Name ______________________________ Date ___________ Class ___________

LESSON 1-7

Reteach

Function Notation

You can use function notation to write a function.

Read: f of x equals $2x - 3$.

$f(x) = 2x - 3$

Output $f(x)$

Input x

Evaluate $f(0)$, $f\left(\frac{1}{2}\right)$, and $f(-2)$ for $f(x) = 2x^2 - x + 1$.

$f(0) = 2(0)^2 - 0 + 1 = 1$

Subsitute 0 for x in the function and evaluate.

$f\left(\frac{1}{2}\right) = 2\left(\frac{1}{2}\right)^2 - \frac{1}{2} + 1 = 2\left(\frac{1}{4}\right) - \frac{1}{2} + 1 = \frac{1}{2} - \frac{1}{2} + 1 = 1$

Substitute $\frac{1}{2}$ for x.

$f(-2) = 2(-2)^2 - (-2) + 1 = 2(4) + 2 + 1 = 8 + 2 + 1 = 11$

Substitute -2 for x.

For each function, evaluate $f(0)$, $f\left(\frac{3}{2}\right)$, and $f(-1)$.

1. $f(x) = 4x^2 - 2$

$f(0) = 4(0)^2 - 2$

$f\left(\frac{3}{2}\right) = 4\left(\frac{3}{2}\right)^2 - 2$

$f(-1) = 4(-1)^2 - 2$

______________ ______________ ______________

2. $f(x) = -2x + 10$

$f(0) =$ ______________

$f\left(\frac{3}{2}\right) =$ ______________

$f(-1) =$ ______________

3. $f(x) = x^2 + 6x$

$f(0) =$ ______________

$f\left(\frac{3}{2}\right) =$ ______________

$f(-1) =$ ______________

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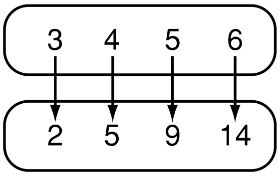
Name ______________________________ Date __________ Class __________

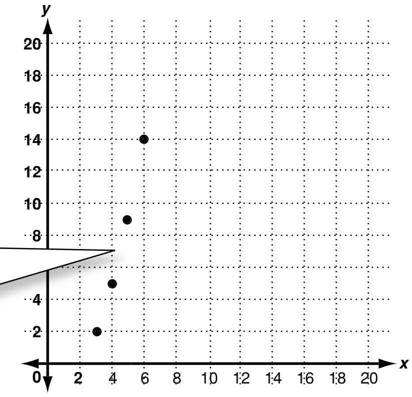
LESSON **1-7**

Reteach

Function Notation (continued)

Plot ordered pairs on a coordinate plane to graph a function.

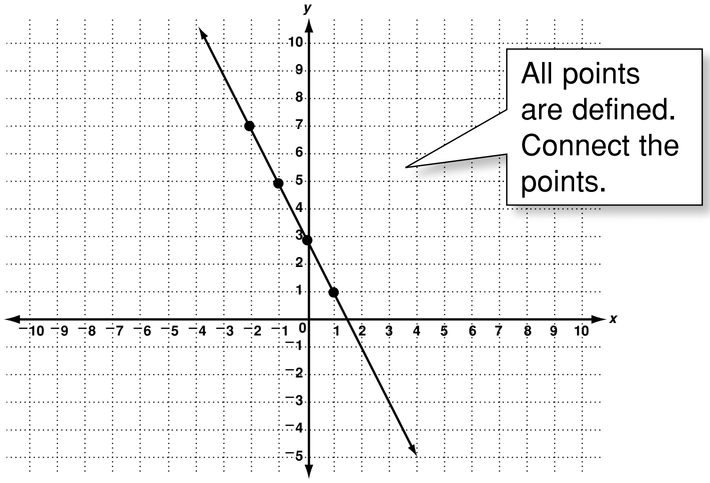




Values between given points are not defined. Do *not* connect the points.

To graph $f(x) = -2x + 3$, make a table of values.

