Curriculum Management System

Monroe Township Schools



Course Name: Fundamentals of Math 11 Grade: 11

For adoption by all regular education programs as specified and for adoption or adaptation by all Special Education Programs in accordance with Board of Education Policy # 2220. **Board Approved:**

TABLE OF CONTENTS

Monroe Township Schools Administration and Board of Education Members	Page3
Acknowledgments	Page4
District Vision, Mission, and Goals	Pages5
Introduction/Philosophy/Educational Goals	Page6
Core Curriculum Content Standards	Page7
Scope and Sequence	Pages8-12
Core Content Overview	Pages13-25
Goals/Essential Questions/Objectives/Instructional Tools/Activities	Pages26-83
Benchmarks	Page84

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Monroe Township Schools

Vision, Mission, and Goals

Vision Statement

The Monroe Township Board of Education commits itself to all children by preparing them to reach their full potential and to function in a global society through a preeminent education.

Mission Statement

The Monroe Public Schools in collaboration with the members of the community shall ensure that all children receive an exemplary education by well trained committed staff in a safe and orderly environment.

Goals

Raise achievement for all students paying particular attention to disparities between subgroups.

Systematically collect, analyze, and evaluate available data to inform all decisions.

Improve business efficiencies where possible to reduce overall operating costs.

Provide support programs for students across the continuum of academic achievement with an emphasis on those who are in the middle.

Provide early interventions for all students who are at risk of not reaching their full potential.

PHILOSOPHY

Monroe Township Schools are committed to providing all students with a quality education resulting in life-long learners who can succeed in a global society. The mathematics program, grades K-12, is predicted on that belief and is guided by the following six principals as stated by the National Council of Teachers of Mathematics (NCTM) in the *Principles and Standards for School Mathematics, 2000.* First, a mathematics education requires equity. All students will be given worthwhile opportunities and strong support to meet high mathematical expectations. Second, a coherent mathematics curriculum will effectively organize, integrate, and articulate important mathematical ideas across the grades. Third, effective mathematics teaching requires the following: a) knowing and understanding mathematics, students as learners, and pedagogical strategies, b) having a challenging and supportive classroom environment and c) continually reflecting on and refining instructional practice. Fourth, students must learn mathematics with understanding. A student's prior experiences and knowledge will actively build new knowledge. Fifth, assessment should support the learning of important mathematics and provide useful information to both teachers and students. Lastly, technology enhances mathematics learning, supports effective mathematics teaching, and influences what mathematics is taught.

As students begin their mathematics education in Monroe Township, classroom instruction will reflect the best thinking of the day. Children will engage in a wide variety of learning activities designed to develop their ability to reason and solve complex problems. Calculators, computers, manipulatives, technology, and the Internet will be used as tools to enhance learning and assist in problem solving. Group work, projects, literature, and interdisciplinary activities will make mathematics more meaningful and aid understanding. Classroom instruction will be designed to meet the learning needs of all children and will reflect a variety of learning styles.

In this changing world those who have a good understanding of mathematics will have many opportunities and doors open to them throughout their lives. Mathematics is not for the select few but rather is for everyone. Monroe township Schools are committed to providing all students with the opportunity and the support necessary to learn significant mathematics with depth and understanding. This curriculum guide is designed to be a resource for staff members and to provide guidance in the planning, delivery, and assessment of mathematics instruction.

EDUCATIONAL GOALS

This course is designed for those students who have been identified by scoring below the passing cutoff in mathematics through their performance on the District Secondary Assessment. Teacher recommendation and prior academic history are also factors that affect student placement. Students will have the opportunity to strengthen skills in area of mathematics. The curriculum for this course will support the Dynamics of Algebra II curriculum through pre-teaching and re-teaching strategies. Topics included are; mathematical models, functions, permutations and combinations, linear functions, equations and inequalities, matrices, system of linear equations and inequalities, quadratic equations and functions, roots and powers, irrational and complex numbers, polynomials and polynomial functions, exponential functions, logarithmic functions, and conic sections. In addition, this course will prepare students for the HSPA test to be administered in March.

NJDOE: Core Curriculum Content Standards

A note about Common Core State Standards for Mathematics

The Common Core State Standards for Mathematics were adopted by the state of New Jersey in 2010. The standards referenced in this curriculum guide refer to these new standards and may be found in the Curriculum folder on the district servers. A complete copy of the new Common Core State Standards for Mathematics and the end of year algebra 1 test content standards may also be found at:

http://www.corestandards.org/the-standards http://www.achieve.org/AlgebralTestOverview

Fundamentals of Math 11 Scope and Sequence

Quarter I		
Big Idea I: Equivalence	Big Idea II: Transformation	
 Number Sense Real numbers Rational numbers Irrational numbers Irrational numbers Powers, roots, and exponents	 II. Geometric Properties and Transformations Geometric terms (e.g. point, ray, line, angle, plane, side, vertices, polygon, face, polyhedron, circle, sphere) Standard notations used in geometry Properties of geometric figures Fundamental relationships between geometric figures (e.g., parallelism, perpendicularity, intersection, congruence, similarity) Inductive and deductive reasoning Spatial relationships (e.g., direction, orientation, and perspective of objects in space) Congruence Similarity Symmetry Transformations Reflections Translations Dilations 11. The rectangular coordinate system Tassellations 	
	14. Vectors	

Quarter I		
Big Idea III: Measurement		
 III. Geometric Measurements Measurable attributes Perimeter Circumference Area Surface area Volume Angle measure Standard and non-standard units of measure Dimensions, shapes, and properties of figures and objects Right triangle relationships The Pythagorean Theorem Basic trigonometric ratios 	Course Quarterly Benchmark Assessment: (Higher level 5-10 questions, 45 minutes)	
Quarter II		
Big Idea IV: Risk	Big Idea V: Patterns	
 IV. Probability Expected value of a probability-based games Determining whether the game is fair Calculate geometric probabilities Model situations involving probability with simulations and theoretical models Probability Models Determine probabilities in complex situations Conditional events Complementary events Dependent and independent events Theoretical probabilities Predictions based on experimental and theoretical probabilities. 	 V. Discrete Mathematics—Systematic Listing and Counting Combinations with replacement Combinations without replacement Multiplication rule of counting in complex situations Replacement Without replacement Ordered counting situations Unordered counting situations Justify solutions to counting problems. Pascal's Triangle, VI. Discrete Mathematics—Sequences and Series Explicit formulas for nth terms Sums of finite arithmetic series Sums of finite and infinite geometric series Informal notation of limit 	

Big Idea VII: Relationships
 III. Functions and Relationships Relations and Functions Representations of relations and functions Equations Inequalities Tables Graphs. Properties and behavior of functions of one variable Slope of a line or curve Domain and range Intercepts Continuity Maximum/minimum Estimating roots of equations Intersecting points as solutions of systems of equations Rates of change Transformations Translations Reflections Dilations Propential Polynomial Rational Trigonometric functions Properties Linear vs. non-linear Symmetry Increasing/decreasing on an interval
(III)

Quarter III	
Big Idea VIII: Modeling	Big Idea IX: Equivalence
Big Idea VIII: Modeling IX. Modeling 7. Model real-world phenomena 8. Solve equations a. Linear b. Quadratic c. Exponential d. Periodic 1. Sine 2. Cosine e. Step functions f. Direct and inverse variation g. Absolute value h. Expressions, equations and inequalities i. Exponential Growth/decay j. Applications in mathematics, biology, and economics 1. Compound interest 9. Independent variable and dependent variables 10. Recursive formulas	 X. Procedure Evaluate and simplify expressions. Add and subtract polynomials Multiply a polynomial by a monomial or binomial Divide a polynomial by a monomial Select and use appropriate methods to solve equations and inequalities. Linear equations - algebraically Quadratic equations - factoring (when the coefficient of x² is 1) and using the quadratic formula All types of equations using graphing, computer, and graphing calculator techniques Judge the meaning, utility, and reasonableness of the results of symbol manipulations, including those carried out by technology.

Quar	ter III
Big Idea X: Networks	
 XI. Discrete Mathematics—Vertex-Edge Graphs and Algorithms Use vertex-edge graphs and algorithmic thinking to represent and solve practical problems. Circuits that include every edge in a graph Circuits that include every vertex in a graph Scheduling problems (e.g., when project meetings should be scheduled to avoid conflicts) using graph coloring Applications to science (e.g., who-eats-whom graphs, genetic trees, molecular structures) 2. Explore strategies for making fair decisions. Combining individual preferences into a group decision (e.g., determining winner of an election or selection process) Determining how many Student Council representatives each class (9th, 10th, 11th, and 12th grade) gets when the classes have unequal sizes (apportionment). 	Course Quarterly Benchmark Assessment: (Higher level 5-10 questions)
Quar	ter IV
Big Idea XI: Application	
 XII. Real-Life Applications 1. Board Game 2. Financial Success using the Graphing Calculator 3. Topic Review 	

Core Content Overview	
	N-RN.1. Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.
	N-RN.2. Rewrite expressions involving radicals and rational exponents using the properties of exponents.
	N-Q.1. Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
	N-Q.2. Define appropriate quantities for the purpose of descriptive modeling.
Big Idea I: Equivalence	N-Q.3. Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
	A-APR.1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.
	A-APR.7. (+) Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.
	Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol (*).
	G-SRT.1. Verify experimentally the properties of dilations given by a center and a scale factor:
	a. A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.
	b. The dilation of a line segment is longer or shorter in the ratio given by the scale factor.
Big Idea II: Transformation	G-SRT.2. Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar; explain using similarity transformations the meaning of similarity for triangles as the equality of all corresponding pairs of angles and the proportionality of all corresponding pairs of sides.
	G-SRT.3. Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.
	G-SRT.4. Prove theorems about triangles. Theorems include: a line parallel to one side of a triangle divides the

Core Content Overview	
	other two proportionally, and conversely; the Pythagorean Theorem proved using triangle similarity.
	G-SRT.5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.
	G-GPE.5. Prove the slope criteria for parallel and perpendicular lines and use them to solve geometric problems (e.g., find the equation of a line parallel or perpendicular to a given line that passes through a given point).
	G-GPE.6. Find the point on a directed line segment between two given points that partitions the segment in a given ratio.
	G-GMD.4. Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three- dimensional objects generated by rotations of two-dimensional objects.
	G-MG.3. Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).
	N-VM.1. (+) Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes (e.g., v , $ v $, $ v $, v).
	N-VM.2. (+) Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.
	N-VM.3. (+) Solve problems involving velocity and other quantities that can be represented by vectors.
	N-VM.6. (+) Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.
	N-VM.7. (+) Multiply matrices by scalars to produce new matrices, e.g., as when all of the payoffs in a game are doubled.
	Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol (*).
Big Idea III: Measurement	G-SRT.6. Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.
	G-SRT.7. Explain and use the relationship between the sine and cosine of complementary angles.

