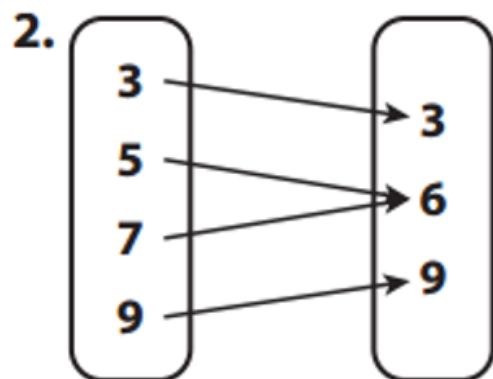


Bellringer

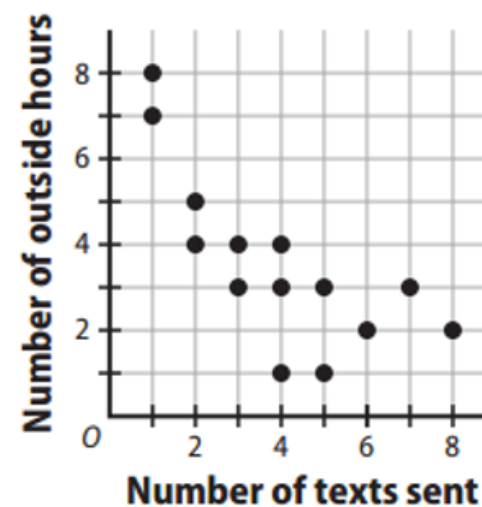
Determine whether each relationship is a function.



3.

Input	Output
2	7
5	10
8	13
5	7

The graph shows the relationship between the number of texts a person sends and the number of hours the person spends outside during the summer. Is the relationship represented by the graph a function? Explain.



6.2 Describing Functions

8.F.3

Interpret the equation $y=mx+b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear

8.F.1

Understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output

EXPLORE ACTIVITY

Investigating a Constant Rate of Change

$$m = \frac{\Delta y}{\Delta x} = \frac{1.5}{1}$$

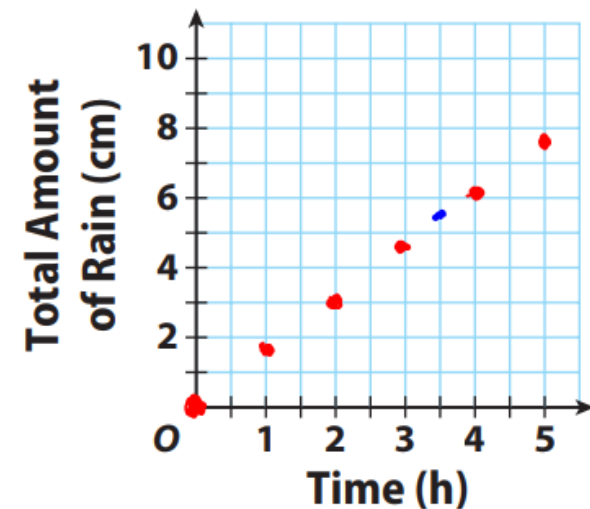
The U.S. Department of Agriculture defines heavy rain as rain that falls at a rate of 1.5 centimeters per hour.

- A** The table shows the total amount of rain that falls in various amounts of time during a heavy rain. Complete the table.

Time (h)	0	1	2	3	4	5
Total Amount of Rain (cm)	0	1.5	3	4.5	6	7.5

- B** Plot the ordered pairs from the table on the coordinate plane at the right.

$$y = 1.5x$$

Heavy Rainfall

Graphing Linear Functions

- When you graph a linear equation, the graph makes a line
- When you graph a linear function, the graph is any non vertical line

EXAMPLE 1

The temperature at dawn was 8°F and increased steadily 2°F every hour. The equation $y = 2x + 8$ gives the temperature y after x hours. State whether the relationship between the time and the temperature is proportional or nonproportional. Then graph the function.

