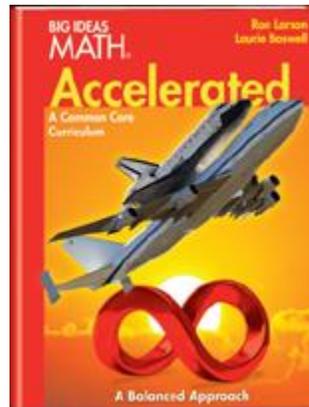
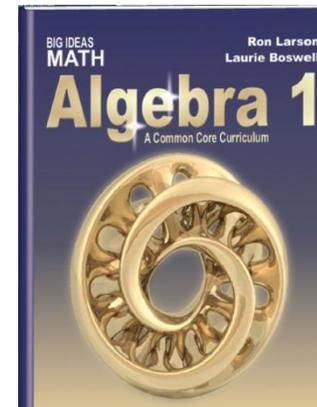


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Minnesota Academic Standards in Mathematics

Grades 6 – 8

Minnesota K-12 Academic Standards in Mathematics (2007)

	Strand	Standard	No.	Benchmark	Green	Accelerated	HS ©2015 Algebra 1
6	Number & Operation	Read, write, represent and compare positive rational numbers expressed as fractions, decimals, percents and ratios; write positive integers as products of factors; use these representations in real-world and mathematical situations.	6.1.1.1	Locate positive rational numbers on a number line and plot pairs of positive rational numbers on a coordinate grid.	6.1 6.5	6.2	
			6.1.1.2	Compare positive rational numbers represented in various forms. Use the symbols $<$, $=$ and $>$. <i>For example:</i> $\frac{1}{2} > 0.36$.	6.2 – 6.3	6.2	
			6.1.1.3	Understand that percent represents parts out of 100 and ratios to 100. <i>For example:</i> 75% corresponds to the ratio 75 to 100, which is equivalent to the ratio 3 to 4.	5.5		
			6.1.1.4	Determine equivalences among fractions, decimals and percents; select among these representations to solve problems. <i>For example:</i> If a woman making \$25 an hour gets a 10% raise, she will make an additional \$2.50 an hour, because \$2.50 is $\frac{1}{10}$ or 10% of \$25.	5.6	6.1	
			6.1.1.5	Factor whole numbers; express a whole number as a product of prime factors with exponents. <i>For example:</i> $24 = 2^3 \times 3$.	1.2 1.4		

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	Strand	Standard	No.	Benchmark	Green	Accelerated	HS ©2015 Algebra 1
6	Number & Operation	Read, write, represent and compare positive rational numbers expressed as fractions, decimals, percents and ratios; write positive integers as products of factors; use these representations in real-world and mathematical situations.	6.1.1.6	Determine greatest common factors and least common multiples. Use common factors and common multiples to calculate with fractions and find equivalent fractions. <i>For example:</i> Factor the numerator and denominator of a fraction to determine an equivalent fraction.	1.5 – 1.6 3.4 and Extension 3.4		
			6.1.1.7	Convert between equivalent representations of positive rational numbers. <i>For example:</i> Express $\frac{10}{7}$ as $\frac{7+3}{7} = \frac{7}{7} + \frac{3}{7} = 1\frac{3}{7}$.	2.1 – 2.3 Extension 1.6	6.1	
			6.1.2.1	Identify and use ratios to compare quantities; understand that comparing quantities using ratios is not the same as comparing quantities using subtraction. <i>For example:</i> In a classroom with 15 boys and 10 girls, compare the numbers by subtracting (there are 5 more boys than girls) or by dividing (there are 1.5 times as many boys as girls). The comparison using division may be expressed as a ratio of boys to girls (3 to 2 or 3:2 or 1.5 to 1).	5.1 – 5.2 5.4		
6	Number & Operation	Understand the concept of ratio and its relationship to fractions and to the multiplication and division of whole numbers. Use ratios to solve real-world and mathematical problems.	6.1.2.2	Apply the relationship between ratios, equivalent fractions and percents to solve problems in various contexts, including those involving mixtures and concentrations. <i>For example:</i> If 5 cups of trail mix contains 2 cups of raisins, the ratio of raisins to trail mix is 2 to 5. This ratio corresponds to the fact that the raisins are $\frac{2}{5}$ of the total, or 40% of the total. And if one trail mix consists of 2 parts peanuts to 3 parts raisins, and another consists of 4 parts peanuts to 8 parts raisins, then the first mixture has a higher concentration of peanuts.	5.2, 5.4		
			6.1.2.3	Determine the rate for ratios of quantities with different units. <i>For example:</i> 60 miles for every 3 hours is equivalent to 20 miles for every one hour (20 mph).	5.3 – 5.4		

