

Dept. of Education and  
Early Development



# **ALASKA MATHEMATICS STANDARDS WITH LEARNING TARGETS GRADE 8**

Adapted with permission from the Kentucky Department of Education, Frankfort, Kentucky 40601.

## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	The Number System
<b>Cluster</b>	Know that there are numbers that are not rational, and approximate them by rational numbers.
<b>Standard</b>	8.NS.1
	Classify real numbers as either rational (the ratio of two integers, a terminating decimal number, or a repeating decimal number) or irrational.

Standards of Mathematical Practice							
Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.

Learning Targets			
Knowledge	Reasoning	Skill	Products
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
Define irrational numbers. Show that the decimal expansion of rational numbers repeats eventually. Convert a decimal expansion which repeats eventually into a rational number. Show informally that every number has a decimal expansion.			

## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	The Number System
<b>Cluster</b>	Know that there are numbers that are not rational, and approximate them by rational numbers.
<b>Standard</b>	8.NS.2
	Order real numbers, using approximations of irrational numbers, locating them on a number line. <i>For example, show that <math>\sqrt{2}</math> is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.</i>

Standards of Mathematical Practice							
Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.

Learning Targets			
Knowledge	Reasoning	Skill	Products
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
<p>Approximate irrational numbers as rational numbers.</p> <p>Approximately locate irrational numbers on a number line.</p> <p>Estimate the value of expressions involving irrational numbers using rational approximations. (For example, by truncating the decimal expansion of <math>\sqrt{2}</math>, show that <math>\sqrt{2}</math> is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.).</p>	Compare the size of irrational numbers using rational approximations.		

## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	The Number System
<b>Cluster</b>	Know that there are numbers that are not rational, and approximate them by rational numbers.
<b>Standard</b>	8.NS.3 Identify or write the prime factorization of a number using exponents. (L).

### Standards of Mathematical Practice

Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.
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### Learning Targets

<b>Knowledge</b>	<b>Reasoning</b>	<b>Skill</b>	<b>Products</b>
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
Define prime factorization. Express the factors of a number using prime numbers using exponents.			

## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	Expressions and Equations
<b>Cluster</b>	Work with radicals and integer exponents.
<b>Standard</b>	8.EE.1 Apply the properties (product, quotient, power, zero, negative exponents, and rational exponents) of integer exponents to generate equivalent numerical expressions. <i>For example, <math>3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27</math>.</i>

Standards of Mathematical Practice							
Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.

Learning Targets			
Knowledge	Reasoning	Skill	Products
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
Explain the properties of integer exponents to generate equivalent numerical expressions. For example, $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$ .  Apply the properties of integer exponents to produce equivalent numerical expressions.			

## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	Expressions and Equations 8.EE
<b>Cluster</b>	Work with radicals and integer exponents.
<b>Standard</b>	8.EE.2
	Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$ , where $p$ is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.

Standards of Mathematical Practice							
Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.

Learning Targets			
Knowledge	Reasoning	Skill	Products
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$ , where $p$ is a positive rational number.  Evaluate square roots of small perfect squares.  Evaluate cube roots of small perfect cubes.  Know that the square root of 2 is irrational.			

## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	Expressions and Equations
<b>Cluster</b>	Work with radicals and integer exponents.
<b>Standard</b>	<p>8.EE.3</p> <p>Use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. <i>For example, estimate the population of the United States as <math>3 \times 10^8</math> and the population of the world as <math>7 \times 10^9</math>, and determine that the world population is more than 20 times larger.</i></p>

Standards of Mathematical Practice							
Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.

Learning Targets			
Knowledge	Reasoning	Skill	Products
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
Express numbers as a single digit times an integer power of 10.  Use scientific notation to estimate very large and/or very small quantities.	Compare quantities to express how much larger one is compared to the other.		

## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	Expressions and Equations
<b>Cluster</b>	Work with radicals and integer exponents.
<b>Standard</b>	8.EE.4
	Perform operations with numbers expressed in scientific notation, including problems where both standard notation and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities. Interpret scientific notation that has been generated by technology.

Standards of Mathematical Practice							
Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.

Learning Targets			
Knowledge	Reasoning	Skill	Products
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
Perform operations using numbers expressed in scientific notations.  Use scientific notation to express very large and very small quantities.	Interpret scientific notation that has been generated by technology.  Choose appropriate units of measure when using scientific notation.		



## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	Expressions and Equations
<b>Cluster</b>	Understand the connections between proportional relationships, lines, and linear equations.
<b>Standard</b>	8.EE.5 Graph linear equations such as $y = mx + b$ , interpreting $m$ as the slope or rate of change of the graph and $b$ as the $y$ -intercept or starting value; Compare two different proportional relationships represented in different ways; <i>For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.</i>

Standards of Mathematical Practice							
Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.

Learning Targets			
Knowledge	Reasoning	Skill	Products
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
Graph proportional relationships.	Compare two different proportional relationships represented in different ways. (For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.)  Interpret the unit rate of proportional relationships as the slope of the graph.		

## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	Expressions and Equations
<b>Cluster</b>	Understand the connections between proportional relationships, lines, and linear equations.
<b>Standard</b>	8.EE.6 Use similar triangles to explain why the slope $m$ is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at $b$ .

Standards of Mathematical Practice							
Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.

Learning Targets			
Knowledge	Reasoning	Skill	Products
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
Identify characteristics of similar triangles. Find the slope of a line. Determine the y-intercept of a line.	Analyze patterns for points on a line through the origin. Derive an equation of the form $y = mx$ for a line through the origin. Analyze patterns for points on a line that do not pass through or include the origin. Derive an equation of the form $y = mx + b$ for a line intercepting the vertical axis at $b$ (the y-intercept). Use similar triangles to explain why the slope $m$ is the same between any two distinct points on a non-vertical line in the coordinate plane.		

## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	Expressions and Equations
<b>Cluster</b>	Analyze and solve linear equations and pairs of simultaneous linear equations.
<b>Standard</b>	8.EE.7
	Solve linear equations in one variable; <ol style="list-style-type: none"> <li>a. Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form <math>x = a</math>, <math>a = a</math>, or <math>a = b</math> results (where <math>a</math> and <math>b</math> are different numbers);</li> <li>b. Solve linear equations with rational coefficients, including equations whose solutions require expanding expressions using the distributive property and combining like terms.</li> </ol>

### Standards of Mathematical Practice

Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.
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### Learning Targets

Knowledge	Reasoning	Skill	Products
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
Give examples of linear equations in one variable with one solution and show that the given example equation has one solution by successively transforming the equation into an equivalent equation of the form $x = a$ .			

<p>Give examples of linear equations in one variable with infinitely many solutions and show that the given example has infinitely many solutions by successively transforming the equation into an equivalent equation of the form <math>a = a</math>.</p> <p>Give examples of linear equations in one variable with no solution and show that the given example has no solution by successively transforming the equation into an equivalent equation of the form <math>b = a</math>, where <math>a</math> and <math>b</math> are different numbers.</p> <p>Solve linear equations with rational number coefficients.</p> <p>Solve equations whose solutions require expanding expressions using the distributive property and/ or collecting like terms.</p>			
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## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	Expressions and Equations
<b>Cluster</b>	Analyze and solve linear equations and pairs of simultaneous linear equations.
<b>Standard</b>	<p>8.EE.8</p> <p>Analyze and solve systems of linear equations;</p> <ol style="list-style-type: none"> <li>a. Show that the solution to a system of two linear equations in two variables is the intersection of the graphs of those equations because points of intersection satisfy both equations simultaneously;</li> <li>b. Solve systems of two linear equations in two variables and estimate solutions by graphing the equations. Simple cases may be done by inspection; <i>For example, <math>3x + 2y = 5</math> and <math>3x + 2y = 6</math> have no solution because <math>3x + 2y</math> cannot simultaneously be 5 and 6;</i></li> <li>c. Solve real-world and mathematical problems leading to two linear equations in two variables; <i>For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.</i></li> </ol>

### Standards of Mathematical Practice

Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.
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### Learning Targets

Knowledge	Reasoning	Skill	Products
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
Identify the solution(s) to a system of two linear equations in two variables as the point(s) of intersection of their graphs.  Describe the point(s) of	Estimate the point(s) of intersection for a system of two equations in two unknowns by graphing the equations.		

