

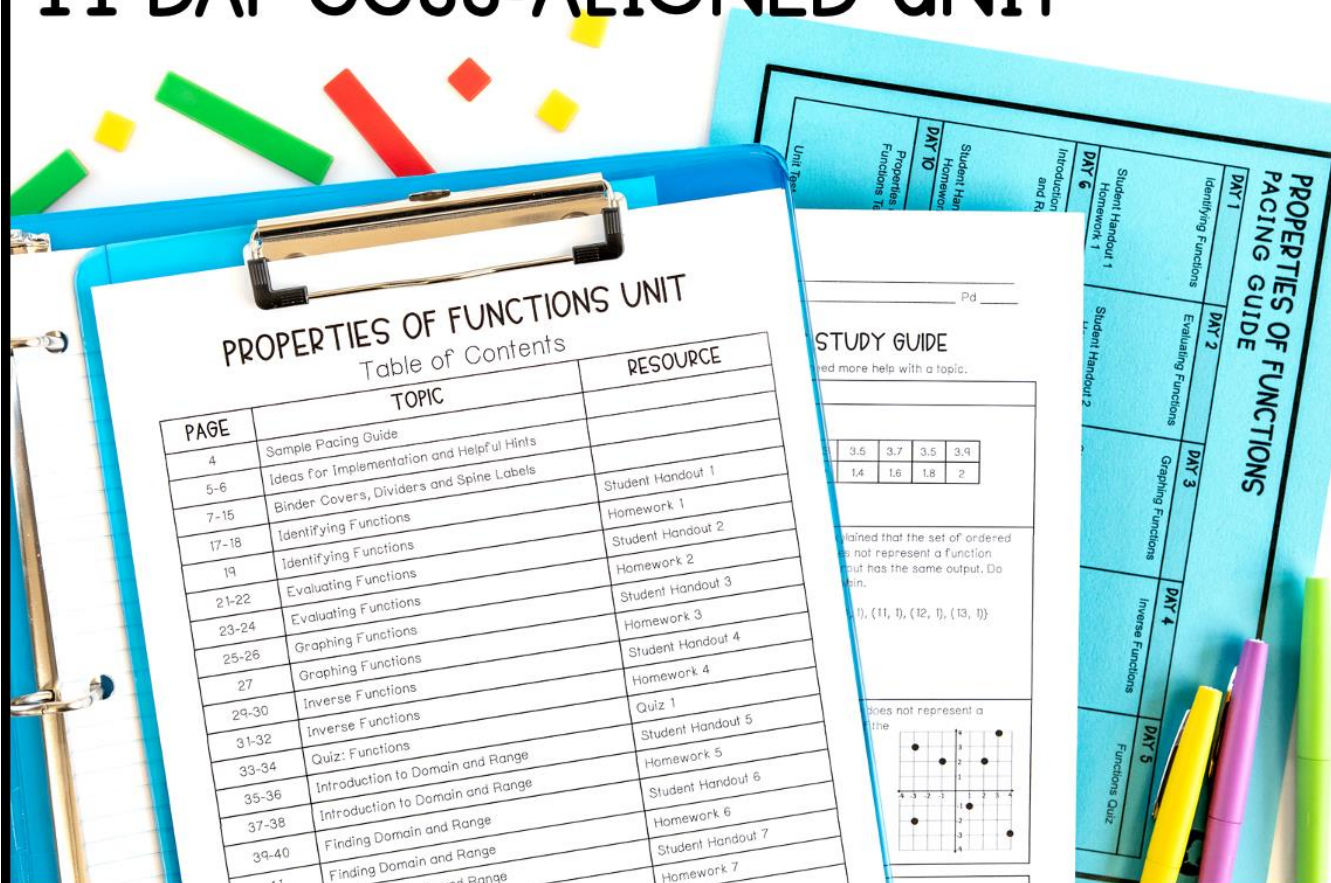
learning focus:

- ✓ identify, evaluate, and graph functions in mathematical and real-world situations
- ✓ find the inverse of a function
- ✓ find the domain and range of functions and relate the domain of a function to its graph

