INTERMEDIATE ALGEBRA

Chapter 3 GRAPHS AND FUNCTIONS

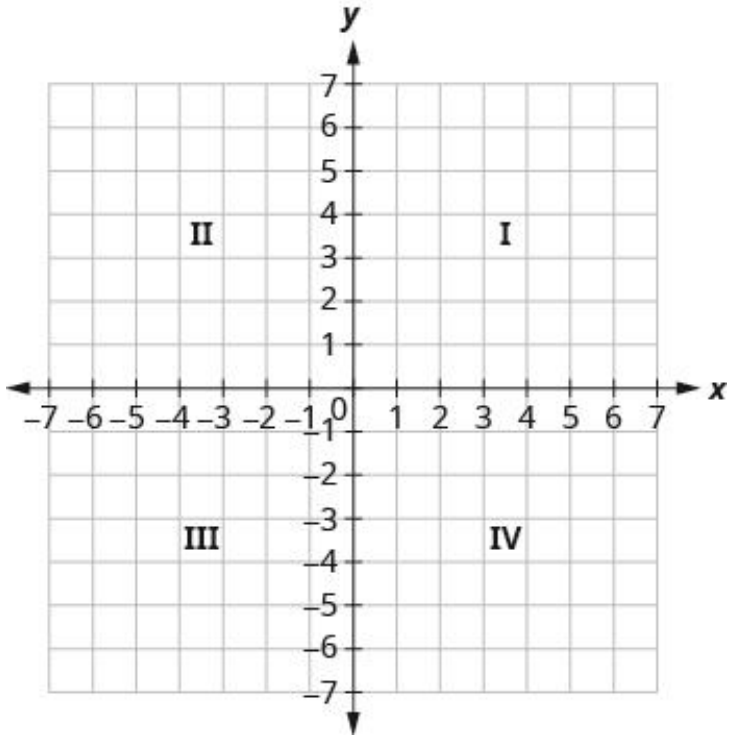
PowerPoint Image Slideshow

openstax™

FIGURE 3.1

This odd-looking headgear provides the user with a virtual world. (credit: fill/Pixabay)

FIGURE 3.2



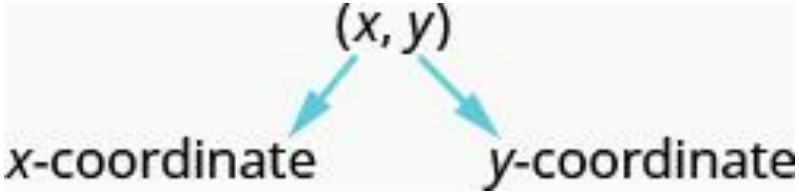

(x, y)
x-coordinate
y-coordinate

FIGURE 3.3

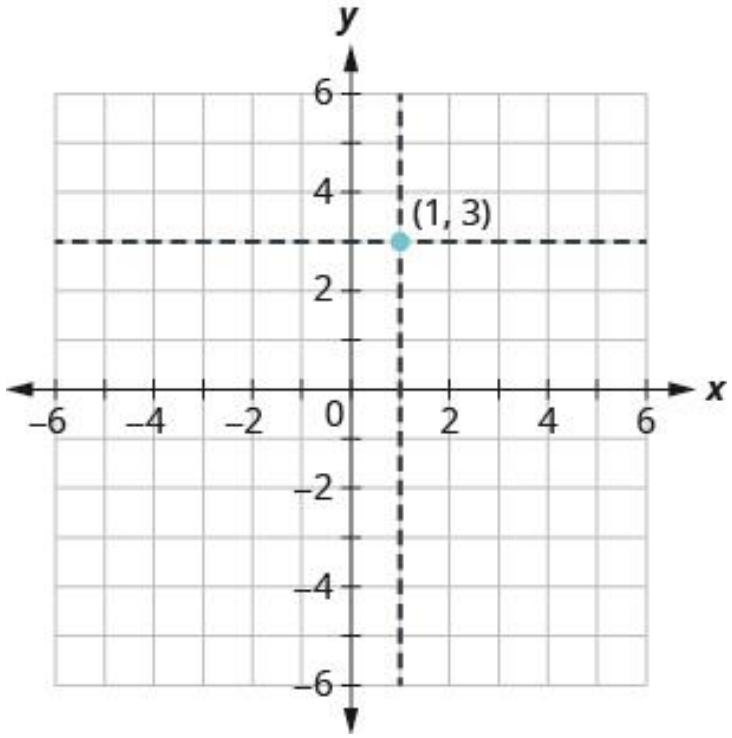
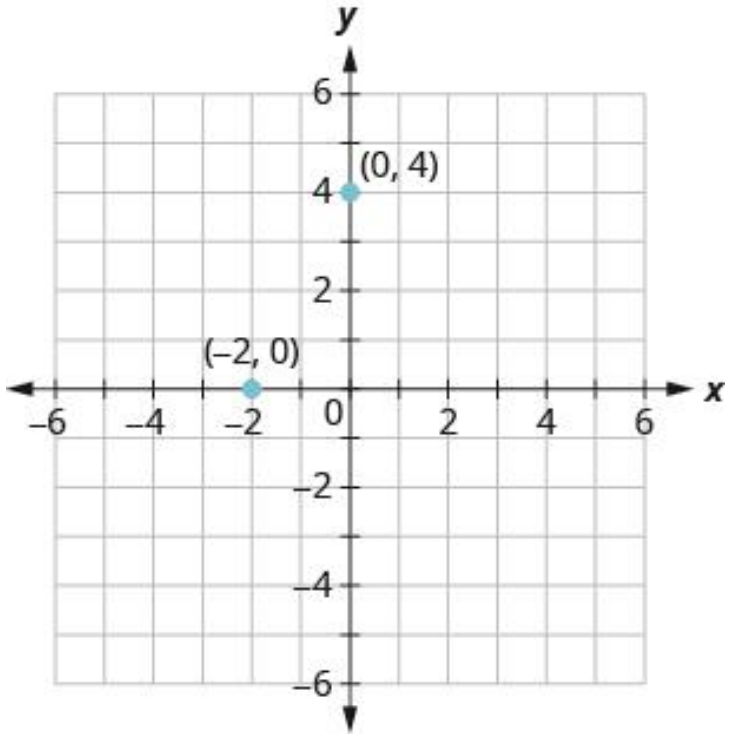
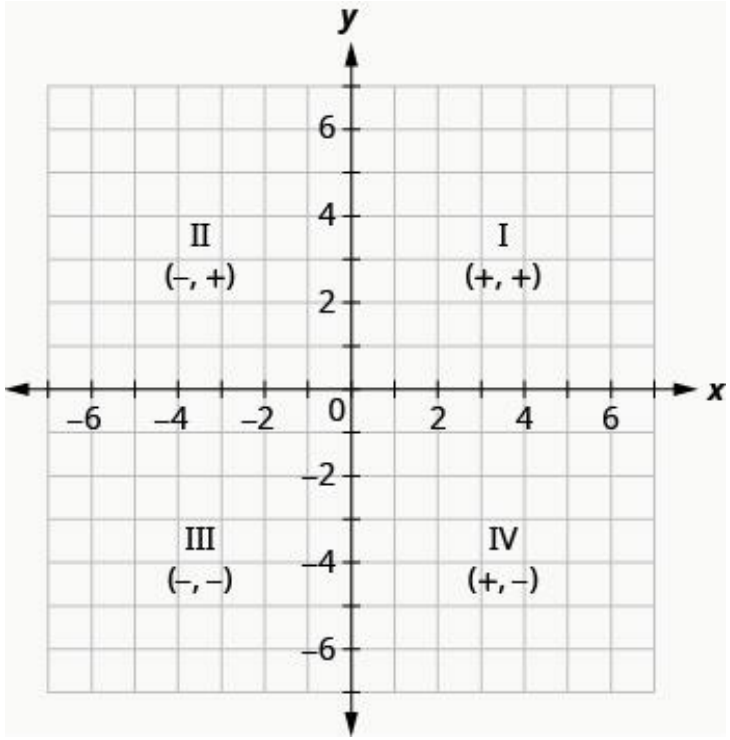


FIGURE 3.4

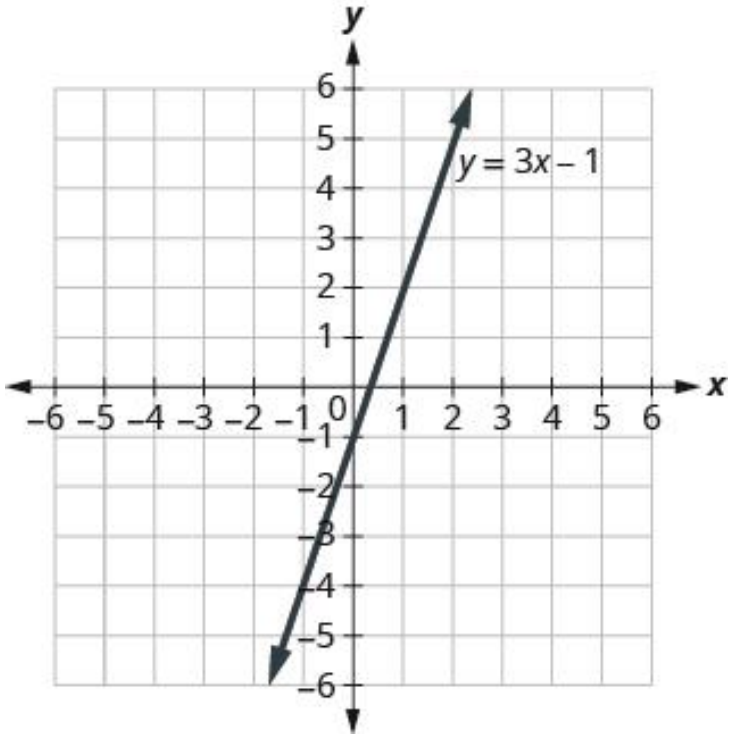



y
x
6
4
2
0
–2
–4
–6
–6
–4
–2
2
4
6
II
(–, +)
I
(+, +)
III
(–, –)
IV
(+, –)

