Virginia Mathematics

Grade 7

Number and Number Sense	**NS.1**	**The student will investigate and describe the concept of exponents for powers of ten and compare and order numbers greater than zero written in scientific notation.** 7.NS.1
	NS.2	**The student will reason and use multiple strategies to compare and order rational numbers.** 7.NS.2
	NS.3	**The student will recognize and describe the relationship between square roots and perfect squares.** 7.NS.3
Investigate and describe powers of 10 with negative exponents by examining patterns. 7.NS.1.A	**a**	**Investigate and describe powers of 10 with negative exponents by examining patterns.** 7.NS.1.A
Represent a power of 10 with a negative exponent in fraction and decimal form. 7.NS.1.B	**b**	**Represent a power of 10 with a negative exponent in fraction and decimal form.** 7.NS.1.B
Convert between numbers greater than 0 written in scientific notation and decimals.* 7.NS.1.C	**c**	**Convert between numbers greater than 0 written in scientific notation and decimals.*** 7.NS.1.C
Compare and order no more than four numbers greater than 0 written in scientific notation. Ordering may be in ascending or descending order.* 7.NS.1.D	**d**	**Compare and order no more than four numbers greater than 0 written in scientific notation. Ordering may be in ascending or descending order.*** 7.NS.1.D
Use multiple strategies (e.g., benchmarks, nu eq (using symbols <, >, =)	**a**	**Use multiple strategies (e.g., benchmarks, number line, equivalency) to compare (using symbols <, >, =) and order (a set of no more than four) rational numbers xpressed as integers, fractions (proper or improper), mixed numbers, decimals, nd percents. Fractions and mixed numbers may be positive or negative. Decimals may be positive or negative and are limited to the thousandths place. Ordering**

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and order (a set of no more than four) rational numbers expressed as integers, fractions (proper or improper), mixed numbers, decimals, and percents. Fractions and mixed numbers may be positive or negative. Decimals may be positive or negative and are limited to the thousandths place. Ordering may be in ascending or descending order. Justify solutions orally, in writing or with a model.* 7.NS.2.A	may be in ascending or descending order. Justify solutions orally, in writing or with a model.* 7.NS.2.A
Determine the positive square root of a perfect square from 0 to 400.* 7.NS.3.A	**a** Determine the positive square root of a perfect square from 0 to 400.* 7.NS.3.A
Describe the relationship between square roots and perfect squares.* 7.NS.3.B	**b** Describe the relationship between square roots and perfect squares.* 7.NS.3.B
Computation and Estimation 7.CE	**CE.1** The student will estimate, solve, and justify solutions to multistep contextual problems involving operations with rational numbers. 7.CE.1
	CE.2 The student will solve problems, including those in context, involving proportional relationships. 7.CE.2
Estimate, solve, and justify solutions to contextual problems involving addition, subtraction, multiplication, and division with rational numbers expressed as integers, fractions (proper or improper), mixed numbers, and	**a** Estimate, solve, and justify solutions to contextual problems involving addition, subtraction, multiplication, and division with rational numbers expressed as integers, fractions (proper or improper), mixed numbers, and decimals. Fractions may be positive or negative. Decimals may be positive or negative and are limited to the thousandths place. 7.CE.1.A
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Decimals may be positive or negative and are limited to the thousandths place. 7.CE.1.A		
Given a proportional relationship between two quantities, create and use a ratio table to determine missing values. 7.CE.2.A	**a**	**Given a proportional relationship between two quantities, create and use a ratio table to determine missing values.** 7.CE.2.A
Write and solve a proportion that represents a proportional relationship between two quantities to find a missing value, including problems in context. 7.CE.2.B	**b**	**Write and solve a proportion that represents a proportional relationship between two quantities to find a missing value, including problems in context.** 7.CE.2.B
Apply proportional reasoning to solve problems in context, including converting units of measurement, when given the conversion factor. 7.CE.2.C	**c**	**Apply proportional reasoning to solve problems in context, including converting units of measurement, when given the conversion factor.** 7.CE.2.C
Estimate and determine the percentage of a given whole number, including but not limited to the use of benchmark percentages. 7.CE.2.D	**d**	**Estimate and determine the percentage of a given whole number, including but not limited to the use of benchmark percentages.** 7.CE.2.D
Measurement and Geometry 7.MG	**MG.1**	**The student will investigate and determine the volume formula for right cylinders and the surface area formulas for rectangular prisms and right cylinders and apply the formulas in context.**
	MG.2	**The student will solve problems and justify relationships of similarity using proportional reasoning.** 7.MG.2