PROPERTIES OF FUNCTIONS UNIT

11 DAY CCSS-ALIGNED UNIT

**ALG
1**



A MANEUVERING THE MIDDLE® RESOURCE

PROPERTIES OF FUNCTIONS

**ALG
1**

an 11 day CCSS-aligned unit

CCSS: N.Q.1, F.IF.1, F.IF.2, F.IF.5, F.IF.7b, F.BF.4, F.LE.5

**ready-to-go, scaffolded
student materials**

PROPERTIES OF FUNCTIONS UNIT

Table of Contents

PAGE	TOPIC	RESOURCE
4	Sample Pacing Guide	
5-6	Ideas for Implementation and Helpful Hints	
7-15	Binder Covers, Dividers and Spine Labels	
17-18	Identifying Functions	Student Handout 1
19	Identifying Functions	Homework 1
21-22	Evaluating Functions	Student Handout 2
23-24	Evaluating Functions	Homework 2
25-26	Graphing Functions	Student Handout 3
27	Graphing Functions	Homework 3
29-30	Inverse Functions	Student Handout 4
31-32	Inverse Functions	Homework 4
33-34	Quiz: Functions	Quiz 1
35-36	Introduction to Domain and Range	Student Handout 5
37-38	Introduction to Domain and Range	Homework 5
39-40	Finding Domain and Range	Student Handout 6
41	Finding Domain and Range	Homework 6
43-44	Applying Domain and Range	Student Handout 7
45-46	Applying Domain and Range	Homework 7
47-48	Quiz: Domain and Range	Quiz 2
49-52	Properties of Functions Study Guide	Review
53-56	Properties of Functions Unit Test	Test

©Maneuvering the Middle LLC, 2020

PROPERTIES OF FUNCTIONS

**ALG
1**

an 11 day CCSS-aligned unit

CCSS: N.Q.1, F.IF.1, F.IF.2, F.IF.5, F.IF.7b, F.BF.4, F.LE.5

student friendly + real-world application

multiple representations

Unit: Properties of Functions
Student Handout 2

Name _____
Date _____ Pd _____

EVALUATING FUNCTIONS

Evaluating functions can be compared to a "machine" where each input (x) in the machine follows a rule to produce its output called $f(x)$. Two "machine" functions are given below. Use the given input values and function rule to find the output values.

A. $x \rightarrow 2x \rightarrow f(x)$
 $5 \rightarrow 2x \rightarrow$
 $-3 \rightarrow 2x \rightarrow$

B. Evaluate the functions.

4. Find $f(3)$.
 $f(x) = \frac{1}{2}(x - 6) - \frac{5}{2}$

5. Given $h(x) = 5(x + 3)^2$, what is the value of $h(-5)$?

6. If $g(x) = 3(x^2 - 1) + 7$, what is the value of $g(-7)$?

7. Given the function, $f(x) = x^2 + 10$ what values of x will yield a negative output? Explain.

9. The graph of $y = f(x)$ is shown below.

11. Malcolm is shooting a free throw. The function $h(t)$, where $h(t)$ is the height of the ball has left Malcolm's hands. The graph is shown below.

For $p(x)$ in question 3, is there a value of x such that $p(x) = 0$?

FUNCTION NOTATION
 f is the name of the function
 $f(x)$
 x is the input

EVALUATING FUNCTIONS
 • To evaluate $f(x) = 3x + 2$, write $f(5) = 3(5) + 2 = 15 + 2 = 17$.

Unit: Properties of Functions
Homework 2

Name _____
Date _____ Pd _____

EVALUATING FUNCTIONS

Five functions are given below. Use the functions to answer the questions 1 - 6. Show your work.

$f(x) = 14 - 3x$
 $h(t) = \frac{5}{4}(4 - t)$
 $r(x) = \frac{x + 13}{x - 3}$
 $g(x) = 4(x - 5) + x^2$
 $p(x) = (x + 7)^2 - 15$

1. Find $h(-8)$.
 2. What is the value of $g(-3)$?
 3. Find $f(10)$.

4. Evaluate the following.
 $g(5) =$
 $p(5) =$

5. Evaluate the following.
 $r(-9) =$
 $f(-9) =$

6. What value of x cannot be evaluated in the function $r(x)$?

Evaluate the functions. Show your work.

7. The graph of $y = g(x)$ is shown below. Find $g(-15)$.

8. Tonya is cutting square frame mats to frame several square photographs. She can determine the area of the mat from the function $m(x) = x^2 + 6x + 9$, where x is the length in inches of the side of the photograph and $m(x)$ represents the area of the mat. Find the area of the mat given a photograph with a side length of 4.6 inches.

Summarize today's lesson:

higher-level analysis

PROPERTIES OF FUNCTIONS

**ALG
1**

an 11 day CCSS-aligned unit

CCSS: N.Q.1, F.IF.1, F.IF.2, F.IF.5, F.IF.7b, F.BF.4, F.LE.5

**streamline your planning process
with unit overviews**

PROPERTIES OF FUNCTIONS OVERVIEW

STANDARDS

N.Q.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.