Core Content Overview	
	G-SRT.8. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
	G-C.2. Identify and describe relationships among inscribed angles, radii, and chords. <i>Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.</i>
	G-C.5. Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.
	G-GPE.4. Use coordinates to prove simple geometric theorems algebraically. For example, prove or disprove that a figure defined by four given points in the coordinate plane is a rectangle; prove or disprove that the point $(1, \sqrt{3})$ lies on the circle centered at the origin and containing the point $(0, 2)$.
	G-GPE.7. Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.
	G-GMD.3. Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.*
	G-MG.1. Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).
	G-MG.2. Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).
	G-MG.3. Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).
	Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol (*).
	S-CP.1. Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").
Big Idea IV: Risk	S-CP.2. Understand that two events <i>A</i> and <i>B</i> are independent if the probability of <i>A</i> and <i>B</i> occurring together is the product of their probabilities, and use this characterization to determine if they are independent.
	S-CP.3. Understand the conditional probability of A given B as P(A and B)/P(B), and interpret independence of A

Core Content Overview	
	and <i>B</i> as saying that the conditional probability of <i>A</i> given <i>B</i> is the same as the probability of <i>A</i> , and the conditional probability of <i>B</i> given <i>A</i> is the same as the probability of <i>B</i> .
	S-CP.4. Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities. For example, collect data from a random sample of students in your school on their favorite subject among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.
	S-CP.5. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.
	S-CP.6. Find the conditional probability of <i>A</i> given <i>B</i> as the fraction of <i>B</i> 's outcomes that also belong to <i>A</i> , and interpret the answer in terms of the model.
	S-CP.7. Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model.
	S-CP.8. (+) Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B A) = P(B)P(A B)$, and interpret the answer in terms of the model.
	A-APR.5. (+) Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer <i>n</i> , where x and y are any numbers, with coefficients determined for example by Pascal's Triangle. ¹
	S-CP.5. Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.
<u>Big Idea V</u> : Patterns	S-CP.6. Find the conditional probability of <i>A</i> given <i>B</i> as the fraction of <i>B</i> 's outcomes that also belong to <i>A</i> , and interpret the answer in terms of the model.
	S-CP.8. (+) Apply the general Multiplication Rule in a uniform probability model, $P(A \text{ and } B) = P(A)P(B A) = P(B)P(A B)$, and interpret the answer in terms of the model.
	S-CP.9. (+) Use permutations and combinations to compute probabilities of compound events and solve problems.

Core Content Overview	
	F-IF.3. Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ for $n \ge 1$.
	F-BF.2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.
	Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol (*).
	S-ID.1. Represent data with plots on the real number line (dot plots, histograms, and box plots).
<u>Big Idea VI</u> : Data Analysis	S-ID.2. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.
	S-ID.3. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).
	S-ID.4. Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.
	S-ID.6. Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.
	 Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models.
	b. Informally assess the fit of a function by plotting and analyzing residuals.
	c. Fit a linear function for a scatter plot that suggests a linear association.
	S-ID.7. Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.
	S-ID.8. Compute (using technology) and interpret the correlation coefficient of a linear fit.
	Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout

Core Content Overview	
	the high school standards indicated by a star symbol (*).
	A-APR.3. Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.
	A-REI.1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
	A-REI.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.
	A-REI.5. Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
	A-REI.6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.
Big Idea VII: Relationships	A-REI.7. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.
	A-REI.10. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
	A-REI.11. Explain why the <i>x</i> -coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
	A-REI.12. Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.
	F-IF.1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If <i>f</i> is a function and <i>x</i> is an element of its domain, then $f(x)$ denotes the output of <i>f</i> corresponding to the input <i>x</i> . The graph of <i>f</i> is the graph of the equation $y = f(x)$.

Core Content Overview			
	F-IF.2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.		
	F-IF.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i> *		
	F-IF.5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function $h(n)$ gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.		
	F-IF.6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.		
	F-IF.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.		
	a. Graph linear and quadratic functions and show intercepts, maxima, and minima.		
	 Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. 		
	 d. (+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. 		
	F-IF.8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.		
	a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.		
	F-IF.9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). <i>For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.</i>		
	F-BF.1. Write a function that describes a relationship between two quantities.*		
	a. Determine an explicit expression, a recursive process, or steps for calculation from a context.		
	b. Combine standard function types using arithmetic operations. For example, build a function that		

Core Content Overview		
	models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.	
	 c. (+) Compose functions. For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time. 	
	F-BF.3. Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k f(x)$, $f(kx)$, and $f(x + k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.	
	Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol (*).	
	A-CED.1. Create equations and inequalities in one variable and use them to solve problems. <i>Include equations</i> arising from linear and quadratic functions, and simple rational and exponential functions.	
	A-CED.2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.	
	A-CED.3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. <i>For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.</i>	
	A-CED.4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law $V = IR$ to highlight resistance R.	
Big idea viii: Modeling	A-REI.1. Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.	
	A-REI.2. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	
	A-REI.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	
	A-REI.4. Solve quadratic equations in one variable.	

	Core Content Overview		
Use the method of completing the square to transform any quadratic equation in x into an equation of the f p) ² = q that has the same solutions. Derive the quadratic formula from this form.			
	Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b .		
	A-REI.5. Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.		
	A-REI.6. Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.		
	A-REI.7. Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically. For example, find the points of intersection between the line $y = -3x$ and the circle $x^2 + y^2 = 3$.		
	A-REI.8. (+) Represent a system of linear equations as a single matrix equation in a vector variable.		
	A-REI.10. Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).		
	A-REI.11. Explain why the <i>x</i> -coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.		
	A-REI.12. Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.		
	F-IF.1. Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If <i>f</i> is a function and <i>x</i> is an element of its domain, then $f(x)$ denotes the output of <i>f</i> corresponding to the input <i>x</i> . The graph of <i>f</i> is the graph of the equation $y = f(x)$.		
	F-IF.2. Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.		
	F-IF.3. Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ for $n \ge 1$.		

Core Content Overview		
	F-IF.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. <i>Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.</i>	
	F-IF.5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function $h(n)$ gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.	
	F-IF.6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.	
	F-IF.7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.	
	a. Graph linear and quadratic functions and show intercepts, maxima, and minima.	
	 Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. 	
	c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.	
	e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.	
	F-IF.8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.	
	 a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. 	
	b. b. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as $y = (1.02)t$, $y = (0.97)t$, $y = (1.01)12t$, $y = (1.2)t/10$, and classify them as representing exponential growth or decay.	
	F-IF.9. Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.	

Core Content Overview		
	F-BF.1. Write a function that describes a relationship between two quantities.*	
	a. Determine an explicit expression, a recursive process, or steps for calculation from a context.	
	b. Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.	
	 c. (+) Compose functions. For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time. 	
	F-BF.2. Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms. [*]	
	F-LE.1. Distinguish between situations that can be modeled with linear functions and with exponential functions.	
	a. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.	
	b. Recognize situations in which one quantity changes at a constant rate per unit interval relative to another.	
	c. Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.	
	F-LE.2. Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).	
	F-LE.3. Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.	
	F-LE.5. Interpret the parameters in a linear or exponential function in terms of a context.	
	Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol (*).	
Big Idea IX: Equivalence	A-CED.4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm's law $V = IR$ to highlight resistance R.	

Core Content Overview			
	A-REI.2. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.		
	A-REI.3. Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.		
	A-REI.4. Solve quadratic equations in one variable.		
	a. Use the method of completing the square to transform any quadratic equation in <i>x</i> into an equation of the form $(x - p)^2 = q$ that has the same solutions. Derive the quadratic formula from this form.		
	b. Solve quadratic equations by inspection (e.g., for $x^2 = 49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions and write them as $a \pm bi$ for real numbers a and b .		
	F-IF.8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.		
	 Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. 		
	 b. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as y = (1.02)t, y = (0.97)t, y = (1.01)12t, y = (1.2)t/10, and classify them as representing exponential growth or decay. 		
	A-APR.1. Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.		
	A-APR.7. (+) Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.		
	Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol (*).		
Big Idea X: Networks	N-VM.6. (+) Use matrices to represent and manipulate data, e.g., to represent payoffs or incidence relationships in a network.		

Core Content Overview		
Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Makin mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear through the high school standards indicated by a star symbol (*).		
Big Idea XI: Application	Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol (*).	

BIG IDEA I: Equivalence

Curriculum Management System

Overarching Goals

(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.

(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.

(3) Investigate, research, and synthesize various pieces of information from a variety of media sources.

Essential Questions

- How do Mathematical ideas interconnect and build on one another resulting in a coherent whole?
- How are numbers applied in real-world situations?
- Does this make sense?

Suggested Blocks for Instruction: 7-8

KNOW	UNDERSTAND	DO
Students will know that:	Students will understand that:	Students will be able to:
Real numbers are all values that are found on a number line.	Mathematical ideas interconnect and build on one another resulting in a coherent whole.	Extend understanding of the number system.
Rational numbers can be written in the form a'_b where a and b are both integers and $b \neq 0$ Irrational numbers cannot be written in the form a'_b .		Compare and order rational and irrational numbers.
A terminating decimal has finite number of digits.	Sample Conceptual Understandings	Extend understanding and use of operations to include real numbers and algebraic procedures.

A repeating decimal has a digit or sequence of digits that repeats indefinitely.	Tonya's little brother has accidentally spilled chocolate sauce on one of Tonya's homework problems: $(5.382 \times 10^5) \times (2.000 \times 10^2)$ If three digits are unreadable, give the range of possible values for the product. <i>(www.state.nj.us)</i>	Develop, apply and explain various methods for solving problems involving exponents including rational and negative exponents.
Integers are the set of positive and negative whole numbers.	 Every Tuesday, at the Dog Deli, the manager gives away free hot dogs and soda. Every sixth customer gets a free soda, and every eighth customer gets a free hot dog. The Dog Deli served 73 customers last Tuesday. How many free sodas did the Dog Deli give away last Tuesday? How many hot dogs were given away? Did any customers receive both a free hot dog and a free soda? If so, how many customers? If a soda sells for 99¢ and a hot dog sells for \$1.99, how much did the Dog Deli lose in income by giving away these items? 	Distinguish between terminating and repeating decimal forms of rational numbers.

Square root is one of the two equal factors of a number.	 Find the length, width, and area of each of the 5 shaded rectangles. What is the total area represented by the 5 rectangles? How do you think the area of the 5 rectangles. 	Recognize that mathematics is used in a variety of contexts.
	compares to the area of the region under the curve? Explain your reasoning. Justify your answers.	
To multiply powers having the same base, the exponents are added.	(www.state.nj.us)	Determine whether or not properties of equivalence relations and arithmetic operations apply to different relations and operations.
	In the compound interest formula $A = P(1 + r/n)^{nt}$, A represents the value of the investment in the future, P is the amount of the original investment, r is the annual interest rate, t is the number of years of the investment, and n is the number of times the interest is compounded each year. Find the total amount after \$2500 is invested for 18 years at a rate of 6%, compounded quarterly.	
To find the power of a power, multiply the exponents. To find a power of product, find the power of each factor and multiply.	(www.state.nj.us)	Evaluate and write expressions containing exponents.
	In a class 48% students liked math over language. If 252 students liked math, how many students were there in total?	

