

## Using Function Notation to Describe Rules (Part 1)

Let's look at some rules that describe functions and write some too.



## **Notice and Wonder: Two Functions**

What do you notice? What do you wonder?

x	f(x) = 10 - 2x
1	8
1.5	7
5	0
-2	14

х	$g(x) = x^3$
-2	-8
0	0
1	1
3	27



# 4.2 Four Functions

Here are descriptions and equations that represent four functions.

• 
$$f(x) = 3x - 7$$

• 
$$g(x) = 3(x - 7)$$

• 
$$h(x) = \frac{x}{3} - 7$$

• 
$$k(x) = \frac{x - 7}{3}$$

- A. To get the output, subtract 7 from the input, then divide the result by 3.
- B. To get the output, subtract 7 from the input, then multiply the result by 3.
- C. To get the output, multiply the input by 3, then subtract 7 from the result.
- D. To get the output, divide the input by 3, then subtract 7 from the result.
- 1. Match each equation with a verbal description that represents the same function. Record your results.
- 2. For one of the functions, when the input is 6, the output is -3. Which is that function: f, g, h, or k? Explain how you know.

3. Which of the four functions have the greatest value when the input is 0? What about when the input is 10?

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#### Are you ready for more?

Mai says f(x) is always greater than g(x) for the same value of x. Is this true? Explain how you know.





### **Rules for Area and Perimeter**

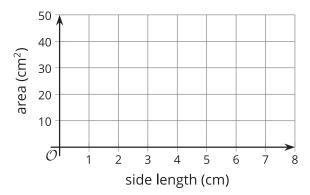
- 1. A square that has a side length of 9 cm has an area of 81 cm $^2$ . The relationship between the side length and the area of the square is a function.
  - a. Complete the table with the area for each given side length.

Then, write a rule for a function, A, that gives the area of the square in  $cm^2$  when the side length is s cm. Use function notation.

side length (cm)	area (cm <sup>2</sup> )
1	
2	
4	
6	
S	

b. What does A(2) represent in this situation? What is its value?

c. On the coordinate plane, sketch a graph of this function.



- 2. A roll of paper that is 3 feet wide can be cut to any length.
  - a. If we cut a length of 2.5 feet, what is the perimeter of the paper?

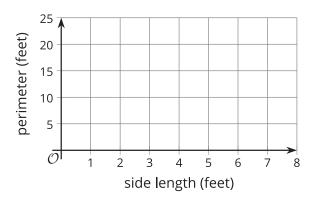


b. Complete the table with the perimeter for each given side length.

Then, write a rule for a function, P, that gives the perimeter of the paper in feet when the side length in feet is  $\ell$ . Use function notation.

side length (feet)	perimeter (feet)
1	
2	
6.3	
11	
$\ell$	

- c. What does P(11) represent in this situation? What is its value?
- d. On the coordinate plane, sketch a graph of this function.





#### Lesson 4 Summary

Some functions are defined by rules that specify how to compute the output from the input. These rules can be verbal descriptions or expressions and equations. For example:

Rules in words:

Rules in function notation:

- To get the output of function f, add 2 to the input, then multiply the result by 5.
- To get the output of function *m*, multiply the input by  $\frac{1}{2}$  and subtract the result from 3.

• 
$$f(x) = (x+2) \cdot 5$$
 or  $f(x) = 5(x+2)$ 

• 
$$m(x) = 3 - \frac{1}{2}x$$

Some functions are defined by rules that relate two quantities in a situation. These functions can also be expressed algebraically with function notation.

Suppose function c gives the cost of buying n pounds of apples at \$1.49 per pound. We can write the rule c(n) = 1.49n to define function c.

To see how the cost changes when n changes, we can create a table of values.

pounds of apples, n	cost in dollars, $c(n)$
0	0
1	1.49
2	2.98
3	4.47
n	1.49n

Plotting the pairs of values in the table gives us a graphical representation of c.