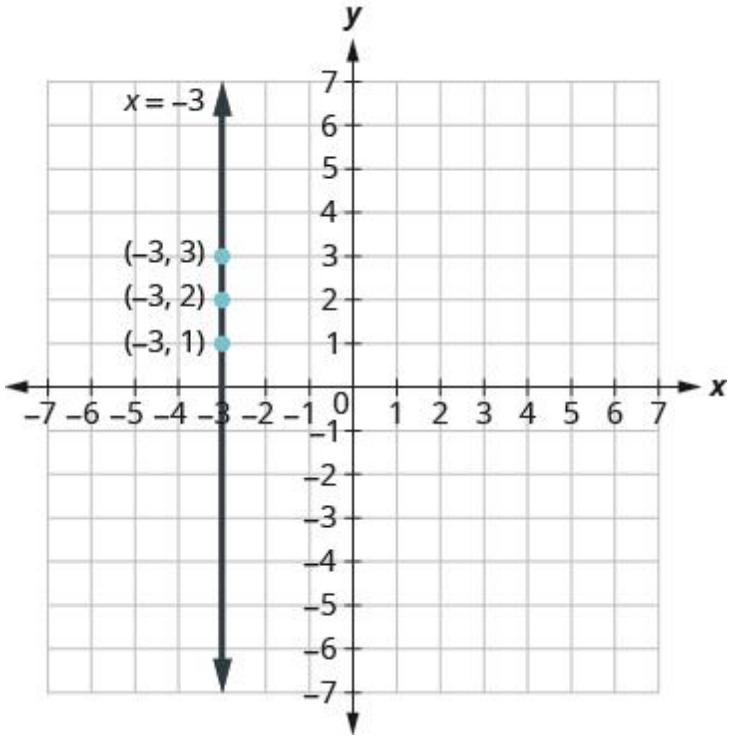
$$Ax + By = C$$

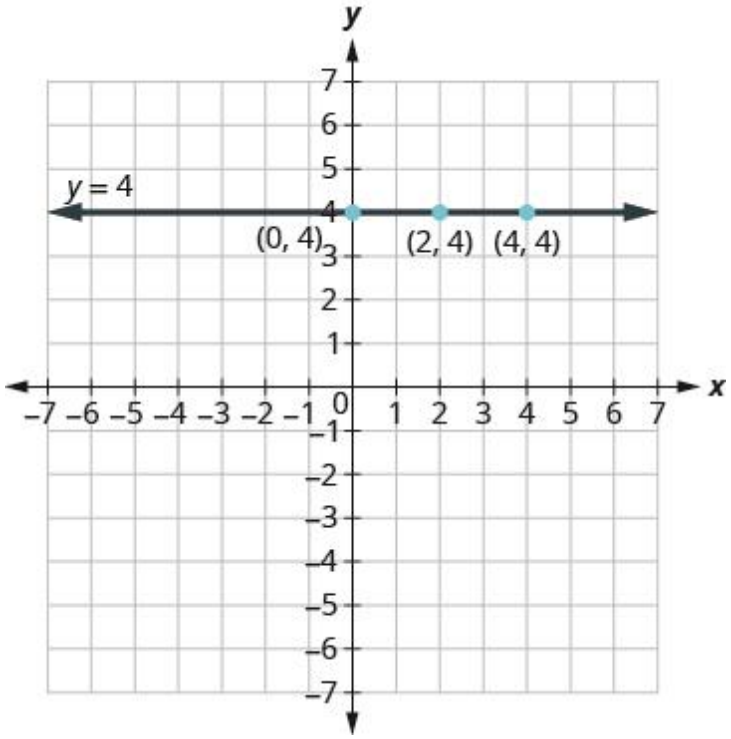
$$x + 4y = 8$$

$$A = 1,\ B = 4,\ C = 8$$


y
x
y = 3x – 1
6
5
4
3
2
1
–1
–2
–3
–4
–5
–6
–6 –5 –4 –3 –2 –1 0 1 2 3 4 5 6

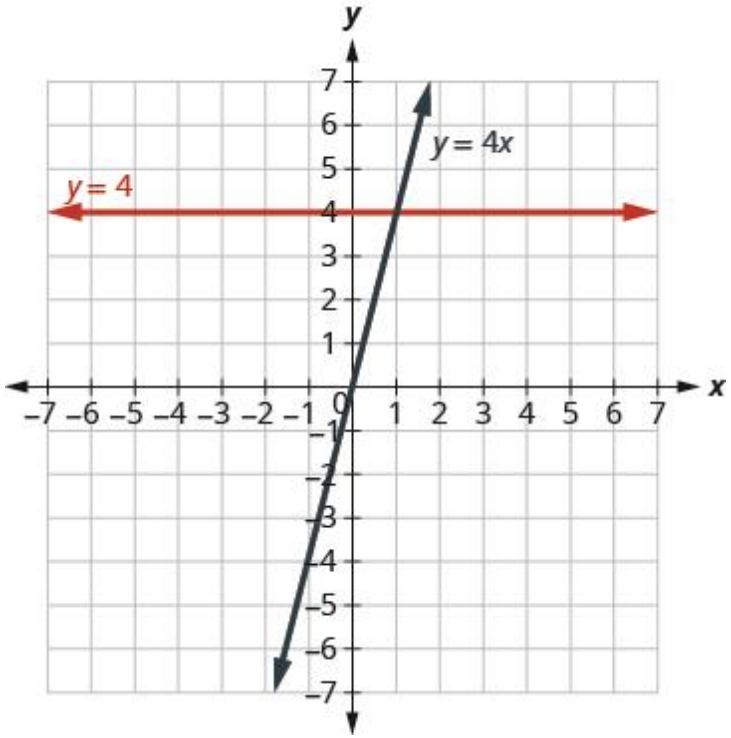
(a) (b)

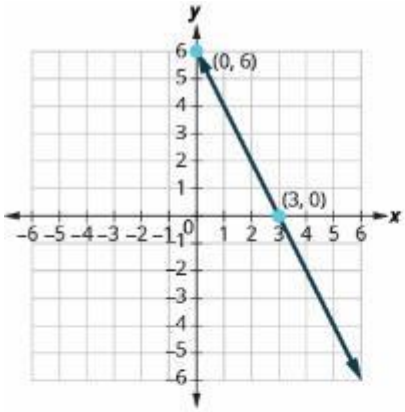

y
x
x = –3
(–3, 3)
(–3, 2)
(–3, 1)
7
6
5
4
3
2
1
0
–1
–2
–3
–4
–5
–6
–7
–7 –6 –5 –4 –3 –2 –1 1 2 3 4 5 6 7


y
x
y = 4
(0, 4)
(2, 4)
(4, 4)
7
6
5
4
3
2
1
0
–1
–2
–3
–4
–5
–6
–7
–7 –6 –5 –4 –3 –2 –1
1 2 3 4 5 6 7

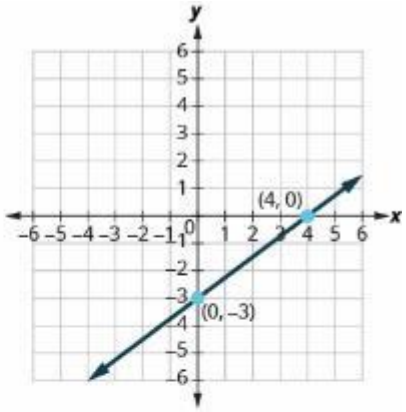
$y = 4x$		
x	y	(x, y)
0	0	(0, 0)
1	4	(1, 4)
2	8	(2, 8)

$y = 4$		
x	y	(x, y)
0	4	(0, 4)
1	4	(1, 4)
2	4	(2, 4)

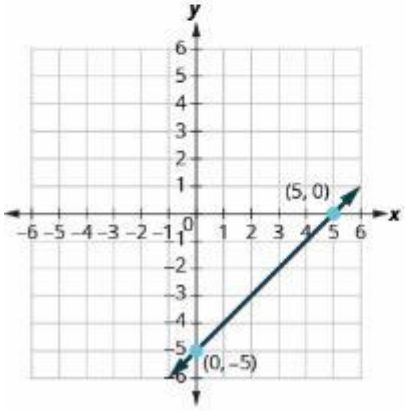

y
x
y = 4x
y = 4
7
6
5
4
3
2
1
0
–1
–2
–3
–4
–5
–6
–7
–7 –6 –5 –4 –3 –2 –1 1 2 3 4 5 6 7



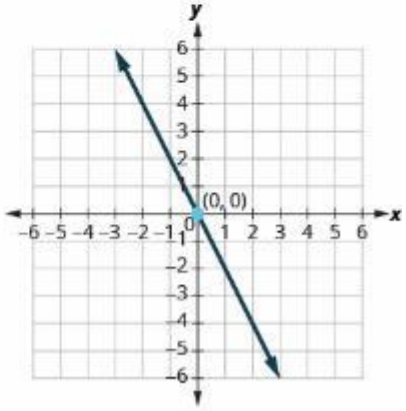
(a) $2x + y = 6$



(b) $3x - 4y = 12$



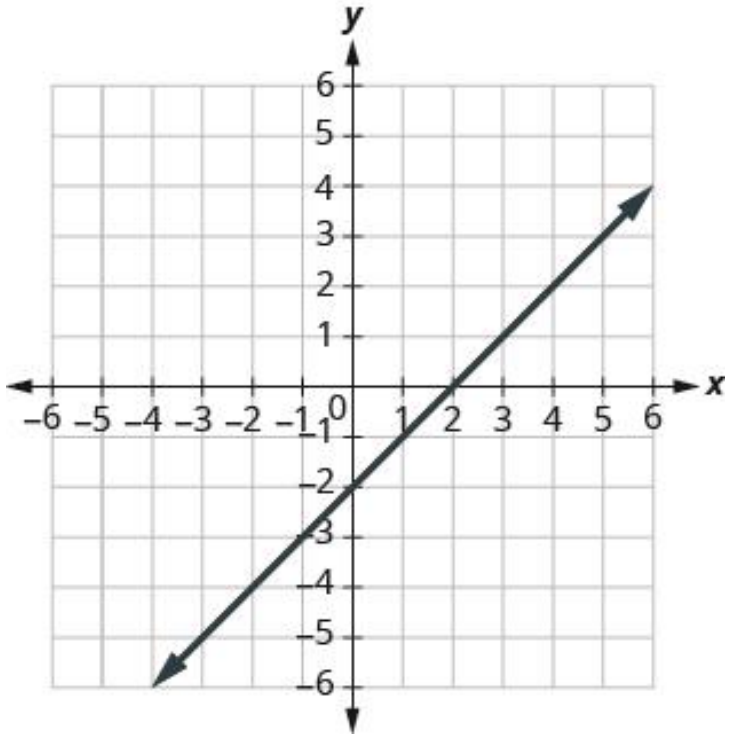
(c) $x - y = 5$



(d) $y = -2x$

- The x-intercept occurs when y is zero.
- The y-intercept occurs when x is zero.

