

Achievement Level Descriptors (ALDs)

Mathematics

Grades 6–8

# Achievement Level Descriptors (ALDs) Mathematics Grades 6–8

The achievement level descriptors describe what a typical student scoring at each achievement level can do. A student who scores at a level would be expected to also be able to demonstrate the skills described in previous levels. A student would not necessarily demonstrate all the skills listed at a particular achievement level on a particular test in order to score at that level.

## Achievement Level Definitions

**Needs Support** – Student may partially meet the standards but needs support to master the knowledge and skills of current grade-level content.

**Approaching Proficient** – Student partially meets the standards and may have gaps in knowledge and skills but is approaching mastery of some grade level content.

**Proficient** – Student meets the standards and demonstrates mastery of the knowledge and skills of most grade level content.

**Advanced** – Student meets the standards and demonstrates mastery of the knowledge and skills on a range of complex grade level content.

## Grade 6

### Ratios and Proportional Relationships

| Alaska Standard | **Needs Support**  **A student at this level:** | **Approaching Proficient**  **A student at this level:** | **Proficient**  **A student at this level:** | **Advanced**  **A student at this level:** |
| --- | --- | --- | --- | --- |
| 6.RP.1 | Identifies that a relationship between two quantities can be expressed as a fraction. | Identifies a verbal interpretation of a given ratio of two quantities.  Identifies that a relationship between two quantities can be expressed as a ratio in the form "*a* : *b*" or in the form "*a* to *b*". | Writes and describes the ratio of two quantities, given a real-world context. | Identifies multiple ways to interpret a ratio in a real-world context. For example, if there are two green marbles and 3 blue marbles, one interpretation is that the ratio of green marbles to blue marbles is 2 : 3. Another interpretation is that the ratio of blue marbles to total marbles is 3 : 5. |
| 6.RP.2 | Identifies a unit rate as a quantity compared to 1. | Calculates a whole-number unit rate, given a real-world context. | Calculates any unit rate (may include rates that use fractions or decimals), given a real-world context. | Compares different unit rates described with decimals or fractions, given a real-world context. |
| 6.RP.3 | Organizes information using a table.  Identifies equivalent ratios when the numbers in one ratio are whole-number multiples of the numbers in the other ratio.  Simplifies a ratio by dividing both quantities by a common factor.  Understands basic percents of a quantity (e.g., 100% is the entire quantity, 50% is half the quantity, and 25% is 1/4 of the quantity). | Expresses a relationship between values using a table.  Uses equivalent ratios to represent a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity).  Writes an expression or equation that can be used to convert measurement units between measurement systems. | Given a table of equivalent ratios, interprets the table, determines missing values in the table, or extends the table.  Plots points on a coordinate plane based on information given in a table.  Uses ratios and rates to solve real-world unit rate problems.  Uses ratios and rates to find percents of a quantity and find a whole, given a part and the percent.   Uses ratios and rates to convert measurement units between measurement systems. | Compares different rates and ratios, including those expressed in a word problem or expressed in a table.  Solves real-world problems involving ratios and rates that involve conversion of more than one unit. |

### The Number System

| Alaska Standard | **Needs Support**  **A student at this level:** | **Approaching Proficient**  **A student at this level:** | **Proficient**  **A student at this level:** | **Advanced**  **A student at this level:** |
| --- | --- | --- | --- | --- |
| 6.NS.1 | Recognizes division of fractions as the correct strategy to solve a real-world problem. Represents the division of two fractions as an expression. | Computes a quotient of two fractions, where neither fraction is a mixed number. (Students using a traditional algorithm may recognize that a reciprocal can be used as part of the computation. Students may also compute quotients using visual fraction models.)  Identifies a situation that represents a given division of fractions or mixed numbers.   Solves a one-step word problem by dividing fractions. | Computes a quotient of any two fractions (including mixed numbers).  Represents problem situations involving division of fractions using expressions or equations with variables (may also represent problem situations using fraction models).  Interprets a quotient of fractions in the context of a real-world problem. | Explains the process for computing quotients of fractions and identifies errors in flawed work. |
| 6.NS.2 | Multiplies multi-digit whole numbers (limited to 3 digits x 3 digits).  Divides multi-digit whole numbers, expressing remainders as a whole number, decimal, or fraction, but without reference to the context of the problem (e.g., 153 students ÷ 45 students per bus = 3.488). | Multiplies and divides multi-digit whole numbers, expressing the quotient as a whole number, decimal, or fraction, with incomplete reference to the context of the problem (e.g., 153 students ÷ 45 students per bus = 3.488 buses). | Multiplies and divides multi-digit whole numbers, expressing the quotient as a whole number, decimal, or fraction, including the correct unit of the problem given the context and can explain the answer (e.g., 153 students ÷ 45 students per bus = 3.4, therefore 4 buses are needed to hold everyone). | Solves multi-digit multiplication and division of whole numbers with problems of any number of digits, and expresses the quotient in the most reasonable method given the context of the problem while providing an explanation. |
| 6.NS.3 | Adds and subtracts multi-digit decimals to the hundredths place. | Multiplies (limited to 4 digits x 4 digits) and divides multi-digit decimals (limited to three-digit dividends) to the hundredths place.  Multiplies a multi-digit decimal by a whole number. | Adds, subtracts, multiplies (up to 5 digits x 5 digits), and divides (limited to four-digit dividends) multi-digit decimals to any place value. For division problems, expresses the remainder as a terminating decimal, or a repeating decimal, or rounded to a designated place value. | Divides a multi-digit decimal by another decimal of any length and expresses the remainder in any form designated. |
| 6.NS.4 | Identifies factors and multiples of numbers. | Identifies the greatest common factor of 2 two-digit numbers.  Identifies the least common multiple of 2 numbers that are either one or two digits. | Determines the greatest common factor of 2 two-digit numbers and uses it to rewrite a numerical expression using the distributive property.Determines the least common multiple of 2 numbers that are either one or two digits. | Solves multi-step modeling problems that require using greatest common factors and/or least common multiples. |
| 6.NS.5 | Recognizes and identifies numbers that are less than 0. | Identifies quantities in a real-world context that represent negative numbers.   Given a quantity in a context, identifies whether it would be better represented as a positive or a negative number. | Given a real-world context that involves positive and negative numbers, explains the meaning of 0 in terms of the context. | Create or identify a context that describes given positive and negative numbers. |
| 6.NS.6 | Orders positive integers and places them on a number line. | Identifies the location of points in the coordinate plane with integer coordinates.  Identifies that when two numbers differ only by signs, the points are an equal distance from 0 on a number line.  Orders positive and negative integers and places them on a number line. | Identifies the location of points in the coordinate plane with positive and negative rational number coordinates.  Identifies and explains the opposite of a number.  Identifies that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.  Orders positive and negative rational numbers and places them on a number line. | Identifies and explains the opposite of the opposite of a number.  Identifies and explains errors in the placement of points on a coordinate plane given an ordered pair. For example, explain the error if the point (2, -3) is placed in the wrong quadrant. |
| 6.NS.7 | Recognizes that distance is a positive value. | Identifies the absolute value of positive and negative rational numbers.  Recognizes the absolute value of a rational number as its distance from 0 on a number line.  Explains the relative position of two negative numbers on a number line. | Interprets the placement of integers on a number line.  Uses rational numbers (including negative numbers) and absolute value to compare real-world quantities.  Explains the meaning of absolute value of a number as the distance on a number line from the number to 0.  Evaluates expressions involving absolute value, which may include a negative sign in front of the absolute value symbol. | Orders expressions involving absolute value of positive and negative rational numbers.  Orders negative numbers that have the same whole number part but different fractional or decimal parts.  Explains errors in evaluating expressions that use absolute value. |
| 6.NS.8 | Given the solution to a real-world or mathematical problem involving ordered pairs, identifies the appropriate quadrant to place the ordered pair.  Identifies coordinate pairs in only the first quadrant. | Identifies the coordinates of points based on a description of their location relative to other points. | Identifies the relationship between points with the same first or second coordinate.  Uses absolute value to represent and calculate the distance between points with the same first or second coordinate. | Solves real-world multi-step modeling problems that involve plotting solutions in any quadrant of the coordinate plane. |

