



Algebra II Assessment

Eligible Texas Essential Knowledge and Skills

STAAR Algebra II Assessment

Mathematical Process Standards

These student expectations will not be listed under a separate reporting category. Instead, they will be incorporated into test questions across reporting categories since the application of mathematical process standards is part of each knowledge statement.

- (2A.1) **Mathematical process standards.** The student uses mathematical processes to acquire and demonstrate mathematical understanding. The student is expected to
- (A) apply mathematics to problems arising in everyday life, society, and the workplace;
 - (B) use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution;
 - (C) select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems;
 - (D) communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate;
 - (E) create and use representations to organize, record, and communicate mathematical ideas;
 - (F) analyze mathematical relationships to connect and communicate mathematical ideas; and
 - (G) display, explain, or justify mathematical ideas and arguments using precise mathematical language in written or oral communication.

Reporting Category 1: Number and Algebraic Methods

The student will demonstrate an understanding of how to use algebraic methods to manipulate numbers, expressions, and equations.

- (2A.7) **Number and algebraic methods.** The student applies mathematical processes to simplify and perform operations on expressions and to solve equations. The student is expected to
- (A) add, subtract, and multiply complex numbers;
Supporting Standard
 - (B) add, subtract, and multiply polynomials; **Supporting Standard**
 - (C) determine the quotient of a polynomial of degree three and of degree four when divided by a polynomial of degree one and of degree two;
Supporting Standard
 - (D) determine the linear factors of a polynomial function of degree three and of degree four using algebraic methods; **Supporting Standard**
 - (E) determine linear and quadratic factors of a polynomial expression of degree three and of degree four, including factoring the sum and difference of two cubes and factoring by grouping;
Readiness Standard
 - (F) determine the sum, difference, product, and quotient of rational expressions with integral exponents of degree one and of degree two; **Readiness Standard**
 - (G) rewrite radical expressions that contain variables to equivalent forms; **Supporting Standard**
 - (H) solve equations involving rational exponents; and
Readiness Standard
 - (I) write the domain and range of a function in interval notation, inequalities, and set notation. **Supporting Standard**

Reporting Category 2: Describing and Graphing Functions and Their Inverses

The student will demonstrate an understanding of how to describe and graph various functions and their inverses.

- (2A.2) **Attributes of functions and their inverses.** The student applies mathematical processes to understand that functions have distinct key attributes and understand the relationship between a function and its inverse. The student is expected to
- (A) graph the functions $f(x) = \sqrt{x}$, $f(x) = 1/x$, $f(x) = x^3$, $f(x) = \sqrt[3]{x}$, $f(x) = b^x$, $f(x) = |x|$, and $f(x) = \log_b(x)$ where b is 2, 10, and e , and, when applicable, analyze the key attributes such as domain, range, intercepts, symmetries, asymptotic behavior, and maximum and minimum given an interval; **Readiness Standard**
 - (B) graph and write the inverse of a function using notation such as $f^{-1}(x)$; **Supporting Standard**
 - (C) describe and analyze the relationship between a function and its inverse (quadratic and square root, logarithmic and exponential), including the restriction(s) on domain, which will restrict its range; and **Readiness Standard**
 - (D) use the composition of two functions, including the necessary restrictions on the domain, to determine if the functions are inverses of each other. **Supporting Standard**
- (2A.8) **Data.** The student applies mathematical processes to analyze data, select appropriate models, write corresponding functions, and make predictions. The student is expected to
- (A) analyze data to select the appropriate model from among linear, quadratic, and exponential models; **Supporting Standard**
 - (B) use regression methods available through technology to write a linear function, a quadratic function, and an exponential function from a given set of data; and **Supporting Standard**
 - (C) predict and make decisions and critical judgments from a given set of data using linear, quadratic, and exponential models. **Readiness Standard**

Reporting Category 3: Writing and Solving Systems of Equations and Inequalities

The student will demonstrate an understanding of how to write and solve systems of equations and inequalities.

- (2A.3) **Systems of equations and inequalities.** The student applies mathematical processes to formulate systems of equations and inequalities, use a variety of methods to solve, and analyze reasonableness of solutions. The student is expected to
- (A) formulate systems of equations, including systems consisting of three linear equations in three variables and systems consisting of two equations, the first linear and the second quadratic;
Readiness Standard
 - (B) solve systems of three linear equations in three variables by using Gaussian elimination, technology with matrices, and substitution;
Readiness Standard
 - (C) solve, algebraically, systems of two equations in two variables consisting of a linear equation and a quadratic equation;
Supporting Standard
 - (D) determine the reasonableness of solutions to systems of a linear equation and a quadratic equation in two variables;
Supporting Standard
 - (E) formulate systems of at least two linear inequalities in two variables;
Supporting Standard
 - (F) solve systems of two or more linear inequalities in two variables; and
Supporting Standard
 - (G) determine possible solutions in the solution set of systems of two or more linear inequalities in two variables. **Supporting Standard**

Reporting Category 4: Quadratic and Square Root Functions, Equations, and Inequalities

The student will demonstrate an understanding of how to describe, write, and solve quadratic and square root functions, equations, and inequalities.