A non-zero number to the zero power is 1.	(www.state.nj.us)	Recognize that mathematical facts, procedures, and claims have to be justified.
	Store A and Store B both sell a product for \$38.50. During a clearance sale, Store A the price by 35% and then takes off another 20% off the discounted price at the register. Store B offers a onetime discount of 55%. Which store should you buy the product from and why? <i>(www.state.nj.us)</i>	
$a^{-n} = \frac{1}{a^n}; a \neq 0$		Use verbal and algebraic models to represent real-life situations.
	Kiran and her brother drove to their grandparent's house. Kiran drove for an hour at 40 MPH and her brother drove for 3 hours at 55 MPH. Find the average speed for the entire trip?	
Exponential function is of the form: $y = a \cdot b^x$		Solve simple quadratic equations. Determine exponential growth and decay factors.
Quotient of powers property states to divide powers having the same base, subtract exponents.		Use technology to gather, analyze, and communicate mathematical information.
Power of a quotient property states to find the power of the quotient, find the power of the numerator and the power of the denominator and divide.		Use absolute values, exponents, and approximations for roots of numbers in real- life situations.
All positive real numbers have two square roots: a positive and negative square root. The positive square root is called the principle square root.		Distinguish between rational and irrational numbers from their decimal representations.

The number or expression inside a radical symbol $(\sqrt{})$ is the radicand.	Apply approximation techniques to situatio involving initial portions of infinite decimal.	
 The square root of a negative number is undefined.	Apply associative, commutative, and distributive properties to simplify algebraic expressions.	
Numbers whose square roots are integers or quotients of integers are called perfect squares.	Use primes, factors and multiples in real-w situations.	1
Absolute value of a number is the distance of a value from zero on the number line.	Understand how mathematical ideas interconnect and build on one another to complete a whole.	
Scientific notation is of the form $c \times 10^n$ where $1 \le c < 10$ and n is an integer.	Apply mathematics in practical situations.	
The reflexive property of equality states that any quantity is equal to itself.	Use reasoning to support mathematical conclusions and problem solutions.	
The symmetric property of equality states that if first quantity equals the second, then the second quantity also equals the first.	Select and apply a variety of appropriate problem-solving strategies.	_
The transitive property of equality states that when one quantity equals the second quantity and the second quantity equals a third quantity, then the first and the third quantity are equal.	Solve proportions.	
The substitution property of equality states that a quantity may be substituted for its equal in a given expression.	Change from a fraction or decimal to a percent and from a percent to a fraction or decimal.	
Commutative property of addition and multiplication states that the order in which numbers are added/multiplied does not change the sum/product.		

a r t	Associative property of addition/multiplication states that the way numbers/factors are grouped does not change he sum/product.
C a	Distributive property states that the product of a factor and a sum or difference is the same is the sum or difference of two products.
l a	A factor is a whole number that can divide another number evenly.
r	A multiple is the product of a given whole number and another number.
t i	A prime number is a whole number greater han 1 that has exactly two factors, 1 and tself.
ہ و	A composite number is a whole number greater than 1 that has more than two factors.
F S fa	Prime factorization is an expression that hows the given number as a product of actors that are all prime numbers.
F	Ratio is a comparison of two numbers.
/ t	A proportion is an equation stating that the wo ratios are equal.
C P e r	Cross products are a way of solving a proportion by multiplying the numerator of each ratio by the denominator of the other atio.

21 st Century Skills								
Creativity and Innovation	Critical Thinking and Problem Solving	Communication and Collaboration						
Information Literacy	Media Literacy	ICT Literacy						
Life and Career Skills	Technology Based Activities							
http://www.p21.org/index.php?option=com_contententententententententententententen	<u>&task=view&id=254&Itemid=119</u> ⊻							
Conceptual Learning Activities								
 Concept Application: Attendance Concept Application: Commission Concept Application: Car Maintenance Concept Application: Prime Factorization 								
✓ Released PATs: Keeping Records at the Gas Station ✓ Released PATs: Pizza Party ✓ Released PATs: Credit Card Calculations								
 NOTE: The assessment models provided in this document are suggestions for the teacher. If the teacher chooses to develop his/her own model, <i>it must be of equal or better quality and at the same or higher cognitive levels (as noted in parentheses).</i> Depending upon the needs of the class, the assessment questions may be answered in the form of essays, quizzes, mobiles, PowerPoint, oral reports, booklets, or other formats of measurement used by the teacher. Diagnostic/Pre - Assessment: Pre-test (5-10 open ended questions) will be given covering multiple concepts. Open-Ended (Formative) Assessment: Homework is assigned daily, from the textbook, Chapter Resource Practice Workbook, or other sources. (<i>Synthesis, Analysis, Evaluation</i>) Introductory and Closing Activities will be done every day to pre-assess student knowledge and assess understanding of topics.(<i>Synthesis, Analysis, Evaluation</i>) Excerpts from previous HSPA exams including multiple choice and open-ended problems should be given every class to assess student understanding and measure their individual skills. Summative Assessment: Assessment questions should be open-ended and should follow the general format illustrated in the Essential Questions/Sample Conceptual Understanding section. (<i>Synthesis, Analysis, Evaluation</i>) Students will be given quizzes that provide a brief review of the concepts and skills in the unit. Students will be given a unit test that provides a review of the concepts and skills in the unit. Students will work on Performance Assessment process similar to the ASHA process 								

Additional Resources

- http://www.state.nj.us/education/njpep/assessment/hspa/hspa_math/main_menu.htm
- Primiani, A. Rose and William Caroscio, Prentice Hall Brief Review for New Jersey: HSPA Mathematics, Pearson: 2008
- Sico, John J., <u>HSPA Success Work-A-Text in Mathematics Expanded Edition</u>, Instructivision: 2003

BIG IDEA II: Transformation

Curriculum Management System Fundamentals of Math : Grade 11

Overarching Goals

(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.

(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.

(3) Investigate, research, and synthesize various pieces of information from a variety of media sources.

Essential Questions

- How do properties define geometric figures?
- How can geometry be used to measure distance and direction?

Suggested Blocks for Instruction: 7-8					
KNOW	UNDERSTAND	DO			
Students will know that:	Students will understand that:	Students will be able to:			
Two points are needed to make a line and it extends in either direction indefinitely.	 Properties of geometric figures are vital to erecting structures and proper portrayal. 	Use properties, definitions, and relationships to identify, classify, and describe two- dimensional and three-dimensional geometric figures.			
A ray has a starting point and direction in which it extends indefinitely.	Geometric figures are defined by unique properties.	Draw two-dimensional representations of three-dimensional objects by sketching shadows, projections, perspectives, and map views.			
An angle has a vertex and two sides.	Sample Conceptual Understandings	Recognize, identify, and describe geometric relationships and properties as they exist in nature, art, and other real-world settings.			
		T			




	A circle is a set of points in a plane that are equidistant from a center point.		Use inductive and deductive reasoning to solve real-life problems and justify solutions.
		 A boat starts at point A and travels 8 miles east, and then turns south and travels 6 miles to a point B located on the shore of the lake. Using the grid paper, make a scale drawing using vectors to show the boat's movement, starting from point A. Draw a vector that would show the direct path from point A to point B. What would be the approximate number of miles the boat could have traveled along this path? Approximately how many degrees from North would this path be? Explain how you arrived at your answer. 	
_	The symbol for ray AB is \overline{AB} .	(www.state.nj.us)	Use properties, definitions, and relationships to identify, classify, and describe two- dimensional and three-dimensional geometric figures.
	The symbol for line AB is \overline{AB} .		Recognize, identify, and describe geometric relationships and properties that exist in real- world settings.
	The symbol for angle ABC is $\angle ABC \text{ or } \square ABC \text{ or } \square ABC $.		Analyze properties of three-dimensional geometric figures by using models and by drawing and interpreting two-dimensional representations of them
	Symbol for perpendicular lines is given by \perp .		Apply concepts of symmetry, similarity, and congruence to problem solving
	Squares have four right angles and congruent sides.		Solve real-world and mathematical problems using geometric models.
	The sum of all angles of a quadrilateral equals 360 degrees.		Given the pre-image and transformation, find the image and vice versa.

Three angles of a triangle add up to 180 degrees.	Γ	Given the pre-image & image, determine the transformation.
All sides and angles are congruent in an equilateral triangle.		Determine the sequence of transformations needed to map one figure onto another.
Two consecutive angles in a parallelogram are supplementary.		Determine the sequence of transformations needed to map one figure onto another.
A trapezoid has exactly two sides parallel.	_	Solve problems in geometry using transformations, coordinates, and vectors.
Right triangle has a 90 degree angle.		Relate the concepts of symmetry, similarity, and congruence to transformations.
Isosceles triangle has two congruent legs and angles.		Predict and represent resulting figures when combining, subdividing, and changing figure.
A square or rhombus is a parallelogram with congruent sides.		Recognize regular and semi-regular tessellations.
Two parallel lines cut by a transversal form corresponding angles .		Create an original tessellation.
Two intersecting lines form two pairs of vertical angles .		Draw a figure & tessellate it.
Congruent figures have same shape(same corresponding angles) and size		Solve problems in geometry using transformations, coordinates, and vectors.

Similar figures have same shape and all corresponding sides in the same ratio.	Perform scalar multiplication on matri
Dilation is a transformation in which a figure is proportionally made smaller or larger.	Solve problems in geometry using transformations, coordinates, and ver
The new image after performing a transformation is called an image where as the original is called the pre-image .	
The line of reflection is a line in which a figure is flipped in a reflection.	
The point of rotation is the point around which a figure is turned.	
Transformation is a way of changing the position or size of a geometric figure without altering the shape.	
Translation is a form of transformation in which a figure is slid horizontally, vertically, or both.	
Tessellation results from the use of congruent geometric figures to cover a plane without overlapping and without gaps.	
A regular tessellation is made up of one type of polygon.	
A semi-regular tessellation uses more than one type of regular polygon.	

	In a tessellation, the angles of polygons at a vertex add up to 360° .			
	Matrix is a rectangular array of numbers.			
	The dimensions of matrix are given by $n \times m$ the number of rows (<i>n</i>) by the number of columns (<i>m</i>). An individual entry in a matrix is called an element .			
	Vectors are arrows that show magnitude and direction.			
		21 st Century Skills		
Cre	ativity and Innovation	Critical Thinking and Problem Solving	Communication and Collaboration	
Info	ormation Literacy	Media Literacy	ICT Literacy	
Life	and Career Skills	Technology Based Activities		
<u>http</u> <u>http</u>	://www.p21.org/index.php?option=com_contenta ://www.iste.org/standards/nets-for-students.asp	&task=view&id=254&Itemid=119 <u><</u>		
	Conceptual Learning Activities			
	 ✓ Concept Application: Location ✓ Concept Application: Vectors 			
Performance Assessment Task Sample		Concept Application: Going Places		

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BIG IDEA III: Measurement

Curriculum Management System Fundamentals of Math : Grade 11

Overarching Goals

(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.

(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.

(3) Investigate, research, and synthesize various pieces of information from a variety of media sources.

- How do area, perimeter, and volume define space?
- How is geometry useful in occupations such as an architect or engineer?

Suggested Blocks for Instruction: 7-8				
KNOW	UNDERSTAND	DO		
Students will know that:	Students will understand that:	Students will be able to:		
Area is the measure, in square units, of the inside of a two-dimensional surface or shape of a three-dimensional object.	• Area, perimeter, and volume define space.	Utilize appropriate formulas and label answers with appropriate units of measure.		
Area of a parallelogram is given by the formula: $A = bh$	• Trigonometric ratios and the Pythagorean Theorem are interconnected in defining the properties of a right triangle.	Measure geometric objects and determine the degree of accuracy needed when measuring them.		
Area of a triangle is given by the formula: $A = \frac{1}{2}bh$	Sample Conceptual Understandings	Choose the appropriate techniques, tools, and units to measure quantities to achieve the desired level of accuracy.		