### Expressions and Equations

| Alaska Standard | **Needs Support**  **A student at this level:** | **Approaching Proficient**  **A student at this level:** | **Proficient**  **A student at this level:** | **Advanced**  **A student at this level:** |
| --- | --- | --- | --- | --- |
| 6.EE.1 | Identifies numerical expressions with whole-number exponents that are equivalent to a given expression. | Rewrites a numerical expression with whole-number exponents as another equivalent expression. For example, rewrites 73 as 7 x 7 x 7. | Evaluates numerical expressions involving whole-number exponents. | Evaluates multi-step numerical expressions involving whole-number exponents. |
| 6.EE.2 | Identifies an algebraic expression that represents a written description where the verbal descriptions do not require students to make a determination about the order of the operands. For example, "the sum of 5 and y" can be expressed as either "5 + y" or "y + 5."  Evaluates a simple algebraic expression for given values of the variables without real-world context. Recognizes that when given an expression where all operations are of equal precedence, operations are performed left-to-right.  Recognizes that when given an expression with parentheses, the operations inside the parentheses should be evaluated first. | Identifies an algebraic expression that represents a written description where the verbal descriptions require students to make a determination about the order of the operands. For example, "y subtracted from 5" is "5 - y" and "5 less than y" is "*y* - 5."   Identifies parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient).  Recognizes that in the conventional order of operations, multiplication and division are of equal precedence and addition and subtraction are of equal precedence. | Evaluates a simple algebraic expression or formula for given values of the variables in a real-world context.   Evaluates arithmetic expressions according to the conventional order of operations. Expressions with exponents are limited to whole-number exponents. | Identifies and explains errors in student work for evaluating an algebraic expression or formula.  Identifies and explains errors in student work in applying the conventional order of operations. |
| 6.EE.3 | Recognizes the distributive, commutative, and identity properties. | Generates equivalent algebraic expressions using the distributive property.  Recognizes the inverse property.  Interprets models that represent the distributive, commutative, identity, and inverse properties. | Generates equivalent algebraic expressions using the distributive, commutative, identity, and inverse properties.  Creates models to represent the distributive, commutative, identity, and inverse properties. | Generates multiple ways to rewrite an algebraic expression.  Identifies and explains errors in a student’s model of the distributive, commutative, identity, and inverse properties. |
| 6.EE.4 | Identifies equivalent arithmetic expressions (without variables) by verifying that they result in the same number. | Identifies equivalent algebraic expressions by substituting values into both expressions and verifying that both expressions always result in the same number. | Identifies equivalent algebraic expressions using any strategy. | Identifies multiple ways to rewrite an algebraic expression using the distributive, commutative, identity, and inverse properties. |
| 6.EE.5 | Recognizes that an equation or inequality can be true or false. | Identifies the values from a given set of numbers that make an equation true. | Identifies the values from a given set of numbers that make an inequality true. | Identifies the values from a given set of numbers that make an equation or inequality true. Equations and inequalities are such that the variable appears in more than one term.  Identifies and explains errors in substituting a value to check whether an equation or inequality is true for that value. |
| 6.EE.6 | Recognizes that variables can be used to represent numbers in an expression. | Identifies an algebraic expression with a single variable that represents a simple relationship in a real-world setting. | Writes and identifies an algebraic expression with up to two variables that represents a relationship in a real-world setting.  Identifies the meaning of variables or expressions given a real-world scenario and a corresponding equation.   Identifies possible values of a variable that make sense in a real-world scenario. | Identifies an expression that represents a quantity in a real-world or mathematical scenario given the relationship between values that contribute to the quantity (e.g., given a rectangle whose length is twice the width, expresses the perimeter of the rectangle using the expression w + 2w + w + 2w). |
| 6.EE.7 | Solves a one-step equation requiring addition or subtraction of a whole number (of the form x + p = q, where x, p, and q are positive). Problems may be in the context of a real-world scenario. | Solves a one-step equation requiring multiplication or division of a whole number (of the form px = q, where x, p, and q are positive). Problems may be in the context of a real-world scenario. | Solves real-world problems that can be represented in the form x + p = q and px = q, where x, p, and q are nonnegative rational numbers (may include fractions or decimals). | Solves multi-step modeling problems that can be represented by equations of the form x + p = q or px = q, where p and q are nonnegative rational numbers.   Explains a process for solving equations of the form x + p = q or px = q.  Identifies and explains errors in solving equations of the form x + p = q or px = q. |
| 6.EE.8 | Recognizes that inequalities of the form x > c or x < c have infinitely many solutions. | Identifies an inequality of the form x > a or x < a to represent a real-world scenario. For example, the inequality x < 12 can be used to represent the situation where a person must be less than 12 years old to order a child meal.  Identifies the graph of an inequality of the form x > a or x < a on a number line when not required to distinguish between open or closed endpoints. | Writes and identifies an inequality of the form x ≥ a or x ≤ a to represent a real-world scenario.  Graphs and identifies the graph on a number line that represents a real-world inequality scenario, which may include distinguishing between open and closed endpoints. | Solves multi-step modeling problems that require writing or interpreting inequalities. |
| 6.EE.9 | Identifies simple equations of the form y = x + a or y = ax to represent a given real-world scenario or table of values, where a is a whole number. | Identifies equations of the form y = x + a or y = ax to represent a given real-world scenario or table of values, where a may be a decimal or fraction. | Plots points in the coordinate plane to represent a real-world scenario that can be represented by an equation of the form y = ax.   Creates equations of the form y = x + a or y = ax to represent a given real-world scenario or table of values. | Solves multi-step modeling problems that require writing or interpreting equations of the form y = x + a or y = ax. |

