality; sum of the measures of angles of a triangle; exterior angle of a triangle, base angles of an isosceles triangle. • Study of quadrilaterals: classification and properties of parallelograms, rectangles, rhombi, squares, and trapezoids. • Study of solids: classification of prism, rectangular solid, pyramid, right circular cylinder, cone, and sphere. • Sample spaces: list of ordered pairs of n-tuples, tree diagrams. 	See Assessment Example 4A.
4B. Justify the procedures for basic geometric constructions.	<ul style="list-style-type: none"> • Basic constructions: copy line and angle, bisect line segment and angle, perpendicular lines and parallel lines. • Comparison of triangles: congruence and similarity. 	See Classroom Idea 4B.
4C. Use transformations in the coordinate plane.	<ul style="list-style-type: none"> • Reflection in a line and in a point. • Translations. • Dilations. 	See Assessment Example 4C.

**Key Idea 4
Modeling/Multiple Representation**

Continued

PERFORMANCE INDICATORS	INCLUDES	EXAMPLES
<p>4D. Develop and apply the concept of basic loci to compound loci.</p>	<ul style="list-style-type: none"> • Locus. • At a fixed distance from a point. • At a fixed distance from a line. • Equidistant from two points. • Equidistant from two parallel lines. • Equidistant from two intersecting lines. • Compound locus. 	<p>See Assessment Example 4D.</p>
<p>4E. Model real-world problems with systems of equations and inequalities.</p>	<ul style="list-style-type: none"> • Systems of linear equations and inequalities. 	<p>See Assessment Example 4E.</p>

Key Idea 5 Measurement

Students use measurement in both metric and English measure to provide a major link between the abstractions of mathematics and the real world in order to describe and compare objects and data.

PERFORMANCE INDICATORS	INCLUDES	EXAMPLES
5A. Apply formulas to find measures such as length, area, volume, weight, time, and angle in real-world contexts.	<ul style="list-style-type: none"> Perimeter of polygons and circumference of circles. Area of polygons and circles. Volume of solids. Pythagorean theorem. 	See Assessment Example 5A.
5B. Choose and apply appropriate units and tools in measurement situations.	<ul style="list-style-type: none"> Converting to equivalent measurements within metric and English measurement systems. Direct and indirect measure. 	See Classroom Idea 5B.
5C. Use dimensional analysis techniques.	<ul style="list-style-type: none"> Dimensional analysis. 	See Assessment Example 5C.
5D. Use statistical methods including the measures of central tendency to describe and compare data.	<ul style="list-style-type: none"> Collecting and organizing data: sampling, tally, chart, frequency table, circle graphs, broken line graphs, frequency histogram, box and whisker plots, scatter plots, stem and leaf plots, and cumulative frequency histogram. Measures of central tendency: mean, median, mode. Quartiles and percentiles. 	See Assessment Example 5D.
5E. Use trigonometry as a method to measure indirectly.	<ul style="list-style-type: none"> Right triangle trigonometry. 	See Assessment Example 5E.
5F. Apply proportions to scale drawings and direct variation.	<ul style="list-style-type: none"> Ratio. Proportion. Scale drawings. Percent. Similar figures. Similar polygons: ratio of perimeters and areas. Direct variation. 	See Assessment Example 5F.
5G. Relate absolute value, distance between two points, and the slope of a line to the coordinate plane.	<ul style="list-style-type: none"> Absolute value and length of a line segment. Midpoint of a segment. Equation of a line: point-slope and slope intercept form. Comparison of parallel and perpendicular lines. 	See Assessment Example 5G.

