6-8 Instructional Schema: Math Skills per Grade Level

(Schema serves as the Tier 1, high-quality academic support for mathematics)

	Sixth Grade **23 skills in sixth grade to learn**	**Seventh Grade** **21 skills to learn in seventh grade**	**Eighth Grade** **22 skills to learn in eighth grade**
Ratios and proportional Relationships	• Understand and explain the concept of ratio as a relationship between two quantities • Use ratio and rate reasoning to solve problems • Create tables of equivalent ratios and plot values on a coordinate plane • Understand the concept of unit rate associated with a ratio	• Identify the constant of proportionality (k) • Analyze proportional relationships to solve percent and ratio problems • Compute unit rates associated with ratios of fractions • Use proportional relationships to solve multistep ratio and percent problems (tax, tips, markups, discounts, fees, and percent increase and decrease)	
The Number System	• Add, subtract, multiply, and divide multi-digit numbers • Add, subtract, multiply, and divide multi-digit decimals • Interpret absolute value using a number line (both horizontal and vertical) • Recognize that every number has an opposite • Locate rational numbers on a number line • Graph points on all four quadrants	• Add, subtract, multiply, & divide rational numbers (integers, fractions, & decimals) • Represent rational numbers on a number line (zero pairs) • Convert between fractions, ratios, decimals, and percentages • Solve problems involving the four operations with rational numbers	• Know the differences between rational and irrational numbers, and understand their decimal expansions (terminating, repeating, or non-repeating). • Use rational numbers to approximate irrational numbers (e.g., locating $\sqrt{2}$ on a number line).
Expressions and Equations	• Write and evaluate numerical expressions involving whole-number exponents • Write, read, and evaluate expressions with variables • Apply properties of operations to generate equivalent expressions • Solve one-variable equations and inequalities • Represent and analyze the quantitative relationships of bivariate data sets	• Use properties to generate equivalent expressions • Add, subtract, factor, and expand linear expressions with rational coefficients • Solve multi-step problems involving equations and inequalities • Graph & interpret the solutions of inequalities in context	• Apply the properties of integer exponents to generate equivalent expressions • Use square and cube root symbols to represent and evaluate solutions to equations of the form $x^2 = p$ and $x^3 = p$. • Perform operations with numbers expressed in scientific notation • Graph proportional relationships and interpret the unit rate as the slope (m) • Compare two different proportional relationships represented in different ways (algebraically, graphically, etc.) • Solve linear equations in one variable, including multi-step equations requiring the distributive property and combining like terms. • Analyze and solve systems of linear equations

Geometry	• Calculate the area of triangles, quadrilaterals, and polygons
	• Calculate the volume of a rectangular prism
	  ○ (V=LxWxH; V=Area of the base x height)
	• Use vertices to identify polygons in a coordinate plane
	• Decompose 3D figures using nets
		• Construct geometric figures with specific conditions
		• Use scale drawings of geometric figures to solve problems
		• Solve problems involving angle measure, area, surface area, and volume
		• Solve for an unknown angle in a figure using facts about supplementary, complementary, adjacent, and vertical angles
		• Describe the 2D figures that result from slicing 3D figures
			• Verify experimentally the properties of reflections, translations, and rotations
			• Understand congruence in terms of rigid motions, and describe the sequence of transformations (reflections, rotations, translations) that prove congruence.
			• Apply the Pythagorean Theorem to find unknown side lengths of a right triangle in 2 and 3 dimensions
			• Apply the Pythagorean Theorem to find the distance between two points.
			• Calculate the volume of cones, cylinders, and spheres
			• Use informal arguments to establish facts about
			  ○ the angles created when parallel lines are cut by a transversal
			  ○ the angle sum and exterior angle of triangles
			  ○ the angle-angle (AA) criterion for similarity of triangles.

Statistics and Probability	• Develop understanding of statistical variability • Describe the distributions of collected data by its center, spread, and overall shape • Interpret the differences between measures of center and measures of variation of a data set • Interpret information on dot plots, box plots, and histograms	• Use random sampling to draw inferences about a population • Compare two data distributions using measures of center and measures of variability • Develop probability models of different events (chance between 0 and 1) and use them to find the probability of events • Find probabilities of compound events	• Construct and interpret scatter plots for bivariate data, describing patterns of association (clustering, outliers, positive/negative, linear/nonlinear). • Informally fit a straight line to scatter plots that suggest a linear association, and informally assess the model's fit. (line of best fit) • Construct and interpret a two-way table summarizing bivariate categorical data, and use relative frequencies to describe associations.
Functions			• Understand that a function is a rule that assigns to each input exactly one output. • Be able to represent and compare properties of functions in different ways (algebraically, graphically, numerically in tables, or by verbal description) • Write and construct a model of a linear function • Qualitatively describe the functional relationship between two quantities by analyzing a graph

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