### Geometry

| Alaska Standard | **Needs Support**  **A student at this level:** | **Approaching Proficient**  **A student at this level:** | **Proficient**  **A student at this level:** | **Advanced**  **A student at this level:** |
| --- | --- | --- | --- | --- |
| 6.G.1 | Calculates the area of a figure composed of rectangles when a grid is shown and all sides are perpendicular to gridlines. For example, determining the area of an L-shaped figure on a grid. | Calculates the area of a right triangle when the lengths of the two legs are clearly labeled.   Calculates the area of a figure composed of rectangles when the dimensions are clearly labeled. | Calculates the area of shapes composed of rectangles and triangles using given side lengths, including real-world applications. | Calculates the area of shapes composed of rectangles and triangles when some side lengths must be deduced from others, including real-world applications. |
| 6.G.2 | Given a visual, calculates the volume of a right rectangular prism when side lengths are whole numbers. | Calculates the volume of a right rectangular prism when two side lengths are whole numbers, the third side length is a fraction, and the dimensions must be read from a figure.  Classifies prisms according to base shape. | Calculates the volume of a prism when side lengths are whole numbers, fractions, or mixed numbers.  Compares or describes three-dimensional figures including prisms and cylinders. For example, if the height of one prism is double the height of another prism with the same base area, its volume is also double. | Calculates the volume of a right rectangular prism when at least two of the side lengths are fractions or mixed numbers.   Solves multi-step modeling problems that require finding the volume of right rectangular prisms.  Identifies and explains errors in tudent work for determining the volume of a prism. |
| 6.G.3 | Calculates the length of a horizontal or vertical side of a polygon in the coordinate plane. | Explains the calculation of the length of a horizontal or vertical segment in the coordinate plane.  Recognizes the perimeter of a polygon as the sum of its side lengths. | Identifies the coordinates of a point to complete a polygon in the coordinate plane.  Uses coordinates to find the perimeter of a rectangle with horizontal and vertical edges in the coordinate plane, in the context of solving a real-world or mathematical problem. | Solves problems involving polygons in the coordinate plane, including area or perimeter and when multiple vertices must be determined. |
| 6.G.4 | Identifies the net of a square pyramid or a right prism when no dimensions are shown. | Identifies the net of a square pyramid or a right prism when the dimensions must be identified. For example, if dimensions are shown on the pyramid, the same dimensions appear in the appropriate locations in the net. | Identifies the areas of the individual faces in a net of a prism in which all faces are rectangles or right triangles, including in real-world scenarios.   Represents a three-dimensional figure as a two-dimensional net.  Calculates the surface area of a square pyramid or a right rectangular prism, including in real-world scenarios. | Calculates the surface area of a three-dimensional figure composed of square pyramids and/or right rectangular prisms, including in real-world scenarios. |

### Statistics and Probability

| Alaska Standard | **Needs Support**  **A student at this level:** | **Approaching Proficient**  **A student at this level:** | **Proficient**  **A student at this level:** | **Advanced**  **A student at this level:** |
| --- | --- | --- | --- | --- |
| 6.SP.1 | Recognizes that statistical thinking is reasoning about collected data. | Recognizes that variability in data is expected in situations where answers are likely to be different. | Distinguishes between statistical and nonstatistical questions. | Develops and conducts surveys consisting of statistical questions. |
| 6.SP.2 | Recognizes that mean is the sum of a group of values divided by the number of values.   Recognizes that in some data sets, a particular value may appear more frequently than others. | Recognizes that mean, median, and mode are considered measures of center.  Recognizes that range is considered a measure of spread (or variation). | Describes the shape of a distribution, recognizing symmetry or lack of symmetry (skew).  Describes the center of a distribution with its mean, median, and/or mode.  Describes the spread of distribution with its range. | Identifies a distribution from a description of the center, spread, and symmetry.   Identifies factors that contribute to the symmetry or lack of symmetry in a distribution.  Matches a statistical question with the type of measure (center or spread) that can be used to answer the question. |
| 6.SP.3 | Recognizes that a set of data can be described and can be summarized. | Recognizes that mean, median, mode, and range each can be used to summarize a data set with a single value.  Recognizes the meaning of the terms mean, median, mode, and range and how they are calculated. | Recognizes that mean, median, mode, and range summarize the center of a data set with a single number.  Recognizes that range summarizes the variability of a data set with a single number (e.g., a data set that includes values from 1 to 5 has less variation than a data set that includes values from 1 to 10 because the range of the first set is less than the range of the second set). | Explains the relationship between statistical values of a distribution (e.g., explains that the median of a data set shows where the data are centered and the range of the data set shows how far the data get from the center). |
| 6.SP.4 | Identifies a dot/line plot that represents a given data set.  Identifies a number line, line plot, histogram, and box and whisker plot without a given set of data. | Calculates the 5-number summary for a set of data to generate a box plot. These include minimum value; Q1, Q2, Q3; and maximum value.  Recognizes that bar graphs are appropriate for categorical data, but histograms are used for data displayed on a continuous axis.  Organizes data and calculates the frequencies of the data that fall in given ranges to generate a histogram. | Uses a given data set to create an appropriate graph. | Identifies or creates multiple displays (dot/line plot, histogram, and/or box plot) from the same data.  Compares two data sets that are represented using the same type of display (dot/line plot, histogram, and/or box plot). |
| 6.SP.5 | Identifies the total number of observations in a data set from a dot plot.  Identifies the appropriate unit of measure for a numerical data set. | Identifies the total number of observations in a data set from a histogram. | Reads and describes the vertical/horizontal axes of any graph or chart.  Summarizes numerical data sets based on a given graph or given data set. | Calculates the mean and/or median for a numerical data set displayed as a frequency table.  Compares distributions based on center and spread.  Calculates the interquartile range for a numerical data set.  Predicts effects on mean/median given a change in data points.  Completes a data set with given measures. |
| 6.SP.6 | *Locally Assessed* | *Locally Assessed* | *Locally Assessed* | *Locally Assessed* |
| 6.SP.7 | *Locally Assessed* | *Locally Assessed* | *Locally Assessed* | *Locally Assessed* |

## Grade 7

### Ratios and Proportional Relationships

| Alaska Standard | **Needs Support**  **A student at this level:** | **Approaching Proficient**  **A student at this level:** | **Proficient**  **A student at this level:** | **Advanced**  **A student at this level:** |
| --- | --- | --- | --- | --- |
| 7.RP.1 | Given a table, identifies the unit rate from two whole-number quantities presented in a table, and computes unit rates in like units. | Given a graph, a table, or a verbal description, calculates unit rates with ratios of fractions, excluding mixed numbers associated with ratios consisting of at least one fraction measured in like or different units. | Calculates unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units. | Determines or explains unit rates by dividing two fractions or mixed numbers and expresses the result as a decimal.   Solves multi-step modeling problems involving unit rates associated with ratios of fractions. |
| 7.RP.2 | See 7.RP.2a–7.RP.2d. | See 7.RP.2a–7.RP.2d. | See 7.RP.2a–7.RP.2d. | See 7.RP.2a–7.RP.2d. |
| 7.RP.2.a | Given a graph or a table, determines whether a given relationship is proportional. | Given a graph or a table, determines whether a given relationship is proportional where the given numbers can be fractions. | Determines whether a given relationship is proportional with any numbers. | Calculates input-output values given one pair of values and the fact that there exists a proportional relationship between values. |
| 7.RP.2.b | Completes a table representing a proportional relationship using additive reasoning. | Identifies the constant of proportionality for a given proportional relationship. | Given a verbal description in a real-world or mathematical relationship, identifies the constant of proportionality (unit rate). | Interprets the constant of proportionality for a given proportional relationship in the context. |
| 7.RP.2.c | Identifies an equation that represents a verbal description of a proportional relationship when the constant of proportionality is a whole number. | Identifies an equation to represent a proportional relationship given as a table or graph, when the constant of proportionality is an integer. | Determines an equation to represent a proportional relationship given as a table, graph, or verbal description, when the constant of proportionality is a rational number. | Represents proportional relationships in the coordinate plane. Understands that if the point (x, y) is on the graph of a line representing a proportional relationship, the rate is y/x. |
| 7.RP.2.d | Identifies the meaning of the point with coordinates (1, r) on the graph of a proportional relationship as the unit rate. | Identifies and computes unit rates involving fractions using tables and graphs. | Recognizes that the *y*-coordinate of the ordered pair (1, *r*) corresponds to the unit rate. | Interprets the meaning of the *y*-coordinate of the ordered pair (1, *r*) as it corresponds to the unit rate. |
| 7.RP.3 | Given a formula, solves problems involving a single percent increase or percent decrease (e.g., discounts, taxes, tips).   Determines *B* in problems of type *A x R = B*, where *A* and *R* are given. | Solves one-step problems involving ratios, percent increase, or percent decrease.   Uses proportional relationships to solve unit rate problems in a real-world context. | Calculates percent increase or decrease.   Determines *R* in problems of type *A x R = B*, where *A* and *B* are given.  Solves multi-step word problems involving ratios, percent increase, and percent decrease (including problems involving both a percent increase and a percent decrease). | Represents percent increase and decrease by algebraic expressions or equations.  Compares percentage change of multiple quantities in real-world scenarios. |