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	MG.3 The student will compare and contrast quadrilaterals based on their properties and determine unknown side lengths and angle measures of quadrilaterals. 7.MG.3
	MG.4 The student will apply dilations of polygons in the coordinate plane. 7.MG.4
Develop the formulas for determining the volume of right cylinders and solve problems, including those in contextual situations, using concrete objects, diagrams, and formulas. 7.MG.1.A	**a** Develop the formulas for determining the volume of right cylinders and solve problems, including those in contextual situations, using concrete objects, diagrams, and formulas. 7.MG.1.A
Develop the formulas for determining the surface area of rectangular prisms and right cylinders and solve problems, including those in contextual situations, using concrete objects, two-dimensional diagrams, nets, and formulas. 7.MG.1.B	**b** Develop the formulas for determining the surface area of rectangular prisms and right cylinders and solve problems, including those in contextual situations, using concrete objects, two-dimensional diagrams, nets, and formulas. 7.MG.1.B
Determine if a problem in context, involving a rectangular prism or right cylinder, represents the application of volume or surface area. 7.MG.1.C	**c** Determine if a problem in context, involving a rectangular prism or right cylinder, represents the application of volume or surface area. 7.MG.1.C
Describe how the volume of a rectangular prism is affected when one measured attribute is multiplied by a factor of 1 4 , 1 3 , 1 2 , 2, 3, or 4, including those in contextual situations. 7.MG.1.D	**d** Describe how the volume of a rectangular prism is affected when one measured attribute is multiplied by a factor of 1 4 , 1 3 , 1 2 , 2, 3, or 4, including those in contextual situations. 7.MG.1.D

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Describe how the surface area of a rectangular prism is affected when one measured attribute is multiplied by a factor of 1 2 or 2, including those in contextual situations. 7.MG.1.E	**e** **Describe how the surface area of a rectangular prism is affected when one measured attribute is multiplied by a factor of 1 2 or 2, including those in contextual situations.** 7.MG.1.E
Identify corresponding congruent angles of similar quadrilaterals and triangles, through the use of geometric markings. 7.MG.2.A	**a** **Identify corresponding congruent angles of similar quadrilaterals and triangles, through the use of geometric markings.** 7.MG.2.A
Identify corresponding sides of similar quadrilaterals and triangles. 7.MG.2.B	**b** **Identify corresponding sides of similar quadrilaterals and triangles.** 7.MG.2.B
Given two similar quadrilaterals or triangles, write similarity statements using symbols. 7.MG.2.C	**c** **Given two similar quadrilaterals or triangles, write similarity statements using symbols.** 7.MG.2.C
Write proportions to express the relationships between the lengths of corresponding sides of similar quadrilaterals and triangles. 7.MG.2.D	**d** **Write proportions to express the relationships between the lengths of corresponding sides of similar quadrilaterals and triangles.** 7.MG.2.D
Recognize and justify if two quadrilaterals or triangles are similar using the ratios of corresponding side lengths. 7.MG.2.E	**e** **Recognize and justify if two quadrilaterals or triangles are similar using the ratios of corresponding side lengths.** 7.MG.2.E
Solve a proportion to determine a missing side length of similar qu tri	**f** **Solve a proportion to determine a missing side length of similar quadrilaterals or triangles.** 7.MG.2.F