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	Strand	Standard	No.	Benchmark	Green	Accelerated	HS ©2015 Algebra 1
			6.1.2.4	Use reasoning about multiplication and division to solve ratio and rate problems. <i>For example:</i> If 5 items cost \$3.75, and all items are the same price, then 1 item costs 75 cents, so 12 items cost \$9.00.	5.1 – 5.4		
		Multiply and divide decimals, fractions and mixed numbers; solve real-world and mathematical problems using arithmetic with positive rational numbers.	6.1.3.1	Multiply and divide decimals and fractions, using efficient and generalizable procedures, including standard algorithms.	2.1 – 2.3 2.5 – 2.6		
6	Number & Operation	Multiply and divide decimals, fractions and mixed numbers; solve real-world and mathematical problems using arithmetic with positive rational numbers.	6.1.3.2	Use the meanings of fractions, multiplication, division and the inverse relationship between multiplication and division to make sense of procedures for multiplying and dividing fractions. <i>For example:</i> Just as $\frac{12}{4} = 3$ means $12 = 3 \times 4$, $\frac{2}{3} \div \frac{4}{5} = \frac{5}{6}$ means $\frac{5}{6} \times \frac{4}{5} = \frac{2}{3}$.	2.1 – 2.3		
			6.1.3.3	Calculate the percent of a number and determine what percent one number is of another number to solve problems in various contexts. <i>For example:</i> If John has \$45 and spends \$15, what percent of his money did he keep?	5.5 – 5.6	6.4 – 6.7	
			6.1.3.4	Solve real-world and mathematical problems requiring arithmetic with decimals, fractions and mixed numbers.	2.1 – 2.6	2.2 – 2.4 6.1 – 6.2	
			6.1.3.5	Estimate solutions to problems with whole numbers, fractions and decimals and use the estimates to assess the reasonableness of results in the context of the problem. <i>For example:</i> The sum $\frac{1}{3} + 0.25$ can be estimated to be between $\frac{1}{2}$ and 1, and this estimate can be used to check the result of a more detailed calculation.	1.1 (Activities) 2.4 – 2.6	2.2 – 2.4	

Minnesota K-12 Academic Standards in Mathematics (2007)

	Strand	Standard	No.	Benchmark	Green	Accelerated	HS ©2015 Algebra 1
6	Algebra	Recognize and represent relationships between varying quantities; translate from one representation to another; use patterns, tables, graphs and rules to solve real-world and mathematical problems.	6.2.1.1	Understand that a variable can be used to represent a quantity that can change, often in relationship to another changing quantity. Use variables in various contexts. <i>For example:</i> If a student earns \$7 an hour in a job, the amount of money earned can be represented by a variable and is related to the number of hours worked, which also can be represented by a variable.	3.1 – 3.2 7.1 – 7.4		
			6.2.1.2	Represent the relationship between two varying quantities with function rules, graphs and tables; translate between any two of these representations. <i>For example:</i> Describe the terms in the sequence of perfect squares $t = 1, 4, 9, 16, \dots$ by using the rule $t = n^2$ for $n = 1, 2, 3, 4, \dots$	3.1 – 3.2, 3.4 5.1-5.4 5.6-5.7		
		6.2.2.1	Use properties of arithmetic to generate equivalent numerical expressions and evaluate expressions involving positive rational numbers. <i>For example:</i> $\frac{32}{15} \times \frac{5}{6} = \frac{32 \times 5}{15 \times 6} = \frac{2 \times 16 \times 5}{3 \times 5 \times 3 \times 2} = \frac{16}{9} \times \frac{2}{2} \times \frac{5}{5} = \frac{16}{9}$. <i>Another example:</i> Use the distributive law to write: $\frac{1}{2} + \frac{1}{3} \left(\frac{9}{2} - \frac{15}{8} \right) = \frac{1}{2} + \frac{1}{3} \times \frac{9}{2} - \frac{1}{3} \times \frac{15}{8} = \frac{1}{2} + \frac{3}{2} - \frac{5}{8} = 2 - \frac{5}{8} = 1\frac{3}{8}$.	1.3 3.3 – 3.4			
6	Algebra	Understand and interpret equations and inequalities involving variables and positive rational numbers. Use equations and inequalities to represent real-world and mathematical problems; use the idea of maintaining equality to solve equations. Interpret solutions in the original context.	6.2.3.1	Represent real-world or mathematical situations using equations and inequalities involving variables and positive rational numbers. <i>For example:</i> The number of miles m in a k kilometer race is represented by the equation $m = 0.62 k$.	3.1 – 3.2 7.1 – 7.7		
			6.2.3.2	Solve equations involving positive rational numbers using number sense, properties of arithmetic and the idea of maintaining equality on both sides of the equation. Interpret a solution in the original context and assess the reasonableness of results. <i>For example:</i> A cellular phone company charges \$0.12 per minute. If the bill was \$11.40 in April, how many minutes were used?	7.2 – 7.4 8.4		

