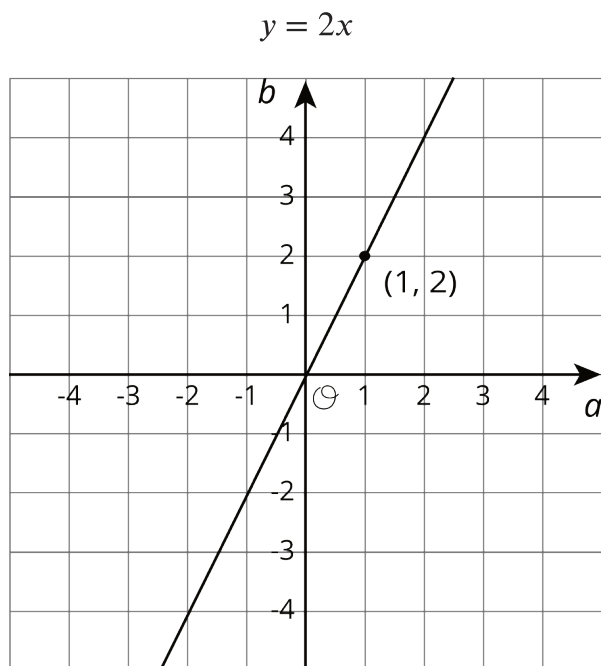


# Lesson 7: Connecting Representations of Functions

Let's connect tables, equations, graphs, and stories of functions.

## 7.1: Which are the Same? Which are Different?

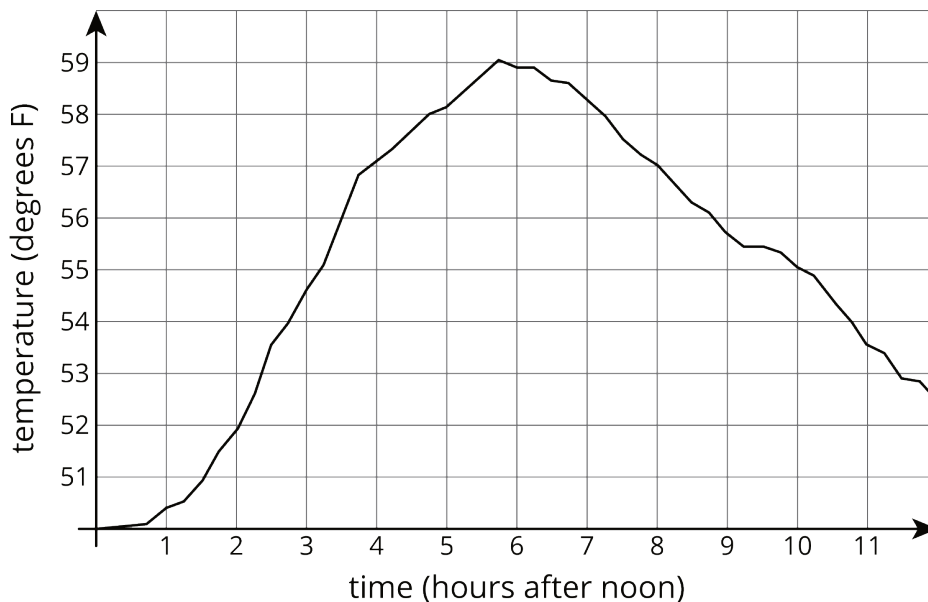
Here are three different ways of representing functions. How are they alike? How are they different?



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

## 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.?
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?
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.

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

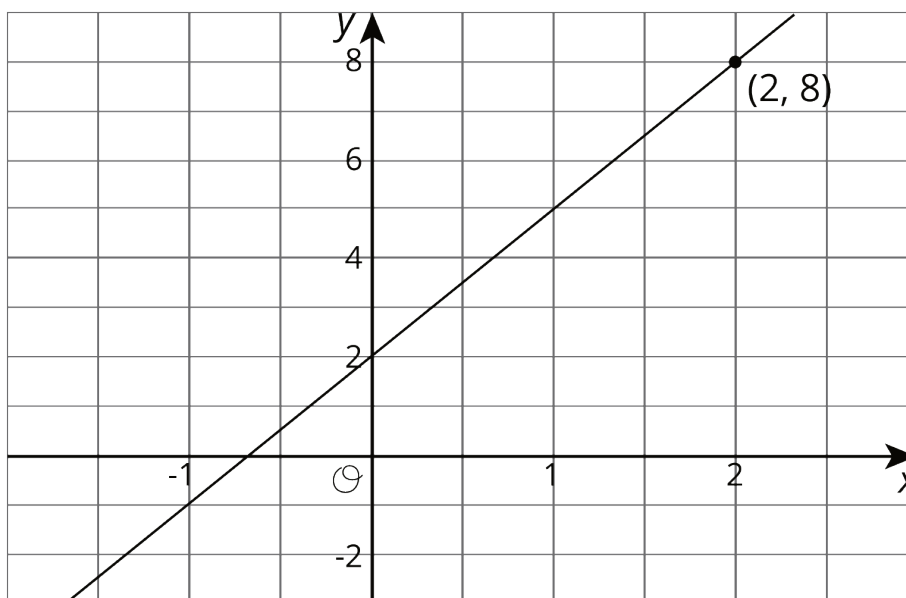
1. How many miles per minute is 55 miles per hour?
2. Who had traveled farther after 5 minutes? After 10 minutes?
3. How long did it take Elena's family to travel as far as Andre's family had traveled after 8 minutes?
4. For both families, the distance in miles is a function of time in minutes. Compare the outputs of these functions when the input is 3.

## Lesson 7 Summary

Functions are all about getting outputs from inputs. For each way of representing a function—equation, graph, table, or verbal description—we can determine the output for a given input.

Let's say we have a function represented by the equation  $y = 3x + 2$  where  $y$  is the dependent variable and  $x$  is the independent variable. If we wanted to find the output that goes with 2, we can input 2 into the equation for  $x$  and find the corresponding value of  $y$ . In this case, when  $x$  is 2,  $y$  is 8 since  $3 \cdot 2 + 2 = 8$ .

If we had a graph of this function instead, then the coordinates of points on the graph are the input-output pairs. So we would read the  $y$ -coordinate of the point on the graph that corresponds to a value of 2 for  $x$ . Looking at the graph of this function here, we can see the point  $(2, 8)$  on it, so the output is 8 when the input is 2.



A table representing this function shows the input-output pairs directly (although only for select inputs).

$x$	-1	0	1	2	3
$y$	-1	2	5	8	11

Again, the table shows that if the input is 2, the output is 8.