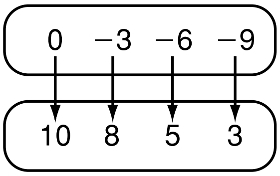
x	$-2x + 3$	$f(x)$
-2	$-2(-2) + 3$	7
-1	$-2(-1) + 3$	5
0	$-2(0) + 3$	3
1	$-2(1) + 3$	1
2	$-2(2) + 3$	-1



All points are defined. Connect the points.

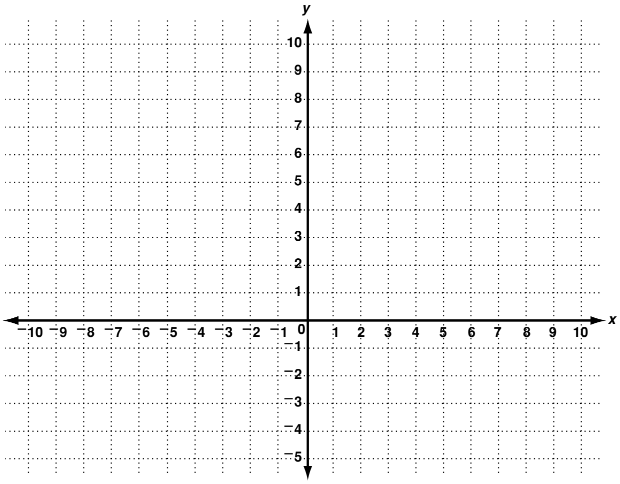
Graph each function on the coordinate plane given.

4.



5. $g(x) = 2x - 4$

x	$2x - 4$	$g(x)$
0		
1		
2		
3		
4		



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LESSON 1-7

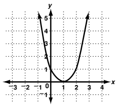
Practice A

Function Notation

Find each value of the function.

1. $f(x) = -5x + 9$ $f(3) = -5(\underline{3}) + 9 = -\underline{15} + 9 = \underline{-6}$

2.

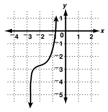


$f(0) = \underline{1}$

$f(1) = \underline{0}$

$f(2) = \underline{1}$

3.

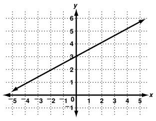


$f(-1) = \underline{-2}$

$f(-2) = \underline{-3}$

$f(-3) = \underline{-4}$

4.



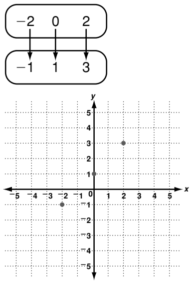
$f(-4) = \underline{1}$

$f(0) = \underline{3}$

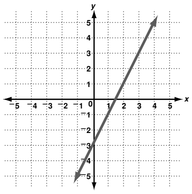
$f(2) = \underline{4}$

Graph each function.

5.



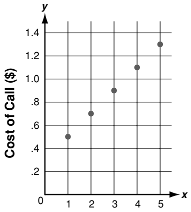
6. $f(x) = 2x - 3$



7. Ty uses the function $g(x) = 0.5 + 0.2(x - 1)$ to calculate the cost in dollars of using a calling card to make a long-distance call lasting x minutes. The variable x must be a whole number. Graph the function. Then determine the cost of a 10-minute call.

$2.30

Calling Card Costs



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LESSON 1-7

Practice B

Function Notation

For each function, evaluate $f(-1)$, $f(0)$, $f\left(\frac{3}{2}\right)$.

1. $g(x) = -4x + 2$ **6, 2, −4**

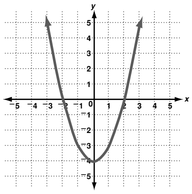
2. $h(x) = x^2 - 3$ **$-2, -3, -\frac{3}{4}$**

3. $f(x) = 3x^2 + x$ **$2, 0, 8\frac{1}{4}$**

4. $f(x) = \frac{x}{2} - 1$ **$-\frac{3}{2}, -1, -\frac{1}{4}$**

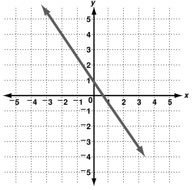
Graph each function. Then evaluate $f(-2)$ and $f(0)$.