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Strand	Standard	No.	Benchmark	Green	Accelerated	HS ©2015 Algebra 1
Geometry & Measurement	Calculate perimeter, area, surface area and volume of two- and three-dimensional figures to solve real-world and mathematical problems.	6.3.1.1	<p>Calculate the surface area and volume of prisms and use appropriate units, such as cm^2 and cm^3. Justify the formulas used. Justification may involve decomposition, nets or other models.</p> <p><i>For example:</i> The surface area of a triangular prism can be found by decomposing the surface into two triangles and three rectangles.</p>	8.1 – 8.4	9.4	
6 Geometry & Measurement	Calculate perimeter, area, surface area and volume of two- and three-dimensional figures to solve real-world and mathematical problems.	6.3.1.2	<p>Calculate the area of quadrilaterals. Quadrilaterals include squares, rectangles, rhombuses, parallelograms, trapezoids and kites. When formulas are used, be able to explain why they are valid.</p> <p><i>For example:</i> The area of a kite is one-half the product of the lengths of the diagonals, and this can be justified by decomposing the kite into two triangles.</p>	4.1 4.3 – 4.4		
		6.3.1.3	<p>Estimate the perimeter and area of irregular figures on a grid when they cannot be decomposed into common figures and use correct units, such as cm and cm^2.</p>		8.2 8.4	
	Understand and use relationships between angles in geometric figures.	6.3.2.1	<p>Solve problems using the relationships between the angles formed by intersecting lines.</p> <p><i>For example:</i> If two streets cross, forming four corners such that one of the corners forms an angle of 120°, determine the measures of the remaining three angles.</p> <p><i>Another example:</i> Recognize that pairs of interior and exterior angles in polygons have measures that sum to 180°.</p>		7.1 – 7.2 12.1	
		6.3.2.2	<p>Determine missing angle measures in a triangle using the fact that the sum of the interior angles of a triangle is 180°. Use models of triangles to illustrate this fact.</p> <p><i>For example:</i> Cut a triangle out of paper, tear off the corners and rearrange these corners to form a straight line.</p> <p><i>Another example:</i> Recognize that the measures of the two acute angles in a right triangle sum to 90°.</p>		7.3 – 7.4 12.2	

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	Strand	Standard	No.	Benchmark	Green	Accelerated	HS ©2015 Algebra 1
6	Geometry & Measurement	Understand and use relationships between angles in geometric figures.	6.3.2.3	Develop and use formulas for the sums of the interior angles of polygons by decomposing them into triangles.		12.3	
		Choose appropriate units of measurement and use ratios to convert within measurement systems to solve real-world and mathematical problems.	6.3.3.1	Solve problems in various contexts involving conversion of weights, capacities, geometric measurements and times within measurement systems using appropriate units.	5.7		
			6.3.3.2	Estimate weights, capacities and geometric measurements using benchmarks in measurement systems with appropriate units. <i>For example:</i> Estimate the height of a house by comparing to a 6-foot man standing nearby.		12.4	
	Data Analysis & Probability	Use probabilities to solve real-world and mathematical problems; represent probabilities using fractions, decimals and percents.	6.4.1.1	Determine the sample space (set of possible outcomes) for a given experiment and determine which members of the sample space are related to certain events. Sample space may be determined by the use of tree diagrams, tables or pictorial representations. <i>For example:</i> A 6×6 table with entries such as (1,1), (1,2), (1,3), ..., (6,6) can be used to represent the sample space for the experiment of simultaneously rolling two number cubes.		10.1 10.4	
6	Data Analysis & Probability	Use probabilities to solve real-world and mathematical problems; represent probabilities using fractions, decimals and percents.	6.4.1.2	Determine the probability of an event using the ratio between the size of the event and the size of the sample space; represent probabilities as percents, fractions and decimals between 0 and 1 inclusive. Understand that probabilities measure likelihood. <i>For example:</i> Each outcome for a balanced number cube has probability $\frac{1}{6}$, and the probability of rolling an even number is $\frac{1}{2}$.		10.2	

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			6.4.1.3	<p>Perform experiments for situations in which the probabilities are known, compare the resulting relative frequencies with the known probabilities; know that there may be differences.</p> <p><i>For example:</i> Heads and tails are equally likely when flipping a fair coin, but if several different students flipped fair coins 10 times, it is likely that they will find a variety of relative frequencies of heads and tails.</p>		10.3 – 10.4	
			6.4.1.4	<p>Calculate experimental probabilities from experiments; represent them as percents, fractions and decimals between 0 and 1 inclusive. Use experimental probabilities to make predictions when actual probabilities are unknown.</p> <p><i>For example:</i> Repeatedly draw colored chips with replacement from a bag with an unknown mixture of chips, record relative frequencies, and use the results to make predictions about the contents of the bag.</p>		10.3 – 10.4	
7	Number & Operation	Read, write, represent and compare positive and negative rational numbers, expressed as integers, fractions and decimals.	7.1.1.1	<p>Know that every rational number can be written as the ratio of two integers or as a terminating or repeating decimal. Recognize that π is not rational, but that it can be approximated by rational numbers such as $\frac{22}{7}$ and 3.14.</p>		2.1 8.1 Extension 14.4	
			7.1.1.2	<p>Understand that division of two integers will always result in a rational number. Use this information to interpret the decimal result of a division problem when using a calculator.</p> <p><i>For example:</i> $\frac{125}{30}$ gives 4.16666667 on a calculator. This answer is not exact. The exact answer can be expressed as $4\frac{1}{6}$, which is the same as $4.\overline{16}$. The calculator expression does not guarantee that the 6 is repeated, but that possibility should be anticipated.</p>		2.1 8.1 – 8.3 Extension 14.4	
			7.1.1.3	<p>Locate positive and negative rational numbers on a number line, understand the concept of opposites, and plot pairs of positive and negative rational numbers on a coordinate grid.</p>	6.1 – 6.3 6.5	1.1 2.1	
			7.1.1.4	<p>Compare positive and negative rational numbers expressed in various forms using the symbols $<$, $>$, $=$, \leq, \geq.</p> <p><i>For example:</i> $-\frac{1}{2} < -0.36$.</p>	6.2 – 6.3	1.1	