Area of a circle is given by the formula: $A = \pi r^2$

A rectangular board that measures 2 m wide and 10 m long is leaning against a wall, as shown below. The sun is shining directly above the board.



A) Sketch the shape of the shadow that the board makes on the ground.

B) If the sun's rays are vertical, describe how moving the bottom edge of the board closer to the wall would affect the width and length of the shadow on the ground.

C) How close to the wall should the bottom edge of the board be positioned so that the shadow of the board forms a square? Explain.

D) Find the height at which the top of the board touches the wall when the shadow on the ground is a square. Explain how you found your answer.

(www.state.nj.us)

Develop and apply a variety of strategies for determining perimeter, circumference, area, surface area, volume, and angle measure.

Volume represents the amount of space enclosed by a three-dimensional shape.	A carpenter positions the bottom of his 45 foot ladder 5 ½ feet from the base of a building to fix a broken window. How high up on the building will the ladder reach to enable the carpenter to fix the window? Explain and show all of your work.	Solve problems using the Pythagorean Theorem.
Volume of a cone is given by the formula: $V = \frac{1}{3}Bh$ where B is the area of the base and h is the height of the solid.	(www.state.nj.us)	measures of familiar objects.
	If a rectangular stick of butter, as shown below, measures 6 in. x 2 in. x 1 in.	
	 What is the volume of the stick of butter? (in square inches) If you take ½ (or 50%) off each side of this stick of butter, what us the volume of the new solid? (in square inches) What is the ratio of the volume of the original stick of butter to the volume if the second? Explain and show your work. 	
	(www.state.nj.us)	

Volume of a pyramid is given by the formula: $V = \frac{1}{3}Bh$ where B is the area of the base and <i>h</i> is the height of the solid.	If you line up 30 squares in a row, side by side, as shown below, with each side equal to 6 inches, what would the perimeter of the figure be?	Express mathematically and explain the impact of change in an object's dimensions on its surface area, volume, and/or perimeter.
 Volume of a cylinder is given by the formula: $V = Bh \text{ or } \pi r^2 h$ where B is the area of the base and h is the height of the solid.		
Volume of a prism is given by the formula: V = Bh where B is the area of the base and h is the height of the solid.		
Volume of a sphere is given by the formula: $V = \frac{4}{3}\pi r^3$ where <i>r</i> is the radius.		
All non-zero digits are always significant.		
Zeros between two significant digits are significant (e.g. 5.03 has three significant digits).		
Zeros to the right of the decimal point and a significant digit are significant (e.g. 0.0030 has two significant digits).		

Placeholders are not significant (e.g. 66,000 has two significant digits).
Triangle Inequality Theorem states that the sum of the lengths of two sides of any triangle is greater than the length of the third side.
Midsegment of a triangle connects the midpoints of two sides of a triangle and is parallel to the third side.
Hypotenuse is the side of a right triangle that is opposite the right angle.
Leg is the side of the right triangle adjacent to the hypotenuse.
The legs of a right triangle are always perpendicular.
Pythagorean Theorem states that the sum of the squares of the lengths of two legs is equal to the square of the hypotenuse.
Trigonometric ratios are the ratios made up of the lengths of the sides of the right triangle.
Sine Ratio is the ratio of the length of the side opposite an acute angle to the length of the hypotenuse in a given right triangle.
Cosine Ratio is the ratio of the length of the side adjacent to an acute angle to the length of the hypotenuse in a given right triangle.

Tangent Ratio is the ratio of the length of the side opposite an acute angle to the length of the adjacent side in a given right triangle.		
	21 st Century Skills	
Creativity and Innovation	Critical Thinking and Problem Solving	Communication and Collaboration
Information Literacy	Media Literacy	ICT Literacy
Life and Career Skills	Technology Based Activities	
http://www.p21.org/index.php?option=com_content&task=view&id=254&Itemid=119 http://www.iste.org/standards/nets-for-students.aspx Conceptual Learning Activities		
 Concept Application: Gardening Choices Concept Application: Draining the Pool Concept Application: Boxes and More Box Concept Application: House Plans Concept Application: Storage 	ies	
Performance Assessment Task Sample	 ✓ Released PATs: Sand and Salt Storage ✓ Released PATs: Fencing the Field ✓ Released PATs: Cake Cutting ✓ Released PATs: Competitive Salaries 	

	•	NOTE: The assessment models provided in this document are suggestions for the teacher. If the teacher chooses to develop his/her own model, it must be of equal or better quality and at the same or higher cognitive levels (as noted in parentheses).
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nent		 Homework is assigned daily, from the textbook, Chapter Resource Practice Workbook, or other sources. (Synthesis, Analysis, Evaluation) Introductory and Closing Activities will be done every day to pre-assess student knowledge and assess understanding of topics.(Synthesis, Analysis, Evaluation)
essi		 Excerpts from previous HSPA exams including multiple choice and open-ended problems should be given every class to assess student understanding and measure their individual skills.
Ass		Summative Assessment: Assessment questions should be open-ended and should follow the general format illustrated in the Essential Questions/Sample Conceptual Understanding section. (Synthesis, Analysis, Evaluation)
		 Students will be given quizzes that provide a brief review of the concepts and skills in the previous lessons.
		Students will be given a unit test that provides a review of the concepts and skills in the unit.
		 Students will take the HSFA Students will work on Performance Assessment process similar to the ASHA process
tional urces	•	http://www.state.nj.us/education/njpep/assessment/hspa/hspa_math/main_menu.htm
so	•	Primiani, A. Rose and Winnam Caroscio, <u>Prentice Hall Brief Review for New Jersey: HSPA Mathematics</u> , Pearson: 2008
Ad Re	•	Sico, John J., <u>HSPA Success Work-A-Text in Mathematics – Expanded Edition</u> , Instructivision: 2003

BIG IDEA IV: Risk

Curriculum Management System Fundamentals of Math : Grade 11

Overarching Goals

(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.

(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.

(3) Investigate, research, and synthesize various pieces of information from a variety of media sources.

- How are theoretical and empirical probability related?
- How can you use probability and expected value to help determine whether a game is fair?

Suggested Blocks for Instruction: 5-6				
KNOW	UNDERSTAND	DO		
Students will know that:	Students will understand that:	Students will be able to:		
Expected Value is the average of a probability distribution. It is the sum of the products of the outcomes of an event and their associated probabilities. $E(X) = \sum X \cdot P(X)$	Probability is a way of predicting outcomes, but does not assure outcomes.	Calculate the expected value of a probability- based game, given the probabilities and payoffs of the various outcomes, and determine whether the game is fair.		
Geometric probability uses the concept of space and area to calculate probability of an event.	Risk and fairness are interrelated.	Use concepts and formulas of area to calculate geometric probabilities.		
Mutually exclusive events are two events that cannot occur at the same time.	Profit is determined by the delicate balance of human perception of odds and underlying probability.	Model situations involving probability with simulations (using spinners, dice, calculators and computers) and theoretical models, and solve problems using these models.		
Independent events are two events where one event does not affect the outcome of the second event.	Sample Conceptual Understandings	Determine probabilities in complex situations such as conditional, complementary, and independent/dependent events.		

Dependent events are two events where one event affects the outcome of the second event.	What is the probability of hitting the bull's eye on the target below?	Estimate probabilities and make predictions based on experimental and theoretical probabilities.
The " Law of Large Numbers " states that empirical probability will approach the theoretical probability of an event after an infinite number of trials.	What is the probability of rolling a 6 on a standard die and picking a jack of clubs?	Understand and use the "law of large numbers".
	A card is randomly selected from a standard deck of 52 cards.a. What is the probability that it is an ace <i>or</i> a face card?b. What is the probability that the card is a heart <i>or</i> a face card?	
	Jack and Jill are playing a game. One option is to flip a coin 10 times and the other is to flip a coin 100 times and count the number of tails that pop up. The object of the game is to have the greater empirical probability of flipping "tails". Which option would you choose and why?	

	21 st Century Skills				
Creativity and Innovation		Critical Thinking and Problem Solving	Communication and Collaboration		
Information Literacy		Media Literacy	ICT Literacy		
Life and Ca	areer Skills	Technology Based Activities			
http://www. http://www.	http://www.p21.org/index.php?option=com_content&task=view&id=254&Itemid=119 http://www.iste.org/standards/nets-for-students.aspx				
		Conceptual Learning Activities			
 Remove One (Probability and Statistics) Declaration of Dependence? (Probability and Statistics) Addition Rules Discovery (Probability and Statistics) Cooperative Learning Activity (McDougal Littell, <u>Algebra 1</u>, 2004, Chapter 1 Resource Books, p.90) Activity Lesson Opener (McDougal Littell, <u>Algebra 1</u>, 2004, Chapter 6 Resource Books, p.94) 11.4 Activity Lesson Opener (McDougal Littell, <u>Algebra 1</u>, 2004, Chapter 11 Resource Books, p.56 11.6 Activity Lesson Opener (McDougal Littell, <u>Algebra 1</u>, 2004, Chapter 11 Resource Books, p.81) 11.3 Graphing Calculator Activity (McDougal Littell, Algebra 1, 2004, Chapter 11 Resource Books, p.40) 					
Performa	ance Assessment Task Sample	Concept Application: Probability Concept Application: Marbles			
s : •	eacher. If the teacher chooses to develop his/her own s (as noted in parentheses). I in the form of essays, quizzes, mobiles, PowerPoint, oral				
sessment Mode	 Diagnostic/Pre – Assessment: Have students play the "Reprobability, and the effects Open-Ended (Formative) Assess Homework is assigned dai Introductory and Closing A Analysis, Evaluation) Excerpts from previous HS understanding and measure 	emove One" game involving dice and a game board. of each on your decisions to win a game. ment: ly, from the textbook, Chapter Resource Practice Wo ctivities will be done every day to pre-assess studen PA exams including multiple choice and open-ended re their individual skills.	This will help to assess knowledge of sample space, orkbook, or other sources. <i>(Synthesis, Analysis, Evaluation)</i> t knowledge and assess understanding of topics. <i>(Synthesis,</i> d problems should be given every class to assess student		
Ass	 Summative Assessment: Assess Questions/Sample Conceptual Und Students will be given quiz Students will be given a ur Students will take the HSP Students will work on Perfect 	sment questions should be open-ended and should for derstanding section. <i>(Synthesis, Analysis, Evaluation</i> zes that provide a brief review of the concepts and s it test that provides a review of the concepts and ski A prmance Assessment process similar to the ASHA p	ollow the general format illustrated in the Essential) kills in the previous lessons. Ils in the unit. rocess		

Additional Resources

- http://www.state.nj.us/education/njpep/assessment/hspa/hspa_math/main_menu.htm
- Primiani, A. Rose and William Caroscio, Prentice Hall Brief Review for New Jersey: HSPA Mathematics, Pearson: 2008
- Sico, John J., <u>HSPA Success Work-A-Text in Mathematics Expanded Edition</u>, Instructivision: 2003

BIG IDEA V: Patterns

Curriculum Management System Fundamentals of Math : Grade 11

Overarching Goals

(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.

(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.

(3) Investigate, research, and synthesize various pieces of information from a variety of media sources.

