Unit #2: Functions

Content Area: **Math**
Course(s):
Time Period: **October**
Length: **5 weeks**
Status: **Published**

State Mandated Topics Addressed in this Unit

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N/A	N/A

Functions

Learning Objectives

- Objective 1 - Understand that a function has one member of the domain assigned to exactly one element of the range.
- Objective 10 - Explain why the solution of f(x)=g(x) is the x coordinate of their intersection. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions. ★
- Objective 11 - Find the solutions approximately using technology to graph the function or create a table of values.
- Objective 12 - 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. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.
- Objective 13 - Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
- Objective 14 - Represent solutions of equations, inequalities, and systems to real-world applications.
- Objective 15 - Interpret solutions as viable based on the constraints of the application.
- Objective 16 - Determine the rate of change given a graph and 2 points.
- Objective 17 - Understand Domain and Range.
- Objective 18 - Understand Relations and Functions.
- Objective 19 - Understand arithmetic and geometric sequences
- Objective 2 - F(x) denotes the output of f corresponding to the input of x.
- Objective 3 - The graph of f is the graph of y=f(x)
- Objective 4 - Use function notation, evaluate functions for inputs in their domains.
- Objective 5 - Interpret statements that use function notations in terms of context
- Objective 6 - Relate the domain of a function to its graph and, where applicable, to the quantitative

relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.

- Objective 7 - 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 quadratic function and an algebraic expression for another, say which has the larger maximum.
- Objective 8 - Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane.
- Objective 9 - Understand that the solution set to an equation in two variables often forms a curve (which could be a line).

Essential Skills

- Essential Skill 1 - The artist will be able to understand that a function has one member of the domain assigned to exactly one element of the range. F(x) denotes the output of f corresponding to the input of x. The graph of f is the graph of y=f(x)
- Essential Skill 10 - The artist will find the solutions approximately using technology to graph the function or create a table of values. *Include f(x) & g(x) that are linear, polynomial, rational, absolute value, exponential, and logarithmic*
- Essential Skill 11 - The artist will be able to represent solutions of equations, inequalities, and systems to real-world applications.
- Essential Skill 12 - The artist will be able to interpret solutions as viable based on the constraints of the application. Example: cannot have negative time
- Essential Skill 13 - The artist will be able to find the average rate of change given 2 points on a graph.
- Essential Skill 14 - The artist will be able to identify if the relation is a function.
- Essential Skill 15 - The artist will be able to locate the domain and range in the coordinate plane.
- Essential Skill 2 - The artist will be able to use function notation to evaluation functions for inputs in their domain.
- Essential Skill 3 - The artist will interpret statements that use function notations in terms of context.
- Essential Skill 4 - The artist will relate the domain of a function its graph.
- Essential Skill 5 - The artist will be able to relate the domain of a function to the quantitative relationship that it describes.
- Essential Skill 6 - Artists will compare properties of two functions represented differently (algebraically, graphically, numerically, verbally). Example: given a graph of a quadratic and algebraic expression, say which has the larger maximum.
- Essential Skill 7 - Artists will be able to understand that the graph of an equation in two variables is the set of all of its solutions plotted in the coordinate plane.
- Essential Skill 8 - Artists will be able to understand that the solution set to an equation in two variables often forms a curve (which could be a line).
- Essential Skill 9 - Artists will be able to explain why the solution of f(x)=g(x) is the x coordinate of their intersection.
- Essential Skills 16 - The artist will be able to identify arithmetic and geometric sequences