### The Number System

| Alaska Standard | **Needs Support**  **A student at this level:** | **Approaching Proficient**  **A student at this level:** | **Proficient**  **A student at this level:** | **Advanced**  **A student at this level:** |
| --- | --- | --- | --- | --- |
| 7.NS.1 | See 7.NS.1a–7.NS.1.d. | See 7.NS.1a–7.NS.1.d. | See 7.NS.1a–7.NS.1.d. | See 7.NS.1a–7.NS.1.d. |
| 7.NS.1.a | Given a visual model of a number line, combines pairs of integers within -10 and 10 to make zero. | Determines additive inverses of rational numbers. | Understands that the sum of any number and its additive inverse is 0 and applies it in real-world context.  Calculates using addition the addition of rational numbers in real-world context.  Calculates using subtraction the subtraction of rational numbers in real-world context. | Understands that the sum of any number and its additive inverse is 0 and describes it in real-world context. |
| 7.NS.1.b | Represents addition of rational numbers on a model. | Adds rational numbers (with common denominators and in the same form) using a model. | Determines when expressions involving addition and subtraction of rational numbers as well as absolute values must be positive, must be negative, or could be either positive or negative. | Applies addition of rational numbers in real-world context. |
| 7.NS.1.c | Represents subtraction of rational numbers on a model. | Subtracts rational numbers (with common denominators and in the same form) using a model. | Distinguishes between correct and incorrect reasoning involving adding and subtracting rational numbers. | Applies subtractionof rational numbers in real-world context. |
| 7.NS.1.d | Adds or subtracts two positive fractions or mixed numbers with common denominators. Adds two negative fractions or mixed numbers. | Adds or subtracts three or more positive fractions or mixed numbers with common denominators. Adds three or more negative fractions or mixed numbers. | Applies an equivalent expression involving addition and subtraction of rational numbers. | Evaluates claims about addition and subtraction of rational numbers. Identifies examples that support or refute given claims. |
| 7.NS.2 | Estimates the product of rational numbers.  Estimates the quotient of rational numbers.  Given a visual model, multiplies and divides integers using properties of operations within -10 and 10.  Computes the decimal equivalent of a fraction with a simple denominator (e.g., 4, 5, 10, 100).   Converts a fraction to a decimal that terminates using long division.  Converts between decimals and percents. | Multiplies an integer by a fraction.  Determines the quotient of rational numbers.  Evaluates expressions involving multiplication and division of integer numbers.   Computes the decimal equivalent of a fraction with a simple denominator (e.g., 4, 5, 10, 100).  Uses the rules of integer multiplication and division to multiply and divide rational numbers.  Identifies properties of operations used as strategies to multiply and divide rational numbers.  Converts between a fraction and a decimal. | Interprets the multiplication of negative numbers in real-world context.   Interprets the division of negative numbers in real-world context.   Distinguishes between correct and incorrect reasoning involving multiplication and division of rational numbers.  Evaluates expressions involving multiplication and division of rational numbers.   Applies and names properties of operations used as strategies to multiply and divide rational numbers.  Converts a percent into a fraction or decimal. | Uses the distributive property to show that (-1)(-1) = 1.  Interprets the multiplication and/or division of negative numbers in real-world context.   Identifies examples that support or refute given claims about multiplication and division of rational numbers.  Evaluates claims about multiplication and division of rational numbers.   Identifies multiple equivalent representations of expressions involving multiplication and division of rational numbers.  Converts interchangeably between decimals, fractions, and percent and uses the best representation depending on the situation. |
| 7.NS.3 | Solves one-step real-world or mathematical problems that involve multiplication of whole numbers and fractions, addition and subtraction of fractions or mixed numbers, or addition, subtraction, multiplication, or division of integers. | Solves one- or two-step real-world or mathematical problems that involve multiplication of whole numbers and fractions, addition and subtraction of fractions or mixed numbers, or addition, subtraction, multiplication, or division of integers. | Solves multi-step real-world or mathematical problems that involve the four operations with fractions or mixed numbers. | Solves multi-step real-world or mathematical problems that involve the four operations with decimals and negative numbers.  Solves multi-step real-world or mathematical problems that involve multiplication, addition, and subtraction with decimals or conversion of units involving fractions. |

### Expressions and Equations

| Alaska Standard | **Needs Support**  **A student at this level:** | **Approaching Proficient**  **A student at this level:** | **Proficient**  **A student at this level:** | **Advanced**  **A student at this level:** |
| --- | --- | --- | --- | --- |
| 7.EE.1 | Identifies equivalent expressions without variables by applying properties of operations.  Matches the vocabulary to the properties of operations to given examples.  Only positive values should be distributed. | Identifies equivalent linear expressions with one variable by combining like terms, expanding terms, or applying the distributive property when all coefficients are integers. | Creates an equivalent linear expression with one or more than one variable which may involve distribution with rational coefficients.  Identifies equivalent linear expressions with one variable, which may involve distribution of a negative sign or fraction. | Creates multiple equivalent linear expressions with one or more variables, which may involve distribution of a negative sign or fraction. |
| 7.EE.2 | Identifies an expression that represents word problems. | Uses an expression to solve a problem.   Determines which equivalent expression to use in a given situation. | Interprets expressions that represent word problems.  Creates an equivalent expression to use in a given situation. | Creates expressions that represent word problems.  Explain why an equivalent expression is most appropriate in a given situation. |
| 7.EE.3 | Identifies the solution to two-step real-world or mathematical problems involving the operations of addition and subtraction and integer numbers.  Uses estimation and mental math to identify the most reasonable solution to a two-step problem. | Solves multi-step real-world or mathematical problems involving all operations and integer numbers.  Uses estimation and mental math to identify the most reasonable solution to a multi-step problem. | Solves multi-step real-world or mathematical problems involving all operations and rational numbers.  Uses estimation and mental math to determine the solution to a multi-step problem. | Solves multi-step real-world or mathematical problems that require comparing different quantities.  Uses estimation and mental math to compare different quantities. |
| 7.EE.4 | Identifies an equation with integer coefficients of the form p = q + rx, r > 0 to solve real-world problems.  Identifies the meaning of the variable in an equation that represents a real-world problem. | Identifies an equation of the form *p* = *q* + *rx*, where *p*, *q*, and *r* are integers or decimals, to solve real-world problems.  Identifies the meaning of the variable in an inequality that represents a real-world problem.  Identifies an inequality with integer coefficients of the form *px* + *q* > *r* or *px* + *q* < *r*, *p* > 0, to solve real-world or mathematical problems.  Graphs the solution to an inequality on a number line. | Creates equations of the form p = r(x + q), where p, q, and r are integers or decimals, to solve real-world or mathematical problems that can be represented by an equation of the form.  Creates inequalities of the form px + q > r or px + q < r, where p, q, and r are integers or decimals, to solve real-world or mathematical problems.   Represents the solution on a number line. | Writes a word problem that can be represented by a given equation.  Creates inequalities with rational coefficients of the form px + q > r or px + q < r to solve real-world or mathematical problems.   Interprets the solution in the context. |