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7	Number & Operation	Read, write, represent and compare positive and negative rational numbers, expressed as integers, fractions and decimals.	7.1.1.5	Recognize and generate equivalent representations of positive and negative rational numbers, including equivalent fractions. <i>For example:</i> $-\frac{40}{12} = -\frac{120}{36} = -\frac{10}{3} = -3.\bar{3}$.		2.1	
			7.1.2.1	Add, subtract, multiply and divide positive and negative rational numbers that are integers, fractions and terminating decimals; use efficient and generalizable procedures, including standard algorithms; raise positive rational numbers to whole-number exponents. <i>For example:</i> $3^4 \times \left(\frac{1}{2}\right)^2 = \frac{81}{4}$.		1.2 – 1.5 2.2 – 2.4 5.1 6.1 16.1	
			7.1.2.2	Use real-world contexts and the inverse relationship between addition and subtraction to explain why the procedures of arithmetic with negative rational numbers make sense. <i>For example:</i> Multiplying a distance by -1 can be thought of as representing that same distance in the opposite direction. Multiplying by -1 a second time reverses directions again, giving the distance in the original direction.		1.2 – 1.3 2.2 – 2.3	
		Calculate with positive and negative rational numbers, and rational numbers with whole number exponents, to solve real-world and mathematical problems.	7.1.2.3	Understand that calculators and other computing technologies often truncate or round numbers. <i>For example:</i> A decimal that repeats or terminates after a large number of digits is truncated or rounded.		8.1 – 8.3 9.3 14.4 and Extension 14.4 16.5	
7	Number & Operation		7.1.2.4	Solve problems in various contexts involving calculations with positive and negative rational numbers and positive integer exponents, including computing simple and compound interest.		6.7 8.3 – 8.4 9.1, 9.3 16.1 – 16.3	
		7.1.2.5	Use proportional reasoning to solve problems involving ratios in various contexts. <i>For example:</i> A recipe calls for milk, flour and sugar in a ratio of 4:6:3 (this is how recipes are often given in large institutions, such as hospitals). How much flour and milk would be needed with 1 cup of sugar?		5.1 – 5.4 6.3 – 6.7		

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	Strand	Standard	No.	Benchmark	Green	Accelerated	HS ©2015 Algebra 1
			7.1.2.6	<p>Demonstrate an understanding of the relationship between the absolute value of a rational number and distance on a number line. Use the symbol for absolute value.</p> <p><i>For example:</i> -3 represents the distance from -3 to 0 on a number line or 3 units; the distance between 3 and $\frac{9}{2}$ on the number line is $3 - \frac{9}{2}$ or $\frac{3}{2}$.</p>	6.4	1.1	
7	Algebra	Understand the concept of proportionality in real-world and mathematical situations, and distinguish between proportional and other relationships.	7.2.1.1	<p>Understand that a relationship between two variables, x and y, is proportional if it can be expressed in the form $\frac{y}{x} = k$ or $y = kx$.</p> <p>Distinguish proportional relationships from other relationships, including inversely proportional relationships ($xy = k$ or $y = \frac{k}{x}$).</p> <p><i>For example:</i> The radius and circumference of a circle are proportional, whereas the length x and the width y of a rectangle with area 12 are inversely proportional, since $xy = 12$ or equivalently, $y = \frac{12}{x}$.</p>		5.6	
			7.2.1.2	<p>Understand that the graph of a proportional relationship is a line through the origin whose slope is the unit rate (constant of proportionality). Know how to use graphing technology to examine what happens to a line when the unit rate is changed.</p>		5.6 13.1 – 13.3	

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	Strand	Standard	No.	Benchmark	Green	Accelerated	HS ©2015 Algebra 1
7	Algebra	Recognize proportional relationships in real-world and mathematical situations; represent these and other relationships with tables, verbal descriptions, symbols and graphs; solve problems involving proportional relationships and explain results in the original context.	7.2.2.1	<p>Represent proportional relationships with tables, verbal descriptions, symbols, equations and graphs; translate from one representation to another. Determine the unit rate (constant of proportionality or slope) given any of these representations.</p> <p><i>For example:</i> Larry drives 114 miles and uses 5 gallons of gasoline. Sue drives 300 miles and uses 11.5 gallons of gasoline. Use equations and graphs to compare fuel efficiency and to determine the costs of various trips.</p>		5.1 – 5.6	
			7.2.2.2	<p>Solve multi-step problems involving proportional relationships in numerous contexts.</p> <p><i>For example:</i> Distance-time, percent increase or decrease, discounts, tips, unit pricing, lengths in similar geometric figures, and unit conversion when a conversion factor is given, including conversion between different measurement systems.</p> <p><i>Another example:</i> How many kilometers are there in 26.2 miles?</p>		5.4 R5.6 6.5 – 6.6	
			7.2.2.3	<p>Use knowledge of proportions to assess the reasonableness of solutions.</p> <p><i>For example:</i> Recognize that it would be unreasonable for a cashier to request \$200 if you purchase a \$225 item at 25% off.</p>		5.2	