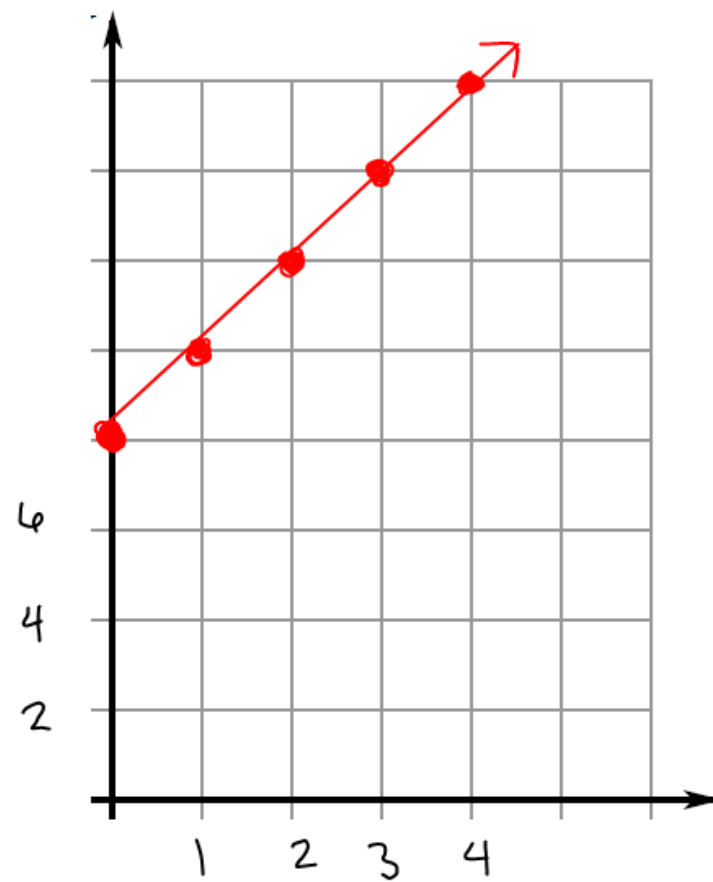
STEP 1 Compare equation to S.I.F. ($y = mx + b$)
Does it have y -int?

STEP 2 Fill in function table to find ordered pairs
* You choose x -values

x	$2x + 8$	y	(x, y)
0	$2(0) + 8$	8	$(0, 8)$
1	$2(1) + 8$	10	$(1, 10)$
2	$2(2) + 8$	12	$(2, 12)$
3	$2(3) + 8$	14	$(3, 14)$
4	$2(4) + 8$	16	$(4, 16)$
5	$2(5) + 8$	18	$(5, 18)$

STEP 3

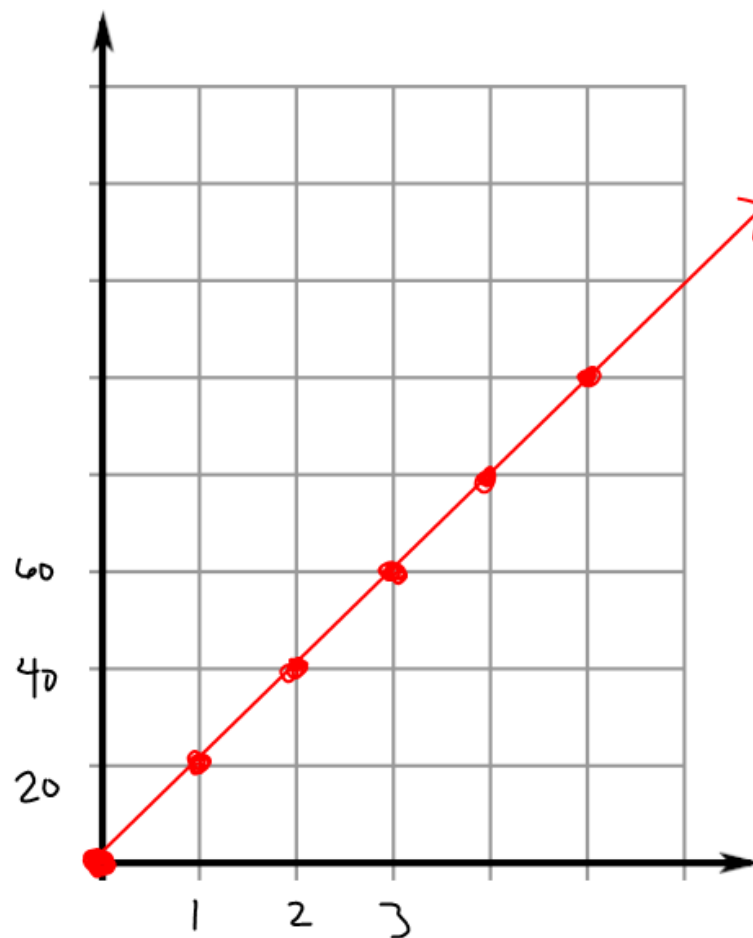
Graph the
ordered pairs



ADDITIONAL EXAMPLE 1

Vance charges \$20 an hour to plow the snow off of driveways. The equation $y = 20x$ gives the cost y in dollars for x hours. State whether the relationship between the time and the cost is proportional or nonproportional. Then graph the function.

