

Algebra 2 Examples

Utah Algebra 2 Core	Assessment Examples
<p>Standard I: <i>Students will use the language and operations of algebra to evaluate, analyze and solve problems.</i></p> <p>Objective 1: Evaluate, analyze, and solve mathematical situations using algebraic properties and symbols.</p> <ol style="list-style-type: none"> Solve and graph first-degree absolute value equations of a single variable. Solve radical equations of a single variable, including those with extraneous roots. Solve absolute value and compound inequalities of a single variable. Add, subtract, multiply, and divide rational expressions and solve rational equations. Simplify algebraic expressions involving negative and rational exponents. 	<p>Solve and graph the solution set</p> <ul style="list-style-type: none"> $x + 3 = 5$ $\sqrt{x - 7} + 2 = 5$ <p>Simplify</p> <ul style="list-style-type: none"> $\frac{1}{x} + \frac{1}{x + 2}$ $\left(x^{\frac{1}{3}} y^2\right) (27xy)^{\frac{1}{3}}$ <p>Solve</p> <ul style="list-style-type: none"> $\frac{x}{x - 2} + \frac{1}{x - 4} = \frac{2}{x^2 - 6x + 8}$
<p>Objective 2: Solve systems of equations and inequalities.</p> <ol style="list-style-type: none"> Solve systems of linear, absolute value, and quadratic equations algebraically and graphically. Graph the solutions of systems of linear, absolute value, and quadratic inequalities on the coordinate plane. Solve application problems involving systems of equations and inequalities. 	<ul style="list-style-type: none"> Solve the system: <ul style="list-style-type: none"> $y = x^2 + 3$ $y = 2x + 3$ Graph the solution set: <ul style="list-style-type: none"> $y \leq -x^2 + 3$ $y > x - 1$
<p>Objective 3: Represent and compute fluently with complex numbers.</p> <ol style="list-style-type: none"> Simplify numerical expressions, including those with rational exponents. Simplify expressions involving complex numbers and express them in standard form, $a + bi$. 	<p>Simplify</p> <ul style="list-style-type: none"> $(25)^{\frac{1}{2}}$ $(3 + 2i)(3 - 2i)$ $\frac{6}{2 + i}$
<p>Objective 4: Model and solve quadratic equations and inequalities.</p>	<p>Solve</p>

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<ul style="list-style-type: none"> a. Model real-world situations using quadratic equations. b. Approximate the real solutions of quadratic equations graphically. c. Solve quadratic equations of a single variable over the set of complex numbers by factoring, completing the square, and using the quadratic formula. d. Solve quadratic inequalities of a single variable. e. Write a quadratic equation when given the solutions of the equation. 	<ul style="list-style-type: none"> • $4x^2 - 25$ • $x^2 - 10x + 2 = 0$ • $x^2 - 6x + 9 = 0$ • Write a quadratic equation whose solutions are 5 and -1. • Write a quadratic equation with only complex solutions.
<p>Standard II: Students will understand and represent functions and analyze function behavior.</p> <p>Objective 1: Represent mathematical situations using relations.</p> <ul style="list-style-type: none"> a. Model real-world relationships with functions. b. Describe a pattern using function notation. c. Determine when a relation is a function. d. Determine the domain and range of relations. 	<ul style="list-style-type: none"> • Ron is paid a salary of \$200 a week plus a 10% commission on his sales. Model his pay as a function of his sales. • Which of the following are functions? <ul style="list-style-type: none"> • $y = 3x - 7$ • $x^2 = y$ • $y^2 = x$ • $x^2 + y^2 = 9$
<p>Objective 2: Evaluate and analyze functions.</p> <ul style="list-style-type: none"> a. Find the value of a function at a given point. b. Compose functions when possible. c. Add, subtract, multiply, and divide functions. d. Determine whether or not a function has an inverse, and find the inverse when it exists. e. Identify the domain and range of a function resulting from the combination or composition of functions. 	<ul style="list-style-type: none"> • Given the functions, $f(x) = 2x + 3$ and $g(x) = x^2$, find <ul style="list-style-type: none"> • $f(2)$ • $g(-3)$ • $f(x) + g(x)$ • $f(g(x))$ • $f^{-1}(x)$
<p>Objective 3: Define and graph exponential functions and use them to model problems in mathematical and real-world contexts.</p> <ul style="list-style-type: none"> a. Define exponential functions as functions of the form $y = ab^x, b > 0, b \neq 1$. b. Model problems of growth and decay using exponential functions. c. Graph exponential functions. 	<ul style="list-style-type: none"> • Graph $y = 3^x$ • A biologist is researching a newly-discovered species of bacteria. At time $t = 0$ hours, he puts one hundred bacteria into what he has determined to be a favorable growth medium. Six hours later, he measures 450 bacteria. Assuming exponential growth, what is the growth constant "k" for the bacteria? (Round k to two decimal places.)