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7	Algebra	Recognize proportional relationships in real-world and mathematical situations; represent these and other relationships with tables, verbal descriptions, symbols and graphs; solve problems involving proportional relationships and explain results in the original context.	7.2.2.4	<p>Represent real-world or mathematical situations using equations and inequalities involving variables and positive and negative rational numbers.</p> <p><i>For example:</i> “Four-fifths is three greater than the opposite of a number” can be represented as $\frac{4}{5} = -n + 3$, and “height no bigger than half the radius” can be represented as $h \leq \frac{r}{2}$.</p> <p><i>Another example:</i> “x is at least -3 and less than 5” can be represented as $-3 \leq x < 5$, and also on a number line.</p>		3.3 – 3.5 4.1 – 4.4 6.3 – 6.4	

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Strand	Standard	No.	Benchmark	Green	Accelerated	HS ©2015 Algebra 1	
7	Algebra	Apply understanding of order of operations and algebraic properties to generate equivalent numerical and algebraic expressions containing positive and negative rational numbers and grouping symbols; evaluate such expressions.	7.2.3.1	Use properties of algebra to generate equivalent numerical and algebraic expressions containing rational numbers, grouping symbols and whole number exponents. Properties of algebra include associative, commutative and distributive laws. <i>For example:</i> Combine like terms (use the distributive law) to write $3x - 7x + 1 = (3 - 7)x + 1 = -4x + 1$.		3.1 – 3.2	
			7.2.3.2	Evaluate algebraic expressions containing rational numbers and whole number exponents at specified values of their variables. <i>For example:</i> Evaluate the expression $\frac{1}{3}(2x - 5)^2$ at $x = 5$.		8.3 – 8.4 9.1 – 9.5 16.1 – 16.4 16.7	
			7.2.3.3	Apply understanding of order of operations and grouping symbols when using calculators and other technologies. <i>For example:</i> Recognize the conventions of using a caret (^ raise to a power) and asterisk (* multiply); pay careful attention to the use of nested parentheses.		13.1 14.4	
7	Algebra	Represent real-world and mathematical situations using equations with variables. Solve equations symbolically, using the properties of equality. Also solve equations graphically and numerically. Interpret solutions in the original context.	7.2.4.1	Represent relationships in various contexts with equations involving variables and positive and negative rational numbers. Use the properties of equality to solve for the value of a variable. Interpret the solution in the original context. <i>For example:</i> Solve for w in the equation $P = 2w + 2\ell$ when $P = 3.5$ and $\ell = 0.4$. <i>Another example:</i> To post an Internet website, Mary must pay \$300 for initial set up and a monthly fee of \$12. She has \$842 in savings, how long can she sustain her website?		3.3 – 3.4 6.3 – 6.4	

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			7.2.4.2	<p>Solve equations resulting from proportional relationships in various contexts.</p> <p><i>For example:</i> Given the side lengths of one triangle and one side length of a second triangle that is similar to the first, find the remaining side lengths of the second triangle.</p> <p><i>Another example:</i> Determine the price of 12 yards of ribbon if 5 yards of ribbon cost \$1.85.</p>		5.1 – 5.2 5.4 – 5.6	
	Geometry & Measurement	Use reasoning with proportions and ratios to determine measurements, justify formulas and solve real-world and mathematical problems involving circles and related geometric figures.	7.3.1.1	Demonstrate an understanding of the proportional relationship between the diameter and circumference of a circle and that the unit rate (constant of proportionality) is π . Calculate the circumference and area of circles and sectors of circles to solve problems in various contexts.		8.1	
		Use reasoning with proportions and ratios to determine measurements, justify formulas and solve real-world and mathematical problems involving circles and related geometric figures.	7.3.1.2	<p>Calculate the volume and surface area of cylinders and justify the formulas used.</p> <p><i>For example:</i> Justify the formula for the surface area of a cylinder by decomposing the surface into two circles and a rectangle.</p>		9.3 15.1 15.4	
7	Geometry & Measurement	Analyze the effect of change of scale, translations and reflections on the attributes of two-dimensional figures.	7.3.2.1	<p>Describe the properties of similarity, compare geometric figures for similarity, and determine scale factors.</p> <p><i>For example:</i> Corresponding angles in similar geometric figures have the same measure.</p>		11.5 – 11.7	
			7.3.2.2	<p>Apply scale factors, length ratios and area ratios to determine side lengths and areas of similar geometric figures.</p> <p><i>For example:</i> If two similar rectangles have heights of 3 and 5, and the first rectangle has a base of length 7, the base of the second rectangle has length $\frac{35}{3}$.</p>		11.6 – 11.7	