5. $f(x) = x^2 - 4$



0, −4

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



4, 1

Solve.

7. On one day the value of $1.00 U.S. was equivalent to 0.77 euro. On the same day $1.00 U.S. was equivalent to $1.24 Canadian. Write a function to represent the value of Canadian dollars in euros. What is the value of the function for an input of 5 rounded to the nearest cent, and what does it represent?

$f(c) = \frac{0.77c}{1.24}$; $f(5) = 3.10$;

the value of $5 Canadian is equivalent to 3.10 euros.

8. PC Haven sells computers at a 15% discount on the original price plus a $200 rebate. Write a function to represent the final price of a computer at PC Haven. What is the value of the function for an input of 2500, and what does it represent?

$f(p) = 0.85p - 200$; $f(2500) = 1925$; $1925 is the final, discounted price of a computer with an original price of $2500.

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LESSON 1-7

Practice C

Function Notation

A set of input values is sometimes referred to as the *replacement set* for the independent variable. Evaluate each function for the given replacement set.

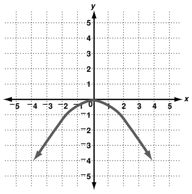
1. $f(x) = \frac{-x}{4} + 6$; $\left\{-8, \frac{1}{2}, 1.6, 3\right\}$

$8, 5\frac{7}{8}, 5.6, 5\frac{1}{4}$

2. $g(x) = x(-2x + 3)$; $\left\{-4\frac{1}{2}, -\frac{1}{3}, 3, 6\right\}$

$-54, -\frac{11}{9}, -9, -54$

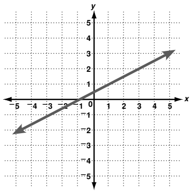
3.



$\left\{-3, -2.5, 1\frac{1}{4}, 3\right\}$

$-2\frac{3}{4}, -2, -\frac{1}{2}\ -2\frac{3}{4}$

4.



$\left\{-3, -\frac{1}{2}, 1.5, 3\right\}$

$-1, \frac{1}{4}, 1\frac{1}{4}, 2$

Explain what a reasonable domain and range would be for each situation.

5. the number of 8-slice pizzas needed to feed x people at a party where each person will eat 3 slices of pizza **Possible answer: The domain is a positive whole number, x, representing the number of people at a party; the range is a positive whole number, $\frac{3x}{8}$, representing the number of pizzas needed.**

6. the time it takes to bicycle m miles at a rate of 15 miles per hour

Possible answer: The domain is a positive rational number, m, representing the number of miles traveled; the range is a positive rational number, $\frac{m}{15}$, representing the time required.

Write a function to represent each situation.

7. Sharon earns $30 for each lawn she mows. **$f(a) = 30a$**

8. Each large tub of ice cream makes 80 single-dip cones. A single-dip cone sells for $1.49. **$f(t) = \$1.49(80t)$**

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LESSON 1-7

Reteach

Function Notation

You can use function notation to write a function.

Read: f of x equals $2x - 3$.

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Output $f(x)$

Input x

Evaluate $f(0)$, $f\left(\frac{1}{2}\right)$, and $f(-2)$ for $f(x) = 2x^2 - x + 1$.

$f(0) = 2(0)^2 - 0 + 1 = 1$

Subsitute 0 for x in the function and evaluate.

$f\left(\frac{1}{2}\right) = 2\left(\frac{1}{2}\right)^2 - \frac{1}{2} + 1 = 2\left(\frac{1}{4}\right) - \frac{1}{2} + 1 = \frac{1}{2} - \frac{1}{2} + 1 = 1$

Substitute $\frac{1}{2}$ for x.

$f(-2) = 2(-2)^2 - (-2) + 1 = 2(4) + 2 + 1 = 8 + 2 + 1 = 11$

Substitute −2 for x.

For each function, evaluate $f(0)$, $f\left(\frac{3}{2}\right)$, and $f(-1)$.