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<p>Objective 4: Define and graph logarithmic functions and use them to solve problems in mathematics and real-world contexts.</p> <ol style="list-style-type: none"> Relate logarithmic and exponential functions. Simplify logarithmic expressions. Convert logarithms between bases. Solve exponential and logarithmic equations. Graph logarithmic functions. Solve problems involving growth and decay. 	<ul style="list-style-type: none"> Simplify $\log_2 8$ Expand $\log_3(2x)$ Convert $\log_5 3$ to base 10. Solve $e^x = 80$
<p><i>Standard III: Students will use algebraic, spatial, and logical reasoning to solve geometry and measurement problems.</i></p> <p>Objective 1: Examine the behavior of functions using coordinate geometry.</p> <ol style="list-style-type: none"> Identify the domain and range of the absolute value, quadratic, radical, sine, and cosine functions. Graph the absolute value, quadratic, radical, sine, and cosine functions. Graph functions using transformations of parent functions. Write an equation of a parabola in the form $y = a(x - h)^2 + k$ when given a graph or an equation. 	<ul style="list-style-type: none"> Graph $y = \sin 2\pi x + 1$ and identify the domain and range. Write $y = 3x^2 - 12x + 13$ in vertex form.
<p>Objective 2: Determine radian and degree measures for angles.</p> <ol style="list-style-type: none"> Convert angle measurements between radians and degrees. Find angle measures in degrees and radians using inverse trigonometric functions, including exact values for special triangles. 	$\frac{2\pi}{3}$ <ul style="list-style-type: none"> Convert $\frac{2\pi}{3}$ radians to degrees. Convert 180 degrees into radians. Find $\sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$ in degrees and radians.
<p>Objective 3: Determine trigonometric measurements using appropriate techniques, tools, and formulas.</p> <ol style="list-style-type: none"> Define the sine, cosine, and tangent functions using the unit circle. Determine the exact values of the sine, cosine, and tangent functions for the special angles of the unit circle using reference angles. Find the length of an arc using radian measure. <p>Find the area of a sector in a circle using radian measure.</p>	<ul style="list-style-type: none"> Find $\sin 210^\circ$, $\cos(-\pi)$, $\tan\left(\frac{3\pi}{4}\right)$ A goat on a 10 ft. rope is tethered in a corner where two fences meet at $\frac{5\pi}{6}$ radians. What is the area of the region the goat can reach?

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Standard IV: Students will understand concepts from probability and statistics and apply statistical methods to solve problems.

Objective 1: Apply basic concepts of probability.

- Distinguish between permutations and combinations and identify situations in which each is appropriate.
- Calculate probabilities using permutations and combinations to count events.
- Compute conditional and unconditional probabilities in various ways, including by definitions, the general multiplication rule, and probability trees.
- Define simple discrete random variables.

- What is the probability that 5 books placed randomly on a shelf will be placed alphabetically?
- What is the probability that a coin will be flipped 4 times and the result will be HTHT?
- If a coin is tossed 3 times, the number of heads can be 0,1,2, or 3. Complete the probability distribution for this event:

Number of Heads	0	1	2	3
Probability				

Objective 2: Use percentiles and measures of variability to analyze data.

- Compute different measures of spread, including the range, standard deviation, and interquartile range.
- Compare the effectiveness of different measures of spread, including the range, standard deviation, and interquartile range in specific situations.
- Use percentiles to summarize the distribution of a numerical variable.
- Use histograms to obtain percentiles.

- Given the heights of 5 adults, 60 in., 62 in., 67 in., 67 in. and 68 in., compute the standard deviation.
- Use the graph to approximate the 28th percentile of salaries of Psychology Grads. Could you use the histogram to determine the 35th percentile of salaries of Psychology Grads? Explain.