**Key Idea 5
Measurement**

Continued

PERFORMANCE INDICATORS	INCLUDES	EXAMPLES
<p>5H. Explain the role of error in measurement and its consequence on subsequent calculations.</p>	<ul style="list-style-type: none"> • Error of measurement and its consequences on calculation of perimeter of polygons and circumference of circles. • Area of polygons and circles. • Volume of solids. • Percent of error in measurements. 	<p>See Classroom Idea 5H.</p>
<p>5I. Use geometric relationships in relevant measurement problems involving geometric concepts.</p>	<ul style="list-style-type: none"> • Similar polygons: ratio of perimeters and areas. • Similar figures. • Comparison of volumes of similar solids. 	<p>See Assessment Example 5I.</p>

Key Idea 6 Uncertainty

Students use ideas of uncertainty to illustrate that mathematics involves more than exactness when dealing with everyday situations.

PERFORMANCE INDICATORS	INCLUDES	EXAMPLES
6A. Judge the reasonableness of results obtained from applications in algebra, geometry, trigonometry, probability, and statistics.	<ul style="list-style-type: none"> Theoretical versus empirical probability. 	See Classroom Idea 6A.
6B. Use experimental and theoretical probability to represent and solve problems involving uncertainty.	<ul style="list-style-type: none"> Single and compound events. Problems involving <i>and</i> and <i>or</i>. Probability of the complement of an event. 	See Assessment Example 6B.
6C. Use the concept of random variable in computing probabilities.	<ul style="list-style-type: none"> Mutually exclusive and independent events. Counting principle. Sample space. Probability distribution. Probability of the complement of an event. 	See Assessment Example 6C.
6D. Determine probabilities, using permutations and combinations.	<ul style="list-style-type: none"> Factorial notation. Permutations: nP_n and nPr. Combinations: nC_n and nCr. 	See Assessment Example 6D.

Key Idea 7 Patterns/Functions

Students use patterns and functions to develop mathematical power, appreciate the true beauty of mathematics, and construct generalizations that describe patterns simply and efficiently.

PERFORMANCE INDICATORS	INCLUDES	EXAMPLES
7A. Represent and analyze functions, using verbal descriptions, tables, equations, and graphs.	<ul style="list-style-type: none"> Techniques for solving equations and inequalities. Techniques for solving factorable quadratic equations. Graphs of linear relations: slope and intercept. Graphs of conics: circle and parabola. Graphic solution of systems of linear equations, inequalities, and quadratic-linear pair. Algebraic solution of systems of linear equations, inequalities, and quadratic-linear pair by substitution method and addition-subtraction method. 	See Assessment Example 7A.
7B. Apply linear and quadratic functions in the solution of problems.	<ul style="list-style-type: none"> Graphic and algebraic solutions of linear and quadratic functions in the solution of problems. 	See Assessment Example 7B.
7C. Translate among the verbal descriptions, tables, equations, and graphic forms of functions.	<ul style="list-style-type: none"> Translate linear and quadratic functions, systems of equations, inequalities and quadratic linear pairs between representations that are verbal descriptions, tables, equations, or graphs. 	See Assessment Example 7C.
7D. Model real-world situations with the appropriate function.	<ul style="list-style-type: none"> Determine and model real-life situations with appropriate functions. 	See Assessment Example 7D.
7E. Apply axiomatic structure to algebra.	<ul style="list-style-type: none"> Solve linear equations with integral, fraction, or decimal coefficients. Solve linear inequalities. Solve factorable quadratic equations. Solve systems of linear equations, inequalities, and quadratic-linear pair. 	See Assessment Example 7E.

Key Idea 1 Mathematical Reasoning

Students use mathematical reasoning to analyze mathematical situations, make conjectures, gather evidence, and construct an argument.

PERFORMANCE INDICATORS	INCLUDES	EXAMPLES
1A. Construct proofs based on deductive reasoning.	<ul style="list-style-type: none">• Euclidean and analytic direct proofs.	See Classroom Activity 1A.
1B. Construct indirect proofs.	<ul style="list-style-type: none">• Euclidean indirect proofs.	See Classroom Activity 1B.

