

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

**Far Below Proficient** - Student may partially meet the standards but has significant gaps in knowledge and skills of current grade-level content.

**Below Proficient** - Student partially meets the standards and may have gaps in knowledge and skills but is capable of most grade-level content.

**Proficient** - Student meets the standards at a proficient level, demonstrating knowledge and skills of current grade-level content.

**Advanced** - Student meets the standards at an advanced level, demonstrating knowledge and skills of complex grade-level content.

## Grade 6

### Ratios and Proportional Relationships

| Alaska Standard | **Far Below Proficient** | **Below Proficient** | **Proficient** | **Advanced** |
| --- | --- | --- | --- | --- |
| 6.RP.1 – 6.RP.3 | A student at this level understands ratio concepts as part-to-part and numerator/denominator relationships.  A student at this level identifies equivalent ratios. | A student at this level understands ratio concepts as part-to-part, dividend/divisor relationships, equivalent fractions, and percentages. | A student at this level understands ratio concepts as numerical comparisons using division, equivalence of rates, unit rates, percentages, and measurement conversions.  A student at this level uses ratio reasoning to solve problems. | A student at this level understands ratio concepts as numerical and symbolic comparisons, equivalence and inequality of rates, unit rates, percentages and fractions of percentages, and measurement conversions. |

### The Number System

| Alaska Standard | **Far Below Proficient** | **Below Proficient** | **Proficient** | **Advanced** |
| --- | --- | --- | --- | --- |
| 6.NS.1 – 6.NS.8 | A student at this level identifies common multiples.  A student at this level orders positive integers on a number line.  A student at this level identifies integer coordinate pairs in Quadrant I. | A student at this level solves problems involving division of fractions.  A student at this level identifies common factors and common multiples.  A student at this level adds, subtracts, and multiplies whole numbers.  A student at this level orders positive and negative integers on a number line.  A student at this level identifies the absolute values of positive and negative integers.  A student at this level identifies integer points in all four quadrants. | A student at this level applies understanding of multiplication and division to divide decimals by decimals and fractions by fractions.  A student at this level uses visual fraction models to represent and divide fractions by fractions.  A student at this level finds and applies least common multiples and greatest common factors.  A student at this level computes fluently with multi-digit whole numbers and multi-digit decimals.  A student at this level orders rational numbers.  A student at this level applies previous understanding of numbers to the system of rational numbers.  A student at this level represents absolute values of rational numbers.  A student at this level solves problems involving plotting integer points in all four quadrants.  A student at this level translates among multiple representations of rational numbers with denominators reducible to 2, 3, 4, 5, 8, 10, and 100. | A student at this level interprets and applies understanding of multiplication and division to divide decimals by decimals and fractions by fractions.  A student at this level applies previous understanding of numbers to the system of rational numbers in real-world contexts. |

### Expressions and Equations

| Alaska Standard | **Far Below Proficient** | **Below Proficient** | **Proficient** | **Advanced** |
| --- | --- | --- | --- | --- |
| 6.EE.1 – 6.EE.9 | A student at this level reads and writes expressions with variables, including expressions described as verbal phrases.  A student at this level uses trial and error to test single-step one-variable equations. | A student at this level reads, writes, and evaluates expressions with variables, including expressions described as verbal phrases.  A student at this level writes equivalent expressions.  A student at this level uses trial and error to test inequalities.  A student at this level solve single-step one-variable equations. | A student at this level reads, writes, and evaluates expressions with variables and whole-number exponents, including expressions described as verbal phrases.  A student at this level writes inequalities, given constraints.  A student at this level applies properties of operations to write equivalent expressions.  A student at this level represents and models relationships between dependent and independent variables. | A student at this level reads, writes, evaluates, and compares expressions with variables and whole-number exponents.  A student at this level understands and interprets expressions, equations, and inequalities in real-world contexts.  A student at this level interprets and analyzes relationships between dependent and independent variables in real-world contexts and translates among graphs, tables, equations, and inequalities. |