x	y
a	0
0	b


y
x
6
5
4
3
2
1
0
−1
−2
−3
−4
−5
−6
−6 −5 −4 −3 −2 −1 1 2 3 4 5 6

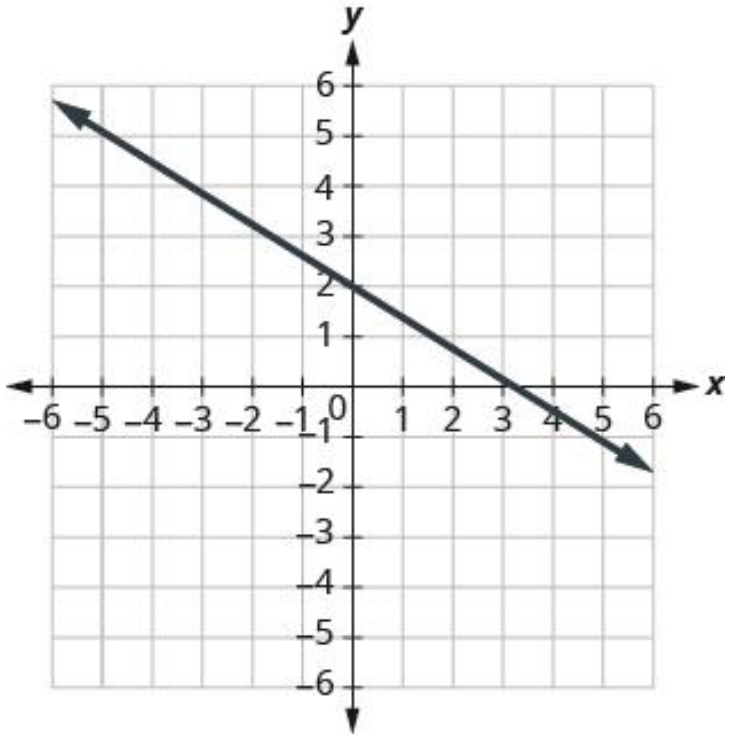
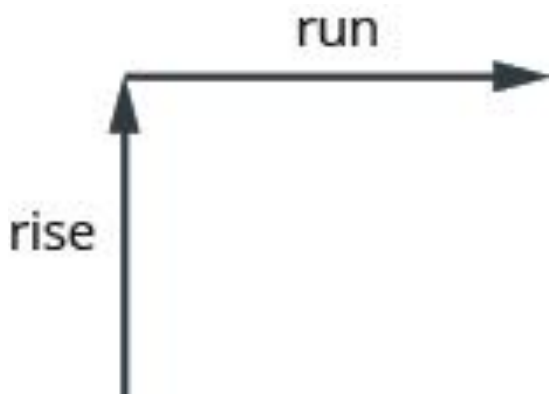
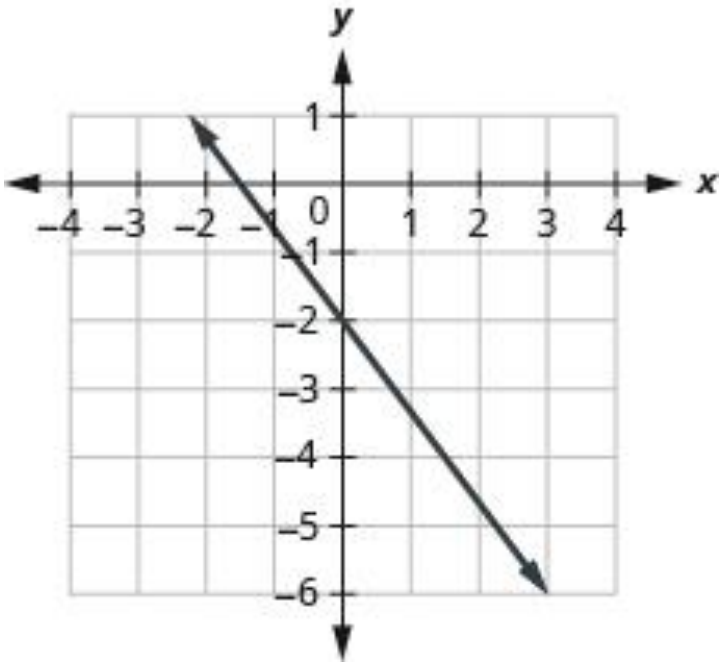
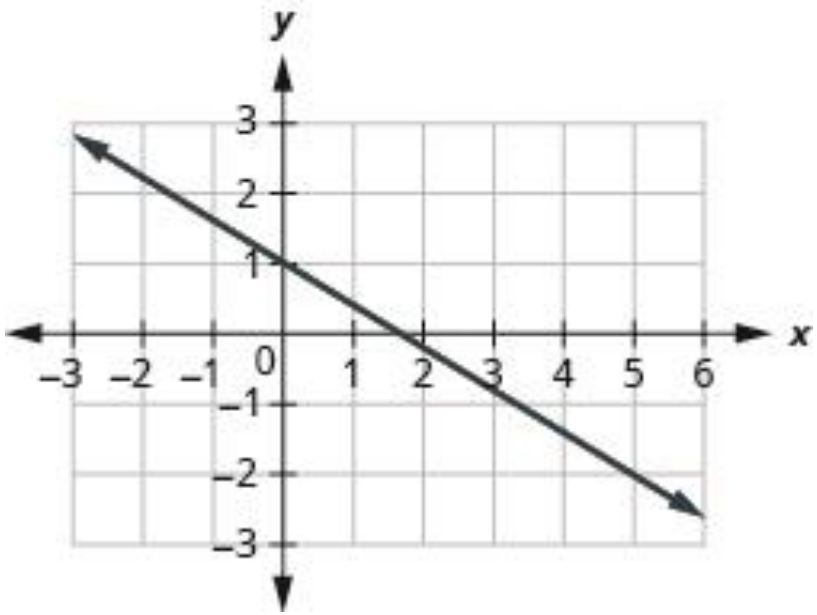
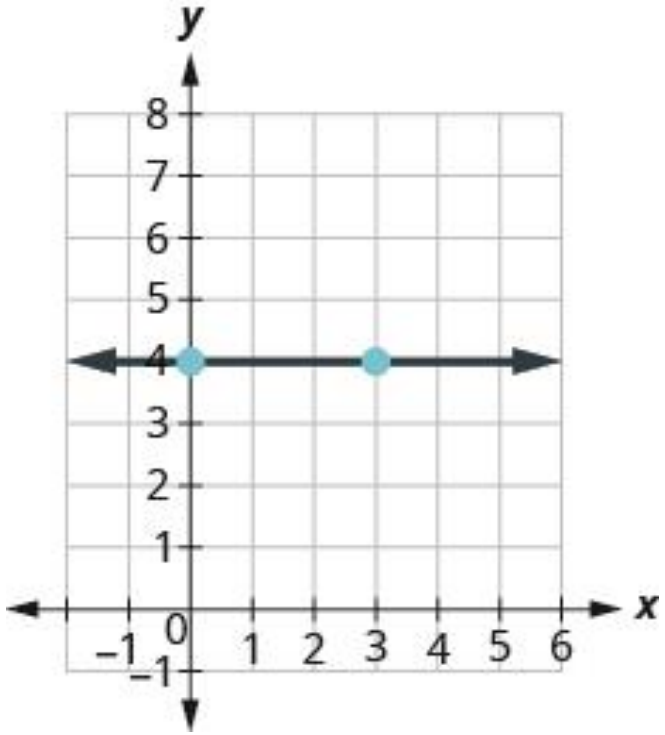

