

Mathematics 8

Squares, Square Roots, Cubes, and Cube Roots				
	Emerging	Developing	Proficient	Extending
determine or estimate perfect squares and square roots	relate perfect squares to area and square roots to side lengths determine or estimate perfect squares and square roots using a calculator	determine whether a number less than or equal to 100 is a perfect square determine the square root of a perfect square less than or equal to 100 estimate (between two whole numbers) the square root of a number (not a perfect square) less than 100	determine whether a number greater than 100 is a perfect square determine the square root of a perfect square greater than 100 estimate (± 0.1) the square root of a number (not a perfect square) less than 100	evaluate claims involving perfect squares and square roots solve challenging or unfamiliar problems involving perfect squares and square roots
determine perfect cubes and cube roots	relate perfect cubes to volume and cube roots to side lengths	determine perfect cubes	determine cube roots	determine the volume of a cube from its surface area

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The Pythagorean Theorem				
	Emerging	Developing	Proficient	Extending
determine unknown side lengths in right triangles	determine the area of a square on the sides of a right triangle identify the hypotenuse of a right triangle	describe the relationship between the side lengths of a right triangle	determine whether a triangle is a right triangle determine an unknown side length in a right triangle	determine unknown side lengths in two connected right triangles create a right triangle with a given side length
solve contextual problems involving perfect squares, square roots, and the Pythagorean theorem	solve contextual problems involving perfect squares or square roots	solve contextual problems involving the Pythagorean theorem (diagram provided)	solve contextual problems involving the Pythagorean theorem	solve contextual problems involving the Pythagorean theorem (combined shapes)

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Operations with Fractions				
	Emerging	Developing	Proficient	Extending
add and subtract fractions	add and subtract fractions with like denominators	add and subtract fractions with unlike denominators add and subtract mixed numbers with like denominators	add and subtract mixed numbers with unlike denominators	write an expression that evaluates to a given sum or difference
multiply and divide fractions	multiply fractions and whole numbers divide fractions by whole numbers	multiply and divide fractions	multiply and divide mixed numbers	write an expression that evaluates to a given product or quotient
evaluate expressions with two or more operations with fractions	evaluate expressions with two operations with fractions (addition and subtraction or multiplication and division) state the order in which to perform two or more operations with fractions	evaluate expressions with two operations with fractions (addition or subtraction and multiplication or division)	evaluate expressions with more than two operations with fractions (addition or subtraction and multiplication or division)	write an expression that evaluates to a given value or characteristic group terms (i.e., use brackets) so that the expression evaluates to a given value or characteristic
solve contextual problems involving operations with fractions	solve contextual problems involving operations with fractions and whole numbers	solve contextual problems involving one operation with fractions	solve contextual problems involving two or more operations with fractions	solve challenging or unfamiliar problems involving operations with fractions

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Ratios, Rates, Proportions, and Percents				
	Emerging	Developing	Proficient	Extending
determine missing values in proportional relationships	use ratios and rates (two-term, three-term, part-to-part, part-to-whole, lowest terms) to compare quantities write an equation to express a proportional relationship use repeated addition to determine a missing value in a proportional relationship	determine whether a relationship is proportional (single-digit multipliers) determine a missing value in a proportional relationship (single-digit multipliers)	determine whether a relationship is proportional (whole number and fractional multipliers) determine a missing value in a proportional relationship (whole number and fractional multipliers)	solve challenging or unfamiliar problems involving missing values in proportional relationships determine a missing value in a proportional relationship (part-to-part ↔ part-to-whole)
compare ratios and rates	determine unit ratios and rates	compare ratios and rates using common numerators and denominators compare ratios and rates using unit ratios and rates	choose an efficient strategy to compare ratios and rates	solve challenging or unfamiliar problems involving the comparison of ratios and rates