- How can systematic listing and counting be useful in the organization of outcomes?
- How can we utilize a small strand of information to help give us information in the grand scheme?

Sug	Suggested Blocks for Instruction: 5-6				
KNOW			UNDERSTAND	DO	
Students will know that:		Si	tudents will understand that:	Students will be able to:	
	Tree Diagrams are a useful tool in listing the outcomes to an event.	•	Theoretical probability is dependent on the sample space of an event.	Calculate combinations with replacement.	
	Permutations and combinations can be used to calculate combinations without replacement.			Calculate combinations without replacement.	
	The Fundamental Counting Rule can be used to calculate combinations with replacement.			Apply the multiplication rule of counting in complex situations.	
	The multiplication rule for independent events is: $P(A \text{ and } B) = P(A) \cdot P(B)$		Sample Conceptual Understandings	Recognize the difference between situations with replacement and without replacement.	

The multiplication rule for dependent events	At Johnny's Burger Place, a customer can get a customized	Recognize the difference between ordered
is: $P(A \text{ and } B) = P(A) \cdot P(B A)$	meal by ordering either: a turkey burger, chicken burger, hamburger, or garden burger with a side order of potato chips	and unordered counting situations.
	or French fries with a choice of either: juice, milk, or soda. a. Use a tree diagram to list all the different	
1	combinations of a burger, side order and a drink.	
1	b. Describe ways and give examples of how Johnny	
	could change his menu so that a customer would have 30 different choices.	
	(www.state.nj.us)	
A sequence is an ordered list of numbers.	1	Justify solutions to counting problems.
1	How many different ways can you put 6 books in a row so that	
1	one specific book is always in the 4th position?	
<u>ا</u>	(www.state.nj.us)	
The sum of terms in a sequence is called a	1	Recognize and explain relationships involving
series. There are two types of series:		combinations and Pascal's Triangle and apply
	You and a group of 9 friends are playing pickup basketball in a	nrobahility
1	hands with every other player, how many handshakes will	producinty.
1	there be?	
An arithmetic series is when a constant or	l L	Use models and algebraic formulas to
common difference is being added to each	1	represent and analyze sequences and series.
preceding term.	The Orchid Orchard has 5,000 orchid plants to sell. Each	
1	month the orchard plans to sell 12% of its orchids and start	
To find any term in an arithmetic series we use		Evaluate explicit formulas for nth terms
the formula:	1	Evaluate explicit formulas for miniterinis.
$a_n = a_1 + (n-1)d$	A garden center is growing bean plants using a new fertilizer.	
ا بر میں میں ا	At the end of each week, they record the number of new	
Where a_1 is the first term in a sequence, d is the segment difference n is the number of the	sprouts.	
term to find	Week 1 2 3 4 5 6	
	New Sprouts 10 12 16 24 40 72	
1	Using the information above, how many sprouts should the	
1	center expect at the end of the seventh week?	
1	(www.state.nj.us)	
1	l l	

To find the sum of a certain number of terms of an arithmetic series we use the formula: $S_n = \frac{n(a_1 + a_n)}{2}$ Where S_n is the sum of the first <i>n</i> terms, a_1 is the first term in a sequence, and a_n is the n^{th} term to find.	Jessie's business partner set a computer password on the office computer and went on vacation. Jessie remembered that the password is a simple pattern. The first few letters of the password are A Z D Y G X Assuming that the pattern continues, what is the next and final letter of the password?	Evaluate sums of finite arithmetic series.
A geometric series is when a constant or common ratio is being multiplied to each preceding term.	(www.state.nj.us) Kylee and Robin are racing their pet turtles. Kylee's turtle starts at ½ foot from the starting line and moves at 4 inches per minute. Robin's turtle starts at the starting line and moves at 6 inches per minute. Assuming they move in the same direction, where are the turtles after 5 minutes? (www.state.nj.us)	Evaluate sums of finite and infinite geometric series.
To find any term in a geometric sequence we use the formula: $a_n = a_1 \cdot r^{n-1}$ where a_1 is the first term of the sequence, r is the common ratio, n is the number of the term to find.	 Belinda wants to determine the number of dots in the 30th step of the following pattern, but she does not want to actually draw all 30 steps. Step 1: ** step 1: ** Step 2: *** *** Step 3: **** **** **** a. Explain how Belinda could find the number of dots in Step 30 without actually drawing them. b. What would be the number of dots in the 30th step? c. Write an algebraic expression for the number of dots in the nth step. (www.state.nj.us) 	Develop an informal notion of limit.

	To find the sum of a certain number of terms of a (finite) geometric sequence : $S_n = \frac{a_1(1-r^n)}{1-r}$ Where S_n is the sum of <i>n</i> terms (n^{th} partial sum), a_1 is the first term, <i>r</i> is the common ratio. To find the sum of an infinite geometric sequence : $S = \frac{a_1}{1-r}$ Where a_1 is the first term, <i>r</i> is the common ratio.	Analyze the pattern below. What letter will be in the position? Show your work and explain your answ MATHMATHMATHMATHMA (www.state.nj.us)	the 76 th ver.	Use inductive reasoning to form generalizations.	
		21 st Century Skills			
Cre	ativity and Innovation	Critical Thinking and Problem Solving	Communication and Collaboration		
Info	ormation Literacy	Media Literacy	ICT Literacy		
Life	and Career Skills	Technology Based Activities			
<u>http</u> <u>http</u>	://www.p21.org/index.php?option=com_contenta ://www.iste.org/standards/nets-for-students.asp	<u>&task=view&id=254&Itemid=119</u> <u>≺</u>			
		Conceptual Learning Activities			
	 ✓ Towers ✓ Tower of Hanoi ✓ A "Numbers" Puzzle ✓ Pizza Halves Problem ✓ Pizza Problem 				
Pei	formance Assessment Task Sample	Concept Application: Senior Class Meetin Concept Application: Triangular Numbers Concept Application: Display of Dots Concept Application: Design Concept Application: Exam Scores Concept Application: Patterns	ng		

- NOTE: The assessment models provided in this document are suggestions for the teacher. If the teacher chooses to develop his/her own model, it must be of equal or better quality and at the same or higher cognitive levels (as noted in parentheses).
- Depending upon the needs of the class, the assessment questions may be answered in the form of essays, guizzes, mobiles, PowerPoint, oral ٠ reports, booklets, or other formats of measurement used by the teacher.
 - Diagnostic/Pre Assessment:

Assessment Models

Additional

- ✓ Give student a wardrobe problem and ask them to list all of the possible outfits they can wear. How are they sure that they found all of the possibilities? (i.e. You own 5 shirts (red, green, blue, orange, and pink), 3 pants (shorts, jeans, and slacks), and 2 pairs of shoes (platforms and sneakers). How many different outfits can you wear? Assume that matching is not an issue.)
- **Open-Ended (Formative) Assessment:**
 - ✓ Homework is assigned daily, from the textbook, Chapter Resource Practice Workbook, or other sources. (Synthesis, Analysis, Evaluation)
 - ✓ Introductory and Closing Activities will be done every day to pre-assess student knowledge and assess understanding of topics. (Synthesis, Analysis, Evaluation)
 - ✓ Excerpts from previous HSPA exams including multiple choice and open-ended problems should be given every class to assess student understanding and measure their individual skills.
- Summative Assessment: Assessment guestions should be open-ended and should follow the general format illustrated in the Essential Questions/Sample Conceptual Understanding section. (Synthesis, Analysis, Evaluation)
 - Students will be given guizzes that provide a brief review of the concepts and skills in the previous lessons. \checkmark
 - Students will be given a unit test that provides a review of the concepts and skills in the unit. \checkmark
 - ✓ Students will take the HSPA
 - ✓ Students will work on Performance Assessment process similar to the ASHA process
- Resources http://www.state.nj.us/education/njpep/assessment/hspa/hspa math/main menu.htm
 - Primiani, A. Rose and William Caroscio, Prentice Hall Brief Review for New Jersey: HSPA Mathematics, Pearson: 2008
 - Sico, John J., HSPA Success Work-A-Text in Mathematics Expanded Edition, Instructivision: 2003

BIG IDEA VI: Data Analysis

Curriculum Management System Fundamentals of Math : Grade 11

Overarching Goals

(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.

(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.

(3) Investigate, research, and synthesize various pieces of information from a variety of media sources.

- How does the type of data influence the choice of display?
- How can various statistical techniques be used to organize, display, and compare sets of data?
- How can advertisers intentionally create data displays that mislead consumers?

Su	Suggested Blocks for Instruction: 5-6				
KNOW		UNDERSTAND	DO		
Students will know that:		Students will understand that:	Students will be able to:		
	Sample selection methods include convenience sampling, responses to survey, random sampling.	 Visual representations of data are essential in analyzing data. 	Use surveys and sampling techniques to generate data and draw conclusions about large groups.		
	Histograms and box-and-whisker plots are used to represent numerical data.	• An effective analysis is comprised of the mean, median, mode, and range of the data.	Identify advantages/disadvantages of sample selection methods.		
	Bar graphs and pie graphs are used to represent categorical or qualitative variables.	• Trends and strengths of relationships are apparent in the visual representations of data.	Evaluate the use of data in real-world contexts.		
	The mean of data is computed by dividing the sum of the data values by the number of data values.	Sample Conceptual Understandings	Evaluate the accuracy and reasonableness of conclusions drawn.		
	The median of a set of data is the middle value when the data is placed in ascending order.	Five houses on my street have been sold in the last two months. They have sold for the following prices: \$450,000, \$480,000, \$465,000, \$440,000, and \$625,000. Is the average the best way to describe the houses market value?	Evaluate the bias in conclusions drawn (e.g., influence of how data is displayed)		

		Evaluate statistical claims based on sampling.
The mode of a set of data is the value that occurs most often in a data set.	If Sally scored 80, 77, 83, 90, and 95 on her last 5 tests and there is one test left in the marking period. What must she score on her next test to have a test average of 88? Determine which measure is the best measure of central tendency based on a given set of data. (Look for outliers that	
The range of a data set is the minimum value subtracted from the maximum value in the data set.	skew data) Create a set of data with the following information: Mean = 5	Design a statistical experiment, conduct the experiment, and interpret and communicate the outcome.
Range = maximum value – minimum value	Median = 6	
Measures of dispersion include: variance, standard deviation, outliers	Mode = 8 and 3. The 315 members of the Smithfield High School Sophomore class voted to see what kinds of movies the class liked. Their results are below. If they had an "Action Movie Night" fundraiser and sell tickets for \$4 each, approximately how much money should they expect to raise? Assume that students who like the type of movie will be the only ones in attendance. favorite Types of Movies $favorite Types of Movies$ $favorite Type of Ty$	Use data to draw bar graphs, line graphs, and double line graphs.
	(www.state.nj.us)	