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Given angle measures in a quadrilateral or triangle, determine unknown angle measures in a similar quadrilateral or triangle. 7.MG.2.G	**g** Given angle measures in a quadrilateral or triangle, determine unknown angle measures in a similar quadrilateral or triangle. 7.MG.2.G
Apply proportional reasoning to solve problems in context including scale drawings. Scale factors shall have denominators no greater than 12 and decimals no less than tenths. 7.MG.2.H	**h** Apply proportional reasoning to solve problems in context including scale drawings. Scale factors shall have denominators no greater than 12 and decimals no less than tenths. 7.MG.2.H
Compare and contrast properties of the following quadrilaterals: parallelogram, rectangle, square, rhombus, and trapezoid: 7.MG.3.A	**i** Compare and contrast properties of quadrilaterals to determine parallel/perpendicular sides and diagonals 7.MG.3.A.I **ii** Compare and contrast properties of quadrilaterals to determine congruence of angle measures, side, and diagonal lengths 7.MG.3.A.II **iii** Compare and contrast properties of quadrilaterals to determine lines of symmetry 7.MG.3.A.III
Sort and classify quadrilaterals as parallelograms, rectangles, trapezoids, rhombi, and/or squares based on their properties: 7.MG.3.B	**i** Sort and classify quadrilaterals as parallelograms, rectangles, trapezoids, rhombi, and/or squares based on their properties: parallel/perpendicular sides and diagonals 7.MG.3.B.I **ii** Sort and classify quadrilaterals as parallelograms, rectangles, trapezoids, rhombi, and/or squares based on their properties: congruence of angle measures, side, and diagonal lengths 7.MG.3.B.II **iii** Sort and classify quadrilaterals as parallelograms, rectangles, trapezoids, rhombi, and/or squares based on their properties: lines of symmetry 7.MG.3.B.III
Given a diagram, determine an unknown angle measure in a quadrilateral, using properties of quadrilaterals. 7.MG.3.C	**c** Given a diagram, determine an unknown angle measure in a quadrilateral, using properties of quadrilaterals. 7.MG.3.C
Gi de	Skip to main content **iven a diagram, determine an unknown side length in a quadrilateral using roperties of quadrilaterals.** 7.MG.3.D

side length in a quadrilateral using properties of quadrilaterals. 7.MG.3.D	
Given a preimage in the coordinate plane, identify the coordinates of the image of a polygon that has been dilated. Scale factors are limited to 1 4 , 1 2 , 2, 3, or 4. The center of the dilation will be the origin. 7.MG.4.A	**a** Given a preimage in the coordinate plane, identify the coordinates of the image of a polygon that has been dilated. Scale factors are limited to 1 4 , 1 2 , 2, 3, or 4. The center of the dilation will be the origin. 7.MG.4.A
Sketch the image of a dilation of a polygon limited to a scale factor of 1 4 , 1 2 , 2, 3, or 4. The center of the dilation will be the origin. 7.MG.4.B	**b** Sketch the image of a dilation of a polygon limited to a scale factor of 1 4 , 1 2 , 2, 3, or 4. The center of the dilation will be the origin. 7.MG.4.B
Identify and describe dilations in context including, but not limited to, scale drawings and graphic design. 7.MG.4.C	**c** Identify and describe dilations in context including, but not limited to, scale drawings and graphic design. 7.MG.4.C
Probability and Statistics	**PS.1** The student will use statistical investigation to determine the probability of an event and investigate and describe the difference between the experimental and theoretical probability. 7.PS.1
	PS.2 The student will apply the data cycle (formulate questions; collect or acquire data; organize and represent data; and analyze data and communicate results) with a focus on histograms. 7.PS.2
Determine the theoretical probability of an event. 7.PS.1.A	**a** Determine the theoretical probability of an event. 7.PS.1.A
Given the results of a statistical investigation, de[illegible] ex[illegible]	**b** Given the results of a statistical investigation, determine the experimental probability of an event. 7.PS.1.B

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probability of an event. 7.PS.1.B	
Describe changes in the experimental probability as the number of trials increases. 7.PS.1.C	**c** Describe changes in the experimental probability as the number of trials increases. 7.PS.1.C
Investigate and describe the difference between the probability of an event found through experiment or simulation versus the theoretical probability of that same event. 7.PS.1.D	**d** Investigate and describe the difference between the probability of an event found through experiment or simulation versus the theoretical probability of that same event. 7.PS.1.D
Formulate questions that require the collection or acquisition of data with a focus on histograms. 7.PS.2.A	**a** Formulate questions that require the collection or acquisition of data with a focus on histograms. 7.PS.2.A
Determine the data needed to answer a formulated question and collect the data (or acquire existing data) using various methods (e.g., observations, measurement, surveys, experiments). 7.PS.2.B	**b** Determine the data needed to answer a formulated question and collect the data (or acquire existing data) using various methods (e.g., observations, measurement, surveys, experiments). 7.PS.2.B
Determine how sample size and randomness will ensure that the data collected is a sample that is representative of a larger population. 7.PS.2.C	**c** Determine how sample size and randomness will ensure that the data collected is a sample that is representative of a larger population. 7.PS.2.C
Organize and represent numerical data using histograms with and wi tec	**d** Organize and represent numerical data using histograms with and without the use of technology 7.PS.2.D

