Unit 8, Lesson 5

Using Function Notation to Describe Rules (Part 2)

Let's graph and find the values of some functions.

5.1 Make It True

Consider the equation $q = 4 + 0.8p$.

1. What value of q would make the equation true when:
   a. p is 7?
   b. p is 100?
2. What value of p would make the equation true when:
   a. q is 12?
   b. q is 60?

Be prepared to explain or show your reasoning.

5.2 Gaming Options

Elena is looking at options for video game consoles. Every purchase of a console comes with a 1-month free trial period of the online gaming service. A store offers two options for purchasing a console and use of the gaming service. These functions represent the total cost for each option:

- Option A: $A(x) = 600$
- Option B: $B(x) = 10x + 250$

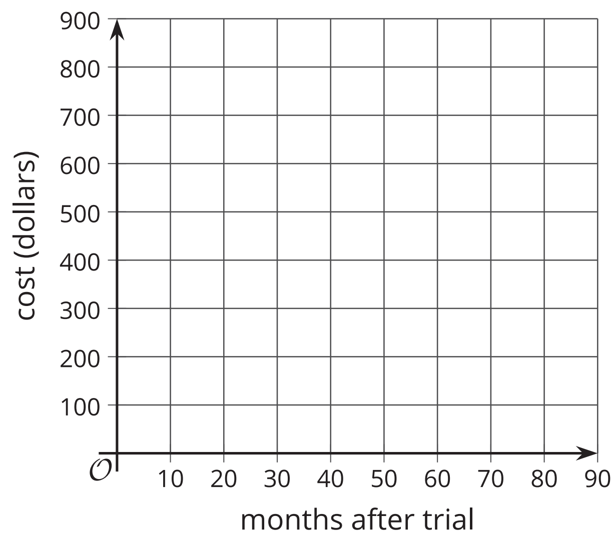
In each function, the input, x, represents the number of months Elena uses the online gaming service after the free trial period.

1. Elena decides to find the values of $A(1)$ and $B(1)$ and compare them. What are those values?

2. When planning her budget, she compares $A(7.5)$ and $B(7.5)$. What are those values?

3. Describe each option in words.

4. Graph each function on the same coordinate plane. Then, explain which option you think she should choose.



5. Elena budgeted only $280 for the console and online service. She thought, "I wonder how many months I could have for $280 if I go with Option B" and wrote $B(x) = 280$. What is the answer to her question? Explain or show how you know.

Are you ready for more?

Describe an option that, for any amount of time used, would cost no more than one of the given options and no less than the other given option. Explain or show how you know this option would meet these requirements.

5.3 Function Notation and Graphing Technology

The function B is defined by the equation $B(x) = 10x + 25$. Use graphing technology to:

1. Find the value of each expression:

   $B(6)$ $\quad$ $B(2.75)$ $\quad$ $B(1.482)$

2. Solve each equation:

   $B(x) = 93$ $\quad$ $B(x) = 42.1$ $\quad$ $B(x) = 116.25$

Lesson 5 Summary

Knowing the rule that defines a function can be very useful. It can help us to:

- Find the output when we know the input.
  - If the rule $f(x) = 5(x + 2)$ defines f, we can find $f(100)$ by evaluating $5(100 + 2)$.
  - If $m(x) = 3 - \frac{1}{2}x$ defines function m, we can find $m(10)$ by evaluating $3 - \frac{1}{2}(10)$.
- Create a table of values.

  Here are tables representing functions f and m:

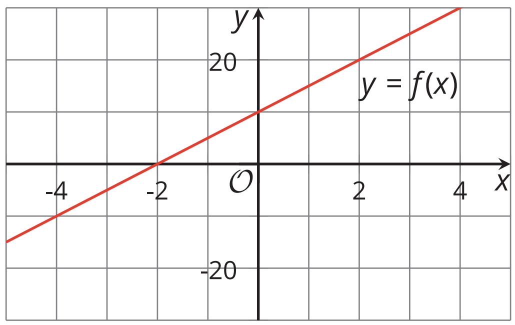
x	$f(x) = 5(x + 2)$
0	10
1	15
2	20
3	25
4	30

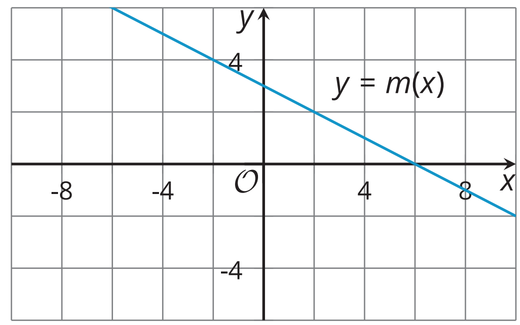
x	$m(x) = 3 - \frac{1}{2}x$
0	3
1	$2\frac{1}{2}$
2	2
3	$1\frac{1}{2}$
4	1

- Graph the function. The horizontal values represent the input, and the vertical values represent the output.

  For function f, the values of $f(x)$ are the vertical values, which are often labeled y, so we can write $y = f(x)$. Because $f(x)$ is defined by the expression $5(x+2)$, we can graph $y = 5(x+2)$.

  For function m, we can write $y = m(x)$ and graph $y = 3 - \frac{1}{2}x$.





- Find the input when we know the output.

  Suppose the output of function f is 65 at some value of x, or $f(x) = 65$, and we want to find out what that value is. Because $f(x)$ is equal to $5(x+2)$, we can write $5(x+2) = 65$ and solve for x.

$$\begin{aligned} 5(x+2) &= 65 \\ x + 2 &= 13 \\ x &= 11 \end{aligned}$$

Each function here is a **linear function** because the value of the function changes by a constant rate and its graph is a line.