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Ratios, Rates, Proportions, and Percents (cont'd)				
	Emerging	Developing	Proficient	Extending
determine and estimate percents, percent amounts, and wholes or initial values	convert between percents, fractions, and decimals (whole number) determine and estimate percents, percent amounts, and wholes or initial values using proportional reasoning (whole number)	convert between percents, fractions, and decimals (less than 1%, greater than 100%, fractional) determine and estimate benchmark percent amounts (0.5%, 0.1%, 200%, 150%, 125%, 110%)	determine and estimate percents, percent amounts, wholes or initial values (less than 1%, greater than 100%, fractional)	generalize relationships involving percents
solve contextual problems involving percents	solve contextual problems involving percents using proportional reasoning (whole number)	solve contextual problems involving percents (less than 1%, greater than 100%, fractional)	solve contextual problems involving two or more percents (combined percents, percents of percents; less than 1%, greater than 100%, fractional)	solve challenging or unfamiliar problems involving percents generalize relationships involving percents

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Linear Relations and Equations				
	Emerging	Developing	Proficient	Extending
graph linear relations	graph a linear relation from a table of values	make a table of values from an equation	graph a linear relation from an equation	generalize relationships involving linear relations (equation $\rightarrow$ graph)
write linear equations	write an equation from a table of values (contains $x = 0$ and change in x-values of 1) write an equation from a graph (passes through the origin)	write an equation from a table of values (change in x-values remains the same) write an equation from a graph (scale of 1)	write an equation from a table of values (change in x-values varies) write an equation from a graph (scale not equal to 1)	generalize relationships involving linear relations (graph $\rightarrow$ equation)

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Linear Relations and Equations (cont'd)				
	Emerging	Developing	Proficient	Extending
solve two-step linear equations	solve one-step linear equations (concretely, pictorially, and symbolically) use substitution to verify solutions to linear solutions	solve two-step linear equations (concretely and pictorially)	solve two-step linear equations (symbolically)	model and solve equations involving the distributive property (integers)
solve contextual problems involving linear relations and equations	determine an unknown value from an equation (provided) determine a value between or beyond plotted points (provided) interpret the parameters of and solution to an equation, in context interpret a graph and plotted points, in context	write an equation to represent a “real-world” scenario graph an equation to represent a “real-world” situation	determine an unknown value from an equation (created) determine an unknown value from a graph (created)	solve challenging or unfamiliar problems involving linear relations and equations

Mathematics 8

Surface Area and Volume				
	Emerging	Developing	Proficient	Extending
visualize 3-D objects	draw views of prisms and cylinders identify 3-D objects from views and nets	draw views of composite objects draw nets of prisms and cylinders	build and draw composite objects from views build and draw prisms and cylinders from nets	solve challenging or unfamiliar problems involving views and nets of 3-D objects
determine surface areas of prisms and cylinders	determine the surface area of rectangular prisms	determine the surface area of triangular prisms	determine the surface area of cylinders	determine the surface area of composite objects
determine volumes of cubes, prisms, and cylinders	determine the volume of rectangular prisms	determine the volume of triangular prisms	determine the volume of cylinders	determine the volume of composite objects
solve contextual problems involving surface area and volume	solve contextual problems involving the surface area and volume of cubes	solve contextual problems involving the surface area and volume of rectangular and triangular prisms	solve contextual problems involving the surface area and volume of cylinders solve contextual problems involving the relationship between surface area and volume	solve contextual problems involving the surface area and volume of composite objects solve contextual problems involving the relationship between surface area and volume

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Statistics and Probability				
	Emerging	Developing	Proficient	Extending
determine and choose measures of central tendency	determine the median and mode of a data set	determine the mean, median, and mode of a data set (list)	determine the mean, median, and mode of a data set (frequency table) choose the measure of central tendency to best describe a data set	create a data set with given measures of central tendency
determine probabilities of independent events	determine the probability of single events use tree diagrams or tables to show the sample space for a probability experiment	use tree diagrams or tables to determine the probability of two independent events	use fractions to determine the probability of two independent events	determine the probability of three or more independent events