y
x
6
5
4
3
2
1
0
−1
−2
−3
−4
−5
−6
−6 −5 −4 −3 −2 −1 1 2 3 4 5 6

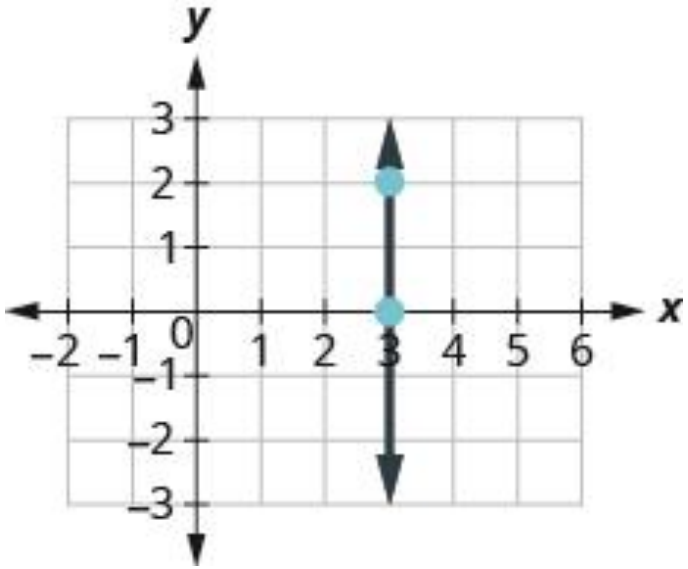
FIGURE 3.5

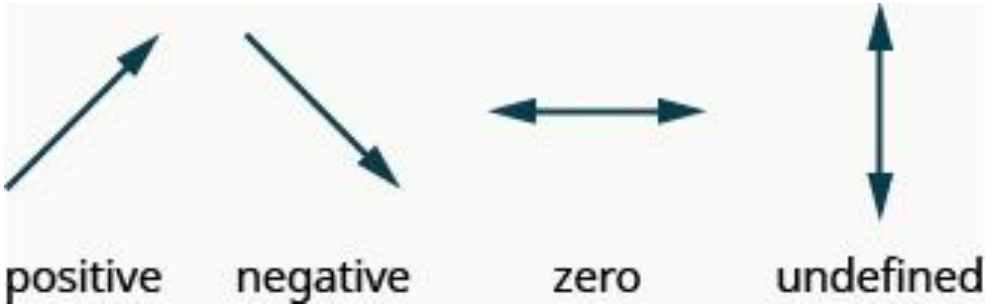



y
x
1
0
1
2
3
4
−4
−3
−2
−1
−1
−2
−3
−4
−5
−6


y
x
3
2
1
0
−1
−2
−3
−3
−2
−1
1
2
3
4
5
6


y
8
7
6
5
4
3
2
1
x
−1
0
1
2
3
4
5
6
−1


y
x
3
2
1
0
−1
−2
−3
−2
−1
1
2
3
4
5
6


positive
negative
zero
undefined

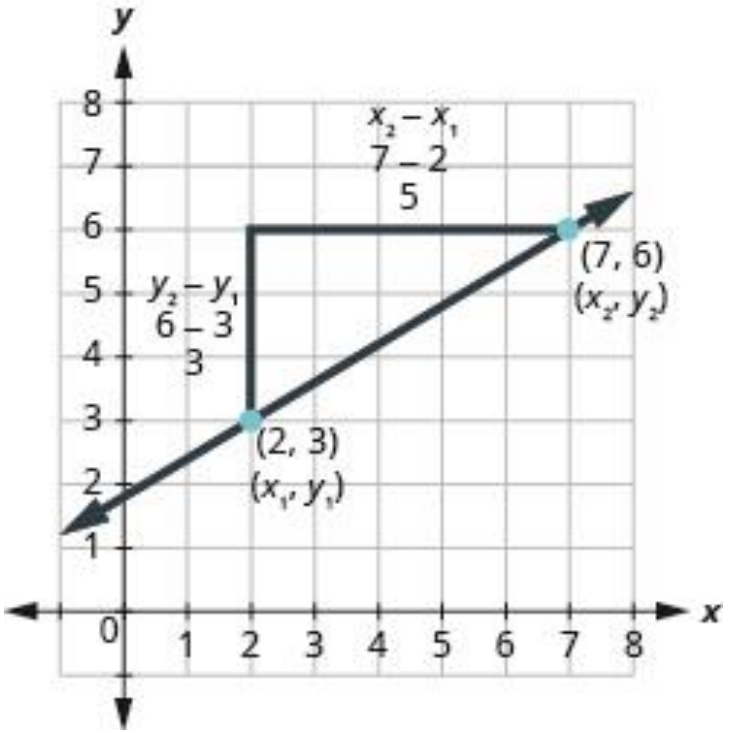
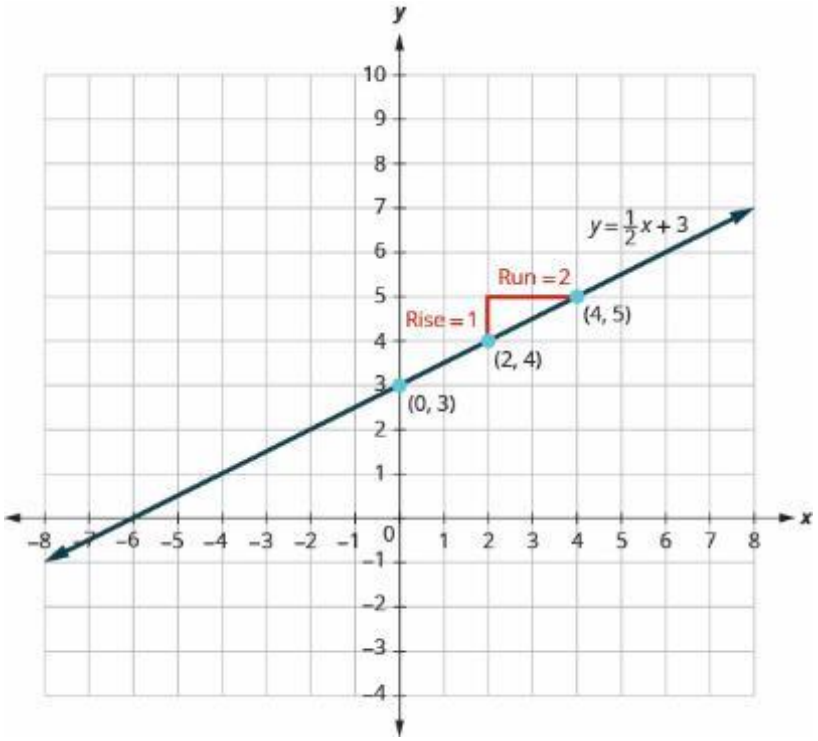

y
x
0
1
2
3
4
5
6
7
8
$x_2 - x_1$
7 – 2
5
$y_2 - y_1$
6 – 3
3
(7, 6)
(x_2, y_2)
(2, 3)
(x_1, y_1)

FIGURE 3.6


y
x
10
9
8
7
6
5
4
3
2
1
0
−1
−2
−3
−4
−8
−7
−6
−5
−4
−3
−2
−1
1
2
3
4
5
6
7
8
$y=\frac{1}{2}x+3$
Run = 2
Rise = 1
(4, 5)
(2, 4)
(0, 3)

$$y = \frac{1}{2}x + 3$$

slope $m = \frac{1}{2}$ and y-intercept $(0, 3)$.

$m = \frac{1}{2}$; y-intercept is $(0, 3)$

$$y = \frac{1}{2}x + 3$$

$$y = mx + b$$

Methods to Graph Lines			
Point Plotting	**Slope–Intercept**	**Intercepts**	**Recognize Vertical and Horizontal Lines**
x | y _____ _____ _____ _____	$y = mx + b$	x | y _____ 0 | _____ | 0 _____ _____	
Find three points. Plot the points, make sure they line up, then draw the line.	Find the slope and y-intercept. Start at the y-intercept, then count the slope to get a second point.	Find the intercepts and a third point. Plot the points, make sure they line up, then draw the line.	The equation has only one variable. $x = a$ vertical $y = b$ horizontal