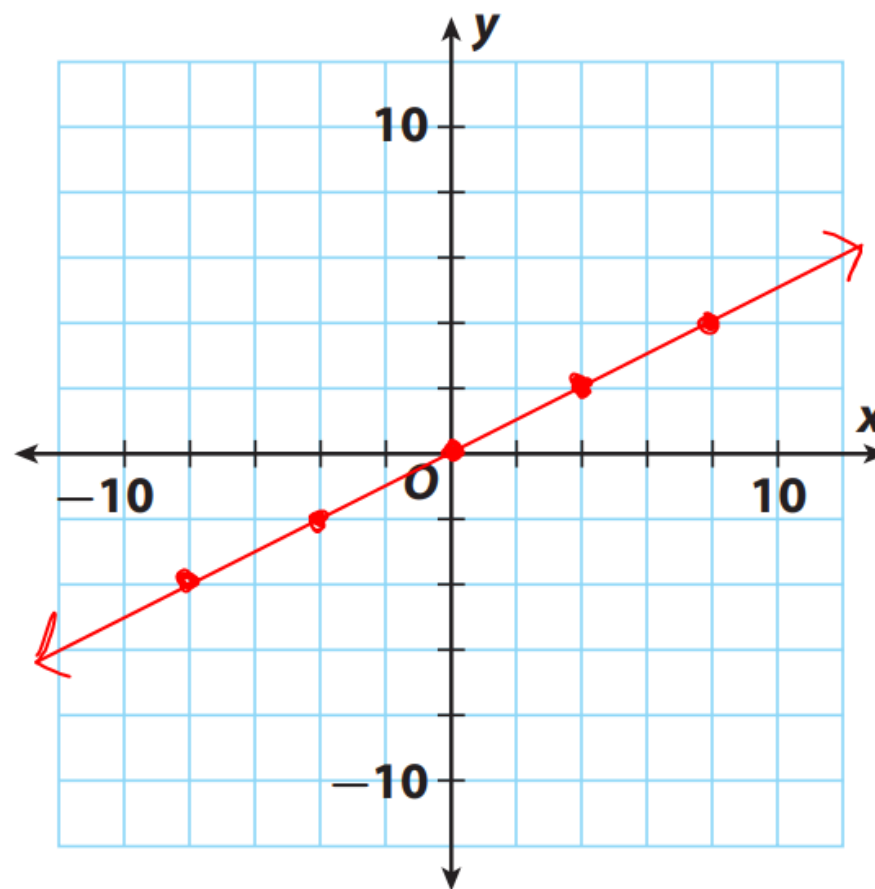
x	$20x$	y	(x, y)
0	$20(0)$	0	$(0, 0)$
1	$20(1)$	20	$(1, 20)$
2	$20(2)$	40	$(2, 40)$
3	$20(3)$	60	$(3, 60)$
4	$20(4)$	80	$(4, 80)$
5	$20(5)$	100	$(5, 100)$



YOUR TURN

2. State whether the relationship between x and y in $y = 0.5x$ is proportional or nonproportional. Then graph the function.

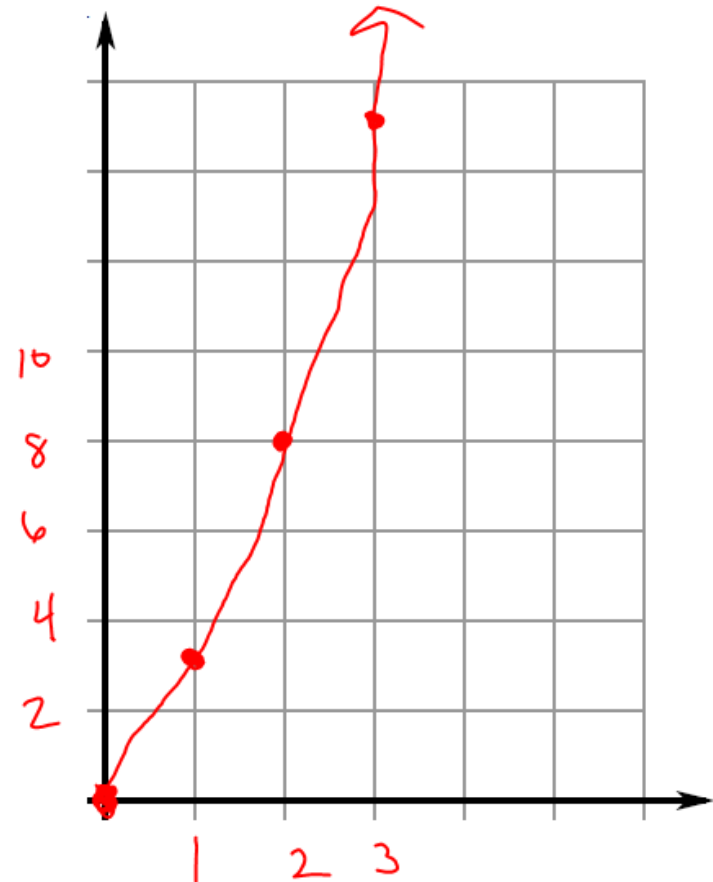
x	$.5x$	y	(x, y)
-12	$.5(-12)$	-6	$(-12, -6)$
-8	$.5(-8)$	-4	$(-8, -4)$
-4	$.5(-4)$	-2	$(-4, -2)$
0	$.5(0)$	0	$(0, 0)$
4	$.5(4)$	2	$(4, 2)$
8	$.5(8)$	4	$(8, 4)$



ADDITIONAL EXAMPLE 2

A rectangular field is x feet wide and $x + 2$ feet long. The equation $y = x^2 + 2x$ gives the area of the field in square feet. Determine whether the relationship between x and y is linear and, if so, whether it is proportional.

