FIVE SKILL PLACEMENT TEST

MATH BLUEPRINT

DOMAIN	SUBDOMAIN / CATEGORY		STANDARD	DESCRIPTION OF STANDARD*	PERCENT OF ITEMS	GRADE LEVEL
GEOMETRY (25%)	Draw construct, and describe geometrical figures and describe the relationships between them.		G.1	Draw construct, and describe geometrical figures and describe the relationships between them.	0.8%	7
			G.2	Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.	0.8%	7
	Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.		G.3	Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.	0.8%	7
			G.4	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.	0.8%	7
			G.5	Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.	0.8%	7
	Understand congruence and similarity using physical models, transparencies, or geometry software.		G.6	Verify experimentally the properties of rotations, reflections, and translations:	1.8%	8
			G.7	Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between	1.8%	8
			G.8	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.	1.8%	8
			G.9	Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them.	1.8%	8
			G.10	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*	1.8%	8
	Understand and apply the Pythagorean Theorem.		G.11	Explain a proof of the Pythagorean Theorem and its converse.	1.8%	8
			G.12	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.	1.8%	8
			G.13	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.	1.8%	8
	Solve real-world & mathematical problems involving volume of cylinders, cones, and spheres.		G.14	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.	1.8%	8
	Congruence	Experiment with transformations in the plane.	G.15	Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.	0.6%	9
			G.16	Develop definitions of rotations, reflections, and translations in terms of angles, circles, perpendicular lines, parallel lines, and line segments.	0.6%	9
			G.17	Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.	0.6%	9
		Make geometric constructions.	G.18	Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.	0.6%	9
	Similarity, Right Triangles, and Trigonometry	Understand similarity in terms of similarity transformations.	G.19	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.	0.6%	9
	Expressing Geometric Properties with Equations	Use coordinates to prove simple geometric theorems algebraically.	G.20	Find the equation of a line parallel or perpendicular to a given line that passes through a given point.	0.6%	9
			G.21	Find the point on a directed line segment between two given points that partitions the segment in a given ratio.	0.6%	9
			G.22	Use coordinates to compute perimeters of polygons and areas of triangles and rectangles, e.g., using the distance formula.	0.6%	9
	Geometric Measurement and Dimension	Visualize relationships between two-dimensional and three dimensional objects.	G.23	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.	0.6%	9

RATIOS, STATISTICS, and PROBABILITY (25%)	Analyze proportional relationships and use them to solve real-world and mathematical problems.		RSP.1	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction 1/2/1/4 miles per hour, equivalently 2 miles per hour.			0.5%	7
			RSP.2	Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.			0.5%	7
	Use random sampling to draw inferences about a population.		RSP.3	Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.			0.5%	7
	Draw inferences about two populations.		RSP.4	Draw informal comparative inferences about two populations.			0.5%	7
	Investigate chance processes and develop, use, and evaluate probability models.		RSP.5	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.			0.5%	7
			RSP.6	Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. *For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.*			0.5%	7
			RSP.7	Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.			0.5%	7
			RSP.8	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.			0.5%	7
	Investigate patterns of association in bivariate data.		RSP.9	Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.			4.1%	8
			RSP.10	Know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.			4.1%	8
			RSP.11	Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*			4.1%	8
			RSP.12	Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend*			4.1%	8
	Interpreting Categorical and Quantitative Data	Summarize, represent, and interpret data on a single count or measurement variable.	RSP.13	Represent data with plots on the real number line (dot plots, histograms, and box plots).			0.8%	9
			RSP.14	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.			0.8%	9
		Summarize, represent, and interpret data on two categorical and quantitative variables.	RSP.15	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.			0.8%	9
			RSP.16	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.			0.8%	9
		Interpret linear models.	RSP.17	Interpret the slope (rate of change) and the intercept (constant term) of a linear model in the context of the data.			0.8%	9
	Making Inferences and Justifying Conclusions	Understand and evaluate random processes underlying statistical experiments.	RSP.18	Understand statistics as a process for making inferences about population parameters based on a random sample from that population.			0.8%	9
	Apply and extend previous understandings of operations with fractions.		A.1	Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.	A.1.A	Understand subtraction of rational numbers as adding the additive inverse, p - q = p + (-q). Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in	0.8%	7
					A.1.B	Apply properties of operations as strategies to add and subtract rational numbers.	0.8%	7
			A.2	Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.	A.2.A	Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then -(p/q) = (-p)/q = p/(-q). Interpret quotients of rational numbers	0.8%	7
					A.2.B	Apply properties of operations as strategies to multiply and divide rational numbers.	0.8%	7
			A.3	Solve real-world and mathematical problems involving the four operations with rational numbers.			0.8%	7