**Key Idea 2
Number and Numeration**

Students use number sense and numeration to develop an understanding of the multiple uses of numbers in the real world, the use of numbers to communicate mathematically, and the use of numbers in the development of mathematical ideas.

PERFORMANCE INDICATORS	INCLUDES	EXAMPLES
2A. Understand and use rational and irrational numbers.	<ul style="list-style-type: none"> Determine from the discriminant of a quadratic equation whether the roots are rational or irrational. Rationalize denominators. Simplifying of algebraic fractions with polynomial denominators. Simplify complex fractions. 	See Classroom Activity 2A.
2B. Recognize the order of the real numbers.	<ul style="list-style-type: none"> Give rational approximations of irrational numbers to a specific degree of accuracy. 	See Classroom Activity 2B.
2C. Apply the properties of the real numbers to various subsets of numbers.	<ul style="list-style-type: none"> Use the properties of real numbers in the development of algebraic skills. 	See Classroom Activity 2C.
2D. Recognize the hierarchy of the complex number system.	<ul style="list-style-type: none"> Subsets of complex numbers. 	See Classroom Activity 2D.
2E. Model the structure of the complex number system.	<ul style="list-style-type: none"> Imaginary unit of complex numbers. Standard form of complex numbers. 	See Classroom Activity 2E.

Key Idea 3 Operations

Students use mathematical operations and relationships among them to understand mathematics.

PERFORMANCE INDICATORS	INCLUDES	EXAMPLES
3A. Use addition, subtraction, multiplication, division, and exponentiation with real numbers and algebraic expressions.	<ul style="list-style-type: none"> • Operations with fractions with polynomial denominators. • Add and subtract rational fractions with monomial and binomial denominators. 	See Classroom Activity 3A.
3B. Develop an understanding of and use the composition of functions and transformations.	<ul style="list-style-type: none"> • Understand the general concept and symbolism of the composition of transformations. • Apply the composition of transformations (line reflections, rotations, translations, glide reflections). • Identify graphs that are symmetric with respect to the axes or origin. • Isometries (direct, opposite). • Applications to graphing (inverse functions, symmetry). • Define and compute compositions of functions and transformations. 	See Classroom Activity 3B.
3C. Use transformations on figures and functions in the coordinate plane.	<ul style="list-style-type: none"> • Apply transformations (line reflection, point reflection, rotation, translation, and dilation) on figures and functions in the coordinate plane. • Use slope and midpoint to demonstrate transformations. • Use the ideas of transformations to investigate relationships of two circles. • Use translation and reflection to investigate the parabola. 	See Classroom Activity 3C.

PERFORMANCE INDICATORS	INCLUDES	EXAMPLES
<p>3D. Use rational exponents on real numbers and all operations on complex numbers.</p>	<ul style="list-style-type: none"> • Absolute value of complex numbers. • Evaluate expressions with fractional exponents. • Basic arithmetic operations with complex numbers. • Simplify square roots with negative radicands. • Use the product of a complex number and its conjugate to express the quotient of two complex numbers. • Cyclic nature of the powers of i. • Solving quadratic equations. • Laws of rational exponents. 	<p>See Classroom Activity 3D.</p>
<p>3E. Combine functions, using the basic operations and the composition of two functions.</p>	<ul style="list-style-type: none"> • Determine the value of compound functions. • Pairs of equations. 	<p>See Classroom Activity 3E.</p>

Key Idea 4 Modeling/Multiple Representation

Students use mathematical modeling/multiple representation to provide a means of presenting, interpreting, communicating, and connecting mathematical information and relationships.