F.IF.1 Understand that a function from one set (the domain) to another set (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

F.IF.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes.

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

F.BF.4 Find inverse functions. a. 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.

F.LE.5 Interpret the parameters...

BIG IDEAS

- Functions are specific relations
- Functions have domains and intervals.
- Functions can be evaluated
- Inverse functions interchange

ESSENTIAL QUESTION

- What are some different ways...
- How is evaluating a function...
- When should domain and range...
- How can you determine a function...

✓ key vocabulary

✓ vertical alignment

sample
pacing
calendar

PROPERTIES OF FUNCTIONS PACING GUIDE

DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
Identifying Functions	Evaluating Functions	Graphing Functions	Inverse Functions	Functions Quiz
Student Handout 1 Homework 1	Student Handout 2 Homework 2	Student Handout 3	Student Handout 4	
DAY 6	DAY 7			
Introduction to Domain and Range	Finding Domain and Range			
Student Handout 5 Homework 5	Student Handout 6 Homework 6			
DAY 10	NOTES			
Properties of Functions Test				
Unit Test				

PROPERTIES OF FUNCTIONS OVERVIEW

TOPIC	TEACHING TIPS
Identifying Functions	<ul style="list-style-type: none"> • Understanding non-examples of functions is important to recognizing examples of functions, so spend time discussing and creating examples of both. • Students often think that all equations represent functions, so challenge students to see if they can discover an equation where an input would result in more than one output. Show students the equation $y^2 = x^2$ and discuss how certain input values would yield more than one output (an input of 25 would have an output of 5 and -5).
Evaluating Functions	<ul style="list-style-type: none"> • Don't rush past the details of "function notation" which will be new for students. Have the students say out loud the meaning of "$f(x)$" with given values of x. For example, when asked what finding $f(7)$ means, a student might say "finding $f(7)$ means finding the output value of the function when the input value is 7". This helps to clarify that $f(7)$ does not represent multiplication of the variable f by 7. • Remind students to be careful when evaluating for a negative value, students can often make mistakes because of integer sign rules.
Inverse Functions	<ul style="list-style-type: none"> • As you teach the inverse function notation, note to students that $f^{-1}(x)$ does not mean "f to the negative one power". Students may confuse this notation and think the inverse function is $\frac{1}{f(x)}$. • Highlight how the input and output of a function and its inverse are related. Use this as an opportunity to extend the lesson on evaluating functions. • Consider having students graph a function and its inverse. An inverse function will be a reflection over the line $y = x$.

teaching
ideas

PROPERTIES OF FUNCTIONS

ALG
1

an 11 day CCSS-aligned unit

CCSS: N.Q.1, F.IF.1, F.IF.2, F.IF.5, F.IF.7b, F.BF.4, F.LE.5

unit study guide + assessments



quizzes



editable unit test

Unit: Properties of Functions
Quiz 1

Name _____ Pd _____
Date _____ Pd _____

QUIZ: FUNCTIONS

Show all work as you answer each question below. Record your solutions in the box at the right.

1. Which set of ordered pairs demonstrates a function?

a. $\{(6, 4), (2, 3), (9, -1), (0, 0), (6, -4)\}$
b. $\{(-5, 1), (-5, 8), (-5, -2), (-5, -5), (-5, -8)\}$
c. $\{(-2, 3), (0, 3), (5, 3), (8, 3), (12, 3)\}$
d. All of the above

Answers
1. _____
2. _____
3. _____

Unit: Properties of Functions
Review

Name _____ Pd _____
Date _____ Pd _____

PROPERTIES OF FUNCTIONS STUDY GUIDE

Solve each problem below. Be sure to ask questions if you need more help with a topic.

I CAN DECIDE WHETHER RELATIONS DEFINE A FUNCTION.

1. Describe whether each table represents a function.

a.

x	9.2	9.4	9.6	9.8
y	6	8	10	12

2. The mapping below represents a function. Give an example of an ordered pair added to the mapping would no longer represent a function.

X Y

4. State whether each graph represents a function.

a.

b.

I CAN EVALUATE FUNCTIONS GIVEN E

6. Given $f(x) = 5(2 - x)$, evaluate the function.

a. $f(7) =$ _____
b. $f(-6) =$ _____

ALGEBRA 1 CURRICULUM

PROPERTIES OF FUNCTIONS

UNIT TWO: ANSWER KEY

©MANEUVERING THE MIDDLE, 2020

answer keys
included

