

learning focus:

- ✓ determine the domain and range of linear and quadratic functions
- ✓ decide whether relations define a function
- ✓ evaluate functions given elements in their domain

PROPERTIES OF FUNCTIONS UNIT

10 DAY TEKS-ALIGNED UNIT



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DAY	TOPIC
DAY 1	Identifying Functions
DAY 2	Evaluating Functions
DAY 3	Graphing Functions
DAY 4	Functions Quiz
DAY 5	Domain and Range

NAME	DATE	PD

x	3.3	3.5	3.7	3.5	3.9
y	1.2	1.4	1.6	1.8	2

Graph below does not represent a function. List one of the ordered pairs that would have to be added to the graph to make it a function.

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a 10 day TEKS-aligned unit

TEKS: A.2A, A.6A, A.12A, A.12B

ready-to-go, scaffolded
student materials

PROPERTIES OF FUNCTIONS UNIT

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a 10 day TEKS-aligned unit
TEKS: A.2A, A.6A, A.12A, A.12B

student friendly + real-world application

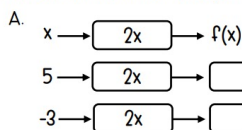
multiple representations

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.



FUNCTION NOTATION

f is the name of the function

x is the _____

EVALUATING FUNCTIONS

- To evaluate $f(x) = 3x + 5$, write $f(5) = 3(5) + 5 = 20$.

Evaluate the following functions.

1. $f(x) = 6(x + 9)$

a. $f(4) =$

b. $f(-6) =$

2. $g(x) = 2x - 7$

a. $g(1) =$

b. $g(-3) =$

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

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.

$f(-4) =$

11. Malcolm is shooting a free throw. The function $h(t)$, where $h(t)$ is the height of the ball in feet and t is the time in seconds, is shown below.

Summarize today's lesson:

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.

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higher-level analysis

PROPERTIES OF FUNCTIONS



a 10 day TEKS-aligned unit
TEKS: A.2A, A.6A, A.12A, A.12B

streamline your planning process with unit overviews

PROPERTIES OF FUNCTIONS OVERVIEW	
STANDARDS	
READINESS	SUPPORTING
<p>A.6A determine the domain and range of quadratic functions and represent the domain and range using inequalities</p> <p>A.2A determine the domain and range of a linear function in mathematical problems; determine reasonable domain and range values for real-world situations, both continuous and discrete; and represent domain and range using inequalities</p>	<p>A.12A decide whether relations represented verbally, tabularly, graphically, and symbolically define a function</p> <p>A.12B evaluate functions, expressed in function notation, given one or more elements in their domains</p>

✓ key vocabulary
✓ vertical alignment

sample pacing calendar

- DIG IDEAS**
- Functions are specific relations.
 - Functions have domains and intervals.
 - Functions can be evaluated.
- ESSENTIAL QUESTIONS**
- What are some different ways to represent a function?
 - How is evaluating a function different from finding a function value?
 - When should domain and range be considered?
 - How can you determine a function's domain and range?

PROPERTIES OF FUNCTIONS PACING GUIDE				
DAY 1	DAY 2	DAY 3	DAY 4	DAY 5
Identifying Functions	Evaluating Functions	Graphing Functions	Functions Quiz	Introduction to Domain and Range
Student Handout 1 Homework 1	Student Handout 2 Homework 2	Student Handout 3 Homework 3	Student Handout 4 Homework 4	Student Handout 5 Homework 5
DAY 6	DAY 7			
Finding Domain and Range	Applying Domain and Range			
Student Handout 5 Homework 5	Student Handout 6 Homework 6			
NOTES				

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.
Domain and Range	<ul style="list-style-type: none"> • If students are struggling to remember domain vs range, it may help to point out that "domain" comes before "range" in the alphabet, just like "x" comes before "y". • When looking at a graph, have students highlight the domain and range on the actual x and y-axis, reinforcing that each axis is essentially a horizontal or vertical number line. Consider using a different color for the domain and the range to better distinguish the two. • Teach students to systematically look from left to right for domain and from bottom to top for range. If students really struggle, they can use notecards to block off extraneous parts of the graph. The notecard will cross the x and y-axis to represent the domain and range. • Consider using this activity as great visual practice for finding domain and range: https://teacher.desmos.com/activitybuilder/custom/57d6b323d5b6478408b8748b • This website suggests using the acronym "DIXROY" (domain, input, x-values, range, output, y-values): https://www.shmoop.com/common-core-standards/ccss-hs-f-if-1.html

teaching ideas

PROPERTIES OF FUNCTIONS



a 10 day TEKS-aligned unit
TEKS: A.2A, A.6A, A.12A, A.12B

unit study guide + assessments

✓ quizzes

✓ editable unit test

Unit: Properties of Functions
Quiz 1

Name _____
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. _____

2. If $h(x) = 7(x + 3)^2 - 14x$, what is the value of $h(2)$?

a. 329 b. 287

3. Which ordered pair would cause the graph at the right to no longer be a function?

a. $(-2, 2)$ b. $(-3, 3)$
c. $(1, 3)$ d. $(4, -1)$

4. Which of the tables represents a function?

TABLE A

x	-0.5	6.2	1.5
y	2	0.9	1.7

TABLE B

x	-16	32	14
y	0.25	19	8.7

- a. Table A only
b. Table B only
c. Both table A and table B
d. Neither table A nor table B

Unit: Properties of Functions
Review

Name _____
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. A.12A

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 that, if 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 ELEMENTS OF THE FUNCTION.

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

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answer keys included