



Algebra II Graphing

Competencies

HS 2.2, 3.1

Resources

HMH, Quizizz, Desmos

Standards

F.IF.1 - (all) Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x . The graph of f is the graph of the equation $y=f(x)$.

F.IF.4 - (all) For a function that models a relationship between two quantities, interpret key features of expressions, graphs and tables in terms of the quantities, and sketch graphs showing key features given a description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.

F.IF.7 - Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

F.BF.3 - (9/10/11) Transform parent functions ($f(x)$) by replacing $f(x)$ with $f(x)+k$, $kf(x)$, $f(kx)$, and $f(x+k)$ for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.

A.CED.1 - (all) Apply and extend previous understanding to create equations and inequalities in one variable and use them to solve problems.

A.CED.2 - (all) Apply and extend previous understanding to create equations and inequalities in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

Vocab

Content: Parent Function Domain Range Zero Relative Maximum Relative Minimum Extremum Absolute Maximum Absolute Minimum Increasing Decreasing Interval Notation Set-Builder Notation End Behavior Transformation Translation Dilation/Stretch/Compression Reflection

Academic: Graph Identify Find Transform Describe



Algebra II Graphing

I can

- *I can graph a function using a T-chart
- *I can graph a function as a translation, reflection, or dilation of its parent function
- *I can write a set in interval notation
- *I can write a set in set-builder notation
- *I can find the domain of a function
- *I can identify the key features of a graph of a function



Algebra II Quadratics

Competencies

HS 2.1, HS 2.2, HS 3.1

Resources

HMH, Desmos

Standards

FN.CN.1 - (11) Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a+bi$ with a and b real.

N.CN.2 - (11) Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.

N.CN.3 - (11) Find the conjugate of a complex number.

N.CN.8 - (11) Solve quadratic equations with real coefficients that have complex solutions.

A.REI.5c - (11) Use the method of completing the square to transform and solve any quadratic equation in x to an equation of the form $(x-p)^2 = q$ that has the same solutions.

A.SSE.3b - (11) Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.

F.IF.4* - (all) For a function that models a relationship between two quantities, interpret key features of expressions, graphs and tables in terms of the quantities, and sketch graphs showing key features given a description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.

F.IF.7a - (9/10) Graph linear, quadratic and absolute value functions and show intercepts, maxima, minima and end behavior.

F.IF.8b - (11) Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context.

A.CED.1 - (all) Apply and extend previous understanding to create equations and inequalities in one variable and use them to solve problems.

A.CED.2 - (all) Apply and extend previous understanding to create equations and inequalities in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

Vocab

Content: Complex Numbers Imaginary Numbers Conjugate Parabola Vertex Axis of Symmetry Solution Root Zero X-Intercept(s) Quadratic Formula Square Root Completing the Square Factoring Vertex Form

Academic: Solve Model Find Sketch Graph Simplify



Algebra II

Quadratics

I can

- *I can find the square root of an integer, using imaginary numbers when necessary.
- *I can add, subtract, and multiply complex numbers
- *I can find the conjugate of a complex number
- *I can solve quadratic equations
- *I can sketch a quadratic function's graph showing its key features
- *I can identify the key features of a graph of a quadratic function



Algebra II

Polynomials

Competencies

HS 2.2, HS 3.1

Resources

HMH, Desmos

Standards

A.APR.2 - (11) Factor higher degree polynomials; identifying that some polynomials are prime.

A.APR.3 - (11) Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number c , the remainder on division by $(x-c)$ is $p(c)$, so $p(c)=0$ if and only if $(x-c)$ is a factor of $p(x)$.

A.APR.4 - (9/10/11) Generate polynomial identities from a pattern. For example, difference of squares, perfect square trinomials, (emphasize sum and difference of cubes in grade 11).

F.IF.7e - (11) Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.

A.CED.1 - (all) Apply and extend previous understanding to create equations and inequalities in one variable and use them to solve problems.

A.CED.2 - (all) Apply and extend previous understanding to create equations and inequalities in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

Vocab

Content: Synthetic Division Fundamental Thm of Alg. Remainder Thm Conjugate Root Thm Factor Theorem Multiplicity Rational zero

Academic: Solve Identify Calculate Sketch Graph Determine Construct Classify



Algebra II

Polynomials

I can

- *I can use the Fundamental Theorem of Algebra to determine how many solutions a polynomial equation will have
- *I can use synthetic division to either factor a polynomial or determine that it is prime.
- *I can sketch a graph of a polynomial function that shows its zeros and end behavior
- *I can solve polynomial equations (that have two or fewer non-rational solutions)



Algebra II Rationals

Competencies

HS 2.2, HS 3.1

Resources

HMH, Desmos

Standards

A.A.APR.7 - (+) Add, subtract, multiply, and divide rational expressions.