### Geometry

| Alaska Standard | **Far Below Proficient** | **Below Proficient** | **Proficient** | **Advanced** |
| --- | --- | --- | --- | --- |
| 6.G.1 – 6.G.5 | A student at this level solves word problems involving the areas of rectangles and involving the surface areas and volumes of cubes. | A student at this level solves word problems involving the areas of rectangles and triangles and involving the surface areas and volumes of right rectangular prisms.  A student at this level identifies three-dimensional objects represented as nets composed of rectangles and triangles.  A student at this level uses previous understanding of packing unit cubes to understand the formula for the volume of a rectangular prism. | A student at this level solves word problems involving the areas of polygons and involving the surface areas and volumes of three-dimensional objects with rectangular and triangular faces.  A student at this level represents three-dimensional figures by using nets composed of rectangles and triangles.  A student at this level finds the lengths of polygonal sides drawn in a coordinate plane if the vertices have the same *x-*coordinates or same *y-*coordinates. | A student at this level solves multistep real-world word problems involving the areas of polygons and involving the surface areas and volumes of three-dimensional objects.  A student at this level extends understanding of the volume formula of a rectangular prism with fractional edge lengths. |

### Statistic and Probability

| Alaska Standard | **Far Below Proficient** | **Below Proficient** | **Proficient** | **Advanced** |
| --- | --- | --- | --- | --- |
| 6.SP.1 – 6.SP.7 | A student at this level describes the differences between uniform and variable data. | A student at this level finds the mean, median, mode, range, maximum, and minimum of a data set. | A student at this level describes the nature and distribution of data in terms of shape, center, spread, and number of observations.  A student at this level finds the first quartile, third quartile, and interquartile range of a data set.  A student at this level understands the relationships between measures of center and measures of spread.  A student at this level displays data in line plots, histograms, and box plots.  A student at this level recognizes or identifies statistical and non-statistical questions. | A student at this level determines and explains the most appropriate measure of center and measure of variability, based on the shape of the data and the context of the problem. |

## Grade 7

### Ratios and Proportional Relationships

| Alaska Standard | **Far Below Proficient** | **Below Proficient** | **Proficient** | **Advanced** |
| --- | --- | --- | --- | --- |
| 7.RP.1 – 7.RP.3 | A student at this level identifies proportional relationships from relationships between equivalent ratios and percentages. | A student at this level determines proportional relationships by examining tables and graphs.  A student at this level computes unit rates. | A student at this level analyzes proportional relationships and uses them to solve problems by computing and comparing unit rates and recognizing equivalent ratios.  A student at this level explains the constant of proportionality in context and uses it to write an equation.  A student at this level solves problems with percentages.  A student at this level identifies specified points on the graph of a proportional relationship and interprets their meaning. | A student at this level analyzes and interprets numerical and symbolic proportional relationships and uses them to solve complex multistep problems by comparing rates and ratios, determining and applying rates, and determining rates from graphs.  A student at this level identifies on the graph of a proportional relationship the points (0, 0) and (1, *r*), where *r* is the unit rate. |

### The Number System

| Alaska Standard | **Far Below Proficient** | **Below Proficient** | **Proficient** | **Advanced** |
| --- | --- | --- | --- | --- |
| 7.NS.1 – 7.NS.3 | A student at this level uses addition, subtraction, multiplication, and division to solve single-step word problems involving positive fractions and decimals. | A student at this level adds and subtracts rational numbers.  A student at this level adds, subtracts, multiplies, and divides integers.  A student at this level converts a fraction to a decimal typically by using long division. | A student at this level applies understanding of fractions and decimals to fluently use all four arithmetic operations with rational numbers.  A student at this level represents addition and subtraction of rational numbers on number lines.  A student at this level recognizes additive inverses, rules for signs, absolute values, and properties of operations and uses them to solve real-world problems with rational numbers. | A student at this level applies understanding of all four operations with rational numbers to solve multistep real-world problems, using fractions and decimals interchangeably, including translating among multiple representations of rational numbers. |