### Geometry

| Alaska Standard | **Needs Support**  **A student at this level:** | **Approaching Proficient**  **A student at this level:** | **Proficient**  **A student at this level:** | **Advanced**  **A student at this level:** |
| --- | --- | --- | --- | --- |
| 7.G.1 | Determines whether one figure can be obtained from another one by rescaling by an integer factor. | Determines the figure that is obtained by rescaling a given one by an integer factor.  Solves for a missing value in similar figures when the scaling factor is given. | Draws a figure in any orientation by rescaling by an integer factor.  Calculates perimeter or area involving scale drawings. | Solves multi-step modeling problems involving scale drawing.   Compares drawings generated by using different scales.  Calculates perimeter or area in one- or two-step real-world or mathematical problems involving scale drawings. |
| 7.G.2 | Constructs a triangle using manipulatives  Determines whether a given set of side lengths, shown to scale, could form a triangle with a model. | Constructs a triangle with given conditions (on angles and/or sides) using a ruler and protractor.  Determines whether a given set of side lengths could form a triangle using the triangle inequality theorem. | Constructs a variety of polygons and circles with given conditions using tools.  Evaluates whether a given set of conditions determines a unique triangle, more than one triangle, or no triangle. | Constructs compound shapes with given conditions using tools. |
| 7.G.3 | Given a drawing of a figure on a plane, determines the shape of a cross section that results from slicing a given three-dimensional figure by a plane when the plane is parallel to the base of the solid. | Given a diagram, determines the shape of a cross section that results from slicing a given three-dimensional figure by a plane when the plane is perpendicular to the base of the solid. | Determines the shape of a cross section that results from slicing a given three-dimensional figure by a plane in any orientation. | Compares the shape of cross sections obtained from slicing one 3-dimensional figure by different planes or from slicing different 3-dimensional shapes.   Given a 2-dimensional shape, determines which 3-dimensional figures it could be a cross section of. |
| 7.G.4 | Identifies the parts of a circle named in the formulas for area and circumference. Identifies the formulas for the area and circumference of a circle and knows the meaning of the quantities in the formula. | Calculates the circumference of a circle when the radius is given, or vice versa.  Calculates the area of a circle when the radius is given. | Uses values of the circumference of a circle and the radius to find the area of the circle, or values of the area of a circle and the radius to find the circumference of the circle.  Solves equations backwards and forwards to find any unknown within the circle formulas using simple numbers. | Solves real-world problems using the formulas for the area and circumference of a circle when the formulas must be modified to include multiple circles or partial circles (sectors).   Solves problems where the values include positive rational numbers. |
| 7.G.5 | Distinguishes between supplementary, complementary, vertical, and adjacent angles in a figure. | Identifies an expression or equation that represents the relationship between angles in a figure using the properties of supplementary, complementary, vertical, and adjacent angles.   Creates and solves linear equations to determine an angle measure using diagrams or descriptions for complementary or supplementary angles. | Creates equations that represent the relationship between angles in a figure using the properties of supplementary, complementary, vertical, and adjacent angles.   Solves one- or two-step problems by creating and solving equations that represent the relationships between or among angles in a figure. | Solves multi-step problems by creating and solving equations that represent three or more relationships between or among angles in a figure. |
| 7.G.6 | Computes areas of triangles and quadrilaterals.  Identifies the nets of prisms, tetrahedrons, and pyramids.  (This should not include square pyramids or right rectangular prisms.) | Shows how a composite figure can be divided into simple figures.  Calculates the volume of a rectangular prism. | Calculates the area of polygons that show a triangular decomposition given necessary measurements in the illustration.  Calculates the volume of triangular prisms.   Calculates the surface area of pyramids.  Calculates the volume of a shape composed of rectangular prisms.  Solves two-step real-world problems involving area, volume, and surface area of two- and three-dimensional objects. | Solves multi-step real-world problems involving area, volume, and surface area of two- and three-dimensional objects. |