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Investigate and explain how using different intervals could impact the representation of the data in a histogram. 7.PS.2.E	e	**Investigate and explain how using different intervals could impact the representation of the data in a histogram.** 7.PS.2.E
Compare data represented in histograms with the same data represented in other graphs, including but not limited to line plots (dot plots), circle graphs, and stem-and-leaf plots, and justify which graphical representation best represents the data. 7.PS.2.F	f	**Compare data represented in histograms with the same data represented in other graphs, including but not limited to line plots (dot plots), circle graphs, and stem-and-leaf plots, and justify which graphical representation best represents the data.** 7.PS.2.F
Analyze data represented in histograms by making observations and drawing conclusions. Determine how histograms reveal patterns in data that cannot be easily seen by looking at the corresponding given data set. 7.PS.2.G	g	**Analyze data represented in histograms by making observations and drawing conclusions. Determine how histograms reveal patterns in data that cannot be easily seen by looking at the corresponding given data set.** 7.PS.2.G
Patterns, Functions, and Algebra	PFA.1	**The student will investigate and analyze proportional relationships between two quantities using verbal descriptions, tables, equations in y = mx form, and graphs, including problems in context.** 7.PFA.1
	PFA.2	**The student will simplify numerical expressions, simplify and generate equivalent algebraic expressions in one variable, and evaluate algebraic expressions for given replacement values of the variables.** 7.PFA.2
	PFA.3	**The student will write and solve two-step linear equations in one variable, including problems in context, that require the solution of a two-step linear equation in one variable.** 7.PFA.3
	PFA.4	**The student will write and solve one- and two-step linear inequalities in one variable, including problems in context, that require the solution of a one- and two-step linear inequality in one variable.** 7.PFA.4

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Determine the slope, m, as the rate of change in a proportional relationship between two quantities given a table of values, graph, or contextual situation and write an equation in the form y = mx to represent the direct variation relationship. Slope may include positive or negative values (slope will be limited to positive values in a contextual situation). 7.PFA.1.A	**a** **Determine the slope, m, as the rate of change in a proportional relationship between two quantities given a table of values, graph, or contextual situation and write an equation in the form y = mx to represent the direct variation relationship. Slope may include positive or negative values (slope will be limited to positive values in a contextual situation).** 7.PFA.1.A
Identify and describe a line with a slope that is positive, negative, or zero (0), given a graph. 7.PFA.1.B	**b** **Identify and describe a line with a slope that is positive, negative, or zero (0), given a graph.** 7.PFA.1.B
Graph a line representing a proportional relationship, between two quantities given an ordered pair on the line and the slope, m, as rate of change. Slope may include positive or negative values. 7.PFA.1.C	**c** **Graph a line representing a proportional relationship, between two quantities given an ordered pair on the line and the slope, m, as rate of change. Slope may include positive or negative values.** 7.PFA.1.C
Graph a line representing a proportional relationship between two quantities given the equation of the line in the form y = mx, where m represents the slope as rate of change. Slope may include positive or ne va	**d** **Graph a line representing a proportional relationship between two quantities given the equation of the line in the form y = mx, where m represents the slope as rate of change. Slope may include positive or negative values.** 7.PFA.1.D

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Make connections between and among representations of a proportional relationship between two quantities using problems in context, tables, equations, and graphs. Slope may include positive or negative values (slope will be limited to positive values in a contextual situation). 7.PFA.1.E	**e** **Make connections between and among representations of a proportional relationship between two quantities using problems in context, tables, equations, and graphs. Slope may include positive or negative values (slope will be limited to positive values in a contextual situation).** 7.PFA.1.E
Use the order of operations and apply the properties of real numbers to simplify numerical expressions. Exponents are limited to 1, 2, 3, or 4 and bases are limited to positive integers. Expressions should not include braces { } but may include brackets [ ] and absolute value bars | |. Square roots are limited to perfect squares.* 7.PFA.2.A	**a** **Use the order of operations and apply the properties of real numbers to simplify numerical expressions. Exponents are limited to 1, 2, 3, or 4 and bases are limited to positive integers. Expressions should not include braces { } but may include brackets [ ] and absolute value bars | |. Square roots are limited to perfect squares.*** 7.PFA.2.A
Represent equivalent algebraic expressions in one variable using concrete manipulatives and pictorial representations (e.g., colored chips, algebra tiles). 7.PFA.2.B	**b** **Represent equivalent algebraic expressions in one variable using concrete manipulatives and pictorial representations (e.g., colored chips, algebra tiles).** 7.PFA.2.B
Simplify and generate equivalent algebraic expressions in one variable by applying the order of operations and pr nu ma Skip to main content	**c** **Simplify and generate equivalent algebraic expressions in one variable by applying the order of operations and properties of real numbers. Expressions may require combining like terms to simplify. Expressions will include only linear and numeric terms. Coefficients and numeric terms may be positive or negative rational numbers.*** 7.PFA.2.C