FIGURE 3.7

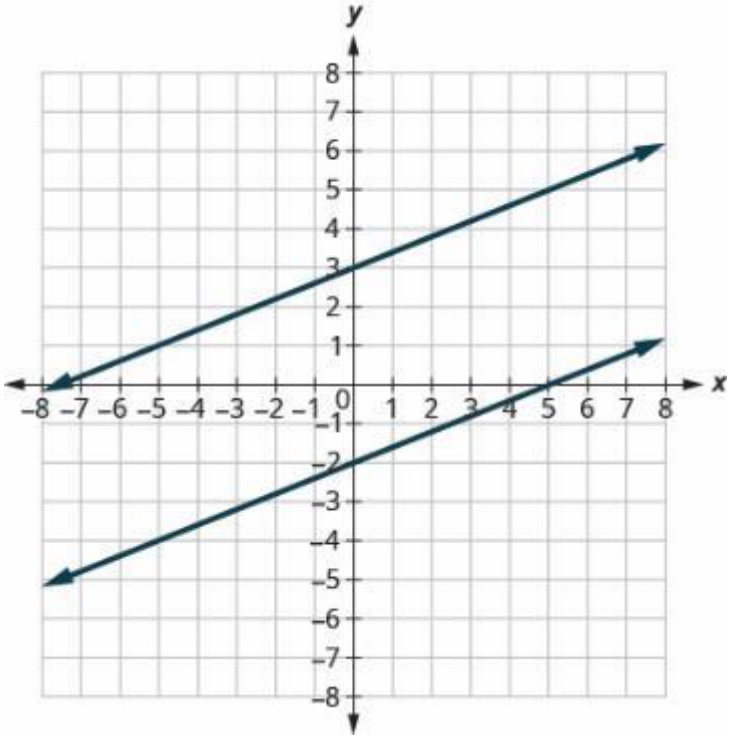


FIGURE 3.8

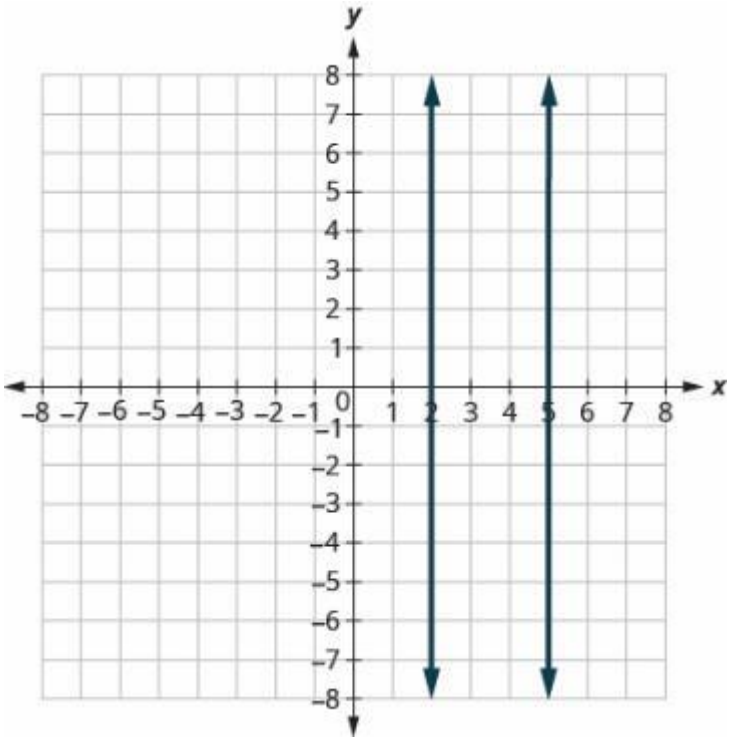
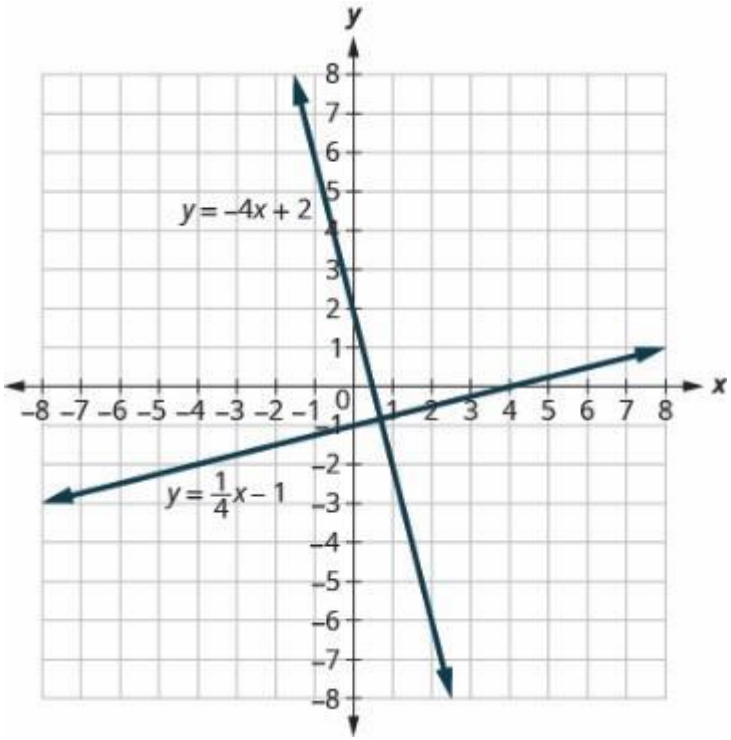
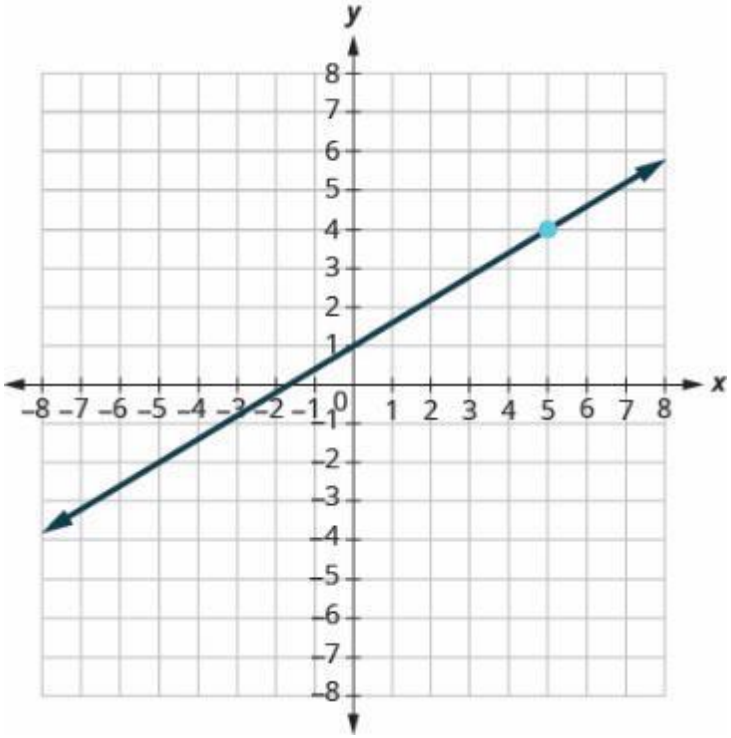
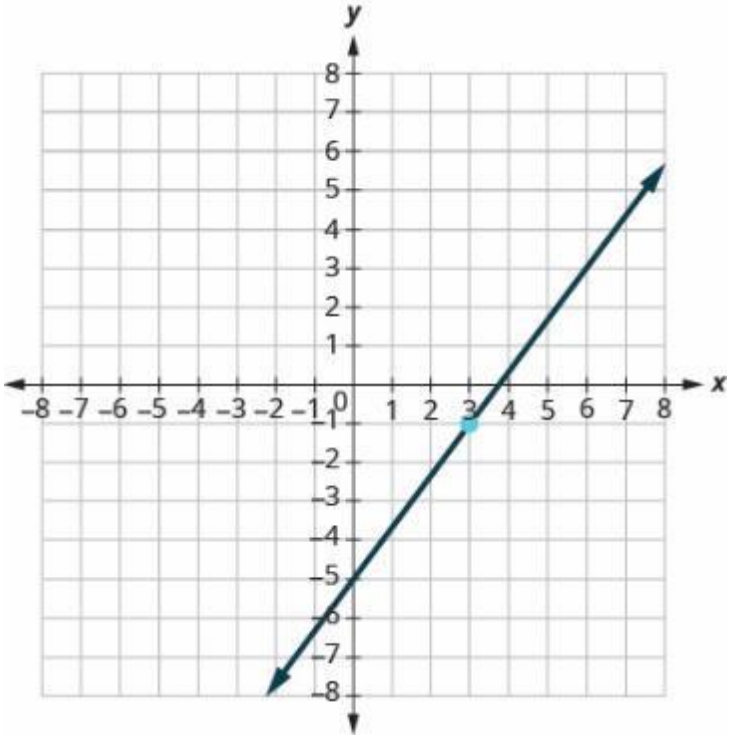
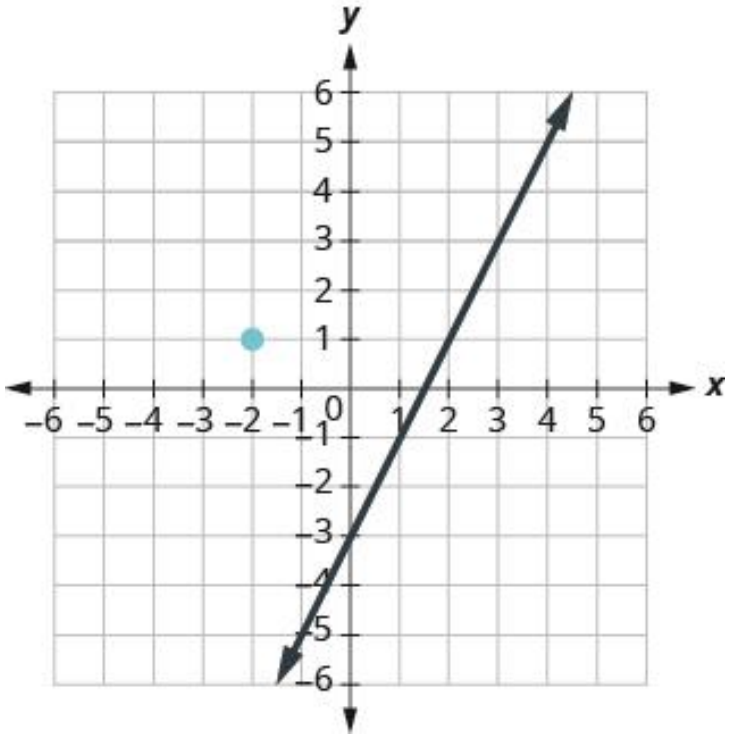


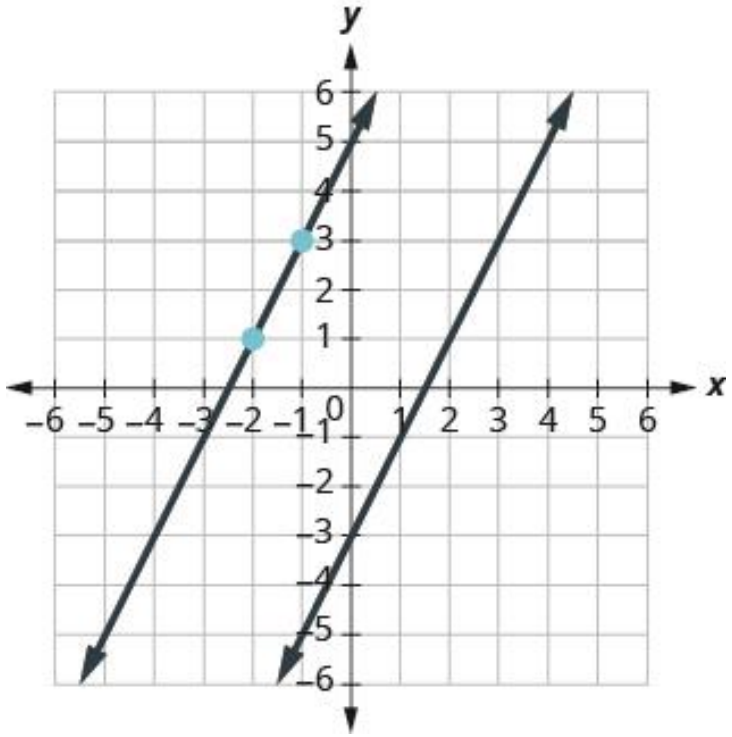
FIGURE 3.9

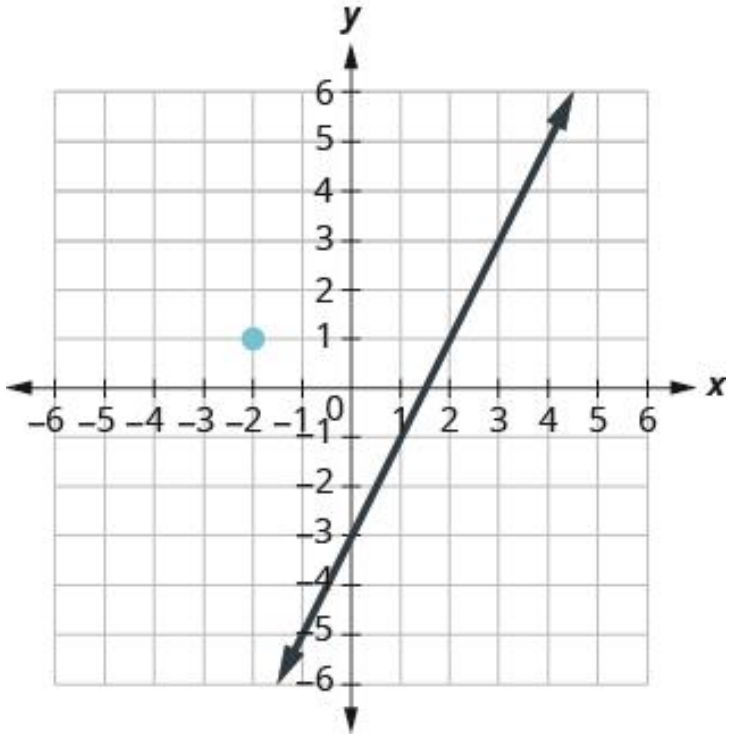


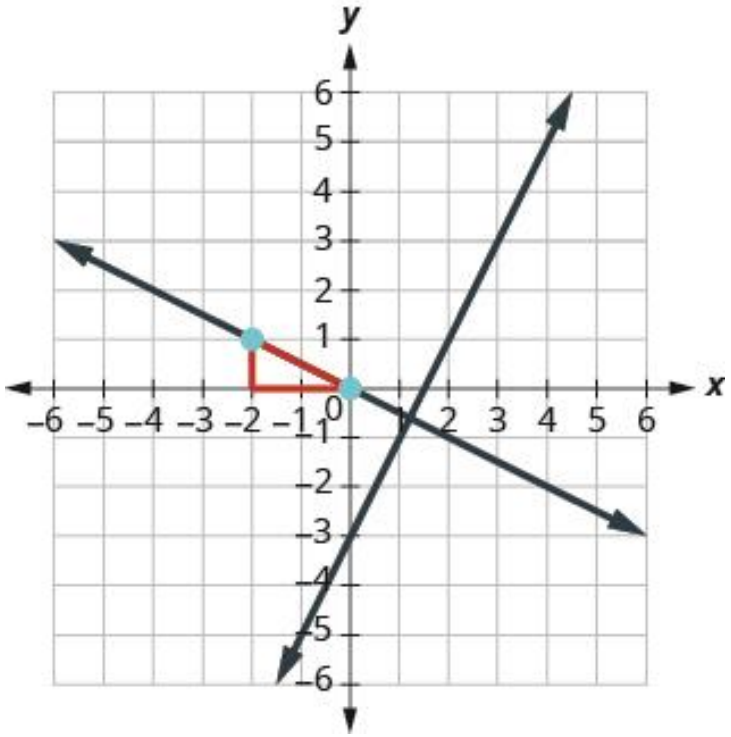

y
x
8
7
6
5
4
3
2
1
0
–1
–2
–3
–4
–5
–6
–7
–8
–8 –7 –6 –5 –4 –3 –2 –1 1 2 3 4 5 6 7 8