1. $f(x) = 4x^2 - 2$

$f(0) = 4(0)^2 - 2$ **−2**

$f\left(\frac{3}{2}\right) = 4\left(\frac{3}{2}\right)^2 - 2$ **7**

$f(-1) = 4(-1)^2 - 2$ **2**

2. $f(x) = -2x + 10$

$f(0) = \underline{10}$ $f\left(\frac{3}{2}\right) = \underline{7}$ $f(-1) = \underline{12}$

3. $f(x) = x^2 + 6x$

$f(0) = \underline{0}$ $f\left(\frac{3}{2}\right) = \underline{\frac{45}{4}}$ $f(-1) = \underline{-5}$

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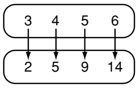
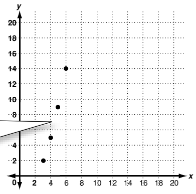
LESSON 1-7

Reteach

Function Notation (continued)

Plot ordered pairs on a coordinate plane to graph a function.

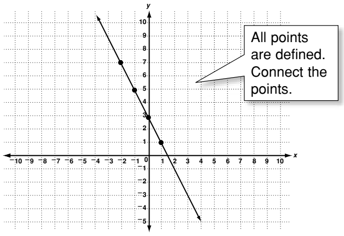




Values between given points are not defined. Do *not* connect the points.

To graph $f(x) = -2x + 3$, make a table of values.

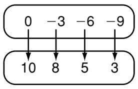
x	$-2x + 3$	$f(x)$
-2	$-2(-2) + 3$	7
-1	$-2(-1) + 3$	5
0	$-2(0) + 3$	3
1	$-2(1) + 3$	1
2	$-2(2) + 3$	-1



All points are defined. Connect the points.

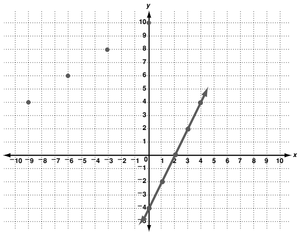
Graph each function on the coordinate plane given.

4.



5. $g(x) = 2x - 4$

x	$2x - 4$	$g(x)$
0	**2(0) − 4**	**−4**
1	**2(1) − 4**	**−2**
2	**2(2) − 4**	**0**
3	**2(3) − 4**	**2**
4	**2(4) − 4**	**4**



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LESSON 1-7

Challenge

Function Togetherness

You can think of a function as a process. The process has an input, the independent variable. That independent variable is put into the function, processed, and then output as the dependent variable.

So $f(x) = 3x + 7$ defines the process performed by the function f. The variable, x, is input, multiplied by 3, and then 7 is added to the result. The output is the result of the process.

Consider the functions $f(x) = 2x - 3$ and $g(x) = x^2 + x - 5$.

1. Describe the process of the functions f and g in words.

f takes a number, doubles it, and subtracts 3; g squares a number, adds the same number, and subtracts 5.

2. Evaluate $f(5x^2)$. **$10x^2 - 3$**

3. Evaluate $g(2x)$. **$4x^2 + 2x - 5$**

A combination of the functions $f(x)$ and $g(x)$ form a composite function, $f(g(x))$. In $f(g(x))$ the output of $g(x)$ is used as the input for $f(x)$.

4. Which function or process is performed first in the composite function $f(g(x))$? **g**

5. Evaluate the composite function $f(g(x))$ and simplify your result.

$2x^2 + 2x - 13$

6. Evaluate the composite function $g(f(x))$ and simplify your result.

$4x^2 - 10x + 1$

7. Is it true that $f(g(x)) = g(f(x))$? **No**

A common function used in math is the difference quotient.

$$\frac{f(x + h) - f(x)}{h}$$

8. Evaluate the difference quotient for the function f and simplify your result.

2

9. Evaluate the difference quotient for the function g and simplify your result.

$2x + h + 1$

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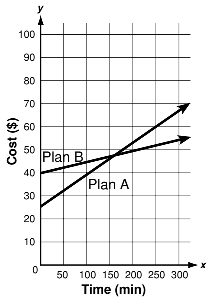
LESSON 1-7

Problem Solving

Function Notation

Juan is analyzing cell phone plans. The graph shows two plans he is considering. Use the graph for Exercises 1–4.