### Statistics and Probability

| Alaska Standard | **Needs Support**  **A student at this level:** | **Approaching Proficient**  **A student at this level:** | **Proficient**  **A student at this level:** | **Advanced**  **A student at this level:** |
| --- | --- | --- | --- | --- |
| 7.SP.1 | Recognizes the definitions for statistical vocabulary (population, samples, randomness).  Identifies the population and the sample of a study. | Identifies a sampling method that is most likely to produce a representative sample.  Identifies betweenrandom and non-random samples. | Determines when a sample is representative of a population.  Determines a sample is generated by random sampling. | Analyzes the effectiveness of a given sampling method. |
| 7.SP.2 | Recognizes the difference between prediction and certainty. | Identifies an appropriate inference based on given data from a random sample. | Makes an inference about a population with an unknown characteristic of interest.   Selects multiple samples to produce different estimates and predictions. | Develops inferences about a population from a given study.  Compares the estimates that can be made using different samples. |
| 7.SP.3 | Determines a measure of center of one distribution.   Compares the range of two distributions. | Compares the measure of center for two distributions when comparison can be made visually. | Compares the measure of center for two different distributions represented in a variety of ways.  Compares the mean absolute deviations of two more apparent distributions given they are positive. | Compares the measure of center for two distributions each represented in a different way.   Compares the variability of two distributions by expressing the range of each as a multiple of the mean absolute deviation from the median and/or the mean.  Compares the mean absolute deviations of two distributions. |
| 7.SP.4 | Draws inferences about one population using measure of center and range. | Draws inferences about two populations by comparing measures of center and mean absolute deviations. | Draws inferences about two populations with similar distributions by comparing measures of center and variability expressed as multiplier of the mean absolute deviation. | Compares the relative variability of data presented on box plots.  Supports inferences with arguments based on the variability of the two populations presented on box plots. |
| 7.SP.5 | When given as a decimal, fraction, or percent, compares events by their likelihood to happen. | Classifies probability values as representing likely, unlikely, certain, or impossible events. | Orders probability values from least to most likely to happen. | Explains why an event is more or less likely to occur than another event. |
| 7.SP.6 | Chooses between an expected or predicted value (approximation) and an exact value. | Identifies the probability of an event based on given concrete collected data.  Identifies the approximate number of times an event is expected to occur given the probability of an event and the total number of trials. | Predicts the probability of an event prior to collecting of the data.  Calculates an approximate number of times an event is expected to occur given the probability of an event and the total number of trials. | Predicts the number of objects in a set based on the outcome of multiple trials of an experiment (calculates the experimental probability and estimates the number of objects in a set).  Calculates an approximate number of times an event is expected to occur given the number of each object in the sample space and the total number of trials (calculates the theoretical probability of an event and predicts the relative frequency). |
| 7.SP.7 | Chooses a set of outcomes of an experiment, presented in a graph, consistent with a uniform probability model.  Chooses a probability model that is consistent with a distribution (uniform or not uniform).  Identifies uniform and not uniform distributions represented in data graphs. | Given the description of a uniform sample space identifies a probability model. Chooses a set of outcomes of an experiment consistent with a uniform probability model.  Given a frequency distribution identifies a probability model (uniform or not uniform). Chooses a set of outcomes of an experiment consistent with a non- uniform probability model.  Determines whether the observed frequencies are consistent with a given probability model. | Given the description of a uniform sample space develops a probability model. Determines whether the outcomes of an experiment are consistent with the model.  Given a frequency distribution develops a probability model (either uniform or not uniform). Determines whether the outcomes of an experiment are consistent with the model.  Determines whether the observed frequencies are consistent with a given probability model and explains the reason for eventual discrepancies. | Compares expected values from a uniform model to actual data and explains possible reasons for discrepancies.   Explains how a probability model can represent different sample spaces. |
| 7.SP.8 | Calculates the probability of a compound event that can be described using "or" by determining the number of successful outcomes divided by the total number of outcomes.  Calculates the probability of an event from a tree diagram with two levels.  Understands the results of a simulation made using interactive tools is different from the theoretical probability. | Calculates the probability of a compound event that can be described using "and" by determining the number of successful outcomes divided by the total number of outcomes.   Completes a tree diagram to show the possible outcomes of an experiment.  Uses simulations to compute frequencies of compound events and determine the experimental probability. | Calculates the probability of a compound event with replacement.  Calculates the probability of an event from a two-way frequency table.  Designs and uses a simulation to generate frequencies for compound events (e.g., The probability of a spinner with 3 sections and the probability of getting heads and tails while flipping a coin.). | Interprets the implications of an experiment being conducted with versus without replacement.  Identifies the entire sample space of an experiment.  Analyzes a real-world simulation used to calculate the experimental probability of an event. |

## Grade 8

### The Number System

| Alaska Standard | **Needs Support**  **A student at this level:** | **Approaching Proficient**  **A student at this level:** | **Proficient**  **A student at this level:** | **Advanced**  **A student at this level:** |
| --- | --- | --- | --- | --- |
| 8.NS.1 | Recognizes irrational numbers as a category distinct from rational numbers (not identifying actual numbers). | Classifies rational numbers and irrational numbers based on the decimal expansion. Knows that finite decimals can be written as fractions with a denominator power of 10, hence they are rational. | Classifies rational numbers and irrational numbers based on understanding that a number is rational because it can be expressed as a fraction whose denominator is non-zero. Knows that finite and repeating decimals can be written as fractions, hence they are rational.  Interprets irrational numbers as non-repeating and nonterminating decimals or as constants such as pi. | Analyzes the classification of real numbers.   Classifies between real numbers and non-real or imaginary numbers. |
| 8.NS.2 | Places the value of the square root of a number less than 100 that is not a perfect square between two whole numbers which represent perfect squares on the number line (e.g., The √3 is between 1 and 4.). | Approximates to the nearest whole number the value of the square root of a whole number less than 100 which is not a perfect square (e.g., The value of √3 is approximately 2.). | Compares or orders two or more rational or irrational numbers from least to greatest when the irrational number may need to be approximated up to one-tenth. | Refines decimal approximations of the value of the square root of an irrational number. |
| 8.NS.3 | *Locally Assessed* | *Locally Assessed* | *Locally Assessed* | *Locally Assessed* |

### Expressions and Equations

| Alaska Standard | **Needs Support**  **A student at this level:** | **Approaching Proficient**  **A student at this level:** | **Proficient**  **A student at this level:** | **Advanced**  **A student at this level:** |
| --- | --- | --- | --- | --- |
| 8.EE.1 | Rewrites a numerical expression with positive exponents using the product, quotient, and zero properties. | Rewrites a numerical expression with at least one negative exponent for which the result has a positive exponent using the product and power properties.  Rewrites a numerical expression that includes only positive exponents using the quotient property. | Rewrites a numerical expression using a single property using the product, quotient, and power properties.  Rewrites a numerical expression with negative exponents as a fraction with positive exponents. | Applies two or more properties of exponents in a single problem in order to create an equivalent numerical expression.  Applies the property of integer exponents within a real-world context. |
| 8.EE.2 | Identifies the positive solution to an equation of the form x2 = a, where a is a small perfect square. | Identifies the positive solution to an equation of the form x3 = a, where a is a small, positive perfect cube.  Uses square root and cube root symbols to represent the solutions to equations of the form x2 = a and x3 = a, where a is a whole number (e.g., if x is positive and if x2 = 57 then x = √57). | Determines both positive and negative solutions to equations of the form *x*2 = a, where a is a perfect square and of the form x3 = a, where a is a small, positive or negative perfect cube.  Uses square root and cube root symbols to represent the solutions to equations of the form x2 = a and x3 = a, where a is a positive rational number.  Orders square roots of perfect squares and cube roots of perfect cubes.  Identifies that the √2 is irrational. | Evaluates square roots of fractions of perfect squares or cube roots of fractions of perfect cubes. |
| 8.EE.3 | Rewrites very large or very small numbers in scientific notation. | Approximates how many times larger or smaller one number is than another when both numbers, with positive exponents, are given in scientific notation. | Approximates how many times larger or smaller one number is than another when the two numbers, with positive and/or negative exponents, are given in both standard and scientific notation. | Determines the approximate value of a number in scientific notation given a number in scientific notation and how many times larger or smaller the first number is. |
| 8.EE.4 | Determines the scientific notation with positive exponents of 10 from standard form and vice versa.  Chooses units of appropriate size for measurements of very large or very small quantities. | Determines the scientific notation with negative exponents of 10 from standard form and vice versa.  Calculates the sum of two numbers represented in scientific notation when the two numbers have the same power of 10 and the sum of the first factor in each number is less than 10 (i.e., the power does not have to be adjusted after the initial addition).   Calculates the product of two numbers represented in scientific notation when the product of the first factor in each number is less than 10 (i.e., the power does not have to be adjusted after the initial multiplication). | Calculates the sum of two numbers represented in scientific notation when the two numbers have different powers of 10 or the sum of the first factor in each number is greater than 10 (i.e., the power has to be adjusted before or after the initial addition).  Calculates the product of two numbers represented in scientific notation when the product of the first factor in each number is greater than 10 (i.e., the power has to be adjusted after the initial multiplication).  Determines the standard form of a number returned by a calculator in scientific notation.   Calculates the difference and quotient of two numbers represented in scientific notation when the difference and quotient of the first factor in each number is greater than 10 (i.e., the power has to be adjusted after the initial multiplication). | Calculates the sum, difference, product, and quotient of two or more numbers represented in scientific notation where the first factor is less than zero. |
| 8.EE.5 | Identifies a graph to represent linear relationships described by a slope-intercept equation. Slopes are whole numbers. | Creates a graph to represent linear relationships described by a slope-intercept equation. Slopes are whole numbers.  Compares the slope of two proportional relationships described in a different form (equation and graph). | Creates a graph to represent linear relationships described verbally, by a slope-intercept equation, or by a table of values, not just whole number slopes.   Compares the slope of two proportional relationships described in different forms (verbal, equation, table, graph). | Creates a graph to represent linear relationships in real-world situations.  Compares the slope and *y*-intercept of two linear relationships described in different forms (verbal, equation, table, graph). |
| 8.EE.6 | Identifies the equation of a line that passes through the origin when the graph of the line is shown. | Understands that the slope can be calculated at different places along the line.   Identifies the equation of a line that does not pass through the origin when the graph of the line is shown. | Uses similar triangles to explain why the slope is the same at different places along the same line.   Determines the equation of a line that does not pass through the origin when the graph of the line is shown (when *m* is a positive whole number or fraction). | Determine the equation of a line that does not pass through the origin when the graph of the line is shown (when *m* is a rational number OR when *b* cannot be exactly determined by the graph). |
| 8.EE.7 | Given a model, identifies solutions to equations that have one non-zero integer solution. | Solves and classifies equations, with integer coefficients, by the number of solutions—one solution, no solutions, or infinitely many solutions.  Solves linear equations that require distribution and/or combining like terms on one or both sides of the equal sign. Equations have integer coefficients. | Solves and classifies equations, with or without integer coefficients, by the number of solutions—one solution, no solutions, or infinitely many solutions.  Solves linear equations that require distribution and/or combining like terms on one or both sides of the equal sign. | Explains when an equation has 0, 1, or infinitely many solutions. |
| 8.EE.8 | Identifies the solution of a system of two linear equations given the graphs of both lines in the coordinate plane. | Given a graph, identifies the solution to the system of two linear equations with one solution in context of the problem. | Understands that the solution to a system of two linear equations is the point of intersection of the graphs of the two equations. Hence determines when a system has one solution, no solution, or infinitely many solutions based on interpreting the graph.  Solves a system of two linear equations by graphing and estimates the point of intersection. Solves a system of two linear equations by inspection when the equations must not be manipulated in order to be solved.  Solves a word problem that leads to a system of two linear equations. | Uses the slopes and y-intercepts to classify a system of two linear equations by the number of solutions: one solution, no solutions, or infinitely many solutions. Solves a system of two linear equations in which one or both equations must be manipulated in order to solve by substitution.Solves a real-world problem that leads to a system of two linear equations. |