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	Strand	Standard	No.	Benchmark	Green	Accelerated	HS ©2015 Algebra 1
			7.3.2.3	Use proportions and ratios to solve problems involving scale drawings and conversions of measurement units. <i>For example:</i> 1 square foot equals 144 square inches. <i>Another example:</i> In a map where 1 inch represents 50 miles, $\frac{1}{2}$ inch represents 25 miles.		7.5	
	Geometry & Measurement	Analyze the effect of change of scale, translations and reflections on the attributes of two-dimensional figures.	7.3.2.4	Graph and describe translations and reflections of figures on a coordinate grid and determine the coordinates of the vertices of the figure after the transformation. <i>For example:</i> The point (1, 2) moves to (-1, 2) after reflection about the y-axis.		11.1 – 11.4	
7	Data Analysis & Probability	Use mean, median and range to draw conclusions about data and make predictions.	7.4.1.1	Design simple experiments and collect data. Determine mean, median and range for quantitative data and from data represented in a display. Use these quantities to draw conclusions about the data, compare different data sets, and make predictions. <i>For example:</i> By looking at data from the past, Sandy calculated that the mean gas mileage for her car was 28 miles per gallon. She expects to travel 400 miles during the next week. Predict the approximate number of gallons that she will use.	9.1 – 9.5 10.4		
			7.4.1.2	Describe the impact that inserting or deleting a data point has on the mean and the median of a data set. Know how to create data displays using a spreadsheet to examine this impact. <i>For example:</i> How does dropping the lowest test score affect a student's mean test score?	9.2 – 9.5		
		Display and interpret data in a variety of ways, including circle graphs and histograms.	7.4.2.1	Use reasoning with proportions to display and interpret data in circle graphs (pie charts) and histograms. Choose the appropriate data display and know how to create the display using a spreadsheet or other graphing technology.	10.2, Extension 10.3		

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7	Data Analysis & Probability	Calculate probabilities and reason about probabilities using proportions to solve real-world and mathematical problems.	7.4.3.1	Use random numbers generated by a calculator or a spreadsheet or taken from a table to simulate situations involving randomness, make a histogram to display the results, and compare the results to known probabilities. <i>For example:</i> Use a spreadsheet function such as RANDBETWEEN(1, 10) to generate random whole numbers from 1 to 10, and display the results in a histogram.		Extension 10.5	
			7.4.3.2	Calculate probability as a fraction of sample space or as a fraction of area. Express probabilities as percents, decimals and fractions. <i>For example:</i> Determine probabilities for different outcomes in game spinners by finding fractions of the area of the spinner.		10.2 – 10.5	
			7.4.3.3	Use proportional reasoning to draw conclusions about and predict relative frequencies of outcomes based on probabilities. <i>For example:</i> When rolling a number cube 600 times, one would predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.		10.3 – 10.4	

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	Strand	Standard	No.	Benchmark	Green	Accelerated	HS ©2015 Algebra 1
8	Number & Operation	Read, write, compare, classify and represent real numbers, and use them to solve problems in various contexts.	8.1.1.1	<p>Classify real numbers as rational or irrational. Know that when a square root of a positive integer is not an integer, then it is irrational. Know that the sum of a rational number and an irrational number is irrational, and the product of a non-zero rational number and an irrational number is irrational.</p> <p><i>For example:</i> Classify the following numbers as whole numbers, integers, rational numbers, irrational numbers, recognizing that some numbers belong in more than one category: $\frac{6}{3}$, $\frac{3}{6}$, $3.\bar{6}$, $\frac{\pi}{2}$, $-\sqrt{4}$, $\sqrt{10}$, -6.7.</p>		14.4 and Extension 14.4	9.1
			8.1.1.2	<p>Compare real numbers; locate real numbers on a number line. Identify the square root of a positive integer as an integer, or if it is not an integer, locate it as a real number between two consecutive positive integers.</p> <p><i>For example:</i> Put the following numbers in order from smallest to largest: 2, $\sqrt{3}$, -4, -6.8, $-\sqrt{37}$.</p> <p><i>Another example:</i> $\sqrt{68}$ is an irrational number between 8 and 9.</p>		14.4	
8	Number & Operation	Read, write, compare, classify and represent real numbers, and use them to solve problems in various contexts.	8.1.1.3	<p>Determine rational approximations for solutions to problems involving real numbers.</p> <p><i>For example:</i> A calculator can be used to determine that $\sqrt{7}$ is approximately 2.65.</p> <p><i>Another example:</i> To check that $1\frac{5}{12}$ is slightly bigger than $\sqrt{2}$, do the calculation $\left(1\frac{5}{12}\right)^2 = \left(\frac{17}{12}\right)^2 = \frac{289}{144} = 2\frac{1}{144}$.</p> <p><i>Another example:</i> Knowing that $\sqrt{10}$ is between 3 and 4, try squaring numbers like 3.5, 3.3, 3.1 to determine that 3.1 is a reasonable rational approximation of $\sqrt{10}$.</p>		14.1 – 14.2 14.4	
			8.1.1.4	<p>Know and apply the properties of positive and negative integer exponents to generate equivalent numerical expressions.</p> <p><i>For example:</i> $3^2 \times 3^{(-5)} = 3^{(-3)} = \left(\frac{1}{3}\right)^3 = \frac{1}{27}$.</p>		16.1 – 16.4	