### Expressions and Equations

| Alaska Standard | **Far Below Proficient** | **Below Proficient** | **Proficient** | **Advanced** |
| --- | --- | --- | --- | --- |
| 7.EE.1 – 7.EE.4 | A student at this level uses one or more properties of operations to combine like terms in an expression.  A student at this level writes single-step equations to solve problems. | A student at this level uses one property of operations, such as the distributive property, to generate equivalent linear expressions.  A student at this level solves two-step problems with rational numbers. | A student at this level uses properties of operations to generate equivalent expressions and to solve multistep problems with rational coefficients.  A student at this level uses variables to represent quantities in multistep problems.  A student at this level solves multistep problems with equations and inequalities and assesses the reasonableness of answers. | A student at this level uses multiple properties of operations to strategize and generate equivalent expressions and to solve complex multistep problems with rational coefficients.  A student at this level uses variables to represent quantities in complex multistep word problems with equations and inequalities requiring multistep solutions and interprets solutions in context, including graphs. |

### Geometry

| Alaska Standard | **Far Below Proficient** | **Below Proficient** | **Proficient** | **Advanced** |
| --- | --- | --- | --- | --- |
| 7.G.1 – 7.G.6 | A student at this level identifies the vertices, edges, and faces of a rectangular prism.  A student at this level draws and describes specific polygons with labeled vertices and identifies their sides and angles.  A student at this level identifies the center, radius, diameter, and circumference of a circle. | A student at this level describes the vertices, edges, and faces of a rectangular prism and describes its surface area as the sum of the areas of its six rectangular faces.  A student at this level constructs triangles by hand and with the appropriate tools and technology.  A student at this level uses formulas to find the circumference of a circle. | A student at this level describes geometric figures, including two-dimensional cross sections, and the relationships between them.  A student at this level decomposes prisms into rectangles and triangles.  A student at this level constructs triangles and special quadrilaterals by hand and with the appropriate tools and technology and describes the relationship between their sides and angles.  A student at this level writes and solves mathematical problems involving angle measures, including intersecting lines and complementary, supplementary, vertical, and adjacent angles.  A student at this level uses formulas to find the area of a circle and to find surface area and volume of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.  A student at this level identifies the scale factor of a model and solves problems with scale drawings by using proportional reasoning. | A student at this level creates geometric figures and analyzes and compares their general properties.  A student at this level solves complex multistep problems involving the angle measures, areas, surface areas, and volumes of right rectangular prisms, right triangular prisms, and shapes composed of those prisms.  A student at this level interprets scale factors and translates between scale models and drawings and actual measurements. |

### Statistics and Probability

| Alaska Standard | **Far Below Proficient** | **Below Proficient** | **Proficient** | **Advanced** |
| --- | --- | --- | --- | --- |
| 7.SP.1 – 7.SP.8 | A student at this level distinguishes between populations and samples.  A student at this level understands probability as quantifiable between 0 and 1.  A student at this level understands samples can be used to gain information about a population.  A student at this level distinguishes between random and nonrandom samples. | A student at this level uses random sampling and numerical measures of center and variability to describe a population.  A student at this level calculates simple probability. | A student at this level uses random sampling and numerical measures to draw comparative inferences about two populations.  A student at this level develops, uses, and evaluates probability models.  A student at this level compares theoretical and experimental probabilities.  A student at this level creates sample spaces to represent outcomes.  A student at this level finds probabilities of compound events, including simulations. | A student at this level draws interpretive comparative inferences about multiple populations.  A student at this level develops, uses, and evaluates multiple probability models.  A student at this level distinguishes between uniform and non-uniform probability models and compares theoretical and experimental probabilities of compound events. |

## Grade 8

### The Number System

| Alaska Standard | **Far Below Proficient** | **Below Proficient** | **Proficient** | **Advanced** |
| --- | --- | --- | --- | --- |
| 8.NS.1 – 8.NS.3 | A student at this level recognizes irrational numbers as a category distinct from rational numbers. | A student at this level recognizes examples of irrational numbers as square roots of non-perfect squares or cube roots of non-perfect cubes.  A student at this level recognizes prime factorizations. | A student at this level interprets irrational numbers as non-repeating and nonterminating decimals or as constants such as π.  A student at this level writes prime factorizations.  A student at this level writes, orders, or plots approximations of irrational numbers between two whole numbers. | A student at this level determines fractional equivalence of repeating decimals. |