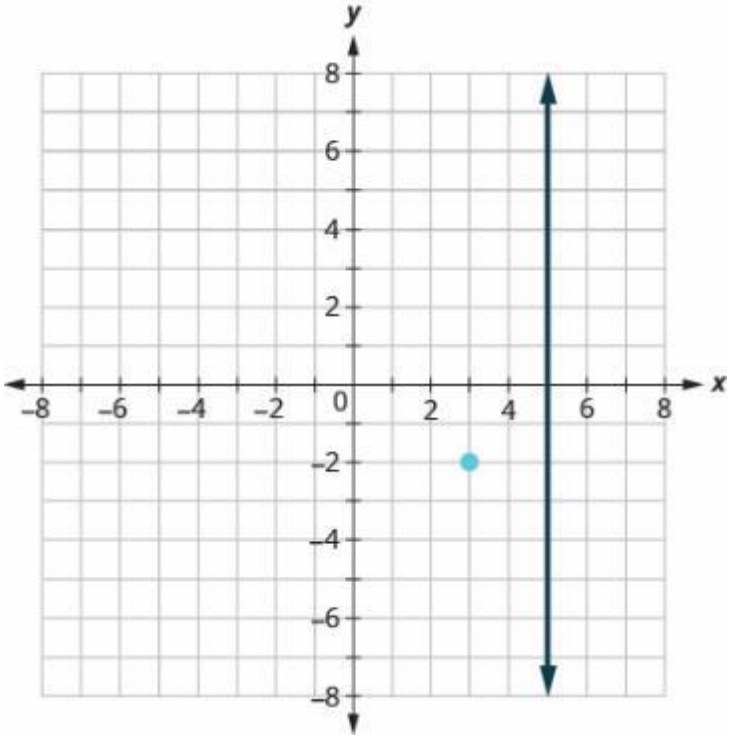

y
x
8
7
6
5
4
3
2
1
0
−1
−2
−3
−4
−5
−6
−7
−8
−8 −7 −6 −5 −4 −3 −2 −1
1 2 3 4 5 6 7 8


y
x
6
5
4
3
2
1
0
−1
−2
−3
−4
−5
−6
−6 −5 −4 −3 −2 −1
1 2 3 4 5 6


y
x
6
5
4
3
2
1
0
−1
−2
−3
−4
−5
−6
−6 −5 −4 −3 −2 −1 1 2 3 4 5 6


y
x
6
5
4
3
2
1
0
−1
−2
−3
−4
−5
−6
−6 −5 −4 −3 −2 −1 1 2 3 4 5 6


y
x
6
5
4
3
2
1
0
−1
−2
−3
−4
−5
−6
−6 −5 −4 −3 −2 −1
1 2 3 4 5 6


y
x
8
6
4
2
0
−2
−4
−6
−8
−8
−6
−4
−2
2
4
6
8

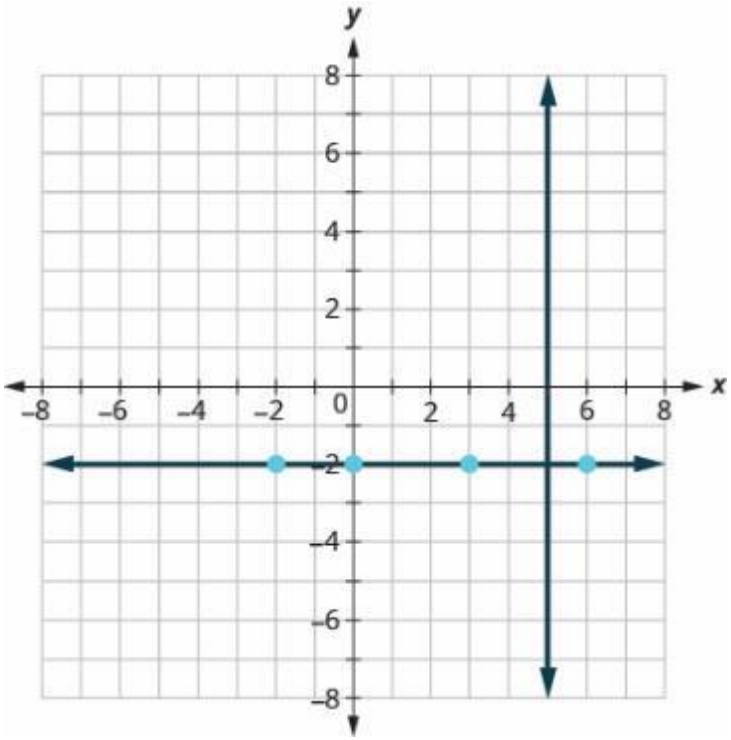

y
x
8
6
4
2
0
−2
−4
−6
−8
−8
−6
−4
−2
2
4
6
8

FIGURE 3.10

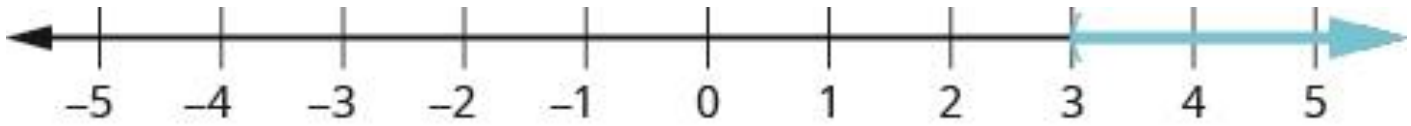
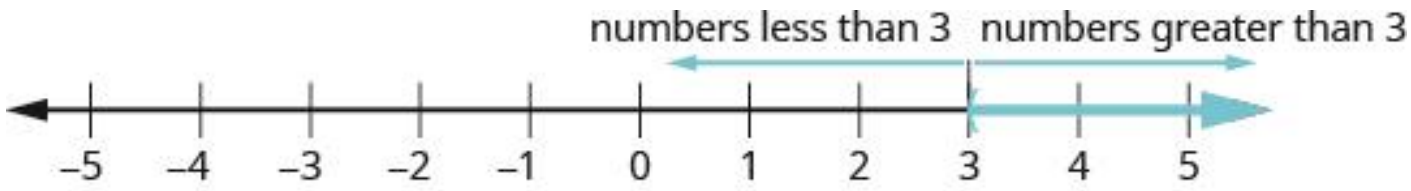


FIGURE 3.11



The solution to $x > 3$ is the shaded part of the number line to the right of $x = 3$.


