02 Function Foundations

Content Area: **Math**
Course(s):
Time Period: **Full Year**
Length: **2 - 3 weeks**
Status: **Published**

General Overview, Course Description or Course Philosophy

This unit will focus on strengthening the prerequisite skills and conceptual understanding needed to graph functions and identify key components of a function. Lesson activities will reinforce new content and address common misconceptions and errors to support students' progress toward analyzing functions.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Objectives/Enduring Understandings:

- Functions represent a one to one or many to one mapping of the domain into the range.

Essential Questions:

- What makes a relation a function?
- What characteristics and properties do all function have in common?
- What characteristics differ for some functions?

STUDENT LEARNING TARGETS

Declarative Knowledge

Students will understand that:

- Functions can be represented graphically, precisely (with technology) or in sketch (by hand)
- Function notation denotes independent and dependent variables (input/output)
- Precision of language and terminology (function, domain/range, odd/even etc) aids fluency in concept

attainment.

- Operations can be performed with the set of functions
- Functions can move in directions, become stretched or compressed and reflect over an axis, all of which has a specific effect on the original parent function.

Procedural Knowledge

Students will be able to:

- Determine if a graph represent a function by using the vertical line test
- Determine if a graph represents a function by using algebra
- Determine the domain and range of a function visually
- Determine the domain of a function by using algebra
- Determine the maximum/minimum values of a graph by inspection
- Determine if a graph is odd, even or neither by inspecting the graph and by performing algebra to the equation
- Analyze and graph piecewise functions
- Evaluate functions graphically and algebraically
- Perform operations with functions
- Graph the the line y = x and use it graph an inverse function
- Find the inverse of a function algebraically
- Apply transformations (vertical/horizontal shifts, compression/stretches) to graph functions

CONTENT AREA STANDARDS

MA.F-BF.B.3	Identify the effect on the graph of replacing $f(x)$ by $f(x) + k$, $kf(x)$, $f(kx)$, 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.
MA.F-BF.B.4a	Solve an equation of the form $f(x) = c$ for a simple function f that has an inverse and write an expression for the inverse.
MA.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 $y = f(x)$.
MA.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.
MA.F-IF.B.4	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.
MA.F-IF.B.6	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.
MA.F-IF.C.7a	Graph linear and quadratic functions and show intercepts, maxima, and minima.

MA.F-IF.C.7b	Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

CS.K-12.3.a	Identify complex, interdisciplinary, real-world problems that can be solved computationally.
CS.K-12.3.b	Decompose complex real-world problems into manageable sub-problems that could integrate existing solutions or procedures.
CS.K-12.3.c	Evaluate whether it is appropriate and feasible to solve a problem computationally.
LA.K-12.NJSLSA.R7	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
TECH.9.4.12.IML.3	Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8).
TECH.9.4.12.IML.4	Assess and critique the appropriateness and impact of existing data visualizations for an intended audience (e.g., S-ID.B.6b, HS-LS2-4).
TECH.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
TECH.K-12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.

EVIDENCE OF LEARNING

Formative Assessments

- Student feedback/questioning/observation
- Error analysis
- Specific skill assessment/questions
- Survey/polling
- Task completion and review of quizzes and material presented in the Algebra II class

Summative Assessments

There will be no formal assessments in this course.

RESOURCES (Instructional, Supplemental, Intervention Materials)

Desmos Activities:Identifying Functions, Explore domain and range, Odd and even symmetry, Linear

Equations - Collection of Activities, Inverse functions Transformations of Functions

Kuta Software worksheets

Approved course textbook

INTERDISCIPLINARY CONNECTIONS

Interdisciplinary connections are frequently addressed through modeling and application problems whereby students solve and analyze situations taken from business, physics, engineering, biology, statistics, geography, and numerous other fields. Examples can be found in topic specific textbook problems and digital resources.

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.