PERFORMANCE INDICATORS	INCLUDES	EXAMPLES
4A. Represent problem situations symbolically by using algebraic expressions, sequences, tree diagrams, geometric figures, and graphs.	<ul style="list-style-type: none"> • Express quadratic, circular, exponential, and logarithmic functions in problem situations algebraically. • Use symbolic form to represent an explicit rule for a sequence. • Definition and graph of an inverse variation (hyperbola). 	See Classroom Activity 4A.
4B. Manipulate symbolic representations to explore concepts at an abstract level.	<ul style="list-style-type: none"> • Use positive, negative, and zero exponents and be familiar with the laws used in working with expressions containing exponents. • In the development of the use of exponents, the students should review scientific notation and its use in expressing very large or very small numbers. • Rewrite the equality $\log_b a = c$ as $a = b^c$. • Solve equations, using logarithmic expressions. • Rewrite expressions involving exponents and logarithms. • Compound functions. 	See Classroom Activity 4B.
4C. Choose appropriate representations to facilitate the solving of a problem.	<ul style="list-style-type: none"> • Select exponential or logarithmic process to solve an equation. • Recognize that a variety of phenomena can be modeled by the same type of function. 	See Classroom Activity 4C.
4D. Develop meaning for basic conic sections.	<ul style="list-style-type: none"> • Circles. • Parabolas. • Using the intercepts, recognize the ellipse and non-rectangular hyperbola. 	See Classroom Activity 4D.

**Key Idea 4
Modeling/Multiple Representation**

Continued

PERFORMANCE INDICATORS	INCLUDES	EXAMPLES
4E. Model real-world problems with systems of equations and inequalities.	<ul style="list-style-type: none"> Solve systems of equations: linear, quadratic, and linear-quadratic systems. 	See Classroom Activity 4E.
4F. Model vector quantities both algebraically and geometrically.	<ul style="list-style-type: none"> The Law of Sines and the Law of Cosines can be used with a wide variety of problems involving triangles, parallelograms and other geometric figures in applications involving the resolution of forces both algebraically and geometrically. 	See Classroom Activity 4F.
4G. Represent graphically the sum and difference of two complex numbers.	<ul style="list-style-type: none"> Represent the basic operations of addition and subtraction. 	See Classroom Activity 4G.
4H. Model quadratic inequalities both algebraically and graphically.	<ul style="list-style-type: none"> Use multiple representation to show inequalities algebraically and graphically to find the possible solutions. 	See Classroom Activity 4H.
4I. Model the composition of transformations.	<ul style="list-style-type: none"> The composition of two line reflections when the two lines are parallel. The composition of two rotations about the same point. The composition of two translations. The composition of a line reflection and a translation in a direction parallel to the line of reflection (glide reflection). 	See Classroom Activity 4I.

Key Idea 4 Modeling/Multiple Representation

Continued

PERFORMANCE INDICATORS	INCLUDES	EXAMPLES
<p>4J. Determine the effects of changing parameters of the graphs of functions.</p>	<ul style="list-style-type: none"> • Be able to sketch the effects of changing the value of a in the function $y = a^x$. Characteristics to be emphasized are: <ul style="list-style-type: none"> -the domain of an exponential function is the set of real numbers -the range of an exponential function is the set of positive numbers -the graph of any exponential function will contain the point $(0, 1)$ -the exponential function is one-to-one. • If $a > 1$, the graph rises, but if $0 < a < 1$, the graph falls. • The graphs of $y = a^x$ and $y = a^{-x}$, $a > 0$, and $a \neq 1$, are reflections of each other in the y-axis. • The logarithmic function is the inverse of the exponential function with the following characteristics: <ul style="list-style-type: none"> -since the exponential function is one-to-one, its inverse, the logarithmic function, exists -the domain of the logarithmic function is the set of positive real numbers -the range of the logarithmic function is the set of all real numbers -the graph of any logarithmic function will contain the point $(1, 0)$. • The graphs of $y = a^x$ and $x = a^y$, $a > 0$, and $a \neq 1$, are reflections of each other in the line $y = x$. 	<p>See Classroom Activity 4J.</p>
<p>4K. Use polynomial, trigonometric, and exponential functions to model real-world relationships.</p>	<ul style="list-style-type: none"> • Recognize when a real-world relationship can be represented by a linear, quadratic, trigonometric, or exponential function. • Solve real-world problems by using linear, quadratic, trigonometric, and exponential functions. 	<p>See Classroom Activity 4K.</p>