ALGEBRA (25%)	Know that there are numbers that are not rational, and approximate them by rational numbers.		A.4	Know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number.			8.1%	8
			A.5	Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2). For example, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.			8.1%	8
	The Real Number System	Extend the properties of exponents to rational exponents.	A.6	Rewrite expressions involving radicals and rational exponents using the properties of exponents.			0.4%	9
	Seeing Structure in Expressions	Interpret the structure of expressions.	A.7	Interpret expressions that represent a quantity in terms of its context.	A.7.A	Interpret parts of an expression, such as terms, factors, and coefficients.	0.4%	9
					A.7.B	Interpret complicated expressions by viewing one or more of their parts as a single entity. *For example, interpret P(1+r)n as the product of P and a factor not depending on P.*	0.4%	9
			A.8	Use the structure of an expression to identify ways to rewrite it. *For example, see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.*			0.4%	9
		Write expressions in equivalent forms to solve problems.	A.9	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.	A.9.A	Factor a quadratic expression to reveal the zeros of the function it defines.	0.4%	9
	Arithmetic with Polynomials and Rational Expressions	Rewrite rational expressions.	A.10	Rewrite simple rational expressions in different forms; write a(x)/b(x) in the form q(x) + r(x)/b(x), where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or, for the more complicated examples, a computer algebra system.			0.4%	9
	Creating Equations	Create equations that describe numbers or relationships.	A.11	Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.			0.4%	9
			A.12	Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.			0.4%	9
			A.13	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. *For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.*			0.4%	9
			A.14	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.*			0.4%	9
	Reasoning with Equations and Inequalities	Solve equations and inequalities in one variable.	A.15	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.			0.4%	9
		Solve systems of equations.	A.16	Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two			0.4%	9
		Represent and solve equations and inequalities graphically.	A.17	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).			0.4%	9
%)	Use properties of operations to generate equivalent expressions.		EF.1	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."*			1.3%	7
	Solve real-life and mathematical problems using numerical and algebraic expressions and equations.		EF.2	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $250. If you want to place a towel bar 9 3/4 inches long in the center of a door that*			1.3%	7
			EF.3	Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.			1.3%	7
	Work with radicals and integer exponents.		EF.4	Know and apply the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$.			1.3%	8
			EF.5	Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that √2 is			1.3%	8
	Understand the connections between proportional relationships, lines, and linear equations.		EF.6	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. *For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.*			1.3%	8
			EF.7	Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation y = mx for a line through the origin and the equation y = mx + b for a line intercepting the vertical axis at b.			1.3%	8

EQUATIONS AND FUNCTIONS (25%	Analyze and solve linear equations and pairs of simultaneous linear equations.		EF.8	Solve linear equations in one variable.	EF.8.A	Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form x = a, a = a, or a = b results (where a and b are different numbers).	1.3%	8
					EF.8.B	Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like	1.3%	8
			EF.9	Analyze and solve linear equations and pairs of simultaneous linear equations.	EF.9.A	Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.	1.3%	8
					EF.9.B	Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6.*	1.3%	8
					EF.9.C	Solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.*	1.3%	8
	Define, evaluate, and compare functions.		EF.10	Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.			1.3%	8
			EF.11	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.			1.3%	8
	Use functions to model relationships between quantities.		EF.12	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.			1.3%	8
			EF.13	Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.			1.3%	8
	Interpreting Functions	Analyze functions using different representations.	EF.14	Graph linear functions and show intercepts, maxima, and minima.			5.0%	9
							100.0%	

**Standard descriptions are drawn from state standards of Illinois, Florida, New York, and Kentucky*