x < a
a
x ≤ a
a

FIGURE 3.12

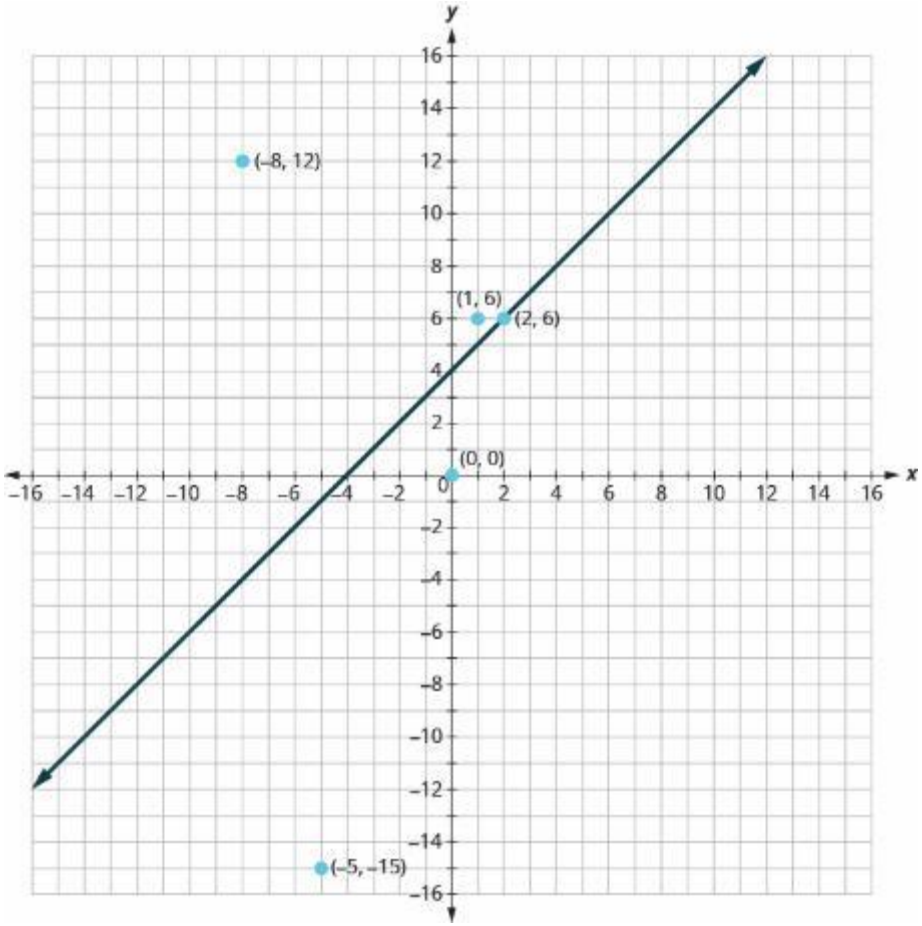
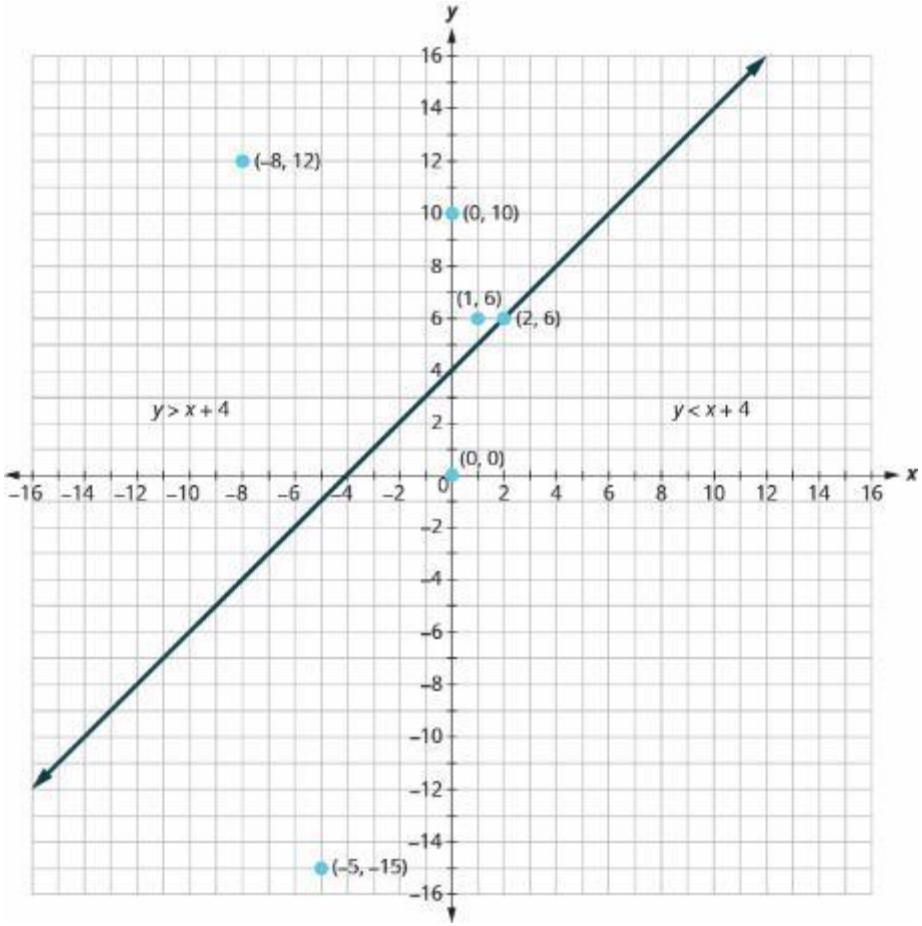
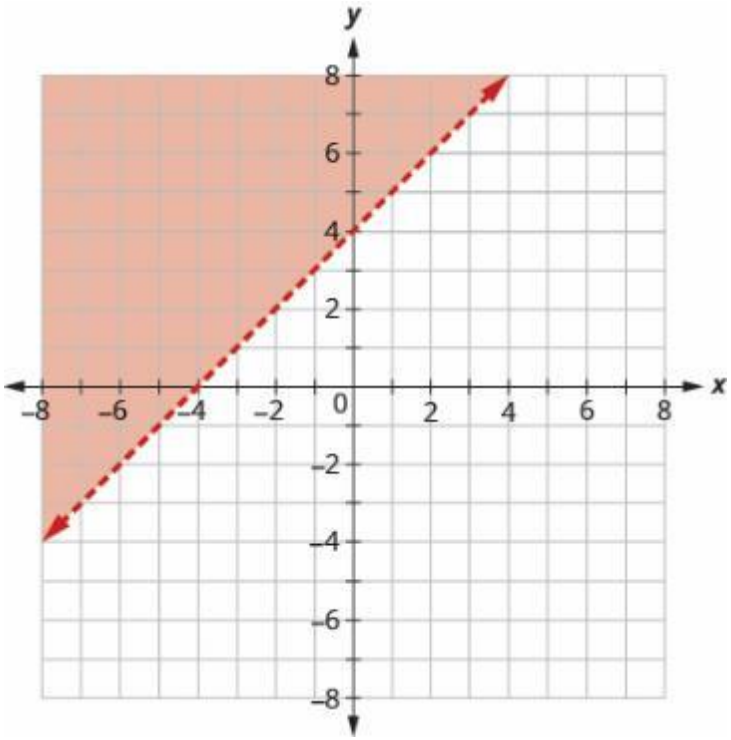
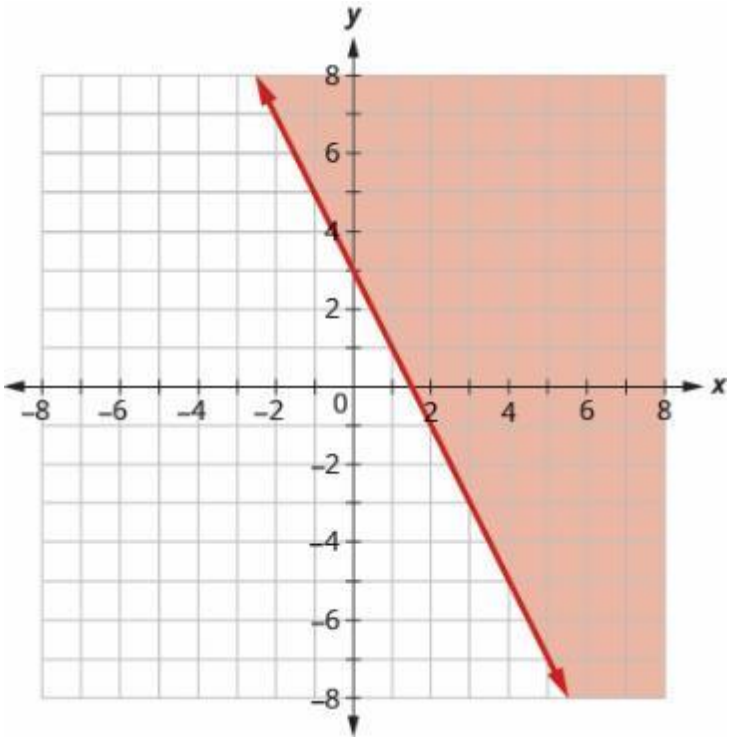
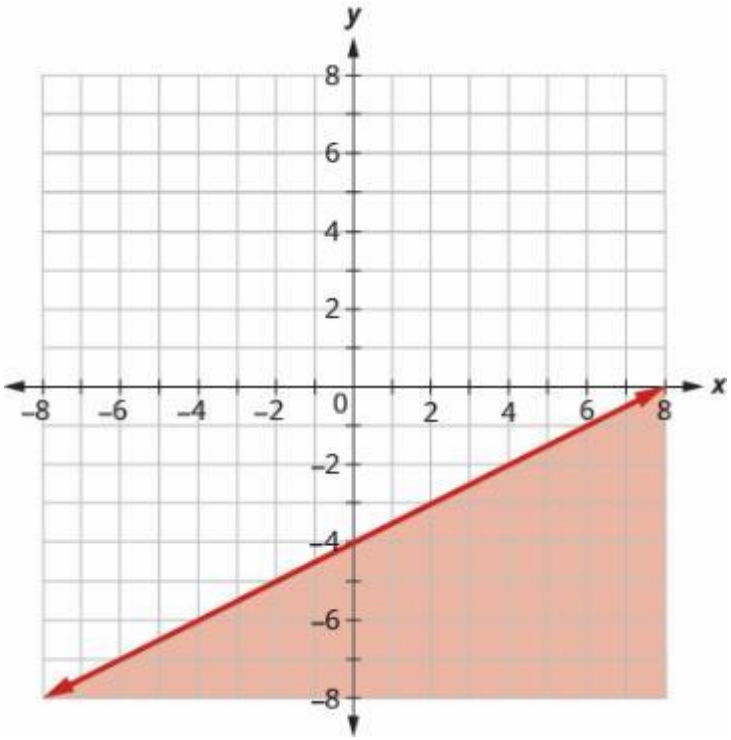


