



Algebra 2 Level 1 - Unit 2 - Relations and Functions

Unit Focus

In this unit we move from working with single variables to multiple variables in equations. Functions and function notation will be the focus of this unit and every unit after this unit. Students will understand the concept of function, function notation, types of functions, transformations of functions, operations on functions, inverse functions and graphing functions. Students will be able to identify the domain and range of a function. Students should be able to work with functions in multiple representations: algebraic, graph and table of values.

Stage 1: Desired Results - Key Understandings

Standard(s)	Transfer	
Common Core Mathematics: 9-12 - Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions. (CCSS.MATH.CONTENT.HSA.CED.A.1) - Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales. (CCSS.MATH.CONTENT.HSA.CED.A.2) - Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context. (CCSS.MATH.CONTENT.HSA.CED.A.3) - For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. (CCSS.MATH.CONTENT.HSF.IF.B.4) - Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. (CCSS.MATH.CONTENT.HSF.IF.B.5) - Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. (CCSS.MATH.CONTENT.HSF.IF.C.8) - Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one	<i>Students will be able to independently use their learning to...</i> T1 model relationships among quantities. T2 draw conclusions about graphs, shapes, equations, or objects. T3 make sense of a problem, initiate a plan, execute it, and evaluate the reasonableness of the solution. T4 justify reasoning using clear and appropriate mathematical language.	
	Meaning	
	Understanding(s)	Essential Question(s)
	<i>Students will understand that...</i> U1 Mathematicians can describe patterns, relations, and/or functions to access strategies to solve problems. U2 Mathematicians use models to represent and make meaning of quantitative relationships. U3 Mathematicians analyze change and make predictions in various contexts.	<i>Students will keep considering...</i> Q1 How do you express and describe a pattern and use it to make predictions and solve a problem? Q2 How can change be described? Q3 How do I interpret this mathematical model?
	Acquisition of Knowledge and Skill	
	Knowledge	Skill(s)
	<i>Students will know...</i> K1 what a linear function is and different representations--verbally, graphically, numerically, and algebraically K2 the relationship between the slopes of parallel and perpendicular lines	<i>Students will be skilled at...</i> S1 graphing two variable equations and inequalities S2 writing linear equations in slope-intercept, point-slope, and standard forms S3 comparing parameters of two functions including those represented in a different way

Stage 1: Desired Results - Key Understandings

quadratic function and an algebraic expression for another, say which has the larger maximum. (CCSS.MATH.CONTENT.HSF.IF.C.9) • Write a function that describes a relationship between two quantities. (CCSS.MATH.CONTENT.HSF.BF.A.1) • Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $k f(x)$, $f(kx)$, 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. (CCSS.MATH.CONTENT.HSF.BF.B.3) • Reason abstractly and quantitatively. (CCSS.MATH.MP.2) • Model with mathematics. (CCSS.MATH.MP.4) • Attend to precision. (CCSS.MATH.MP.6) Madison Public Schools Profile of a Graduate • Analyzing: Examining information/data/ evidence from multiple sources to identify possible underlying assumptions, patterns, and relationships in order to make inferences. (POG.1.2) • Product Creation: Effectively use a medium to communicate important information. (POG.3.2)	K3 input, output can be swapped to find inverses through graphs, tables and algebraically K4 what an absolute value function is and different representations--verbally, graphically, numerically, and algebraically K5 how the parameters of the equations of an absolute value function transformations the parent function K6 the horizontal line test to determine if a function is one-to-one K7 Vocabulary: domain, range, input, output, constraint, relation, function, inverse function, interval notation, inequalities, piecewise, parent functions	S4 identifying the slope (unit rate of change) and y-intercept S5 given a graph writing the equation and vice versa S6 given a problem statement, writing the equation (and solve if appropriate) S7 determining the domain and range from a graph S8 determining solutions from a graph S9 evaluating functions given the input or output S10 identifying direct, inverse and joint variation S11 solving linear systems of 2 and 3 variables using substitution, elimination and/or graphing S12 modeling using a system of linear equations S13 using linear program to solve application problems S14 determining the domain of a function S15 analyzing graphs of functions (domain, range, intercepts, continuous, symmetry, increasing, decreasing) S16 graphing piecewise functions from the equations S17 determining the equations from a piecewise graph S18 algebraically writing inverse functions S19 recognizing parent functions and transform them S20 composing a new function by $f(g(x))$ and $g(f(x))$ S21 using inverse of a function to determine the range of a function
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