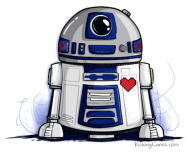


review

$f(x) = x + 4$ a) $f(-10) = \square$? $f(-10) = x+4$ $= (-10)+4 = -6$ ✓ (x given, find y)

b) $f(x) = 6$ (find x, given y) $f(x) = x+4$ $6 = x+4$ $-x \quad -x$ $2 = x$ ✓

p316

Functions Lesson #3:
Function Notation - Part Two

Graphing a Function

Consider the function $f(x) = 3x + 1$. The values of x represent the inputs and make up the domain of the function. The values of $f(x)$ represent the outputs and make up the range of the function.

OR y

In previous lessons, we have used y to represent the outputs and the range of a relation. We can therefore write the function $f(x) = 3x + 1$ in x-y notation as $y = 3x + 1$.

The function $f(x) = 3x + 1$ can be written in x-y notation as shown.

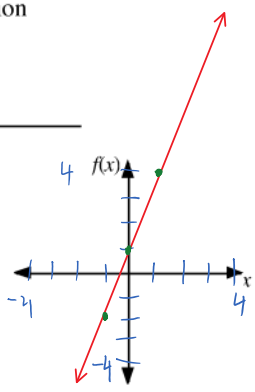
Function notation	x-y notation
$f(x) = 3x + 1$	$y = 3x + 1$

- Values of the independent variable represent the **inputs** of a function and are shown on the **horizontal axis**.
- Values of the dependent variable represent the **outputs** of a function and are shown on the **vertical axis**.

Use a ~~graphing calculator~~ table of values to sketch the graph of the function $f(x) = 3x + 1$.

x	y OR f(x)
−1	−2
0	1
1	4

$y = 3(-1)+1 =$
$y = 3(0)+1 =$
$y = 3(1)+1 =$



a) In each case, express the relation given in function notation as an equation form in two variables.

i) $f(x) = 7x - 23$ → $y = 7x - 23$ ✓

ii) $g(t) = t^2 - 2t + 35$ → $y = t^2 - 2t + 35$ ✓

b) Express the relation $y = 11x - 15$ in function notation.

$f(x) = 11x - 15$ ✓

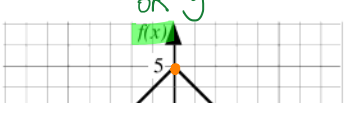
c) The graph of the function defined by $y = f(x)$ has equation $y = 4 - 3x$. Express the equation in function notation.

$f(x) = 4 - 3x$ ✓

given x find y

The graph of a function f is shown.

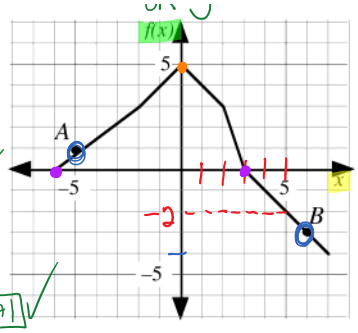
OR y



a) Complete

Class Ex. #3

The graph of a function f is shown.



a) Complete

i) $f(5) =$ -2 **ii)** $f(-2) =$ 3 **iii)** $f(4) =$ -1

b) Write the ordered pairs associated in **a)**.

i) (5, -2) **ii)** (-2, 3) **iii)** (4, -1)

c) State the value(s) of x if

i) $f(x) = -1$ $y = -1$ $x = 4$ **ii)** $f(x) = 3$ $x = -2, +2$ **iii)** $f(x) = 4$ $x = -1, +1$

d) Use the notation in **a)** to make a statement about the points A and B on the graph.

function notation: (A) $f(-5) = 1$ (B) $f(6) = -3$ ordered pairs: (A) (-5, 1) (B) (6, -3)

e) Write the x- and y- intercepts of the graph using function notation.

function notation: $f(-6) = 0$ $f(0) = 5$

x intercepts $f(3) = 0$ y intercept

f) Complete the following statements.

- The domain of f is $\{x \mid$ -6 $\leq x \leq$ 7, $x \in R\}$
- The range of f is $\{f(x) \mid$ -4 $\leq f(x) \leq$ 5, $f(x) \in R\}$

Complete Assignment Questions #1 - #12

/14mks

Assignment

1 (A); 2 (A); 4 (A)(B)(C)(D)(E)(F); 7 (A)(B)(C); 8 (B)(C)(D)

1. In each case, express the relation given in function notation as an equation in two variables.

a) $f(x) = 10 - 3x$ **b)** $g(x) = 12x^2 - 5$ **c)** $P(t) = 2t + 9$

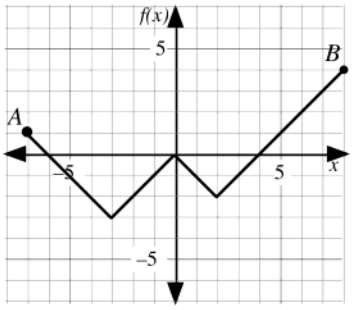
2. Express the following relations in function notation.

a) $y = 17x - 9$ **b)** $y = 4v + 25$ **c)** $x + 2y + 6 = 0$

3. **a)** The graph of the function defined by $y = f(x)$ has equation $y = 0.5x - 0.25$
Express the equation in function notation.

b) The graph of the velocity function defined by $v = f(t)$ has equation $v = 4.9t^2$.
Express the equation in function notation.

4. The graph of a function f is shown.



a) Complete

i) $f(3) =$ **ii)** $f(-3) =$ **iii)** $f(-6) =$

b) Write the ordered pairs associated with **a)**.

i) **ii)** **iii)**

c) State the value(s) of x if

i) $f(x) = 3$ **ii)** $f(x) = -2$ **iii)** $f(x) = -4$

d) Use the notation in a) to make a statement about the points A and B on the graph.

e) Write the x- and y- intercepts of the graph using function notation.

f) Complete the following statements.

