Using Function Notation to Describe Rules (Part 1)

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

4.1 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

x	$g(x) = x^3$
-2	-8
0	0
1	1
3	27

4.2 Four Functions

Here are descriptions and equations that represent four functions.

- $f(x) = 3x - 7$
- $g(x) = 3(x - 7)$
- $h(x) = \frac{x}{3} - 7$
- $k(x) = \dfrac{x - 7}{3}$

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?

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.

4.3 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.

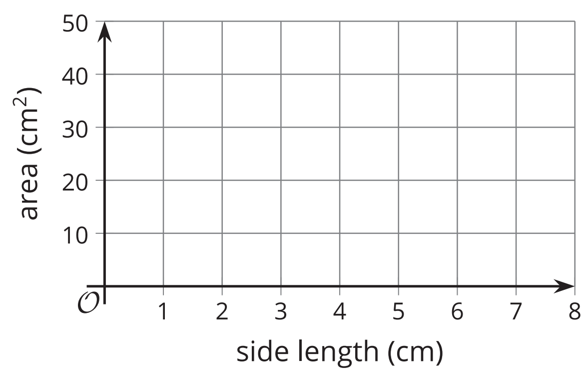
   a. Complete the table with the area for each given side length.

   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^2)
1	
2	
4	
6	
s	

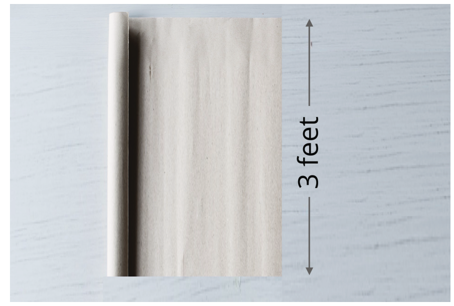
   b. What does $A(2)$ represent in this situation? What is its value?

   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?



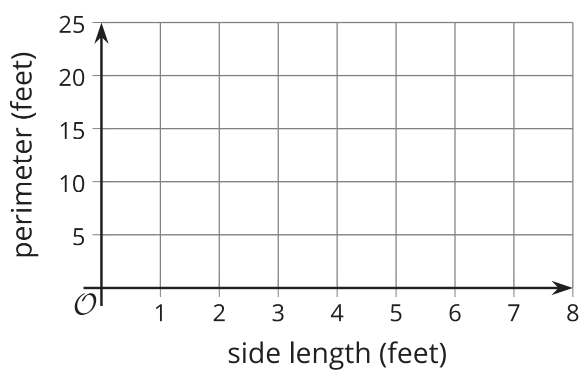
   b. Complete the table with the perimeter for each given side length.

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

side length (feet)	perimeter (feet)
1	
2	
6.3	
11	
ℓ	

   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:

- 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.

Rules in function notation:

- $f(x) = (x+2) \cdot 5$ 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.