# 04 An Introduction to Functions

Content Area: **Mathematics**
Course(s):
Time Period: **Week1**
Length: **5 Weeks**
Status: **Published**

## Stage 1: Desired Results

## Unit Overview/ Rationale

A function is a relationship between variables in which each value of the input variable is associated with a unique value of the output variable. ⬚Functions can be represented in a variety of ways , such as graphs, tables, equations, or words. ⬚Each representation is particularly useful in certain situations.⬚ A function that models a real-world situation can be used to make estimates or predictions about future occurrences.

## Standards & Indicators

| | |
|---|---|
| MA.9-12.N-Q.A | Reason quantitatively and use units to solve problems. |
| MA.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). |
| MA.9-12.N-Q.A.1 | Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. |
| MA.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. |
| MA.9-12.N-Q.A.2 | Define appropriate quantities for the purpose of descriptive modeling. |
| MA.9-12.F-BF.A.1a | Determine an explicit expression, a recursive process, or steps for calculation from a context. |
| MA.9-12.F-IF.B | Interpret functions that arise in applications in terms of the context |
| MA.9-12.F-BF.A.1c | Compose functions. |
| MA.9-12.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.9-12.F-IF.B.5 | Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. |
| MA.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). |
| MA.9-12.F-LE.A.2 | Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table). |
| MA.9-12.A-SSE.A.1 | Interpret expressions that represent a quantity in terms of its context. |
| MA.9-12.A-SSE.A.1a | Interpret parts of an expression, such as terms, factors, and coefficients. |
| MA.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. |
| MA.9-12.A-SSE.A.1b | Interpret complicated expressions by viewing one or more of their parts as a single entity. |

## Big Ideas - Students will understand that...

-A function can be used to represent the relationship between two quantities as they change. ⏹These realtionships can be represented with words, tables, equations and graphs.

-The value of one variable may be uniquely determined by the value of another variable.⏹

## Essential Questions - What provocative questions will foster inquiry and transfer of learning

-How can you represent and describe functions?

-What relationships are found between variables?

## Content - Students will know...

Key Vocabulary:

continuous graph,dependent variable,dependent variable,⏹discrete graph, domain, range, function, function notation, linear function, non linear function, relation, sequence, input, output, vertical line test, arithmetic sequence

## Skills - Students will be able to...

-Use graphs to visually represent the relationship between two variable quantities as they change. ⍰

-Understand that the value of one variable may be uniquely determined by the value of another variable. ⍰

-Use words, tables, equations, sets of order pairs and graphs to represent relationships.⍰

-Analyze sequences and determine a rule to find the nth term

## Stage 2: Assessment Evidence

## Assessment

## Stage 3: Learning Plan

## Learning Activities

Objective: ⍰To represent mathematical relationships using graphs. ⍰

Activity: ( 1 day)

⍰Students will be given different graphs. ⍰They will read the titles, describe how the variables on the axes are related. ⍰ Use key words to describe the relationship between the variables. Example ( rises quickly, stops rising, falls quickly/slowly)

Check for understanding:

⍰Students will match tables to graphs and or sketch a graph given a situation ( hours of daylight each day over the course of one year)

Objective: To identify and represent patterns that describe linear functions.

Activity: ( 2 days)

Given a picture, graph, table or list, students will describe the linear pattern in words, an equation and / or graph. Students will classify relations as functions and/or linear functions.

Check for Understanding

: Students will graph a set of ordered pairs, describe the pattern shown in the graph, determine if it is a function.

Objective: To identify and represent patterns that describe nonlinear functions.

Activity: ( 2 days)

Given a picture, graph, table or list, students will justify why the relation is a function, classify the function as linear or non-linear, graph the function and/or match the function with an equation.

Check for Understanding:

Students will come up with an example of a non-linear function and an example of a non-linear relation that is not a function.

Objective: to graph equations that represent functions

Activity: ( 1 day)

Students will use a table and an equation to make continuous and discrete graphs of linear and non linear functions.

Check for Understanding:

Students will describe a relation that can be represented by a discrete graph.

Objective: Students will write equations that represent functions.

Activity: (1 day)

Students will be given a word problem, they will:

use text rendering to find key information, define the variables, write an equation, and use the equation to solve.

Check for Understanding:

A worker has dug 3 holes for fence posts. It will take 15 min to dig each additional hole. Your friend write the rule = =15n+3 for the time t, in minutes, required to dig n additional holes. Describe and correct your friend's error.

Objective:

To determine whether a relation is a function. To find the domain and range and use function notation.

Activity:

Students will formally define the terms: relation, domain and range. Students will use mapping diagrams to determine if a relation is a function. Given a graph students will use the vertical line test to determine if a relation is a function. Students will evaluate functions given an input value. Example: $f(3)=?$

Check for Understanding

: Given a set of ordered pairs and/or graph determine if the relation is a function. Evaluate the value of a function given an input.

Objective:

To identify and extend patterns and sequences and to represent arithmetic sequences using function notation.

Learning Activity:

students will be given a sequence and must find the next terms in the sequence. Given a pattern, students will write the function that represents the sequence. Students will use the function to find the nth term.

Check for Understanding:

Given two sequences, determine if it is arithmetic if it is write the rule for the sequence.

## Resources

Pearson Algebra 1c. 2012

Chapter 4 - An Introduction to Functions