PERFORMANCE INDICATORS	INCLUDES	EXAMPLES
<p>4L. Use algebraic relationships to analyze the conic sections.</p>	<ul style="list-style-type: none"> • Write the equation of a circle with a given center and radius and determine the radius and center of a circle whose equation is in the form $(x - h)^2 + (y - k)^2 = r^2$. • Recognize an equation in the form $y = ax^2 + bx + c$, $a \neq 0$ as an equation of a parabola and <ul style="list-style-type: none"> -be able to form a table of values in order to sketch its graph -find the axis of symmetry -determine the abscissa of the vertex to provide a point of reference for choosing the x-coordinates to be plotted -find the y-intercept of the parabola. • Turning point. • Maximum or minimum. 	<p>See Classroom Activity 4L.</p>
<p>4M. Use circular functions to study and model periodic real-world phenomena.</p>	<ul style="list-style-type: none"> • Use the concept of the unit circle to solve real-world problems involving: <ul style="list-style-type: none"> -radian measure -sine -cosine -tangent -reciprocal trigonometric functions. • Relate reference angles, amplitude, period, and translations to the solution of real-world problems. 	<p>See Classroom Activity 4M.</p>
<p>4N. Use graphing utilities to create and explore geometric and algebraic models.</p>	<ul style="list-style-type: none"> • Graph quadratic equations and observe where the graph crosses the x-axis, or note that it does not. 	<p>See Classroom Activity 4N.</p>

Key Idea 5 Measurement

Students use measurement in both metric and English measure to provide a major link between the abstractions of mathematics and the real world in order to describe and compare objects and data.

PERFORMANCE INDICATORS	INCLUDES	EXAMPLES
5A. Use trigonometry as a method to measure indirectly.	<ul style="list-style-type: none"> • Triangle solutions. • Right triangle trigonometry. • Unit circle. • Angle rotation—the measure of an angle can be a real number. 	See Classroom Activity 5A.
5B. Understand error in measurement and its consequence on subsequent calculations.	<ul style="list-style-type: none"> • Error of measurement of angles and length of the sides of a triangle and its consequence to the solution of trigonometric problems. 	See Classroom Activity 5B.
5C. Derive and apply formulas relating angle measure and arc degree measure in a circle.	<ul style="list-style-type: none"> • Express angle measure in terms of degrees and radians. • Reference and coterminal angles. • Understand the derivation and apply formulas for sine, cosine, tangent, and their reciprocal trigonometric function. • Sum and difference of two angles. • Double and half angles for sine and cosine. • Vectors. • Angles formed by arcs, chords, tangents, and secants. 	See Classroom Activity 5C.
5D. Prove and apply theorems related to lengths of segments in a circle.	<ul style="list-style-type: none"> • Prove and apply theorems related to arcs, chords, tangents, secants, and angles. • Prove theorems related to congruence and similarity including right triangle proportions. 	See Classroom Activity 5D.
5E. Define the trigonometric functions in terms of the unit circle.	<ul style="list-style-type: none"> • Sine, cosine, tangent, and their reciprocal functions on the unit circle. • Radian measure. • Coordinates of a point on the unit circle expressed as $(\cos A, \sin A)$. • Special angles $30^\circ, 45^\circ, 60^\circ$. • Reference angles. • Amplitude and period. • Reflections in the line $y = x$. • Inverse functions. 	See Classroom Activity 5E.

