

Achievement Level Descriptors (ALDs)

Mathematics

Grade 9

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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.

## Number and Quantity—The Real Number System

| Alaska Standard | **Far Below Proficient** | **Below Proficient** | **Proficient** | **Advanced** |
| --- | --- | --- | --- | --- |
| N.RN.1 – N.RN.3 | A student at this level identifies rational and irrational numbers. | A student at this level determines whether the sums or products of rational and irrational numbers are rational or irrational.A student at this level translates between simple expressions written with radicals and rational exponents. | A student at this level determines whether the sums and products of rational and irrational numbers are rational or irrational.A student at this level uses the properties of exponents to rewrite expressions containing radicals and rational exponents. | A student at this level interprets and understands the properties of rational and irrational numbers. |

## Number and Quantity - Quantities

| Alaska Standard | **Far Below Proficient** | **Below Proficient** | **Proficient** | **Advanced** |
| --- | --- | --- | --- | --- |
| N.Q.1 – N.Q.3 | A student at this level uses units consistently in formulas. | A student at this level chooses a unit scale appropriate to a graphical display. | A student at this level chooses the quantities, units, and level of accuracy appropriate for a problem situation. | A student at this level explains how units can be used to guide the solution to multistep problems. |

## Algebra – Seeing Structure in Expressions

| Alaska Standard | **Far Below Proficient** | **Below Proficient** | **Proficient** | **Advanced** |
| --- | --- | --- | --- | --- |
| A.SSE.1 – A.SSE.3 | A student at this level identifies terms, factors, variables, and coefficients in a linear expression.A student at this level uses the distributive property to factor common factors out of a linear expression. | A student at this level identifies the coefficient as a constant rate of change in a linear expression.A student at this level identifies the equivalent forms of a given linear, quadratic, or exponential expression based on the structure of the expression. | A student at this level identifies how a given problem can be written as a complicated expression.A student at this level determines equivalent forms of a given quadratic or exponential expression to reveal a property of the expression. | A student at this level explains how portions of a complicated expression relate to a given context.A student at this level interprets a complex quadratic or exponential expression by viewing one or more parts as a single entity. |

## Algebra – Arithmetic with Polynomials and Rational Expressions

| Alaska Standard | **Far Below Proficient** | **Below Proficient** | **Proficient** | **Advanced** |
| --- | --- | --- | --- | --- |
| A.APR1 – A.APR.3 | A student at this level identifies a polynomial.A student at this level identifies the zeros of a quadratic equation given a graph of the quadratic equation. | A student at this level adds, subtracts, or multiplies polynomials.A student at this level sketches a graph of a quadratic equation given the zeros of the quadratic equation. | A student at this level adds, subtracts, and multiplies polynomials.A student at this level determines the zeros of a quadratic equation and uses the zeros to sketch a graph of the quadratic equation. | A student at this level understands that polynomials are closed under addition, subtraction, and multiplication.A student at this level interprets the relationships among factors, graphs, and zeros of quadratic equations. |

## Algebra – Creating Equations and Inequalities

| Alaska Standard | **Far Below Proficient** | **Below Proficient** | **Proficient** | **Advanced** |
| --- | --- | --- | --- | --- |
| A.CED.1 – A.CED.4 | A student at this level solves problems by using linear equations in one variable.A student at this level identifies the graphs of equations.A student at this level identifies linear equations that describe a given problem situation. | A student at this level solves problems by using linear equations or inequalities in one variable.A student at this level graphs equations in two variables.A student at this level identifies equations or inequalities that describe a given problem situation.A student at this level calculates a rewritten formula for specified values of the variables. | A student at this level solves problems by using linear, quadratic, or exponential equations or inequalities in one variable.A student at this level writes and graphs equations that represent relationships between two quantities.A student at this level writes or identifies a system of equations or inequalities to describe a given problem situation.A student at this level identifies the rewritten form of a formula to highlight a variable of interest. | A student at this level interprets solutions to linear, quadratic, or exponential equations or inequalities based on the context of the problem.A student at this level interprets graphs and equations in two-variables in a problem-solving situation.A student at this level interprets problem solutions as viable or nonviable in a modeling context.A student at this level determines from a context a variable of interest and rewrites a linear formula to solve the problem. |

## Algebra – Reasoning with Equations and Inequalities

| Alaska Standard | **Far Below Proficient** | **Below Proficient** | **Proficient** | **Advanced** |
| --- | --- | --- | --- | --- |
| A.REI.1 – A.REI.12 | A student at this level solves linear equations in one variable.A student at this level adds and subtracts linear expressions.A student at this level solves the quadratic equation *x*2 = *c* by inspection. | A student at this level solves a system of two linear equations graphically.A student at this level solves linear inequalities in one variable.A student at this level graphs a linear inequality.A student at this level identifies the solution of a system of one linear equation and one quadratic equation graphically.A student at this level solves a quadratic equation by inspection, by factoring, or by using the quadratic formula. | A student at this level solves a system of two linear equations algebraically.A student at this level solves a system of two linear inequalities graphically.A student at this level understands and explains how graphs relate to the solution to a linear equation or inequality.A student at this level solves a system of one linear equation and one quadratic equation graphically.A student at this level solves a quadratic equation by inspection, by factoring, and by using the quadratic formula. | A student at this level justifies solutions steps in solving an equation by referencing mathematical properties.A student at this level understands and explains how graphs relate to the solution to a linear equation or inequality.A student at this level understands and explains how graphs relate to the solution to a system of linear equations and inequalities.A student at this level solves a system of one linear equation and one quadratic equation algebraically.A student at this level rewrites a quadratic equation in the form (*x* – *p*)2 = *q*. |