(2A.4) **Quadratic and square root functions, equations, and inequalities.**

The student applies mathematical processes to understand that quadratic and square root functions, equations, and quadratic inequalities can be used to model situations, solve problems, and make predictions. The student is expected to

- (A) write the quadratic function given three specified points in the plane; **Supporting Standard**
- (B) write the equation of a parabola using given attributes, including vertex, focus, directrix, axis of symmetry, and direction of opening; **Readiness Standard**
- (C) determine the effect on the graph of $f(x) = \sqrt{x}$ when $f(x)$ is replaced by $af(x)$, $f(x) + d$, $f(bx)$, and $f(x - c)$ for specific positive and negative values of a , b , c , and d ; **Readiness Standard**
- (D) transform a quadratic function $f(x) = ax^2 + bx + c$ to the form $f(x) = a(x - h)^2 + k$ to identify the different attributes of $f(x)$; **Supporting Standard**
- (E) formulate quadratic and square root equations using technology given a table of data; **Supporting Standard**
- (F) solve quadratic and square root equations; **Readiness Standard**
- (G) identify extraneous solutions of square root equations; and **Supporting Standard**
- (H) solve quadratic inequalities. **Supporting Standard**

Reporting Category 5: Exponential and Logarithmic Functions and Equations

The student will demonstrate an understanding of how to describe, write, and solve exponential and logarithmic functions and equations.

- (2A.5) **Exponential and logarithmic functions and equations.** The student applies mathematical processes to understand that exponential and logarithmic functions can be used to model situations and solve problems. The student is expected to
- (A) determine the effects on the key attributes on the graphs of $f(x) = b^x$ and $f(x) = \log_b(x)$ where b is 2, 10, and e when $f(x)$ is replaced by $af(x)$, $f(x) + d$, and $f(x - c)$ for specific positive and negative real values of a , c , and d ; **Readiness Standard**
 - (B) formulate exponential and logarithmic equations that model real-world situations, including exponential relationships written in recursive notation; **Supporting Standard**
 - (C) rewrite exponential equations as their corresponding logarithmic equations and logarithmic equations as their corresponding exponential equations; **Supporting Standard**
 - (D) solve exponential equations of the form $y = ab^x$ where a is a nonzero real number and b is greater than zero and not equal to one and single logarithmic equations having real solutions; and **Readiness Standard**
 - (E) determine the reasonableness of a solution to a logarithmic equation. **Supporting Standard**

Reporting Category 6: Other Functions, Equations, and Inequalities

The student will demonstrate an understanding of how to describe, write, and solve cubic, cube root, absolute value, and rational functions, equations, and inequalities.

(2A.6) **Cubic, cube root, absolute value and rational functions, equations, and inequalities.** The student applies mathematical processes to understand that cubic, cube root, absolute value and rational functions, equations, and inequalities can be used to model situations, solve problems, and make predictions. The student is expected to

- (A) analyze the effect on the graphs of $f(x) = x^3$ and $f(x) = \sqrt[3]{x}$ when $f(x)$ is replaced by $af(x)$, $f(bx)$, $f(x - c)$, and $f(x) + d$ for specific positive and negative real values of a , b , c , and d ; **Supporting Standard**
- (B) solve cube root equations that have real roots; **Supporting Standard**
- (C) analyze the effect on the graphs of $f(x) = |x|$ when $f(x)$ is replaced by $af(x)$, $f(bx)$, $f(x - c)$, and $f(x) + d$ for specific positive and negative real values of a , b , c , and d ; **Supporting Standard**
- (D) formulate absolute value linear equations; **Supporting Standard**
- (E) solve absolute value linear equations; **Readiness Standard**
- (F) solve absolute value linear inequalities; **Supporting Standard**
- (G) analyze the effect on the graphs of $f(x) = 1/x$ when $f(x)$ is replaced by $af(x)$, $f(bx)$, $f(x - c)$, and $f(x) + d$ for specific positive and negative real values of a , b , c , and d ; **Supporting Standard**
- (H) formulate rational equations that model real-world situations; **Supporting Standard**
- (I) solve rational equations that have real solutions; **Readiness Standard**
- (J) determine the reasonableness of a solution to a rational equation; **Supporting Standard**

- (K) determine the asymptotic restrictions on the domain of a rational function and represent domain and range using interval notation, inequalities, and set notation; and ***Supporting Standard***
- (L) formulate and solve equations involving inverse variation.
Readiness Standard