Cell Phone Plans



1. For which value of x does each function have a value of \$40?

Plan A, 100 min; plan B, 0 min

2. The graphs of the functions cross at $x = 150$. Explain what this represents. **Possible answer: For 150 min the two plans cost the same amount.**

3. Use function notation and estimation to represent the value of each function for 200 minutes.

Plan A, \$53; plan B, \$50

4. Juan expects to use about 300 minutes per month. Which plan should he buy? Why?

Plan B; costs less than plan A for 300 minutes

In September, Harley puts \$1035 that he earned during the summer in a bank account to use during the school year for his personal expenses. He budgets *d* dollars a month for expenses. Choose the letter for the best answer.

5. Which shows a function representing the amount left in his account after 4 months?

[✓ **A**] $f(d) = \$1035 - 4d$
B $f(d) = \$1035 - d$
C $f(d) = (\$1035 - 4)d$
D $f(d) = \dfrac{\$1035}{4d}$

6. Harley writes the function $g(a) = \dfrac{\$1035}{9} - a$ to show his monthly budgeted amount remaining in a month when a, the actual amount he spends, is less than the amount of his budget. What is the value of this function for a month when he spends \$87.50?

F \$12.50
[✓ **G**] \$27.50
H \$115.00
J \$202.50

7. Fay uses the function $f(x) = \frac{3}{2}x + 1$ to find the number of boxes of tile to buy for each 10 square feet of floor. How many boxes of tiles does she need to cover 600 square feet?

A 901 boxes
B 401 boxes
[✓ **C**] 91 boxes
D 41 boxes

8. Rasheed uses the function $f(e) = 4e$ to find the distance around a square barbecue pit. What is the length of the side of the pit that has a perimeter of 55.2 ft?

[✓ **F**] 13.8 ft
G 27.6 ft
H 110.4 ft
J 220.8 ft

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LESSON 1-7

Reading Strategies

Understand Notation

Function notation, $f(x)$, allows you to keep track of the dependent variable. The dependent variable is x.

Read $f(x)$ as "f of x."

In function notation, $y = f(x)$.

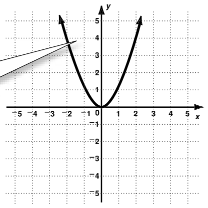
Write ordered pairs as (x, y) or $(x, f(x))$.

To evaluate $f(x) = x^2 + 2x - 1$ for $f(3)$, substitute 3 for x in the function.
$f(3) = (3)^2 + 2(3) - 1 = 9 + 6 - 1 = 14$
For $y = f(x)$, when $x = 3$, $y = 14$.

Read $f(x) = x^2 + 2x - 1$ as "f of x is equal to x squared plus $2x$ minus 1.

You can graph $y = f(x)$. Use the graph to evaluate $f(-2)$: find the point on the graph where $x = -2$.

$f(-2)$ is the corresponding y-value where $x = -2$.



$f(-2) = 4$

Answer each question.

1. Use function notation to write: "f of x is equal to x cubed minus x squared."

$f(x) = x^3 - x^2$

2. Describe the function in words: $f(x) = 5x^2 + 4x - 3$.

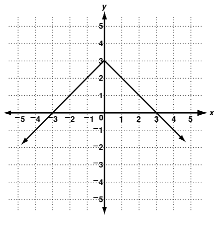
f of x is equal to 5 times x squared plus 4 times x minus 3.

3. Explain how to evaluate $f(x) = x^3 + 6x$ for $f(-1)$.

Substitute -1 for x in $x^3 + 6x$; $(-1)^3 + 6(-1)$; $f(-1) = -7$

4. Explain how to use the graph to evaluate $f(2)$.

Find $x = 2$ on the x-axis. Then find the corresponding y-value on the graph; $f(2) = 1$.



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