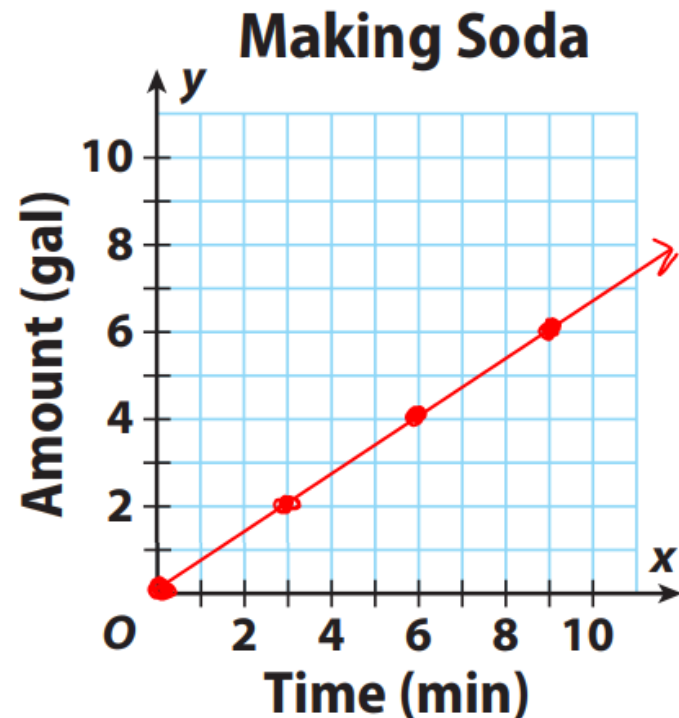
x	$x^2 + 2x$	y	(x, y)
0	$0^2 + 2(0)$	0	$(0, 0)$
1	$1^2 + 2(1)$	3	$(1, 3)$
2	$2^2 + 2(2)$	8	$(2, 8)$
3	$3^2 + 2(3)$	15	$(3, 15)$
4	$4^2 + 2(4)$		
5	$5^2 + 2(5)$		



YOUR TURN

3. A soda machine makes $\frac{2}{3}$ gallon of soda every minute. The total amount y that the machine makes in x minutes is given by the equation $y = \frac{2}{3}x$. Determine whether the relationship between x and y is linear and, if so, if it is proportional.

Time (min), x	0	3	6	9
Amount (gal), y	0	2	4	6



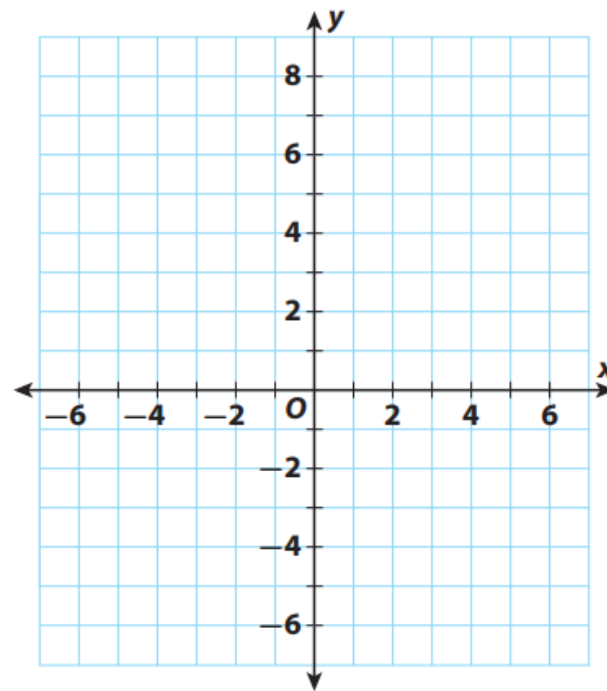
Guided Practice

Plot the ordered pairs from the table. Then graph the function represented by the ordered pairs and tell whether the function is linear or nonlinear.

(Examples 1 and 2)

1. $y = 5 - 2x$

Input, x	-1	1	3	5
Output, y				



Explain whether each equation is a linear equation.

3. $y = x^2 - 1$