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8	Number & Operation	Read, write, compare, classify and represent real numbers, and use them to solve problems in various contexts.	8.1.1.5	<p>Express approximations of very large and very small numbers using scientific notation; understand how calculators display numbers in scientific notation. Multiply and divide numbers expressed in scientific notation, express the answer in scientific notation, using the correct number of significant digits when physical measurements are involved.</p> <p><i>For example:</i> $(4.2 \times 10^4) \times (8.25 \times 10^3) = 3.465 \times 10^8$, but if these numbers represent physical measurements, the answer should be expressed as 3.5×10^8 because the first factor, 4.2×10^4, only has two significant digits.</p>		16.5 – 16.7	
			Algebra	8.2.1.1	<p>Understand that a function is a relationship between an independent variable and a dependent variable in which the value of the independent variable determines the value of the dependent variable. Use functional notation, such as $f(x)$, to represent such relationships.</p> <p><i>For example:</i> The relationship between the area of a square and the side length can be expressed as $f(x) = x^2$. In this case, $f(5) = 25$, which represents the fact that a square of side length 5 units has area 25 units squared.</p>		
8	Algebra	Understand the concept of function in real-world and mathematical situations, and distinguish between linear and nonlinear functions.	8.2.1.2	<p>Use linear functions to represent relationships in which changing the input variable by some amount leads to a change in the output variable that is a constant times that amount.</p> <p><i>For example:</i> Uncle Jim gave Emily \$50 on the day she was born and \$25 on each birthday after that. The function $f(x) = 50 + 25x$ represents the amount of money Jim has given after x years. The rate of change is \$25 per year.</p>			3.2 4.1 4.2
			8.2.1.3	<p>Understand that a function is linear if it can be expressed in the form $f(x) = mx + b$ or if its graph is a straight line.</p> <p><i>For example:</i> The function $f(x) = x^2$ is not a linear function because its graph contains the points (1,1), (-1,1) and (0,0), which are not on a straight line.</p>		13.1 13.3	
			8.2.1.4	<p>Understand that an arithmetic sequence is a linear function that can be expressed in the form $f(x) = mx + b$, where $x = 0, 1, 2, 3, \dots$</p> <p><i>For example:</i> The arithmetic sequence 3, 7, 11, 15, ..., can be expressed as $f(x) = 4x + 3$.</p>			4.6

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			8.2.1.5	<p>Understand that a geometric sequence is a non-linear function that can be expressed in the form $f(x)=ab^x$, where $x = 0, 1, 2, 3, \dots$</p> <p><i>For example:</i> The geometric sequence 6, 12, 24, 48, ... , can be expressed in the form $f(x) = 6(2^x)$.</p>			6.6
8	Algebra	Recognize linear functions in real-world and mathematical situations; represent linear functions and other functions with tables, verbal descriptions, symbols and graphs; solve problems involving these functions and explain results in the original context.	8.2.2.1	Represent linear functions with tables, verbal descriptions, symbols, equations and graphs; translate from one representation to another.		13.1	
			8.2.2.2	Identify graphical properties of linear functions including slopes and intercepts. Know that the slope equals the rate of change, and that the y-intercept is zero when the function represents a proportional relationship.		13.1 – 13.2 Extension 13.2	
			8.2.2.3	Identify how coefficient changes in the equation $f(x) = mx + b$ affect the graphs of linear functions. Know how to use graphing technology to examine these effects.		13.1 – 13.2 Extension 13.2	
			8.2.2.4	<p>Represent arithmetic sequences using equations, tables, graphs and verbal descriptions, and use them to solve problems.</p> <p><i>For example:</i> If a girl starts with \$100 in savings and adds \$10 at the end of each month, she will have $100 + 10x$ dollars after x months.</p>			4.6
			8.2.2.5	<p>Represent geometric sequences using equations, tables, graphs and verbal descriptions, and use them to solve problems.</p> <p><i>For example:</i> If a girl invests \$100 at 10% annual interest, she will have $100(1.1^x)$ dollars after x years.</p>			6.6

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8	Algebra	Generate equivalent numerical and algebraic expressions and use algebraic properties to evaluate expressions.	8.2.3.1	<p>Evaluate algebraic expressions, including expressions containing radicals and absolute values, at specified values of their variables.</p> <p><i>For example:</i> Evaluate $\pi r^2 h$ when $r = 3$ and $h = 0.5$, and then use an approximation of π to obtain an approximate answer.</p>		AT3 14.1 – 14.2, 14.4 15.1 – 15.4 16.1 – 16.4	1.4 6.2 9.1
			8.2.3.2	<p>Justify steps in generating equivalent expressions by identifying the properties used, including the properties of algebra. Properties include the associative, commutative and distributive laws, and the order of operations, including grouping symbols.</p>		AT1 – AT3 15.1 – 15.4 16.1 – 16.4	
8	Algebra	Represent real-world and mathematical situations using equations and inequalities involving linear expressions. Solve equations and inequalities symbolically and graphically. Interpret solutions in the original context.	8.2.4.1	<p>Use linear equations to represent situations involving a constant rate of change, including proportional and non-proportional relationships.</p> <p><i>For example:</i> For a cylinder with fixed radius of length 5, the surface area $A = 2\pi(5)h + 2\pi(5)^2 = 10\pi h + 50\pi$, is a linear function of the height h, but the surface area is not proportional to the height.</p>		13.1 – 13.7	
			8.2.4.2	<p>Solve multi-step equations in one variable. Solve for one variable in a multi-variable equation in terms of the other variables. Justify the steps by identifying the properties of equalities used.</p> <p><i>For example:</i> The equation $10x + 17 = 3x$ can be changed to $7x + 17 = 0$, and then to $7x = -17$ by adding/subtracting the same quantities to both sides. These changes do not change the solution of the equation.</p> <p><i>Another example:</i> Using the formula for the perimeter of a rectangle, solve for the base in terms of the height and perimeter.</p>		AT1 – AT3	
			8.2.4.3	<p>Express linear equations in slope-intercept, point-slope and standard forms, and convert between these forms. Given sufficient information, find an equation of a line.</p> <p><i>For example:</i> Determine an equation of the line through the points $(-1,6)$ and $(2/3, -3/4)$.</p>		13.3 – 13.7	