- The domain of f is $\{x \mid \_\_\_\_\_ \le x \le \_\_\_\_\_,\ x \in R\}$
- The range of f is $\{f(x) \mid \_\_\_\_\_ \le f(x) \le \_\_\_\_\_,\ f(x) \in R\}$

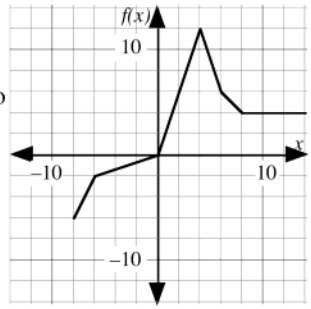
5. The function $g(x) = 3x^2 - 4$ has a domain $\{-2, -1, 0, 1, 2\}$.

a) State the range of g. **b)** Solve the equation $g(x) = -1$.

6. Consider the graph of the function f shown below.

a) Complete the table.

b) Explain why the solution to the equation $f(x) = 4$ has an infinite number of solutions.



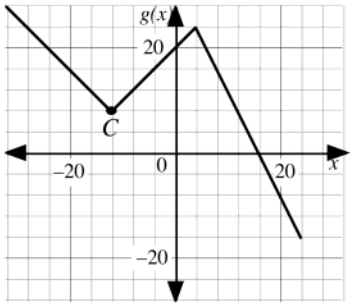
x	$f(x)$	Ordered Pair
		(2,)
	0	
–6		
8		
	–6	
10		

7. Given that $f(x) = 9 - 2x$

a) evaluate $f(-3)$ **b)** find the value of $f(t) + f(-t)$

c) calculate the x-intercept and the y-intercept on the graph of f.

8. The graph of a function is shown.



a) A student is asked to make a statement about point C on the graph. The student states that $f(-3) = 2$.

i) Explain **two** errors in the student's statement.

ii) Write a correct statement using function notation about point C.

b) Give the solution to the following equations.

i) $g(x) = -8$ **ii)** $g(x) = 16$.

c) State the value of **i)** $g(-8)$ **ii)** $g(16)$

d) State the domain and range of the function.

e) The equation $g(a) = b$ has **exactly two** solutions. Explain clearly how to use the graph to determine values of a and b, and provide two sets of answers to the problem.

9. Consider the function $f(x) = 1 - x^2$, where x is an integer.

a) Evaluate $f(2) - f(-1)$ **b)** Given that $f(a) = -8$, calculate all possible values of a.

Multiple Choice **10.** The graph of the function $f(x) = 4^x$, $x \in R$, intersects the y-axis at

A. $(0, 0)$
B. $(0, 1)$
C. $(0, 4)$
D. no point

Use the following information to answer the next question.

Function P is such that $P(5) = -1$.
Two students each make a statement about the function P.

- Rose states "When the domain value is 5, the related range value is -1."
- Susan states "The point $(-1, 5)$ is on the graph of $y = P(x)$."

11. Which of the following is true?

A. Both statements are correct.
B. Both statements are incorrect.
C. Rose is correct and Susan is incorrect.
D. Susan is correct and Rose is incorrect.

Numerical Response **12.** Consider the graph of the function $f(x) = 5x - 11$. The x-intercept of the graph of f is located at $(a, 0)$. The value of a is _____ .

(Record your answer in the numerical response box from left to right)

Answer Key

1. **a)** $y = 10 - 3x$ **b)** $y = 12x^2 - 5$ **c)** $y = 2t + 9$

2. **a)** $f(x) = 17x - 9$ **b)** $f(v) = 4v + 25$ **c)** $f(x) = -\frac{1}{2}x - 3$

3. **a)** $f(x) = 0.5x - 0.25$ **b)** $f(t) = 4.9t^2$

4. **a)** **i)** -1 **ii)** -3 **iii)** 0

b) **i)** $(3, -1)$ **ii)** $(-3, -3)$ **iii)** $(-6, 0)$

c) **i)** 7 **ii)** $-4, -2, 2$ **iii)** no solution **d)** A is $f(-7) = 1$, B is $f(8) = 4$

e) x-intercepts can be represented in function notation by; $f(-6) = 0, f(0) = 0, f(4) = 0$
y-intercept can be represented in function notation by $f(0) = 0$

f) $-7 \le x \le 8, \quad -3 \le f(x) \le 4$

5. **a)** Range $= \{-4, -1, 8\}$ **b)** $x = \pm 1$

6. See table below.

x	$f(x)$	Ordered Pair
2	6	(2, 6)
0	0	(0, 0)
−6	−2	(−6, −2)
8	4	(8, 4)
−8	−6	(−8, −6)
10	4	(10, 4)

b) The horizontal line where $f(x) = 4$ has an infinite number of input values between 8 and 14.

7. **a)** 15 **b)** 18 **c)** x-int $= \frac{9}{2}$, y-int $= 9$

8. **a)** **i)** The name of the function is g not f. The scale is 4 units per box, not 1 unit per box.

ii) $g(-12) = 8$

b) **i)** $x = 20$ **ii)** $x = -20, -4, 8$

c) **i)** 12 **ii)** 0

d) Domain $= \{x \mid -32 \le x \le 24, x \in R\}$, $\{g(x) \mid -16 \le g(x) \le 28\}, g(x) \in R$

e) A horizontal line must intersect the graph at exactly two points.
This occurs when $g(x) = 24$ and when $g(x) = 8$.
Solution 1: $b = 24$ when $a = -28$ or 4.
Solution 2: $b = 8$ when $a = -12$ or 12

9. **a)** -3 **b)** ± 3 **10.** B **11.** C **12.**

2	.	2	