### Functions

| Alaska Standard | **Needs Support**  **A student at this level:** | **Approaching Proficient**  **A student at this level:** | **Proficient**  **A student at this level:** | **Advanced**  **A student at this level:** |
| --- | --- | --- | --- | --- |
| 8.F.1 | Completes a table of input-output values given an input-output rule with whole numbers.  Determines whether a relationship given as a table of input-output values represents a function. | Builds an input-output table given an input-output rule with a direct correlation (e.g., a table with *y* = *ax* as a solution.).  Determines whether a relationship given as a graph, input-output map, or list of coordinates represents a function. | Builds an input-output table given a function represented by an equation.  Explains why a relation is or is not a function.  Determines the output given the input and/or the input given the output for a function represented as an equation, and plots the resulting ordered pairs on the coordinate plane. | Determines how a pair of values can be changed or removed so that a given relation will be a function. |
| 8.F.2 | Compares the *y*-intercepts of two linear functions when the *y*-intercepts can be directly retrieved by the representations used. | Compares the rates of change or slopes of two linear functions that both have a positive slope and each is represented in a different way.  Compares visual and simple algebraic equations (e.g., scatter plots and equations in slope-intercept form). | Compares more than one attribute between two linear functions each represented in a different way.  Compares rates of change or intercepts across more than two linear functions each represented in a different way. | Creates a linear function that satisfies a given comparison to another linear function. |
| 8.F.3 | Identifies graphs that represent linear functions.  Identifies tables that represent linear functions when all the points listed on the table are equally spaced. | Identifies equations that represent linear or nonlinear functions when all linear equations are given in slope-intercept form. | Identifies equations that represent linear or nonlinear functions, including cases when linear equations are given in standard form.  Explains why a linear equation in slope-intercept form has a constant rate of change and has a graph that is a straight line. | Interprets multiple equations or sets of ordered pairs that represent linear or nonlinear functions when equations are in any form.  Explains why a linear equation in any form has a constant rate of change and has a graph that is a straight line. |
| 8.F.4 | Identifies the linear equation that represents a relationship given by a table of values or a graph.  Identifies the graph of the linear equation that passes through a given pair of points (when two (*x, y*) values are given).  Identifies the rate of change and initial value from the graph of a function.  Matches a function to a graph or table. | Determines the linear equation that represents a relationship given by a table of values or a graph.  Identifies a linear equation that passes through a given pair of points (when two (x, y) values are given).  Identifies the rate of change and initial value of a function from a graph of a function and/or that represents a situation.  Identifies which graph and table have the greatest/least slope or initial value. | Determines the linear equation that represents a relationship given by either a verbal description, a table of values, or a graph.  Determines a linear equation that passes through a given pair of points (when two (*x, y*) values are given).  Interprets the rate of change and initial value of a function in the context it represents.   Describes how the rate of change and initial value of a function affects its graph and table of values. | Creates an equation to represent a real-world scenario for which the initial value and rate of change are not described explicitly.   Identifies the initial value and calculates the rate of change, including the appropriate units, of a relationship that represents a real-world scenario and is given as a table of values. |
| 8.F.5 | Identifies the graph that satisfies a description (e.g., Identifies graphs or sections of a graph that are increasing, decreasing, or constant).  Matches real-world situations to the graphs that represent them. | Identifies the graph that represents a real-world situation (e.g., Identifies graphs, or sections of a graph, that are described as both increasing or decreasing and linear or nonlinear).  Identifies a possible real-world situation that is represented by a graph. | Sketches a graph that represents a real-world situation.  Creates a possible real-world situation that is represented by a linear graph.  Creates a graph that exhibits the features of a function that has been described verbally. | Creates a possible real-world situation that is represented by a graph (piecewise linear function). |