Standards

MA.F-IF.A.3	Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers.
MATH.9-12.F.BF.A.2	Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.
MA.F-IF.B.5	Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.
MATH.9-12.F.BF.B.4	Find inverse functions.
MA.F-IF.C	Analyze functions using different representations
MA.F-IF.C.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases. For example, $f(x) = 2x^3$ or $f(x) = (x + 1)/(x - 1)$ for $x \neq 1$.
MA.F-IF.C.7a	Graph linear and quadratic functions and show intercepts, maxima, and minima.
MATH.9-12.A.CED.A.3	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.
MATH.9-12.F.IF	Interpreting Functions
MATH.9-12.F.IF.A.1	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 $y = f(x)$.
MATH.9-12.F.IF.A.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.
MATH.9-12.A.REI.A.1	Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.
MA.F-BF.A.1	Write a function that describes a relationship between two quantities.
MATH.9-12.F.IF.C.7	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.
MATH.9-12.A.REI.C.5	Prove that, given a system of two equations in two variables, replacing one equation by the sum of that equation and a multiple of the other produces a system with the same solutions.
MATH.9-12.F.IF.C.7.a	Graph linear and quadratic functions and show intercepts, maxima, and minima.
MATH.9-12.A.REI.D.10	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).
MATH.9-12.A.REI.D.11	Explain why the x-coordinates of the points where the graphs of the equations $y = f(x)$ and $y = g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where $f(x)$ and/or $g(x)$ are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.
MATH.9-12.F.IF.C.9	Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

Instructional Tasks/Activities

- Activity 1 - Ladder Activity
- Activity 10 - worksheet and practice graphing discrete functions
- Activity 11 - Domain and range of continuous functions

- Activity 12 - Review and quiz on intro to relations and functions
- Activity 2 - Academic games & Competitions
- Activity 3 - Worksheets
- Activity 4 - Formative Assessments
- Activity 5 - Arts inspired projects
- Activity 6 - Notes
- Activity 7 - Worksheet on Relations and Functions
- Activity 8 - Worksheet on Domain and Range
- Activity 9 - Review and practice domain and range / ordered pairs
- Carnegie Learning MATHbook
- Complete notes and examples
- Guided practice
- Makeup quiz/ makeup assignments/ complete assignments/ extra credit work
- QUIZIZZ activity (domain and range of continuous functions)
- Review Midterm
- rewrite F(x) = y as an ordered pair (x,y)
- Worksheet on domain and range of continuous functions
- Worksheet on function notation (for continuous functions)
- Worksheet on function notation (for discrete functions)

Assessment Procedure

- Classroom Total Participation Technique
- Classwork
- DBQ
- Essay
- Exit Ticket/Entrance Ticket/Do Now
- Journal / Student Reflection
- Kahoot
- Online based assessment
- Other named in lesson
- Peer Review
- Performance
- Problem Correction
- Project
- Quiz
- Quiz review
- Rubric
- Teacher Collected Data

- Test
- Worksheet

Recommended Technology Activities

- Appropriate Content Specific Online Resource
- Chromebook
- Gimkit
- GoGuardian
- Google Classroom
- Google Docs
- Google Forms
- Google Slides
- Kahoot
- MagicSchool AI
- MATHia
- Other- Specified in Lesson
- Quizizz
- Screencastify

Accommodations & Modifications & Differentiation

Accommodations and Modifications should be used to meet individual needs. Their IEP and 504 plans should be used in addition to the following suggestions.

Gifted and Talented

- Compare & Contrast
- Conferencing
- Debates
- Jigsaw
- Peer Partner Learning
- Problem Solving
- Structured Controversy
- Think, Pair, Share
- Tutorial Groups

Instruction/Materials

- alter format of materials (type/highlight, etc.)
- color code materials
- eliminate answers
- extended time
- large print
- modified quiz
- modified test
- Modify Assignments as Needed
- Modify/Repeat/Model directions
- necessary assignments only
- Other (specify in plans)
- other- named in lesson
- provide assistance and cues for transitions
- provide daily assignment list
- read class materials orally
- reduce work load
- shorten assignments
- study guide/outline
- utilize multi-sensory modes to reinforce instruction

Environment

- alter physical room environment
- assign peer tutors/work buddies/note takers
- assign preferential seating
- individualized instruction/small group
- modify student schedule (Describe)
- other- please specify in plans
- provide desktop list/formula

Honors Modifications

Resources

- Resource 1- www.Khanacademy.com

- Resource 2 - Algebra 1 - McGraw-Hill 2003
- Resource 3 - Carnegie Learning