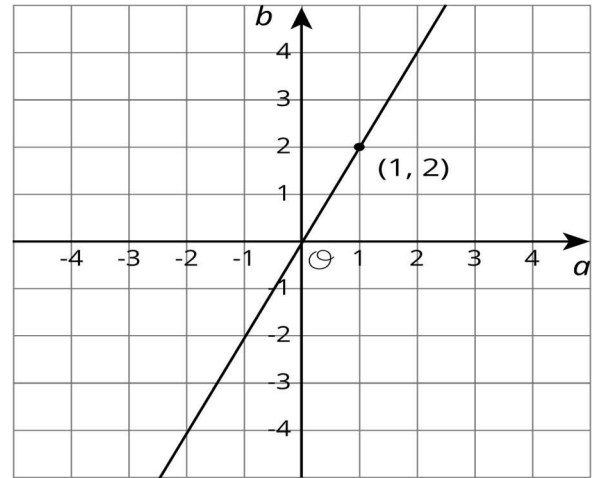Unit 5, Lesson 7: Connecting Representations of Functions

7.1: Which are the Same? Which are Different?

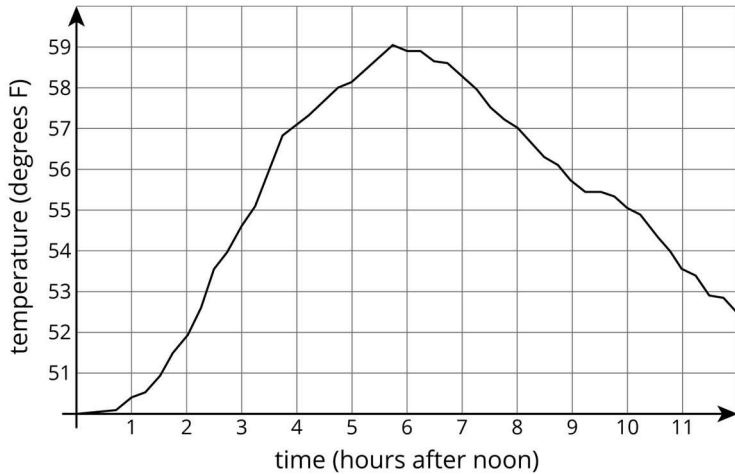Here are three different ways of representing functions. How are they alike? How are they different?

p	-2	-1	0	1	2	3
q	4	2	0	-2	-4	6

$y = 2x$

7.2: Comparing Temperatures

The graph shows the temperature between noon and midnight in City A on a certain day. The table shows the temperature, T, in degrees Fahrenheit, for h hours after noon, in City B.

h	1	2	3	4	5	6
T	82	78	75	62	58	59

1. Which city was warmer at 4:00 p.m.?

2. Which city had a bigger change in temperature between 1:00 p.m. and 5:00 p.m.? Prove with evidence.

3. How much greater was the highest recorded temperature in City B than the highest recorded temperature in City A during this time?

4. Compare the outputs of the functions when the input is 3.

7.3: Comparing Volumes

The volume, V, of a cube with edge length s cm is given by the equation $V = s^3$.

The volume of a sphere is a function of its radius (in centimeters), and the graph of this relationship is shown here.
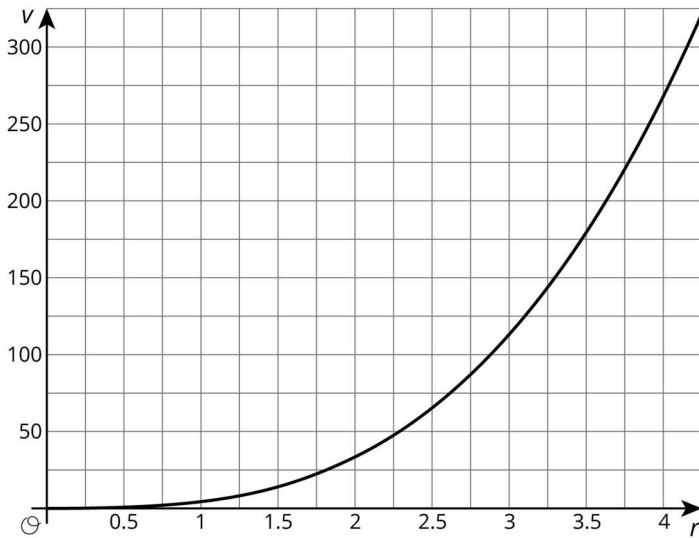
1. Is the volume of a cube with edge length $s = 3$ greater or less than the volume of a sphere with radius 3? Show your evidence.

2. If a sphere has the same volume as a cube with edge length 5, estimate the radius of the sphere.

3. Compare the outputs of the two volume functions when the inputs are 2.

Are you ready for more?

Estimate the edge length of a cube that has the same volume as a sphere with radius 2.5.