### Geometry

| Alaska Standard | **Needs Support**  **A student at this level:** | **Approaching Proficient**  **A student at this level:** | **Proficient**  **A student at this level:** | **Advanced**  **A student at this level:** |
| --- | --- | --- | --- | --- |
| 8.G.1 | Identifies pairs of corresponding sides and angles in a preimage and its image after a rotation, reflection, or translation. | Identifies which figures could or could not be the image of a given shape after a rotation, reflection, or translation based on side lengths and angle measures. | Explains that under a rotation, reflection, or translation, the side lengths and angle measures of the image are always the same as the preimage. | Explains that under a rotation, reflection, or translation, parallel lines in the preimage are always parallel in the image.  Analyze properties of rotations, reflections, and translations to verify that lines are taken to lines or that line segments are taken to line segments of the same length. |
| 8.G.2 | Demonstrates, using manipulatives (e.g., transparencies), that two shapes are congruent by providing a rotation, translation, or a reflection that maps one into the other.  Determines whether a rotation, a translation, or a reflection in the coordinate plane can map a given shape into a congruent one (using a visual aid or manipulative). | Describes how two shapes on the coordinate plane are congruent by providing a translation or reflection that maps one into the other.  Identifies a sequence of rotations, translations, and reflections in the coordinate plane that map a given shape into a congruent one. | Shows that two shapes on the coordinate plane are congruent by providing a sequence of rotations (90 or 180 degrees centered in the origin), translations, and reflections that maps one into the other.  Determines a sequence of rotations (90 or 180 degrees centered in the origin), translations, and reflections in the coordinate plane that map a given shape into a congruent one. | Shows that two shapes on the coordinate plane are congruent by providing a sequence of rotations (30, 60, 120 degrees centered in the origin or 90, 180 degrees centered at any point), translations, and reflections that maps one into the other.  Determines a sequence of rotations (30, 60, 120 degrees centered in the origin or 90, 180 degrees centered at any point), translations, and reflections in the coordinate plane that map a given shape into a congruent one. |
| 8.G.3 | Matches a segment to the segment that generated it through dilation, rotation, translation, or reflection. | Identifies which triangles or line segments can be the result of mapping another triangle or line segment through dilations, rotation, translation, or reflection.   Recognizes that size/shape does not change in translations, reflections, and rotations. Recognizes that orientation changes with rotations. | Using coordinates, describes how a triangle or line segment can be the result of mapping another triangle or line segment through rotation, translation, or reflection. | Using coordinates, creates a polygon from a given polygon using dilation, rotation, translation, or reflection. |
| 8.G.4 | Demonstrates, using manipulatives (e.g., geoboards), that two shapes are similar by providing a dilation, rotation, translation, or a reflection that maps one into the other.  Determine whether a dilation, rotation, translation, or reflection of the coordinate plane can map a given shape into a similar one (using a visual aid or manipulative). | Recognizes that a two-dimensional figure is similar to another if the second can be obtained from the first by a single transformation including a rotation, reflection, translation, or dilation. | Shows that two shapes on the coordinate plane are similar by providing a sequence of dilations, rotations (90 or 180 degrees centered at the origin), translations, and reflections that maps one into the other.  Determines a sequence of dilations, rotations (90 or 180 degrees centered at the origin), translations, and reflections of the coordinate plane that map a given shape into a similar one. | Shows that two shapes on the coordinate plane are similar by providing a sequence of dilations, rotations (90 or 180 degrees centered at any point), translations, and reflections that maps one into the other.  Determines a sequence of dilations, rotations (90 or 180 degrees centered at any point), translations, and reflections of the coordinate plane that map a given shape into a similar one. |
| 8.G.5 | Given a diagram, finds the measure of an exterior angle of a triangle given the measure of the two opposite angles. | Given a diagram, solves problems involving angle measures when two similar triangles have a coinciding angle and the noncoincident sides are parallel.  Given a diagram, explains the relationship between the measure of an exterior angle in a triangle and the measures of the two opposite angles.  Given a diagram, identifies pairs of congruent angles when two parallel lines are cut by a transversal. | Solves problems about angle relationships when two parallel lines are cut by a transversal.   Explains a proof of the triangle sum theorem. | Solves problems about angle relationships when two parallel lines are cut by more than one transversal. Finds multiple values given only a few.  Explains angle relationships for similar or congruent triangles. |
| 8.G.6 | Recalls the Pythagorean theorem without having to apply it or explain it. | Identifies situations in which the Pythagorean theorem can be used. | Explains the application of the Pythagorean theorem.  Understands the Pythagorean theorem can be used to find the length of a missing side length of a right triangle. | Explains the converse of the Pythagorean theorem and determines whether three given side lengths could form a right triangle. |
| 8.G.7 | Uses the Pythagorean theorem to calculate the hypothenuse in a right triangle given a figure with the lengths of the two legs. | Uses the Pythagorean theorem to calculate a side length in a right triangle given a figure with the other two side lengths. | Uses the Pythagorean theorem to calculate a side length in a right triangle when a figure is not given.  Applies the Pythagorean theorem to calculate perimeter or area in the context of a real-world problem. | Applies the Pythagorean theorem to solve multi-step real-world or mathematical problems. |
| 8.G.8 | Given a set of three points that create a simple right triangle on a coordinate plane, estimates the length of the hypothenuse using the side lengths. | Calculates the distance between two points of a right triangle on a coordinate plane in the first quadrant. | Uses the Pythagorean theorem to calculate the distance between two points in the coordinate plane, calculating the differences between *x*-coordinates and *y*-coordinates. | Uses the Pythagorean theorem to determine the perimeter and area of shapes in the coordinate plane to solve mathematical or real-world problems.   Uses the Pythagorean theorem to determine the side length of a triangle with legs graphed on the coordinate plane where only the hypotenuse can be parallel to either the x- or y-axis. |
| 8.G.9 | Given formulas and labeled diagrams, calculates the volume of a cylinder given the area of the base and the height.   Matches an applicable formula to the corresponding figure in order to calculate the volume with the area of the base provided. | Calculates the volume of a cylinder, cone, or sphere given a figure with the radius or diameter and the height labeled. | Calculates the volume of a cylinder, cone, or sphere given a description of the figure.   Solves real-world problems that require finding the volume of a cylinder, cone, or sphere. | Compares the volumes of spheres, cylinders, and cones in a real-world or mathematical context. |

### Statistics and Probability

| Alaska Standard | **Needs Support**  **A student at this level:** | **Approaching Proficient**  **A student at this level:** | **Proficient**  **A student at this level:** | **Advanced**  **A student at this level:** |
| --- | --- | --- | --- | --- |
| 8.SP.1 | Identifies the correlation of data in a given scatter plot as positive.  Identifies the pattern of data points in a scatter plot as generally linear or nonlinear. | Identifies positive and negative correlations of data in a given table or scatter plot.  Describes patterns such as outliers, positive or negative association, linear association, and nonlinear association. | Interprets scatter plots for bivariate measurement data to investigate patterns of association between two quantities.  Determines whether the relationship between bivariate data is approximately linear or nonlinear by examination of a scatter plot. | Interprets clusters, outliers, and patterns in the context where the data is taken from.  Analyzes patterns of association between two quantities and uses data to make and justify predictions. |
| 8.SP.2 | Identifies a graph that represents a line of best fit for data in a scatter plot. | Explains why one line is a better fit than another to data in a scatter plot. | Identifies an equation for a line of best fit for given data in a scatter plot.  Uses a linear model to predict an expected value. | Determines the equation for a line of best fit for given data in a scatter plot. |
| 8.SP.3 | Interprets the meaning of the slope of a linear model that represents bivariate quantitative data. | Interprets the meaning of the intercept of a linear model that represents bivariate quantitative data. | Interprets the meaning of the correlation coefficient for a linear model in context. | Analyzes the equation of the line of best fit to make and justify predictions. |
| 8.SP.4 | Completes missing values in a fully determinable two-way frequency table. | Calculates relative frequency from a two-way frequency table.  Calculates the frequency of a certain subset of bivariate categorical data given a description of the data set. | Interprets data represented in a two-way frequency table.  Calculates values for one category of data given values for another category and the assumption that there is no association between the variables. | Determines whether an association exists between two variables given a two-way frequency table or a description of the data set. |