<p>intersection between two lines as points that satisfy both equations simultaneously.</p> <p>Define “inspection”.</p> <p>Identify cases in which a system of two equations in two unknowns has no solution.</p> <p>Identify cases in which a system of two equations in two unknowns has an infinite number of solutions.</p> <p>Solve a system of two equations (linear) in two unknowns algebraically.</p> <p>Solve simple cases of systems of two linear equations in two variables by inspection.</p>			
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## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	Geometry
<b>Cluster</b>	Understand congruence and similarity using physical models, transparencies, or geometry software.
<b>Standard</b>	8.G.1
	Through experimentation, verify the properties of rotations, reflections, and translations (transformations) to figures on a coordinate plane); a. Lines are taken to lines, and line segments to line segments of the same length; b. Angles are taken to angles of the same measure; c. Parallel lines are taken to parallel lines.

Standards of Mathematical Practice							
Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.

Learning Targets			
Knowledge	Reasoning	Skill	Products
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
Define & identify rotations, reflections, and translations.  Identify corresponding sides & corresponding angles.  Understand prime notation to describe an image after a translation, reflection, or rotation.	Use physical models, transparencies, or geometry software to verify the properties of rotations, reflections, and translations (i.e., Lines are taken to lines and line segments to line segments of the same length, angles are taken to angles of the same measure, & parallel lines are taken to parallel lines.).		

Identify center of rotation. Identify direction and degree of rotation. Identify line of reflection.			
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## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	Geometry
<b>Cluster</b>	Understand congruence and similarity using physical models, transparencies, or geometry software.
<b>Standard</b>	8.G.2
	Demonstrate understanding of congruence by applying a sequence of translations, reflections, and rotations on two-dimensional figures. Given two congruent figures, describe a sequence that exhibits the congruence between them.

Standards of Mathematical Practice							
Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.

Learning Targets			
Knowledge	Reasoning	Skill	Products
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
Define congruency.  Identify symbols for congruency.	Apply the concept of congruency to write congruent statements.  Reason that a 2-D figure is congruent to another if the second can be obtained by a sequence of rotations, reflections, translation.  Describe the sequence of rotations, reflections, translations that exhibits the congruence between 2-D figures using words.		

## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	Geometry
<b>Cluster</b>	Understand congruence and similarity using physical models, transparencies, or geometry software.
<b>Standard</b>	8.G.3
	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.

Standards of Mathematical Practice							
Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.

Learning Targets			
Knowledge	Reasoning	Skill	Products
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
Define dilations as a reduction or enlargement of a figure.  Identify scale factor of the dilation.	Describe the effects of dilations, translations, rotations, & reflections on 2-D figures using coordinates.		

## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	Geometry
<b>Cluster</b>	Understand congruence and similarity using physical models, transparencies, or geometry software.
<b>Standard</b>	8.G.4 Demonstrate understanding of similarity, by applying a sequence of translations, reflections, rotations, and dilations on two-dimensional figures. Describe a sequence that exhibits the similarity between them.

Standards of Mathematical Practice							
Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.

Learning Targets			
Knowledge	Reasoning	Skill	Products
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
Define similar figures as corresponding angles are congruent and corresponding sides are proportional. Recognize symbol for similar.	Apply the concept of similarity to write similarity statements. Reason that a 2-D figure is similar to another if the second can be obtained by a sequence of rotations, reflections, translation, or dilation. Describe the sequence of rotations, reflections, translations, or dilations that exhibits the similarity between 2-D figures using words and/or symbols.		

## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	Geometry
<b>Cluster</b>	Understand congruence and similarity using physical models, transparencies, or geometry software.
<b>Standard</b>	8.G.5
	Justify using informal arguments to establish facts about the angle sum of triangles (sum of the interior angles of a triangle is $180^\circ$ ); measures of exterior angles of triangles; angles created when parallel lines are cut by a transversal (e.g., alternate interior angles); and angle-angle criterion for similarity of triangles.

Standards of Mathematical Practice							
Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.

Learning Targets			
Knowledge	Reasoning	Skill	Products
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
Define similar triangles. Define and identify transversals. Identify angles created when parallel line is cut by transversal (alternate interior, alternate exterior, corresponding, vertical, adjacent, etc.).	Justify that the sum of interior angles equals 180. (For example, arrange three copies of the same triangle so that the three angles appear to form a line.)  Justify that the exterior angle of a triangle is equal to the sum of the two remote interior angles.  Use Angle-Angle Criterion to prove similarity among triangles. (Give an argument in terms of transversals why this is so.).		

## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	Geometry
<b>Cluster</b>	Understand and apply the Pythagorean Theorem.
<b>Standard</b>	8.G.6 Explain the Pythagorean Theorem and its converse.

### Standards of Mathematical Practice

Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.
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### Learning Targets

<b>Knowledge</b>	<b>Reasoning</b>	<b>Skill</b>	<b>Products</b>
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
Define key vocabulary: square root, Pythagorean Theorem, right triangle, legs a & b, hypotenuse, sides, right angle, converse, base, height, proof.  Be able to identify the legs and hypotenuse of a right triangle.  Explain a proof of the Pythagorean Theorem.  Explain a proof of the converse of the Pythagorean Theorem.			

## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	Geometry
<b>Cluster</b>	Understand and apply the Pythagorean Theorem.
<b>Standard</b>	8.G.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.

Standards of Mathematical Practice							
Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.

Learning Targets			
Knowledge	Reasoning	Skill	Products
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
Recall the Pythagorean theorem and its converse.	Solve basic mathematical Pythagorean theorem problems and its converse to find missing lengths of sides of triangles in two- and three-dimensions.  Apply Pythagorean theorem in solving real-world problems dealing with two- and three-dimensional shapes.		

## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	Geometry
<b>Cluster</b>	Understand and apply the Pythagorean Theorem.
<b>Standard</b>	8.G.8
	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.

### Standards of Mathematical Practice

Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.
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### Learning Targets

<b>Knowledge</b>	<b>Reasoning</b>	<b>Skill</b>	<b>Products</b>
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
Recall the Pythagorean Theorem and its converse.	<p>Determine how to create a right triangle from two points on a coordinate graph.</p> <p>Use the Pythagorean Theorem to solve for the distance between the two points.</p>		

## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	Geometry
<b>Cluster</b>	Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.
<b>Standard</b>	8.G.9 Identify and apply the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Standards of Mathematical Practice							
Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.

Learning Targets			
Knowledge	Reasoning	Skill	Products
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
Identify and define vocabulary: cone, cylinder, sphere, radius, diameter, circumference, area, volume, pi, base, height  Know formulas for volume of cones, cylinders, and spheres.	Compare the volume of cones, cylinders, and spheres.  Determine and apply appropriate volume formulas in order to solve mathematical and real-world problems for the given shape.  Given the volume of a cone, cylinder, or sphere, find the radii, height, or approximate for $\pi$ .		



## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	Statistics and Probability
<b>Cluster</b>	Investigate patterns of association in bivariate data.
<b>Standard</b>	8.SP.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.

Standards of Mathematical Practice							
Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.

Learning Targets			
Knowledge	Reasoning	Skill	Products
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.  Construct scatter plots for bivariate measurement data.	Interpret scatter plots for bivariate (two different variables such as distance and time) measurement data to investigate patterns of association between two quantities.		

## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	Statistics and Probability
<b>Cluster</b>	Investigate patterns of association in bivariate data.
<b>Standard</b>	8.SP.2 Explain why straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.

Standards of Mathematical Practice							
Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.

Learning Targets			
Knowledge	Reasoning	Skill	Products
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
Know straight lines are used to model relationships between two quantitative variables.	Informally assess the model fit by judging the closeness of the data points to the line.  Fit a straight line within the plotted area.		

## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	Statistics and Probability
<b>Cluster</b>	Investigate patterns of association in bivariate data.
<b>Standard</b>	8.SP.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and $y$ -intercept; <i>For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.</i>

Standards of Mathematical Practice							
Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.

Learning Targets			
Knowledge	Reasoning	Skill	Products
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
Find the slope and intercept of a linear equation.	Interpret the meaning of the slope and intercept of a linear equation in terms of the situation. (For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.)  Solve problems using the equation of a linear model.		

## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	Statistics and Probability
<b>Cluster</b>	Investigate patterns of association in bivariate data.
<b>Standard</b>	8.SP.4
	Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects and use relative frequencies to describe possible association between the two variables; <i>For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?</i>

### Standards of Mathematical Practice

Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.
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### Learning Targets

Knowledge	Reasoning	Skill	Products
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
Recognize patterns shown in comparison of two sets of data.  Know how to construct a two-way table.	Interpret the data in the two-way table to recognize patterns. (For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?) .  Use relative frequencies of the data to describe relationships (positive, negative, or no correlation).		

## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	Functions
<b>Cluster</b>	Define, evaluate, and compare functions.
<b>Standard</b>	8.F.1
	Understand that a function is a rule that assigns to each input (the domain) exactly one output (the range). The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. <i>For example, use the vertical line test to determine functions and non-functions.</i>

Standards of Mathematical Practice							
Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.

Learning Targets			
Knowledge	Reasoning	Skill	Products
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
Define “inspection”. Identify cases in which a system of two equations in two unknowns has no solution. Identify cases in which a system of two equations in two unknowns has an infinite number of solutions. Solve a system of two equations (linear) in two unknowns algebraically. Solve simple cases of systems of two linear equations in two variables by inspection.			

## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	Functions
<b>Cluster</b>	Define, evaluate, and compare functions.
<b>Standard</b>	8.F.2
	Compare properties of two functions, each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions); <i>For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.</i>

Standards of Mathematical Practice							
Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.

Learning Targets			
Knowledge	Reasoning	Skill	Products
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
Identify functions algebraically including slope and y intercept. Identify functions using graphs. Identify functions using tables. Identify functions using verbal descriptions.	Compare and Contrast 2 functions with different representations.  Draw conclusions based on different representations of functions.		

## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	Functions
<b>Cluster</b>	Define, evaluate, and compare functions.
<b>Standard</b>	8.F.3
	Interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear; <i>For example, the function <math>A = s^2</math> giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line.</i>

Standards of Mathematical Practice							
Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.

Learning Targets			
Knowledge	Reasoning	Skill	Products
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
<p>Recognize that a linear function is graphed as a straight line.</p> <p>Recognize the equation <math>y=mx+b</math> is the equation of a function whose graph is a straight line where <math>m</math> is the slope and <math>b</math> is the <math>y</math>-intercept.</p> <p>Provide examples of nonlinear functions using multiple representations.</p>	Compare the characteristics of linear and nonlinear functions using various representations.		

## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	Functions
<b>Cluster</b>	Use functions to model relationships between quantities.
<b>Standard</b>	8.F.4
	Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two $(x, y)$ values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.

Standards of Mathematical Practice							
Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.

Learning Targets			
Knowledge	Reasoning	Skill	Products
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
<p>Recognize that slope is determined by the constant rate of change.</p> <p>Recognize that the y-intercept is the initial value where <math>x=0</math>.</p> <p>Determine the rate of change from two <math>(x,y)</math> values, a verbal description, values in a table, or graph.</p> <p>Determine the initial value from two <math>(x,y)</math> values, a verbal description, values in a table, or graph.</p>	<p>Construct a function to model a linear relationship between two quantities.</p> <p>Relate the rate of change and initial value to real world quantities in a linear function in terms of the situation modeled and in terms of its graph or a table of values.</p>		



## Alaska Mathematics Standards Grade 8

<b>Grade Level/Course</b>	8
<b>Domain</b>	Functions
<b>Cluster</b>	Use functions to model relationships between quantities.
<b>Standard</b>	8.F.5 Given a verbal description between two quantities, sketch a graph. Conversely, given a graph, describe a possible real-world example; <i>For example, graph the position of an accelerating car or tossing a ball in the air.</i>

Standards of Mathematical Practice							
Make sense of problems and persevere to solve them.	Reason abstractly and quantitatively.	Construct viable arguments and critique the reasoning of others.	Model with mathematics.	Use appropriate tools strategically.	Attend to precision.	Look for and make use of structure.	Look for and express regularity in repeated reasoning.

Learning Targets			
Knowledge	Reasoning	Skill	Products
Facts and concepts we want students to know.	Use what they know to reason or solve problems.	Use knowledge and reasoning to act skillfully.	Use knowledge, reasoning, and skills to create a concrete product.
Analyze a graph and describe the functional relationship between two quantities using the qualities of the graph.  Sketch a graph given a verbal description of its qualitative features.	Interpret the relationship between x and y values by analyzing a graph.		