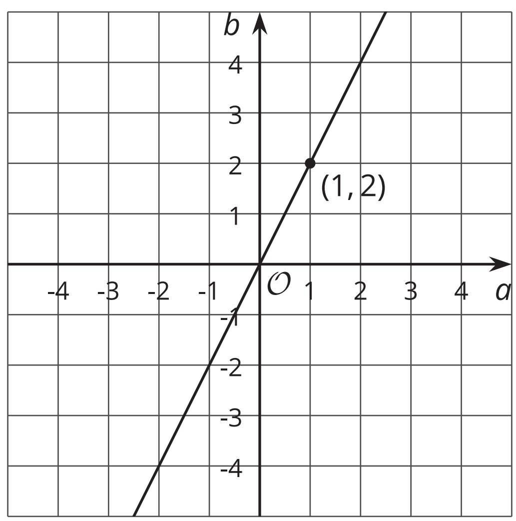
Connecting Representations of Functions

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?

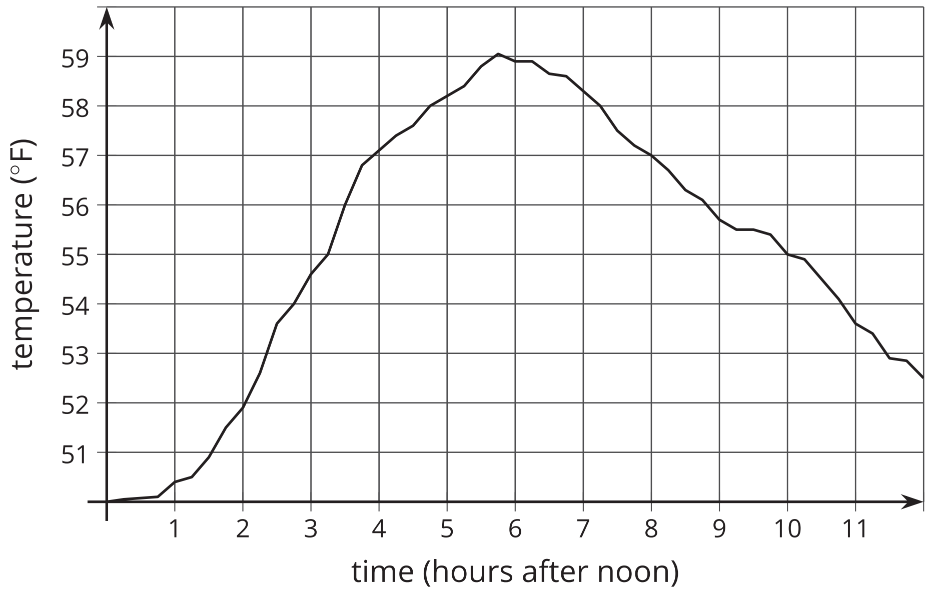
$$y = 2x$$



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.?

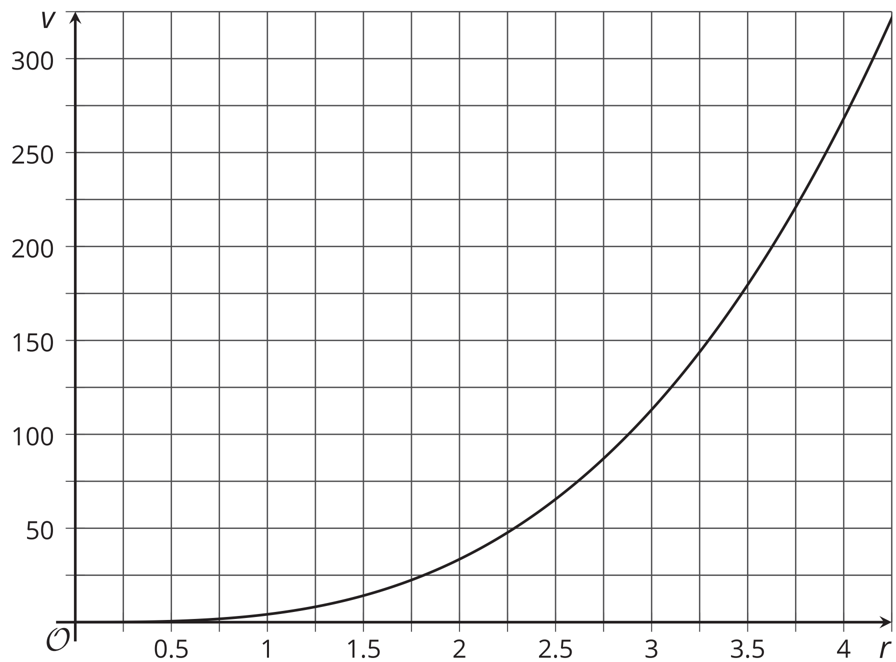
3. How much greater was the highest recorded temperature in City B than the highest recorded temperature in City A on this day?

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 cm), 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 cm?

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

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 in miles, d, 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 has 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.

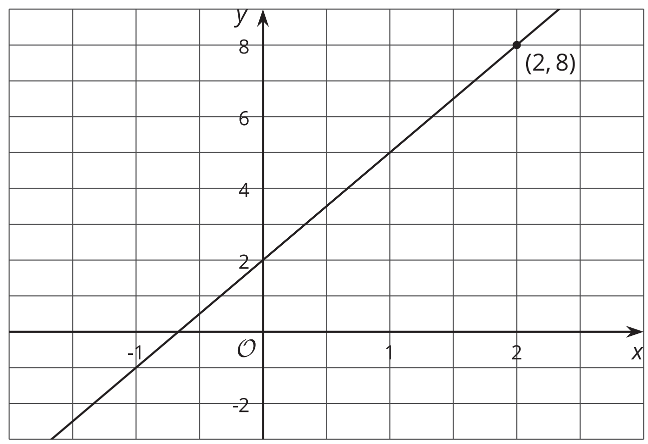
Lesson 7 Summary

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 could 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 would be 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 following graph of a function, 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).

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

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