A.REI.3a - (9/10/11) Solve rational, absolute value and square root equations.

F.IF.7f - (+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.

A.CED.1 - (all) Apply and extend previous understanding to create equations and inequalities in one variable and use them to solve problems.

A.CED.2 - (all) Apply and extend previous understanding to create equations and inequalities in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

Vocab

Content: Asymptote Domain restrictions Excluded values LCM

Academic: Simplify Solve Sketch Identify Determine



Algebra II Rationals

I can

- *I can add, subtract, multiply, and divide rational operations
- *I can solve rational equations
- *I can sketch the graph of simple rational functions



Algebra II Radicals

Competencies

HS 2.2, HS 3.1

Resources

HMH, Desmos

Standards

N.RN.2 - (11) Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents.

N.RN.3 - (11) Rewrite expressions involving radicals and rational exponents using the properties of exponents.

A.REI.3a - (9/10/11) Solve rational, absolute value and square root equations.

A.REI.4 - (11) Solve radical and rational exponent equations and inequalities in one variable, and give examples showing how extraneous solutions may arise.

F.IF.7b - (11) Graph square root, cube root, and exponential functions.

A.CED.1 - (all) Apply and extend previous understanding to create equations and inequalities in one variable and use them to solve problems.

A.CED.2 - (all) Apply and extend previous understanding to create equations and inequalities in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

Vocab

Content: Index Radicand Radix/Radical Sign Domain Restrictions Rational Exponents

Academic: Simplify Solve Graph Identify Determine Transform Convert



Algebra II Radicals

I can

- **I can explain rational exponent notation
- *I can convert between radicals and rational exponents
- *I can solve radical and rational exponent equations
- *I can graph square root and cube root functions.



Algebra II

Exponentials & Logarithms

Competencies

HS 2.2, HS 3.1

Resources

HMH, Desmos

Standards

F.IF.7b - (11) Graph square root, cube root, and exponential functions.

F.IF.7c - (11) Graph logarithmic functions, emphasizing the inverse relationship with exponentials and showing intercepts and end behavior.

F.BF.5 - (11) Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.

A.CED.1 - (all) Apply and extend previous understanding to create equations and inequalities in one variable and use them to solve problems.

A.CED.2 - (all) Apply and extend previous understanding to create equations and inequalities in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

Vocab

Content: Logarithm Natural Logarithm Common Logarithm "e" Euler's Number Asymptote

Academic: Simplify Solve Graph Convert Expand Condense Identify Determine Explain Compare Contrast Construct



Algebra II

Exponentials & Logarithms

I can

- *I can graph exponential functions
- *I can graph logarithmic functions
- *I can convert between exponential and logarithmic equations
- *I can solve basic exponential and logarithmic equations



Algebra II Functions

Competencies

HS 2.2, HS 3.1

Resources

HMH, Desmos

Standards

F.LQE.1 - F.LQE.1. Distinguish between situations that can be modeled with linear functions and with exponential functions.

F.LQE.2 - (11) Construct exponential functions, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

F.IF.1 - (all) Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x . The graph of f is the graph of the equation $y=f(x)$.

F.IF.2 - Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

F.IF.6 - (9/10/11) Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.

F.BF.1b - (11) Determine an explicit expression, a recursive function, or steps for calculation from a context.

F.BF.1c - (11) Compose functions.

F.BF.4 - Find inverse functions.

A.REI.9 - (9/10/11) Solve an equation $f(x) = g(x)$ by graphing $y = f(x)$ and $y = g(x)$ and finding the x -value of the intersection point. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.

A.CED.1 - (all) Apply and extend previous understanding to create equations and inequalities in one variable and use them to solve problems.

A.CED.2 - (all) Apply and extend previous understanding to create equations and inequalities in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.

Vocab

Content: Composition Inverse Function Notation Function Operations

Academic: Evaluate Determine Show Prove Find



Algebra II Functions

I can

- *I can determine whether a linear or exponential model is appropriate
- *I can construct an exponential function to model a situation
- *I can use function notation
- *I can evaluate a function at a given input
- *I can calculate average rate of change
- *I can construct a function to model a situation
- *I can compose functions
- *I can find the inverse of a function if it exists
- *I can solve an equation by graphing



Algebra II Statistics

Competencies

HS 5.1

Resources

HMH, Desmos

Standards

FS.ID.7 - (11) Compute (using technology) and interpret the correlation coefficient of a linear fit.

S.ID.8 - (11) Distinguish between correlation and causation.

Vocab

Content:

Academic:



Algebra II Statistics

I can

*I can find the correlation coefficient (Pearson product-moment correlation - i.e. Pearson's r) of a linear fit between two data sets.

*I can distinguish between correlation and causation