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8	Algebra	Represent real-world and mathematical situations using equations and inequalities involving linear expressions. Solve equations and inequalities symbolically and graphically. Interpret solutions in the original context.	8.2.4.4	Use linear inequalities to represent relationships in various contexts. <i>For example:</i> A gas station charges \$0.10 less per gallon of gasoline if a customer also gets a car wash. Without the car wash, gas costs \$2.79 per gallon. The car wash is \$8.95. What are the possible amounts (in gallons) of gasoline that you can buy if you also get a car wash and can spend at most \$35?			2.1 – 2.5
			8.2.4.5	Solve linear inequalities using properties of inequalities. Graph the solutions on a number line. <i>For example:</i> The inequality $-3x < 6$ is equivalent to $x > -2$, which can be represented on the number line by shading in the interval to the right of -2 .			2.1 – 2.5
			8.2.4.6	Represent relationships in various contexts with equations and inequalities involving the absolute value of a linear expression. Solve such equations and inequalities and graph the solutions on a number line. <i>For example:</i> A cylindrical machine part is manufactured with a radius of 2.1 cm, with a tolerance of 1/100 cm. The radius r satisfies the inequality $ r - 2.1 \leq .01$.			1.4 2.6
8	Algebra	Represent real-world and mathematical situations using equations and inequalities involving linear expressions. Solve equations and inequalities symbolically and graphically. Interpret solutions in the original context.	8.2.4.7	Represent relationships in various contexts using systems of linear equations. Solve systems of linear equations in two variables symbolically, graphically and numerically. <i>For example:</i> Marty's cell phone company charges \$15 per month plus \$0.04 per minute for each call. Jeannine's company charges \$0.25 per minute. Use a system of equations to determine the advantages of each plan based on the number of minutes used.			5.1 – 5.5
			8.2.4.8	Understand that a system of linear equations may have no solution, one solution, or an infinite number of solutions. Relate the number of solutions to pairs of lines that are intersecting, parallel or identical. Check whether a pair of numbers satisfies a system of two linear equations in two unknowns by substituting the numbers into both equations.			5.1 – 5.5

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		8.2.4.9	Use the relationship between square roots and squares of a number to solve problems. <i>For example:</i> If $\pi x^2 = 5$, then $ x = \sqrt{\frac{5}{\pi}}$, or equivalently, $x = \sqrt{\frac{5}{\pi}}$ or $x = -\sqrt{\frac{5}{\pi}}$. If x is understood as the radius of a circle in this example, then the negative solution should be discarded and $x = \sqrt{\frac{5}{\pi}}$.		14.1 14.3	
8 Geometry & Measurement	Solve problems involving right triangles using the Pythagorean Theorem and its converse.	8.3.1.1	Use the Pythagorean Theorem to solve problems involving right triangles. <i>For example:</i> Determine the perimeter of a right triangle, given the lengths of two of its sides. <i>Another example:</i> Show that a triangle with side lengths 4, 5 and 6 is not a right triangle.		14.3 14.5	
		8.3.1.2	Determine the distance between two points on a horizontal or vertical line in a coordinate system. Use the Pythagorean Theorem to find the distance between any two points in a coordinate system.		14.5	
		8.3.1.3	Informally justify the Pythagorean Theorem by using measurements, diagrams and computer software.		14.3	
	Solve problems involving parallel and perpendicular lines on a coordinate system.	8.3.2.1	Understand and apply the relationships between the slopes of parallel lines and between the slopes of perpendicular lines. Dynamic graphing software may be used to examine these relationships.		13.2b	
		8.3.2.2	Analyze polygons on a coordinate system by determining the slopes of their sides. <i>For example:</i> Given the coordinates of four points, determine whether the corresponding quadrilateral is a parallelogram.		13.2b	
		8.3.2.3	Given a line on a coordinate system and the coordinates of a point not on the line, find lines through that point that are parallel and perpendicular to the given line, symbolically and graphically.			4.3

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8	Data Analysis & Probability	Interpret data using scatterplots and approximate lines of best fit. Use lines of best fit to draw conclusions about data.	8.4.1.1	Collect, display and interpret data using scatterplots. Use the shape of the scatterplot to informally estimate a line of best fit and determine an equation for the line. Use appropriate titles, labels and units. Know how to use graphing technology to display scatterplots and corresponding lines of best fit.			4.4 – 4.5
			8.4.1.2	Use a line of best fit to make statements about approximate rate of change and to make predictions about values not in the original data set. <i>For example:</i> Given a scatterplot relating student heights to shoe sizes, predict the shoe size of a 5'4" student, even if the data does not contain information for a student of that height.			4.5
			8.4.1.3	Assess the reasonableness of predictions using scatterplots by interpreting them in the original context. <i>For example:</i> A set of data may show that the number of women in the U.S. Senate is growing at a certain rate each election cycle. Is it reasonable to use this trend to predict the year in which the Senate will eventually include 1000 female Senators?			4.4 – 4.5