	The Normal distribution states that approximately 95% of the sample lies between two standard deviations on either side of the mean.A liquid substance in a science experiment doubles in volume every two minutes. The experiment begins at 1:00PM with a small amount of the substance being placed in a large beaker. At 2:00PM the container is full. At what time was the container one-eighth filled? (www.state.nj.us)Researchers decided to see if there was a relationship between the number of flu shots each year and the number of cases of the flu that year. a. Sketch a data display of how you might display this data and what type of relationship the data would demonstrate. b. Describe the relationship between the variables in words.		doubles in volume Use a scatter plot to identify the correlation by at 1:00PM with a use a scatter plot to identify the correlation by a set of data; approximate the line of best fit for a set of data. was the container Estimate or determine lines of best fit (or curves of best fit if appropriate) with technology, and use them to interpolate withir t display this data would demonstrate. variables in words. a set of the data.	
			Analyze data using technology, and use statistical terminology to describe conclusions.	
Cr	activity and Innovation	Critical Thinking and Problem Solving	Communica	tion and Collaboration
		Chical minking and Problem Solving		
Inf	Armation Literacy	Madia Litaraay	ICT Literacy	
Inf Lif	ormation Literacy and Career Skills	Media Literacy Technology Based Activities	ICT Literacy	,
Inf Lif http http	ormation Literacy and Career Skills ://www.p21.org/index.php?option=com_conten ://www.iste.org/standards/nets-for-students.as	Media Literacy Technology Based Activities It&task=view&id=254&Itemid=119 DX	ICT Literacy	,
Inf Lif http http	ormation Literacy and Career Skills ://www.p21.org/index.php?option=com_conten ://www.iste.org/standards/nets-for-students.as	Media Literacy Technology Based Activities It&task=view&id=254&Itemid=119 DX Conceptual Learning Activities	ICT Literacy	,
Inf Lif http http	 And Career Skills Centers Activity: Have students go to diff and describe the data using measures of a sampling Techniques Have students cor students to use two different sampling tech 	Media Literacy Technology Based Activities ht&task=view&id=254&Itemid=119 px Conceptual Learning Activities erent centers and collect different types of data. At exenter and dispersion. npare and contrast the different surveying technique and compare and contrast the effectiveness.	ICT Literacy each center, th s by having the /bias of each.	ney should create an appropriate data display em survey topics around the school. Assign

- NOTE: The assessment models provided in this document are suggestions for the teacher. If the teacher chooses to develop his/her own model, it must be of equal or better quality and at the same or higher cognitive levels (as noted in parentheses).
- Depending upon the needs of the class, the assessment questions may be answered in the form of essays, quizzes, mobiles, PowerPoint, oral reports, booklets, or other formats of measurement used by the teacher.
 - Diagnostic/Pre Assessment: \geq

Assessment Models

- ✓ KWL chart on data displays and statistics
- \geq **Open-Ended (Formative) Assessment:**
 - ✓ Homework is assigned daily, from the textbook, Chapter Resource Practice Workbook, or other sources. (Synthesis, Analysis, Evaluation)
 - ✓ Introductory and Closing Activities will be done every day to pre-assess student knowledge and assess understanding of topics. (Synthesis. Analysis. Evaluation)
 - ✓ Excerpts from previous HSPA exams including multiple choice and open-ended problems should be given every class to assess student understanding and measure their individual skills.
- \triangleright Summative Assessment: Assessment questions should be open-ended and should follow the general format illustrated in the Essential Questions/Sample Conceptual Understanding section. (Synthesis, Analysis, Evaluation)
 - ✓ Students will be given guizzes that provide a brief review of the concepts and skills in the previous lessons.
 - Students will be given a unit test that provides a review of the concepts and skills in the unit. \checkmark
 - Students will be instructed to collect data from a variety of people in the classroom and explain how they chose to collect their data. They \checkmark will then create an appropriate data display given the information to answer the following question: "What type of relationship does height have on shoe size?" Student should create a scatter plot of their sample's heights and shoe sizes or their heights and weights. Discuss what kind of correlation if any exists in the data.
 - Students will take the HSPA \checkmark
 - Students will work on Performance Assessment process similar to the ASHA process \checkmark
- Additional Resources http://www.state.nj.us/education/njpep/assessment/hspa/hspa_math/main_menu.htm
 - Primiani, A. Rose and William Caroscio, Prentice Hall Brief Review for New Jersey: HSPA Mathematics, Pearson: 2008
 - Sico, John J., HSPA Success Work-A-Text in Mathematics Expanded Edition, Instructivision: 2003

BIG IDEA VII: Relationships

Curriculum Management System Fundamentals of Math : Grade 11

Overarching Goals

(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.

(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.

(3) Investigate, research, and synthesize various pieces of information from a variety of media sources.

- How is a linear model used to approximate a real life situation?
- Explain how to use a linear model to make predictions from given data.
- How do the different forms of linear functions and the concept of slope help solve real world situations?
- How can transformations be used in architecture and various types of art?

Suggested Blocks for Instruction: 5-6		
KNOW	UNDERSTAND	DO
Students will know that:	Students will understand that:	Students will be able to:
The slope of a line is defined as the rate of change over an interval. It is the ration of vertical change to horizontal change. $m = \frac{rise}{run} = \frac{y_2 - y_1}{x_2 - x_1}$	 Equations model patterns that occur in real life problems and are used to solve for unknown quantities. 	Understand relations and functions and select, convert flexibly among, and use various representations for them, including equations or inequalities, tables, and graphs.
The domain of a function is the set of possible x values. The range of a function is the set of possible y values.	• A graph and its equation are in an interdependent relationship.	Analyze and explain the general properties and behavior of functions of one variable, using appropriate graphing technologies.
The intercepts of a function is where the graph has a value where $y = 0$.	 Formulas are direct representations of real life applications that help to solve for an unknown quantity. 	Understand and perform translations, reflections, and dilations on commonly-used functions.
Continuity of a function is described as not having to lift your pencil off the paper to draw it; for instance, it has no jumps or breaks.	A solution of a system of equations models a unique outcome for two or more real-life situations.	Understand and perform transformations on the effects on linear and quadratic graphs of parameter changes in equations.
Estimates of the roots of equations can be done by finding the x-intercepts.	Sample Conceptual Understandings	Use graphing calculators or computers for transformations on more complex functions.
		<u>[</u>

A solution to system of equations is a point where the graphs of all the equations in the system intersect (i.e. a common point).	The table below shows a pattern. What type of model represents the function shown? How do you know? $ \frac{x + y}{0 + 0} $ $ \frac{x + y}{0 + 0} $	Understand and compare the properties of classes of functions, including exponential, polynomial, rational, and trigonometric functions.
 Slope represents rate of change.	(www.state.nj.us)	Identify a linear function vs. a non-linear function.
The translation of a graph is a horizontal and/or vertical shift of a figure or graph on a coordinate plane.	A local jewelry dealer calculates the price at which he will buy back gold jewelry based on the following formula: $B =$.75($G - 15$) + .15 G , where B is the "buyback" price and G is the current market value of the gold. You bring in a gold bracelet with a current market value of \$105. What will the dealer pay you for the bracelet?	Define symmetry in a given graph or figure.
The reflection of a graph is when a figure is reflected over an axis or line.	James came home from school with 16 hours of homework. He had three times as much English homework as he had math. How much math homework did he have? (www.state.nj.us)	Identify increasing or decreasing on an interval of a graph.

	Judge Esther Odometer developed a formula to determine the fine for speeding on the parkway in her town. The formula she developed is:
	F = 12(R - 60) + 55
The dilation of a graph is a transformation in which all distances on the coordinate plane are lengthened by multiplying either all <i>x</i> -coordinates (horizontal dilation) or all <i>y</i> -	In this equation, F represents the total amount of fine, R represents how fast (rate of speed) the car was going in miles per hour.
coordinates (vertical dilation) by a common factor greater than 1. (http://www.mathwords.com)	 A car has been stopped for traveling 75 mph, 80 mph, 87 mph, 90 mph, and 100 mph over the course of the past year. Show the domain and range for this relation. Judge Esther charges you a fine of \$175 for speeding. Is this a reasonable fine? Why or why not
	(www.state.nj.us)
	Sharifa is offered two jobs: one at Tom's World of Music and one at Rosie's Café. Tom's promises her a salary of \$30,000 and a raise of \$500 each year. Rosie's offers her a salary of \$30,000 and a raise of 4% of her current salary each year. Which job should she accept? Explain your answer. Show all work.
	(www.state.nj.us)

 Mike dropped a basketball ball from his bedroom window height of 20 feet. Each time the ball bounced, it reached maximum height of approximately half that of its previous height. Draw a graph to represent the relationship betwee the number of times the ball bounces and the heir reached by the ball. What is the total of the heights the ball reached a the 4th bounce? What do you think this total would have been if the ball had bounced 20 times? (www.state.nj.us) 		a window a reached a previous ip between d the height eached after been if the		
	21 st Century Skills			
Creativity and Innovation	Critical Thinking and Problem Solving	ICT Literacy		
Information Literacy	dia Literacy Communicati		ion and Collaboration	
Life and Career Skills	Technology Based Activities			
http://www.p21.org/index.php?option=com_content&task=view&id=254&Itemid=119 http://www.iste.org/standards/nets-for-students.aspx				
 ✓ Concept Application: Frame ✓ Concept Application: Fundraiser 				
Performance Assessment Task Sample	Released PATs: Prom Expenses Released PATs: Profit Percent			

- NOTE: The assessment models provided in this document are suggestions for the teacher. If the teacher chooses to develop his/her own model, it must be of equal or better quality and at the same or higher cognitive levels (as noted in parentheses).
- Depending upon the needs of the class, the assessment questions may be answered in the form of essays, quizzes, mobiles, PowerPoint, oral reports, booklets, or other formats of measurement used by the teacher.
 - Diagnostic/Pre Assessment:
 - Give students a system of equations word problem and ask them to solve it to the best of their ability (without instructing them to use equations or algebra).
 - ✓ Ask students to reflect, dilate, and translate a geometric figure in a coordinate plane.
 - **Open-Ended (Formative) Assessment:**
 - ✓ Homework is assigned daily, from the textbook, Chapter Resource Practice Workbook, or other sources. (Synthesis, Analysis, Evaluation)
 - Introductory and Closing Activities will be done every day to pre-assess student knowledge and assess understanding of topics. (Synthesis, Analysis, Evaluation)
 - Excerpts from previous HSPA exams including multiple choice and open-ended problems should be given every class to assess student understanding and measure their individual skills.
 - Summative Assessment: Assessment questions should be open-ended and should follow the general format illustrated in the Essential Questions/Sample Conceptual Understanding section. (Synthesis, Analysis, Evaluation)
 - ✓ Students will be given quizzes that provide a brief review of the concepts and skills in the previous lessons.
 - ✓ Students will be given a unit test that provides a review of the concepts and skills in the unit.
 - ✓ Students will take the HSPA
 - ✓ Students will work on Performance Assessment process similar to the ASHA process
- http://www.state.nj.us/education/njpep/assessment/hspa/hspa_math/main_menu.htm
 - Primiani, A. Rose and William Caroscio, <u>Prentice Hall Brief Review for New Jersey: HSPA Mathematics</u>, Pearson: 2008
 - Sico, John J., HSPA Success Work-A-Text in Mathematics Expanded Edition, Instructivision: 2003

Assessment Models

Additional Resources

BIG IDEA VIII: Modeling

Curriculum Management System Fundamentals of Math : Grade 11

Overarching Goals

(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.

(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.

(3) Investigate, research, and synthesize various pieces of information from a variety of media sources.

- Why is it necessary to utilize different types of functions in order to model real-world phenomena?
- How are functions useful in making predictions?