7.4: It's Not a Race

Elena's family is driving on the freeway at 55 miles per hour.

Andre's family is driving on the same freeway, but not at a constant speed. The table shows how far Andre's family has traveled, d, in miles, every minute for 10 minutes.

t	d
1	0.9
2	1.9
3	3.0
4	4.1
5	5.1
6	6.2
7	6.8
8	7.4
9	8
10	9.1

1. How many miles per minute is 55 miles per hour?

2. Who had traveled farther after 5 minutes? After 10 minutes?

3. How long did it take Elena's family to travel as far as Andre's family had traveled after 8 minutes?

4. For both families, the distance in miles is a function of time in minutes. Compare the outputs of these functions when the input is 3.

8.2: Proportional Relationships Define Linear Functions

1. Jasmine earns $7 per hour mowing her neighbors' lawns.

    a. Name the two quantities in this situation that are in a functional relationship. Which did you choose to be the independent variable? What is the variable that depends on it?

    b. Write an equation that represents the function.

    c. Here is a graph of the function. Label the axes. Label at least two points with input-output pairs.
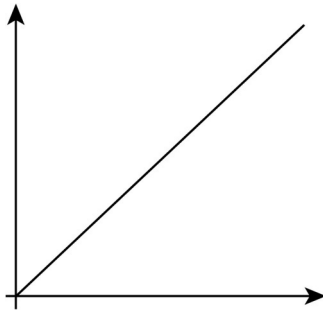
2. To convert feet to yards, you multiply the number of feet by $\frac{1}{3}$.

    a. Name the two quantities in this situation that are in a functional relationship. Which did you choose to be the independent variable? What is the variable that depends on it?

   b. Write an equation that represents the function.

    c. Draw the graph of the function. Label at least two points with input-output pairs.

There are four tanks of water. The amount of water in gallons, A, in Tank A is given by the function $A = 200 + 8t$, where t is in minutes. The amount of water in gallons, B, in Tank B starts at 400 gallons and is decreasing at 5 gallons per minute. These functions work when $t \geq 0$ and $t \leq 80$.

1. Which tank started out with more water?

2. Write an equation representing the relationship between B and t.

3. One tank is filling up. The other is draining out. Which is which? How can you tell?

4. The amount of water in gallons, C, in Tank C is given by the function $C = 800 - 7t$. Is it filling up or draining out? Can you tell just by looking at the equation?

5. The graph of the function for the amount of water in gallons, D, in Tank D at time t is shown. Is it filling up or draining out? How do you know?
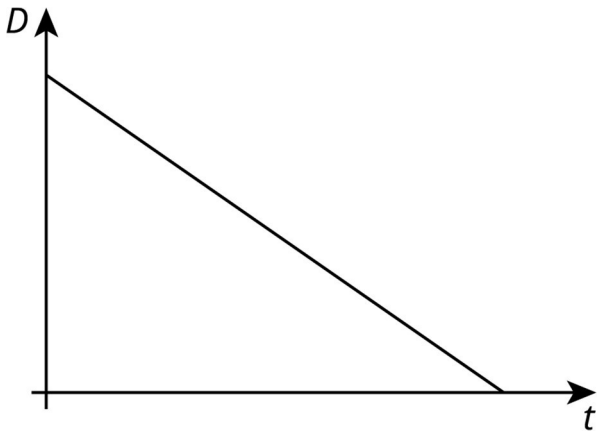
8.4: Which is Growing Faster?

Noah is depositing money in his account every week to save money. The graph shows the amount he has saved as a function of time since he opened his account.

Elena opened an account the same day as Noah. The amount of money E in her account is given by the function $E = 8w + 60$, where w is the number of weeks since the account was opened.
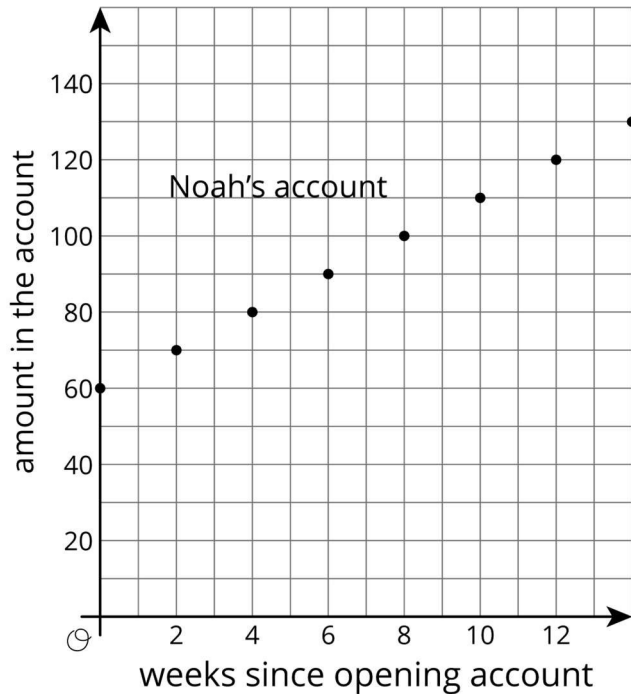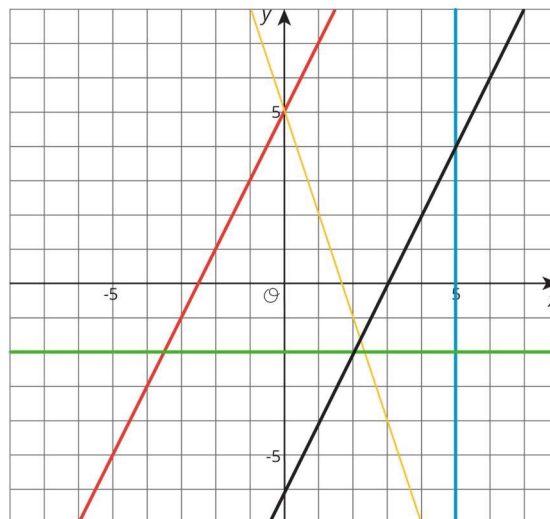