## Functions – Interpreting Functions

| Alaska Standard | **Far Below Proficient** | **Below Proficient** | **Proficient** | **Advanced** |
| --- | --- | --- | --- | --- |
| F.IF.1 – F.IF.9 | A student at this level identifies independent variables of a function.A student as this level uses function notation to represent a function.A student at this level identifies equivalent forms of a given linear or quadratic function. | A student at this level understands a function as including a domain and a range.A student at this level evaluates functions (including sequences) for a given input.A student at this level identifies equivalent forms of a given linear, quadratic, or exponential function.A student at this level identifies key features of the graphical representations of functions. | A student at this level understands a function as a specific type of mapping from a domain onto a range.A student at this level uses functions and sequence notation and evaluates functions and sequences for a given input.A student at this level writes equivalent forms of a given quadratic or exponential function.A student at this level compares properties or key features of two functions represented in the same way.A student at this level interprets key features of the graphical representations of functions. | A student at this level places limits on a domain or range of a linear function based on context.A student at this level uses function and sequence notation, evaluates functions and sequences for a given input, and interprets functions and sequence notation in terms of a context.A student at this level interprets an exponential function’s properties by applying properties of exponents or rewriting the function.A student at this level compares properties of two functions represented in different ways.A student at this level graphs functions and analyzes key features of graphs and tables that represent functions. |

## Functions – Building Functions

| Alaska Standard | **Far Below Proficient** | **Below Proficient** | **Proficient** | **Advanced** |
| --- | --- | --- | --- | --- |
| F.BF.1a – F.BF.4a | A student at this level identifies a linear equation from a context.A student at this level distinguishes between an equation and a sequence. | A student at this level adds and subtracts linear and exponential functions.A student at this level writes linear function for a given context.A student at this level identifies a sequence as either arithmetic or geometric. | A student at this level adds, subtracts, multiplies, or divides linear, quadratic, and exponential functions.A student at this level writes a given arithmetic or geometric sequence as an equation.A student at this level identifies the effects on a graph of *f*(*x*) + *k* and *f*(*x* + *k*).A student at this level finds the inverse of a given linear function. | A student at this level combines functions to solve a problem where the needed combination must be inferred from a context.A student at this level translates between different explicit and recursive formulas representing the same arithmetic or geometric sequence.A student at this level identifies the effects on a graph of *kf*(*x*) and *f*(*kx*).A student at this level finds the inverse of a given nonlinear function. |

## Functions – Linear, Quadratic, and Exponential Models

| Alaska Standard | **Far Below Proficient** | **Below Proficient** | **Proficient** | **Advanced** |
| --- | --- | --- | --- | --- |
| F.LE.1 – F.LE.5 | A student at this level identifies linear functions given a description of the numerical relationship. | A student at this level identifies the constant difference for a given linear functional relationship or the constant growth factor (ratio) for a given exponential functional relationship.A student at this level constructs linear functions given a description of the numerical relationship. | A student at this level identifies contexts that can be represented with linear or exponential functions including observing that exponential functions eventually exceed linear and quadratic functions.A student at this level constructs linear or exponential functions given a description of the numerical relationship.A student at this level interprets the parameters of a linear or exponential function in terms of a context. | A student at this level analyzes contexts that can be described with linear or exponential functions including analyzing the end behavior of the functions.A student at this level interprets the parameters of a linear, quadratic, or exponential function in terms of a context. |

## Statistics and Probability – Interpreting Categorical and Quantitative Data

| Alaska Standard | **Far Below Proficient** | **Below Proficient** | **Proficient** | **Advanced** |
| --- | --- | --- | --- | --- |
| S.ID.1 – S.ID.9 | A student at this level represents data with dot plots.A student at this level identifies the center or spread of a data set.A student at this level identifies relevant data in two-way frequency tables.A student at this level identifies relevant data on scatter plots.A student at this level identifies the intercept of a linear model. | A student at this level represents data with dot plots, histograms, or box plots.A student at this level compares the center or spread of two or more data sets.A student at this level identifies differences in the distributions of data sets.A student at this level summarizes two-variable data by using two-way frequency table.A student at this level represents two-variable data with scatter plots.A student at this level identifies the slope or intercept of a linear model. | A student at this level represent data with dot plots, histograms, and box plots.A student at this level compares the center and spread of two or more data sets.A student at this level interprets differences in the distributions of data sets based on context.A student at this level summarizes and interprets two-variable data by using two-way frequency tables.A student at this level represents two-variable data with scatter plots and describes how the variables are related.A student at this level interprets the slope and intercept of a linear model based on context.A student at this level interprets the correlation coefficient of a linear fit.A student at this level distinguishes correlation and causation. | A student at this level represents and interprets data with dot plots, histograms, and box plots.A student at this level interprets and analyzes differences in the distributions of data sets based on context.A student at this level represents and interprets two-variable data with scatter plots and describes how the variables are related.A student at this level interprets and analyzes elements of linear models, including slope, intercept, correlation, and causation. |