PERFORMANCE INDICATORS	INCLUDES	EXAMPLES
<p>5F. Relate trigonometric relationships to the area of a triangle and to general solutions of triangles.</p>	<ul style="list-style-type: none"> • Application of the sine function in the solution of the area of a triangle. • Law of Sines: <ul style="list-style-type: none"> -finding a side given ASA or AAS. -the ambiguous case (SSA). -finding a side given SSA. • Law of Cosines: <ul style="list-style-type: none"> -finding a side given SAS. -finding an angle given SSS. • Solutions of triangles. 	<p>See Classroom Activity 5F.</p>
<p>5G. Apply the normal curve and its properties to familiar contexts.</p>	<ul style="list-style-type: none"> • Intuitive use of the normal curve in real-world situations. • Mean on the bell curve. • Standard deviation. 	<p>See Classroom Activity 5G.</p>
<p>5H. Derive formulas to find measures such as length, area, and volume in real-world context.</p>	<ul style="list-style-type: none"> • Includes Pythagorean Theorem, perimeter of polygons, circumference of circles, area of polygons and circles, and volume of solids. 	<p>See Classroom Activity 5H.</p>
<p>5I. Design a statistical experiment to study a problem and communicate the outcome, including dispersion.</p>	<ul style="list-style-type: none"> • Bias. • Random sample. • Choose appropriate statistical measures. 	<p>See Classroom Activity 5I.</p>
<p>5J. Use statistical methods, including scatter plots and lines of best fit, to make predictions.</p>	<ul style="list-style-type: none"> • Given data, produce scatter plots and lines of best fit. • Make predictions • Discuss possibility of error in predictions. 	<p>See Classroom Activity 5J.</p>

Key Idea 6 Uncertainty

Students use ideas of uncertainty to illustrate that mathematics involves more than exactness when dealing with everyday situations.

PERFORMANCE INDICATORS	INCLUDES	EXAMPLES
6A. Judge the reasonableness of results obtained from applications in algebra, geometry, trigonometry, probability, and statistics.	<ul style="list-style-type: none"> • Uses substitution as a check for solutions to equations and inequalities. • Using proof as a check on the validity of geometric constructions. • Compare histograms with formula-derived solutions for mean, median, variation, and standard deviation. 	See Classroom Activity 6A.
6B. Judge the reasonableness of a graph produced by a calculator or computer.	<ul style="list-style-type: none"> • Determine the effects of changing the parameters of graphs of linear, quadratic, trigonometric, exponential, and circular functions. 	See Classroom Activity 6B.
6C. Interpret probabilities in real-world situations.	<ul style="list-style-type: none"> • Applications of the probability of exactly, at least, or at most r successes in n trials of a Bernoulli experiment. • Simple applications of the binomial theorem. 	See Classroom Activity 6C.
6D. Use a Bernoulli experiment to determine probabilities for experiments with exactly two outcomes.	<ul style="list-style-type: none"> • Definition of a Bernoulli experiment. • Case where r successes are assumed to occur first. • General case. 	See Classroom Activity 6D.
6E. Use curve fitting to fit data.	<ul style="list-style-type: none"> • Linear, logarithmic, exponential, and power regressions from scatter plots. • Linear correlation coefficient. 	See Classroom Activity 6E.

PERFORMANCE INDICATORS	INCLUDES	EXAMPLES
<p>6F. Create and interpret applications of discrete and continuous probability distributions.</p>	<ul style="list-style-type: none"> • Measures of central tendency. • Use of σ-notation. • Measures of dispersion. • Range. • Mean absolute deviation. • Variance using the calculator. • Standard deviation using the calculator. • Binomial theorem. • Normal approximation for the binomial distribution. 	<p>See Classroom Activity 6F.</p>
<p>6G. Make predictions based on interpolations and extrapolations from data.</p>	<ul style="list-style-type: none"> • Domain and range. • Interpolate and extrapolate from graphs of linear, quadratic, trigonometric, circular, exponential, and logarithmic function. 	<p>See Classroom Activity 6G.</p>

Key Idea 7 Patterns/Functions

Students use patterns and functions to develop mathematical power, appreciate the true beauty of mathematics, and construct generalizations that describe patterns simply and efficiently.