### Expressions and Equations

| Alaska Standard | **Far Below Proficient** | **Below Proficient** | **Proficient** | **Advanced** |
| --- | --- | --- | --- | --- |
| 8.EE.1 – 8.EE.8 | A student at this level understands exponents as representing repeated multiplication.  A student at this level finds the slope of a line using a graph.  A student at this level represents whole-number multiples of ten in scientific notation. | A student at this level rewrites expressions with negative exponents as fractions with positive exponents.  A student at this level calculates the value of a positive base with a negative integer exponent.  A student at this level expresses quantities in scientific notation.  A student at this level understands the meaning of equations with two variables. | A student at this level understands and applies the properties of integer exponents and scientific notation.  A student at this level understands and applies the connections between proportional relationships, the slope of a graph, and triangle similarity.  A student at this level solves linear equations and systems of linear equations, including the intersection of the graphs of a system.  A student at this level solves word problems with two linear equations in two variables. | A student at this level understands, applies, and interprets the properties of integer exponents, scientific notation, and operations in scientific notation.  A student at this level understands, applies, and interprets the graphs of proportional relationships in multiple ways and the relationship between similar triangles and the slope of a graph.  A student at this level interprets, analyzes, graphs, and solves linear equations in two variables.  A student at this level solves complex multistep word problems involving systems of linear equations.  A student at this level identifies systems with no solutions, one solution, and infinitely many solutions. |

### Functions

| Alaska Standard | **Far Below Proficient** | **Below Proficient** | **Proficient** | **Advanced** |
| --- | --- | --- | --- | --- |
| 8.F.1 – 8.F.5 | A student at this level identifies relations that are functions and relations that are not. | A student at this level identifies and defines linear functions.  A student at this level distinguishes between linear and nonlinear functions.  A student at this level identifies the slope and *y*-intercept of a linear function. | A student at this level defines, evaluates, compares, and uses functions that model linear relationships between quantities in multiple representations.  A student at this level uses functions to model linear relationships between two quantities in slope-intercept form. | A student at this level defines, evaluates, compares, analyzes, and uses functions that model nonlinear relationships between quantities in multiple representations.  A student at this level identifies characteristics of different types of functions. |

### Geometry

| Alaska Standard | **Far Below Proficient** | **Below Proficient** | **Proficient** | **Advanced** |
| --- | --- | --- | --- | --- |
| 8.G.1 – 8.G.9 | A student at this level recognizes congruence and similarity and distinguishes between them using physical models.  A student at this level finds the hypotenuse of a right triangle whose sides are Pythagorean triples.  A student at this level recognizes single transformations. | A student at this level recognizes and identifies congruence and similarity via multiple transformations.  A student at this level applies the Pythagorean theorem in two dimensions.  A student at this level identifies supplementary angles. | A student at this level understands and analyzes congruence and similarity using physical models, transparencies, or geometry software.  A student at this level understands and applies the Pythagorean theorem and its converse in two dimensions.  A student at this level understands, analyzes, and justifies congruence and similarity through translations, reflections, rotations, and dilations.  A student at this level applies the formulas of volume of a cone, volume of a cylinder, volume of a sphere, and surface area of a cylinder.  A student at this level understands and applies properties of triangles and of interior and exterior angles. | A student at this level interprets and applies the Pythagorean theorem in three dimensions.  A student at this level justifies or completes a proof of the Pythagorean theorem.  A student at this level applies the formulas of volume of a prism, volume of a cone, volume of a cylinder, and volume of a sphere to real-world problems. |

### Statistics and Probability

| Alaska Standard | **Far Below Proficient** | **Below Proficient** | **Proficient** | **Advanced** |
| --- | --- | --- | --- | --- |
| 8.SP.1 – 8.SP.4 | A student at this level recognizes association in bivariate data. | A student at this level recognizes and describes association in bivariate data.  A student at this level identifies the line of best fit for a linear association. | A student at this level constructs and describes bivariate data and recognizes, describes, and investigates patterns of association in bivariate data.  A student at this level interprets the slope and *y*-intercept of the line of best fit.  A student at this level identifies and represents volume identifies patterns of association between two categorical variables. | A student at this level describes, analyzes, and investigates patterns of association in bivariate categorical data in a two-way table. |