Suggested Blocks for Instruction: 7-8				
KNOW		UNDERSTAND	DO	
Students will know that:		Students will understand that:	Students will be able to:	
	Linear, quadratic, exponential, periodic (sine and cosine) and step functions can be used to model real – world situations.	 Functions model real-life patterns to enable us to make predictions. 	Use functions to model real-world phenomena and solve problems that involve varying quantities.	
	Direct variation is when the variable <i>x</i> and <i>y</i> vary directly if for a constant <i>k</i> ; $\frac{y}{x} = k$ or $y = kx$; $k \neq 0$	 Equations describe the relationship between a dependent and an independent variable. 	Analyze and describe how a change in an independent variable leads to change in a dependent one.	
	k is the constant of variation .			
	Inverse variation is when the variable <i>x</i> and <i>y</i> vary inversely if for a constant <i>k</i> ; $xy = k$ or $y = \frac{k}{x}$; $k \neq 0$.	Sample Conceptual Understandings	Convert recursive formulas to linear or exponential functions.	
	Absolute value of a number is the distance of a value from zero on the number line.	The weekly pay a worker at a restaurant earns, <i>P</i> , varies directly as the number of hours, <i>h</i> , which they work. Express this relation as a formula.		



What is the inequality for the following graph?



(www.state.nj.us)

A Web designer is building pages that are 600 pixels wide and 480 pixels high. She wishes to place an image on the page that is proportionate to those dimensions. The image is 320 pixels wide. How high will it have to be? *(www.state.nj.us)*

Diana had \$1200 in her checking account. She withdrew the same amount each month for 5 months to pay for a car loan. At the end of 6 months, she deposited an additional \$600 into her account. Her new balance was \$800.

- How much money did she withdraw each month?
- What was her account balance after the 6 months before her deposit of \$600? Explain and show all your work.

(www.state.nj.us)

	 John and Ellen work in a clothing store after schoboss told him to reduce every item in the store for by 30%. After the sale, John's boss told her to inclus ale item's sale price by 30%. John started mark with the original price. Ellen said, "That is wrong! increase the sale price by 30% you will not get the price." Who is right? Show your work. You may include a simple, specific example to support you <i>(www.state.nj.us)</i> You are the service manager at an auto repair sh charge \$22 per hour for labor plus the cost of any needed \$256 of new parts. The final bill for the cate. How long did it take to repair the cat? Expanser. Write an algebraic equation to solve this p Show all work. <i>(www.state.nj.us)</i> 	ol. John's a 2-day sale erease every ing each item If you e original wish to r answer. op. You parts. A car r was \$421. blain your broblem.			
21 st Century Skills					
Information Literacy	Media Literacy				
Life and Career Skills	Technology Based Activities				
http://www.p21.org/index.php?option=com_content&task=view&id=254&Itemid=119 http://www.iste.org/standards/nets-for-students.aspx					
 7.4 Cooperative Learning Activity (McDougal Littell, <u>Algebra 1</u>, 2004, Chapter 7 Resource Books, p.60) 7.5 Graphing Calculator Lesson Opener (McDougal Littell, <u>Algebra 1</u>, 2004, Chapter 7 Resource Books, p.66) 9.3 Graphing Calculator Lesson Opener (McDougal Littell, <u>Algebra 1</u>, 2004, Chapter 9 Resource Books, p.37) 9.3 Graphing Calculator Activity (McDougal Littell, <u>Algebra 1</u>, 2004, Chapter 9 Resource Books, p.40) 9.4 Visual Approach Lesson Opener (McDougal Littell, <u>Algebra 1</u>, 2004, Chapter 9 Resource Books, p.55) 9.6 Activity Lesson Opener (McDougal Littell, <u>Algebra 1</u>, 2004, Chapter 9 Resource Books, p.85) 					
Performance Assessment Task Sample Released PATs: Counting Numbers					

- NOTE: The assessment models provided in this document are suggestions for the teacher. If the teacher chooses to develop his/her own model, it must be of equal or better quality and at the same or higher cognitive levels (as noted in parentheses).
- Depending upon the needs of the class, the assessment questions may be answered in the form of essays, quizzes, mobiles, PowerPoint, oral reports, booklets, or other formats of measurement used by the teacher.
 - Diagnostic/Pre Assessment: \geq
 - \checkmark Given a set of numerical sequences, try to come up with an equation to fit each.
 - **Open-Ended (Formative) Assessment:**
 - ✓ Homework is assigned daily, from the textbook, Chapter Resource Practice Workbook, or other sources. (Synthesis, Analysis, Evaluation)
 - ✓ Introductory and Closing Activities will be done every day to pre-assess student knowledge and assess understanding of topics. (Synthesis. Analysis. Evaluation)
 - ✓ Excerpts from previous HSPA exams including multiple choice and open-ended problems should be given every class to assess student understanding and measure their individual skills.
 - Summative Assessment: Assessment questions should be open-ended and should follow the general format illustrated in the Essential Questions/Sample Conceptual Understanding section. (Synthesis, Analysis, Evaluation)
 - ✓ Students will be given guizzes that provide a brief review of the concepts and skills in the previous lessons.
 - Students will be given a unit test that provides a review of the concepts and skills in the unit. \checkmark
 - Students will take the HSPA \checkmark
 - ✓ Students will work on Performance Assessment process similar to the ASHA process
- http://www.state.ni.us/education/nipep/assessment/hspa/hspa_math/main_menu.htm
- Additional Resources Primiani, A. Rose and William Caroscio, Prentice Hall Brief Review for New Jersey: HSPA Mathematics, Pearson: 2008
 - Sico, John J., HSPA Success Work-A-Text in Mathematics Expanded Edition, Instructivision: 2003
 - McDougal-Littell: Algebra 1 2004
 - McDougal-Littell: Algebra 1 Chapter Resource Books
 - www.classzone.com
BIG IDEA IX: Equivalence

Curriculum Management System Fundamentals of Math : Grade 11

Overarching Goals

(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.

(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.

(3) Investigate, research, and synthesize various pieces of information from a variety of media sources.

Essential Questions

- Why can't you solve for the zeros of a polynomial if the polynomial equation is set equal to anything other than zero?
- How are factoring a polynomial and multiplying a polynomial related?
- How does factoring a polynomial help to yield information from a real-life model?

Suggested Blocks for Instruction: 7-8

KNOW		UNDERSTAND	DO		
Students will know that:		Students will understand that:	Students will be able to:		
	When adding or subtracting polynomials, combine like terms.	• The factors and x-intercepts of a polynomial are directly related.	Evaluate and simplify expressions.		
	The degree of a polynomial is the highest exponent.	 Multiplying polynomials and factoring polynomials are reverse processes of each other. 	Add and subtract polynomials		
	The leading coefficient is the number next to the variable with the highest exponent.	Sample Conceptual Understandings	Multiply a polynomial by a monomial or binomial.		
_					

A term is called a monomial, involving multiplication between constants which can be multiplied by variables.	You plan to build a house that is 1 ½ times as long as it is wide. You want the land around the house to be 20 feet wider than the width of the house, and twice as long as the length of the house. $\underbrace{15x}_{x}_{x}_{x+20}$ $\underbrace{15x}_{x}_{x+20$	Divide a polynomial by a monomial
FOIL is a double distributing method of multiplication for two binomials $(ax + b)(cx + d)$: (ax + b)(cx + d) (ax + b)(cx + d) (ax + b)(cx + d)	Consider a circle whose radius is greater than 9 and whose area is given by $A = \pi(x^2 - 18x + 81)$. Use factoring to find an expression for the radius of the circle. (McDougal-Littell: <u>Algebra 1</u> , 2004)	 Select and use appropriate methods to solve equations and inequalities. Linear equations - algebraically Quadratic equations - factoring (when the coefficient of x² is 1) and using the quadratic formula All types of equations using graphing, computer, and graphing calculator techniques
Zero product property states that if $ab = 0$ then $a = 0$ or $b = 0$.	Using the vertical motion equation $h = 16t^2 - vt$, you toss a tennis ball from a height of 96 feet with an initial velocity of 16 feet per second. How long will it take for the tennis ball to reach the ground? (<i>McDougal-Littell: <u>Algebra 1</u>, 2004</i>)	Judge the meaning, utility, and reasonableness of the results of symbol manipulations, including those carried out by technology.
Greatest common factor is the common		
factor of all the terms.		
A polynomial is prime if it is not the product		
or polynomials having integer coefficients.		

To factor a polynomial completely write as the product of monomial factors or prime factors with at least two terms.				
	21 st Century Skills			
Creativity and Innovation	Critical Thinking and Problem Solving	Communication and Collaboration		
Information Literacy	Media Literacy	ICT Literacy		
Life and Career Skills	Technology Based Activities			
http://www.p21.org/index.php?option=com_content&task=view&id=254&Itemid=119 http://www.iste.org/standards/nets-for-students.aspx				
Conceptual Learning Activities				
 10.1 Application Lesson Opener (McDougal Littell, <u>Algebra 1</u>, 2004, Chapter 10 Resource Books, p.13) 10.2 Graphing Calculator Activity (McDougal Littell, <u>Algebra 1</u>, 2004, Chapter 10 Resource Books, p.27) 10.3 Application Lesson Opener (McDougal Littell, <u>Algebra 1</u>, 2004, Chapter 10 Resource Books, p.40) 10.3 Cooperative Learning Activity (McDougal Littell, <u>Algebra 1</u>, 2004, Chapter 10 Resource Books, p.47) 10.5 Activity Lesson Opener (McDougal Littell, <u>Algebra 1</u>, 2004, Chapter 10 Resource Books, p.68) 10.7 Activity Lesson Opener (McDougal Littell, <u>Algebra 1</u>, 2004, Chapter 10 Resource Books, p.95) 				
Performance Assessment Task Sample	Concept Application: Quadratic Function Concept Application: Scientific Notation			

- NOTE: The assessment models provided in this document are suggestions for the teacher. If the teacher chooses to develop his/her own model, it must be of equal or better quality and at the same or higher cognitive levels (as noted in parentheses).
- Depending upon the needs of the class, the assessment questions may be answered in the form of essays, quizzes, mobiles, PowerPoint, oral reports, booklets, or other formats of measurement used by the teacher.
 - Diagnostic/Pre Assessment: \geq
 - Ask students to describe the relationship between the product of two prime numbers and the product of two prime factors of a polynomial. (i.e. Describe the relationship between the following statements: " $3 \cdot 2 = 6$ " and " $(x + 3) \cdot (x + 2) = x^2 + 5x + 6$ ")
 - **Open-Ended (Formative) Assessment:**
 - ✓ Homework is assigned daily, from the textbook, Chapter Resource Practice Workbook, or other sources. (Synthesis, Analysis, Evaluation)
 - Introductory and Closing Activities will be done every day to pre-assess student knowledge and assess understanding of topics. (Synthesis, Analysis, Evaluation)
 - ✓ Excerpts from previous HSPA exams including multiple choice and open-ended problems should be given every class to assess student understanding and measure their individual skills.
 - Summative Assessment: Assessment questions should be open-ended and should follow the general format illustrated in the Essential Questions/Sample Conceptual Understanding section. (Synthesis, Analysis, Evaluation)
 - Students will be given guizzes that provide a brief review of the concepts and skills in the previous lessons. \checkmark
 - Students will be given a unit test that provides a review of the concepts and skills in the unit. \checkmark
 - ✓ Students will take the HSPA
 - ✓ Students will work on Performance Assessment process similar to the ASHA process
- http://www.state.nj.us/education/njpep/assessment/hspa/hspa math/main menu.htm
- Resources Primiani, A. Rose and William Caroscio, Prentice Hall Brief Review for New Jersey: HSPA Mathematics, Pearson: 2008
 - Sico, John J., <u>HSPA Success Work-A-Text in Mathematics Expanded Edition</u>, Instructivision: 2003
 - McDougal-Littell: Algebra 1 2004
 - McDougal-Littell: Algebra 1 Chapter Resource Books
 - www.classzone.com

Additional

BIG IDEA X: Networks

Curriculum Management System Fundamentals of <u>Math : Grade 11</u>

Overarching Goals

(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.