PERFORMANCE INDICATORS	INCLUDES	EXAMPLES
7A. Use function vocabulary and notation.	<ul style="list-style-type: none"> • Definition of a relation. • Determining if a relation is a function. • Definition of inverse function. • Notation for absolute value, composite functions. • Expressing exponential functions as logs. • Functions (inverse, exponential, logarithmic). 	
7B. Represent and analyze functions, using verbal descriptions, tables, equations, and graphs.	<ul style="list-style-type: none"> • Represent and analyze exponential, logarithmic, quadratic, and trigonometric functions. 	See Classroom Activity 7B.
7C. Translate among the verbal descriptions, tables, equations, and graphic forms of functions.	<ul style="list-style-type: none"> • Relate algebraic expressions to the graphs of functions. 	See Classroom Activity 7C.
7D. Analyze the effect of parametric changes on the graphs of functions.	<ul style="list-style-type: none"> • Use graphing calculators or sketches to analyze the effects of changing parameters of functions. 	See Classroom Activity 7D.
7E. Apply linear, exponential, and quadratic functions in the solution of problems.	<ul style="list-style-type: none"> • Solve real-world problems by using linear, exponential, and quadratic functions. 	See Classroom Activity 7E.
7F. Apply and interpret transformations to functions.	<ul style="list-style-type: none"> • Use ideas of transformations to investigate the relationships between functions. 	See Classroom Activity 7F.
7G. Model real-world situations with the appropriate function.	<ul style="list-style-type: none"> • Characteristics of linear, quadratic, trigonometric, circular, exponential, and logarithmic functions. 	See Classroom Activity 7G.
7H. Apply axiomatic structure to algebra and geometry.	<ul style="list-style-type: none"> • Algebraic and geometric proof. • Find the solution of a quadratic equation both algebraically and graphically as a check. • Use the quotient identities, reciprocal identities, and the Pythagorean identities. 	See Classroom Activity 7H.

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PERFORMANCE INDICATORS	INCLUDES	EXAMPLES
7I. Solve equations with complex roots, using a variety of algebraic and graphical methods with appropriate tools.	<ul style="list-style-type: none"> Determine from the discriminant of a quadratic equation whether the roots are imaginary, rational, or irrational. 	See Classroom Activity 7I.
7J. Evaluate and form the composition of functions.	<ul style="list-style-type: none"> Evaluate composite functions. Use composite functions in problem-solving situations. 	See Classroom Activity 7J.
7K. Solve equations, using fractions, absolute values, and radicals.	<ul style="list-style-type: none"> Fractional equations. Equations with radicals. Linear inequalities. Absolute value inequalities. Quadratic inequalities. 	See Classroom Activity 7K.
7L. Use basic transformations to demonstrate similarity and congruence of figures.	<ul style="list-style-type: none"> Transformations that provide congruence. Direct isometries. Opposite isometries. Transformations that provide similarity. Dilation. 	See Classroom Activity 7L.
7M. Identify and differentiate between direct and indirect isometries.	<ul style="list-style-type: none"> Transformations that provide congruence. 	See Classroom Activity 7M.
7N. Analyze inverse functions, using transformations.	<ul style="list-style-type: none"> Identify inverse functions which are reflections in the line $y = x$. 	See Classroom Activity 7N.
7O. Apply the ideas of symmetries in sketching and analyzing graphs of functions.	<ul style="list-style-type: none"> Simplify the graphing of functions by using symmetries with respect to an axis, the origin, or some other point. 	See Classroom Activity 7O.
7P. Use the normal curve to answer questions about data.	<ul style="list-style-type: none"> Standard deviation for grouped data. Measures of central tendency. 	See Classroom Activity 7P.
7Q. Develop methods to solve trigonometric equations and verify trigonometric functions.	<ul style="list-style-type: none"> Solve first-degree trigonometric equations. Solve quadratic trigonometric equations. Double- and half-angle formulas. 	See Classroom Activity 7Q.