like terms to simplify. Expressions will include only linear and numeric terms. Coefficients and numeric terms may be positive or negative rational numbers.* 7.PFA.2.C	
Use the order of operations and apply the properties of real numbers to evaluate algebraic expressions for given replacement values of the variables. Exponents are limited to 1, 2, 3, or 4 and bases are limited to positive integers. Expressions should not include braces { } but may include brackets [ ] and absolute value bars | |. Square roots are limited to perfect squares. Limit the number of replacements to no more than three per expression. Replacement values may be positive or negative rational numbers. 7.PFA.2.D	d Use the order of operations and apply the properties of real numbers to evaluate algebraic expressions for given replacement values of the variables. Exponents are limited to 1, 2, 3, or 4 and bases are limited to positive integers. Expressions should not include braces { } but may include brackets [ ] and absolute value bars | |. Square roots are limited to perfect squares. Limit the number of replacements to no more than three per expression. Replacement values may be positive or negative rational numbers. 7.PFA.2.D
Represent and solve two-step linear equations in one variable using a variety of concrete materials and pictorial representations. 7.PFA.3.A	a Represent and solve two-step linear equations in one variable using a variety of concrete materials and pictorial representations. 7.PFA.3.A
Apply properties of real numbers and properties of equality to solve two-step linear equations in on	b Apply properties of real numbers and properties of equality to solve two-step linear equations in one variable. Coefficients and numeric terms will be rational. 7.PFA.3.B

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numeric terms will be rational. 7.PFA.3.B		
Confirm algebraic solutions to linear equations in one variable. 7.PFA.3.C	c	Confirm algebraic solutions to linear equations in one variable. 7.PFA.3.C
Write a two-step linear equation in one variable to represent a verbal situation, including those in context. 7.PFA.3.D	d	Write a two-step linear equation in one variable to represent a verbal situation, including those in context. 7.PFA.3.D
Create a verbal situation in context given a two-step linear equation in one variable. 7.PFA.3.E	e	Create a verbal situation in context given a two-step linear equation in one variable. 7.PFA.3.E
Solve problems in context that require the solution of a two-step linear equation. 7.PFA.3.F	f	Solve problems in context that require the solution of a two-step linear equation. 7.PFA.3.F
Apply properties of real numbers and the addition, subtraction, multiplication, and division properties of inequality to solve one- and two-step inequalities in one variable. Coefficients and numeric terms will be rational. 7.PFA.4.A	a	Apply properties of real numbers and the addition, subtraction, multiplication, and division properties of inequality to solve one- and two-step inequalities in one variable. Coefficients and numeric terms will be rational. 7.PFA.4.A
Investigate and explain how the solution set of a linear inequality is affected by multiplying or dividing both sides of the inequality statement by a rational number less than zero.	b	Investigate and explain how the solution set of a linear inequality is affected by multiplying or dividing both sides of the inequality statement by a rational number less than zero. 7.PFA.4.B

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Represent solutions to one- or two-step linear inequalities in one variable algebraically and graphically using a number line. 7.PFA.4.C	**c** **Represent solutions to one- or two-step linear inequalities in one variable algebraically and graphically using a number line.** 7.PFA.4.C
Write one- or two-step linear inequalities in one variable to represent a verbal situation, including those in context. 7.PFA.4.D	**d** **Write one- or two-step linear inequalities in one variable to represent a verbal situation, including those in context.** 7.PFA.4.D
Create a verbal situation in context given a one or two-step linear inequality in one variable. 7.PFA.4.E	**e** **Create a verbal situation in context given a one or two-step linear inequality in one variable.** 7.PFA.4.E
Solve problems in context that require the solution of a one- or two-step inequality. 7.PFA.4.F	**f** **Solve problems in context that require the solution of a one- or two-step inequality.** 7.PFA.4.F
Identify a numerical value(s) that is part of the solution set of as given one- or two-step linear inequality in one variable. 7.PFA.4.G	**g** **Identify a numerical value(s) that is part of the solution set of as given one- or two-step linear inequality in one variable.** 7.PFA.4.G
Describe the differences and similarities between solving linear inequalities in one variable and linear equations in one variable. 7.PFA.4.H	**h** **Describe the differences and similarities between solving linear inequalities in one variable and linear equations in one variable.** 7.PFA.4.H