(2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.

(3) Investigate, research, and synthesize various pieces of information from a variety of media sources.

Essential Questions

- How can visual tools such as networks be used to optimize the answer to questions?
- How can algorithmic thinking be used to solve problems?

Suggested Blocks for Instruction: 7-8				
KNOW	UNDERSTAND	DO		
Students will know that:	Students will understand that:	Students will be able to:		
Vertex-edge graphs, consisting of dots (vertices) and lines joining them (edges), can be used to represent and solve problems based on real-world situations. (http://www.ntuaft.com/njcccs)	 A Vertex Edge Graph is a visual vehicle that helps to optimize a solution within given constraints. Discrete information can be quantified and interpreted effectively using algorithms. 	 Use vertex-edge graphs and algorithmic thinking to represent and solve practical problems. Circuits that include every edge in a graph Circuits that include every vertex in a graph 		
Optimization is finding the best solution within given constraints.	Sample Conceptual Understandings	Explore strategies for making fair decisions.		
	Draw a network of roads connecting the six cities below so that it is possible to drive between any two of the cities without passing through another city. (HSPA Success Work-A-Test in Mathematics)	Follow and devise lists of instructions, called "algorithms," and use algorithmic thinking to find the best solution to problems like those involving vertex-edge graphs, but also to solve other problems. (http://www.ntuaft.com/njcccs)		

Your science class' pet mice Mickey and Minnie just gave birth to 6 babies: 3 males and 3 females. The teacher informs you that the baby mice can breed when they are 6 weeks old and the babies are born 3 weeks later. If each female mouse has a litter of 6 babies, half males and half females, how many mice will you have 12 weeks from now? (*www.state.nj.us*)

A design follows this pattern: a square is divided in half by drawing another square inside of it on a 45 degree rotation. The outer area is then shaded. Then, the unshaded area is divided again in the same manner. Assume that the pattern stays the same, what is the ratio of the shaded area to the unshaded area in Stage 3?





Stage 2

(www.state.nj.us)

Cass has \$4,000 that she is saving to buy a \$7,000 car. She has decided to invest this money in an investment that will return 12% each year. . She makes no withdrawals but she doesn't deposit any more money. If all of her earnings are reinvested, how many years will it be until she can buy her car? (Assume that the price of \$7,000 includes all extras: license plates, taxes, etc.) (*www.state.nj.us*)

Your science class' pet mice Mickey and Minnie just gave birth to 6 babies: 3 males and 3 females. The teacher informs you that the baby mice can breed when they are 6 weeks old and the babies are born 3 weeks later. If each female mouse has a litter of 6 babies, half males and half females, how many mice will you have 12 weeks from now? (*www.state.nj.us*)

The picture below shows stages 1 and 2 of a geometric progression that follows this rule: In a triangle, a line is drawn from the middle of each leg to the middle of the hypotenuse. The legs of the new triangles are 1/2 the length of the previous triangle's legs.

Stage 1 and Stage 2 of an right triangle are shown below:



- Find the area of the triangle in Stage 1.
- Draw stage 3 and Stage 4
- Find the total area of the all shaded triangles in Stage 3 and Stage 4.

Will the total area of the shaded triangles in any stage ever exceed the area of the triangle in Stage 1? Explain your answer.

(www.state.nj.us)

	Before Jason pays 25% tax on the 8% commission on every house he sells at Top Notch Real Estate deducts 12% of the commission for expenses to of amount of taxes to be paid. a. Write a set of steps that any Top Notch en- could follow, using the same procedure a b. Test out your steps by computing the amo- Jason would pay on a \$250,000 home. (www.state.nj.us)	on he makes Agency, he determine the mployee s Jason. bunt of taxes	
	21 [°] Century Skills		
Creativity and Innovation	Critical Thinking and Problem Solving	Communication and Collaboration	
Information Literacy	Media Literacy	ICT Literacy	
Life and Career Skills	Technology Based Activities		
http://www.p21.org/index.php?option=com_content&task=view&id=254&Itemid=119 http://www.iste.org/standards/nets-for-students.aspx			
Conceptual Learning Activities			
 Concept Application: Nets Concept Application: Vertices and Edges 			
Performance Assessment Task Sample http://www.themathworkshop.com/assets/DiscreteMathC.pdf			

- NOTE: The assessment models provided in this document are suggestions for the teacher. If the teacher chooses to develop his/her own model, it must be of equal or better quality and at the same or higher cognitive levels (as noted in parentheses).
- Depending upon the needs of the class, the assessment questions may be answered in the form of essays, quizzes, mobiles, PowerPoint, oral reports, booklets, or other formats of measurement used by the teacher.
 - Diagnostic/Pre Assessment:
 - You are a mailman, you have 10 drop offs as indicated by the symbol below. Trace the shortest path without crossing any one path twice.

Open-Ended (Formative) Assessment:

- ✓ Homework is assigned daily, from the textbook, Chapter Resource Practice Workbook, or other sources. (Synthesis, Analysis, Evaluation)
- Introductory and Closing Activities will be done every day to pre-assess student knowledge and assess understanding of topics. (Synthesis.) Analysis, Evaluation)
- Excerpts from previous HSPA exams including multiple choice and open-ended problems should be given every class to assess student understanding and measure their individual skills.
- Summative Assessment: Assessment questions should be open-ended and should follow the general format illustrated in the Essential Questions/Sample Conceptual Understanding section. (Synthesis, Analysis, Evaluation)
 - Students will be given guizzes that provide a brief review of the concepts and skills in the previous lessons. \checkmark
 - Students will be given a unit test that provides a review of the concepts and skills in the unit.
 - Students will take the HSPA \checkmark
 - ✓ Students will work on Performance Assessment process similar to the ASHA process
- Resources http://www.state.nj.us/education/njpep/assessment/hspa/hspa math/main menu.htm
 - Primiani, A. Rose and William Caroscio, Prentice Hall Brief Review for New Jersey: HSPA Mathematics, Pearson: 2008
 - Sico, John J., HSPA Success Work-A-Text in Mathematics Expanded Edition, Instructivision: 2003

Additional

BIG IDEA XI: Application

Curriculum Management System Fundamentals of Math : Grade 11

Overarching Goals

(1) Communicate mathematical ideas in clear, concise, organized language that varies in content, format and form for different audiences and purposes.

- (2) Comprehend, understand, analyze, evaluate, critique, solve, and respond to a variety of real-life, meaningful problems.
- (3) Investigate, research, and synthesize various pieces of information from a variety of media sources.

Essential Questions

How can we apply mathematical concepts to problem solve in the real world?

Suggested Blocks for Instruction: 22				
KNOW	UNDERSTAND		DO	
Students will know that:	Students will understand that:		Students will be able to:	
Problem solving is an essential part of application of mathematical concepts.	• Problems solving and application are interconnected .		Apply multiple concepts to real life situations.	
	21 st Century Skills			
Creativity and Innovation	Critical Thinking and Problem Solving	Communica	tion and Collaboration	
Information Literacy	Media Literacy	ICT Literacy		
Life and Career Skills	Technology Based Activities			
http://www.p21.org/index.php?option=com_content&task=view&id=254&Itemid=119 http://www.iste.org/standards/nets-for-students.aspx				
Conceptual Learning Activities				
 ✓ Practice College Entrance Exams ✓ Financial organization 				
	Create a successful board game.			
Performance Assessment Task Sample	Organize a finance portfolio to help prioritize your funds for the future.			

- NOTE: The assessment models provided in this document are suggestions for the teacher. If the teacher chooses to develop his/her own model, it must be of equal or better quality and at the same or higher cognitive levels (as noted in parentheses).
- Depending upon the needs of the class, the assessment questions may be answered in the form of essays, quizzes, mobiles, PowerPoint, oral reports, booklets, or other formats of measurement used by the teacher.
 - Diagnostic/Pre Assessment:
 - ✓ College Entrance Exam
 - Open-Ended (Formative) Assessment:
 - ✓ Homework is assigned daily, from the textbook, Chapter Resource Practice Workbook, or other sources. (Synthesis, Analysis, Evaluation)
 - Introductory and Closing Activities will be done every day to pre-assess student knowledge and assess understanding of topics. (Synthesis, Analysis, Evaluation)
 - Excerpts from previous HSPA exams including multiple choice and open-ended problems should be given every class to assess student understanding and measure their individual skills.
 - Summative Assessment: Assessment questions should be open-ended and should follow the general format illustrated in the Essential Questions/Sample Conceptual Understanding section. (Synthesis, Analysis, Evaluation)
 - ✓ Students will be given quizzes that provide a brief review of the concepts and skills in the previous lessons.
 - ✓ Students will be given a unit test that provides a review of the concepts and skills in the unit.
 - ✓ Students will take the HSPA
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 - Sico, John J., <u>HSPA Success Work-A-Text in Mathematics Expanded Edition</u>, Instructivision: 2003

Fundamentals of Math 11 COURSE BENCHMARKS

- 1. Mathematical ideas **interconnect** and build on one another resulting in a **coherent whole**.
- 2. Properties of geometric figures are vital to erecting structures and proper portrayal. Geometric figures are defined by unique properties.
- 3. Area, perimeter, and volume define space. Trigonometric ratios and the Pythagorean Theorem are interconnected in defining the properties of a right triangle.
- 4. **Probability** is a way of **predicting** outcomes, but does not assure outcomes. **Risk** and **fairness** are interrelated. **Profit** is determined by the delicate **balance** of human perception of odds and underlying probability.
- 5. **Theoretical probability** is dependent on the **sample space** of an event.
- 6. Visual **representations** of data are essential in **analyzing** data. An effective analysis is comprised of the mean, median, mode, and range of the data. **Trends** and strengths of **relationships** are apparent in the visual representations of data.
- 7. Equations model patterns that occur in real life problems and are used to solve for unknown quantities. A graph and its equation are in an interdependent relationship. Formulas are direct representations of real life applications that help to solve for an unknown quantity. A solution of a system of equations models a unique outcome for two or more real-life situations.
- 8. Functions model real-life **patterns** to enable us to make **predictions**. Equations describe the **relationship** between a dependent and an independent variable.
- 9. The factors and x-intercepts of a polynomial are directly **related**. Multiplying polynomials and factoring polynomials are reverse **processes** of each other.
- 10. A Vertex Edge Graph is a visual vehicle that helps to optimize a solution within given constraints. Discrete information can be quantified and interpreted effectively using algorithms.
- 11. Problems solving and application are **interconnected**.