1. Who started out with more money in their account? Explain how you know.

2. Who is saving money at a faster rate? Explain how you know.

5. How much will Noah save over the course of a year if he does not make any withdrawals? How long will it take Elena to save that much?

6. Write an equation for each line.

9.1: Candlelight

A candle is burning. It starts out 12 inches long. After 1 hour, it is 10 inches long. After 3 hours, it is 5.5 inches long.

1. When do you think the candle will burn out completely?

2. Is the height of the candle a function of time? If yes, is it a linear function? Explain your thinking.
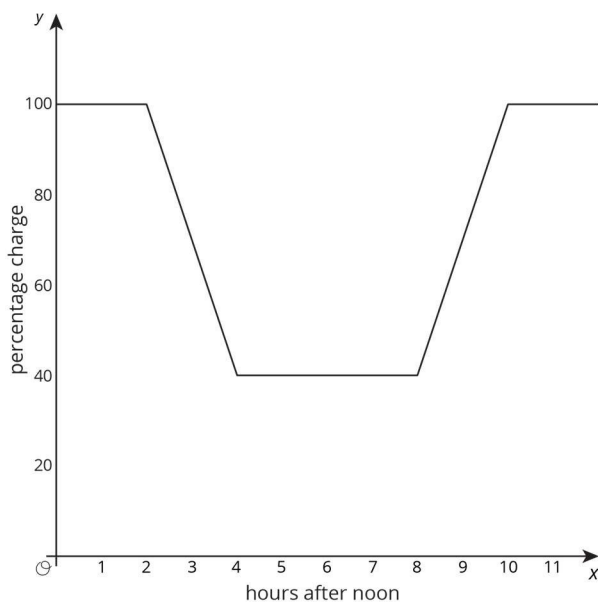
Practice Problems

1. The equation and the graph represent two functions. Use the equation $y = 4$ and the graph to answer the questions.
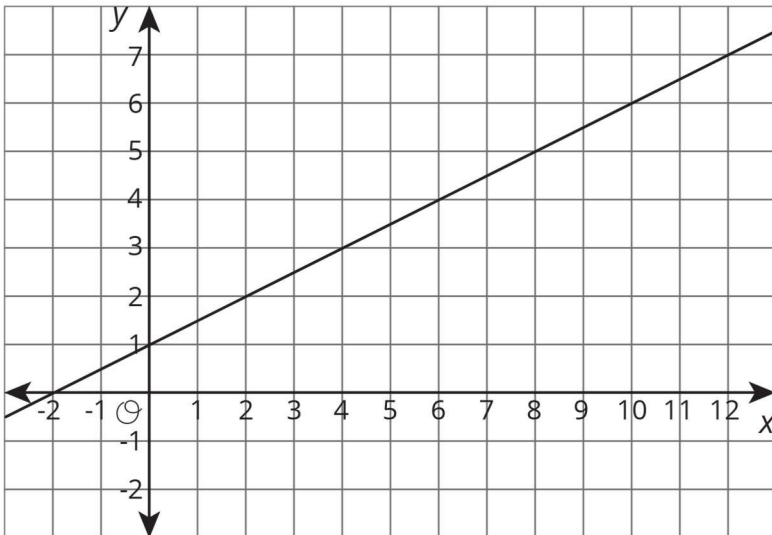
a.   When x is 4, is the output of the equation or the graph greater?

b.   What value for x produces the same output in both the graph and the equation? Provide evidence for your answer.

2.   Lin uses an app to graph the charge on her phone.

1. When did she start using her phone?

2. When did she start charging her phone?

3. While she was using her phone, at what rate was Lin's phone battery dying?