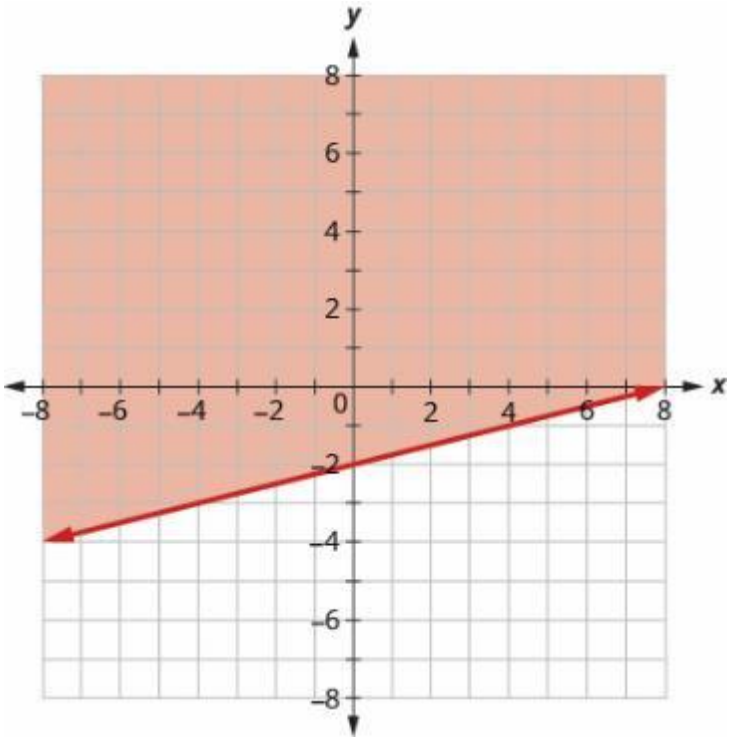
FIGURE 3.13

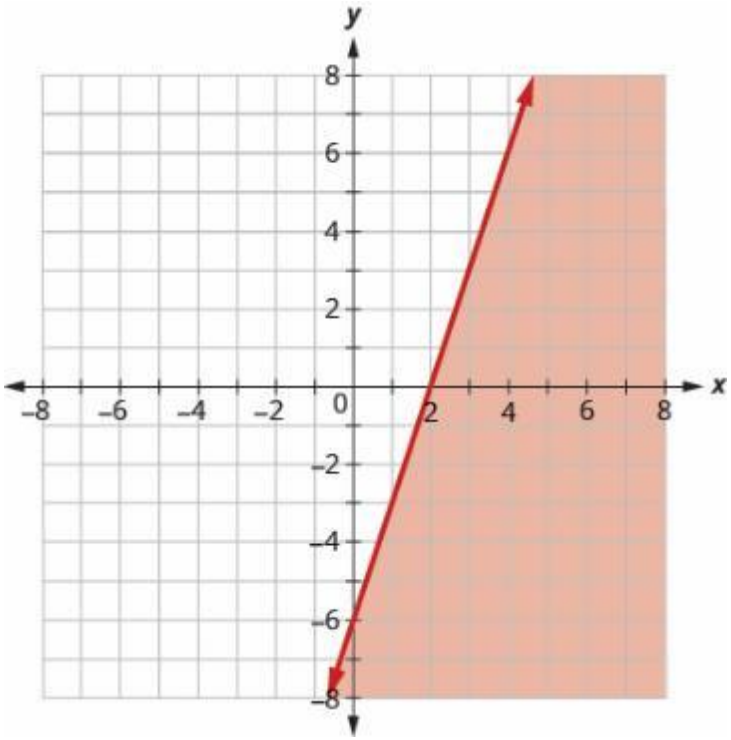



y
x
8
6
4
2
0
–2
–4
–6
–8
–8
–6
–4
–2
2
4
6
8


y
x
8
6
4
2
0
−2
−4
−6
−8
−8
−6
−4
−2
2
4
6
8


y
x
8
6
4
2
0
–2
–4
–6
–8
–8
–6
–4
–2
2
4
6
8


y
x
8
6
4
2
0
−2
−4
−6
−8
−8
−6
−4
−2
2
4
6
8


y
x
8
6
4
2
0
–2
–4
–6
–8
–8
–6
–4
–2
2
4
6
8

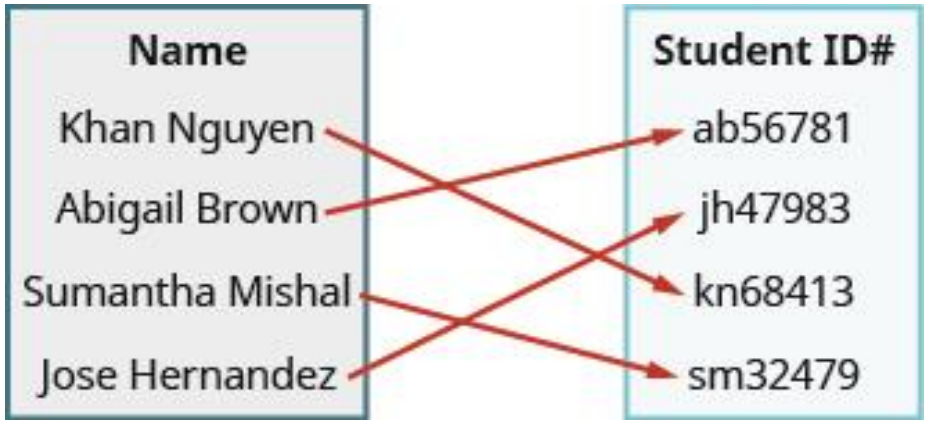
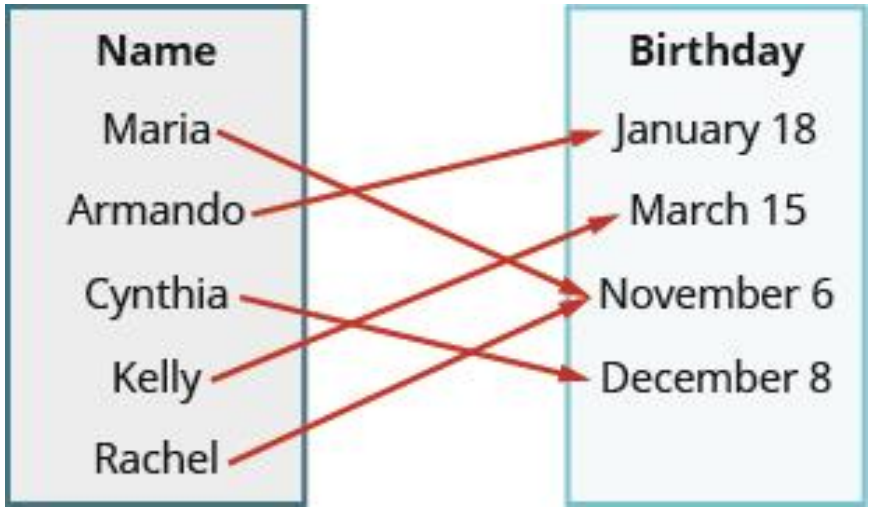
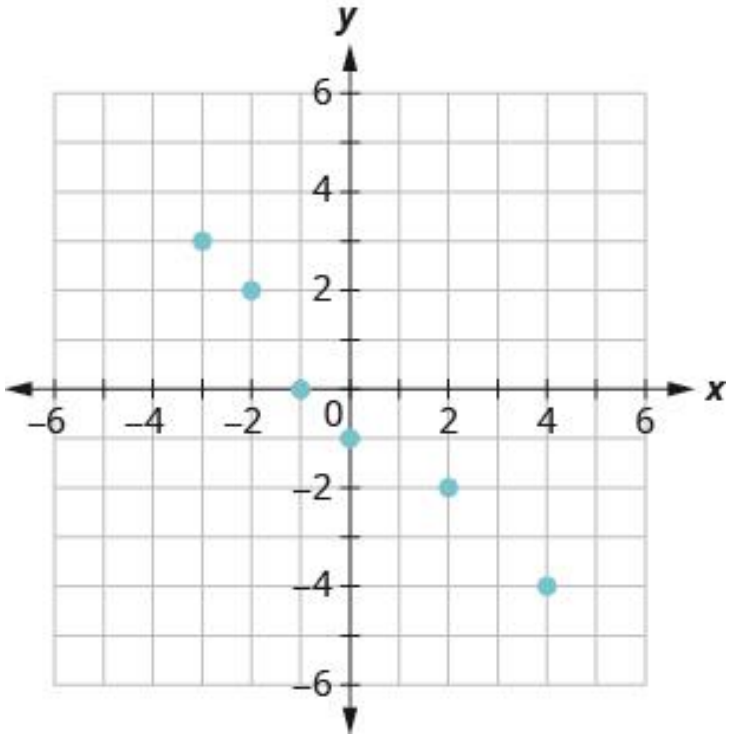
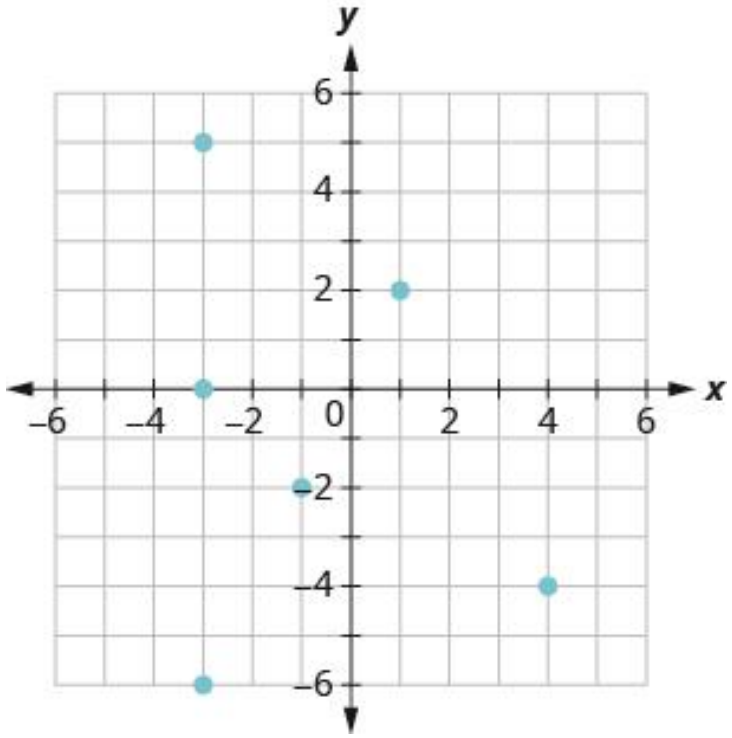
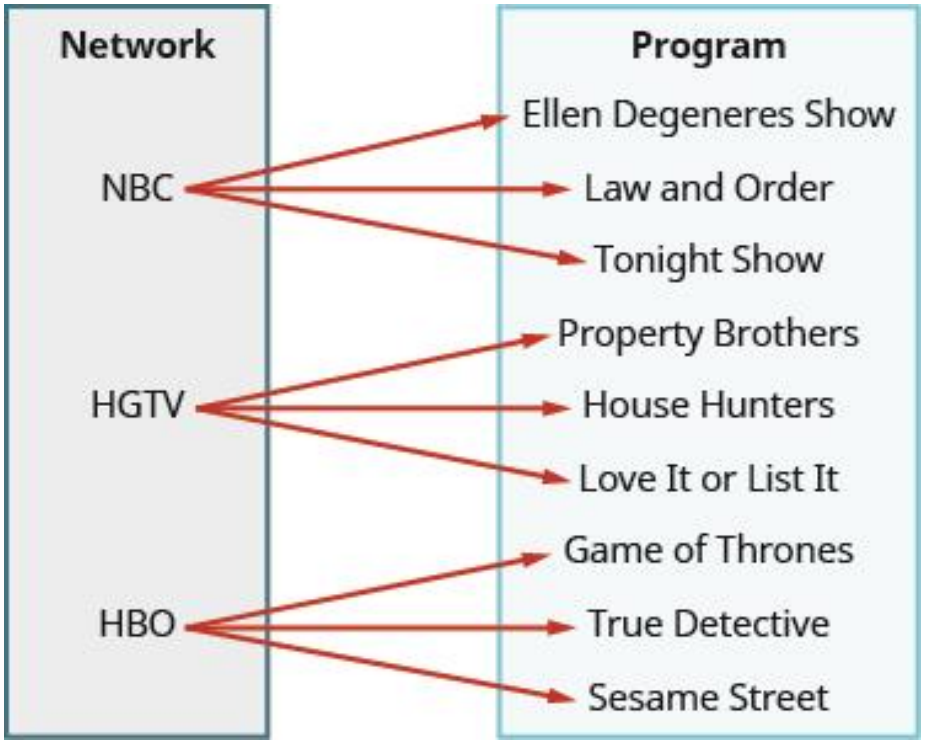

Name
Khan Nguyen
Abigail Brown
Sumantha Mishal
Jose Hernandez
Student ID#
ab56781
jh47983
kn68413
sm32479

FIGURE 3.1


Name
Maria
Armando
Cynthia
Kelly
Rachel
Birthday
January 18
March 15
November 6
December 8


y
x
6
4
2
0
–2
–4
–6
–6
–4
–2
2
4
6


y
x
6
4
2
0
−2
−4
−6
−6
−4
−2
2
4
6


Network
Program
NBC
HGTV
HBO
Ellen Degeneres Show
Law and Order
Tonight Show
Property Brothers
House Hunters
Love It or List It
Game of Thrones
True Detective
Sesame Street

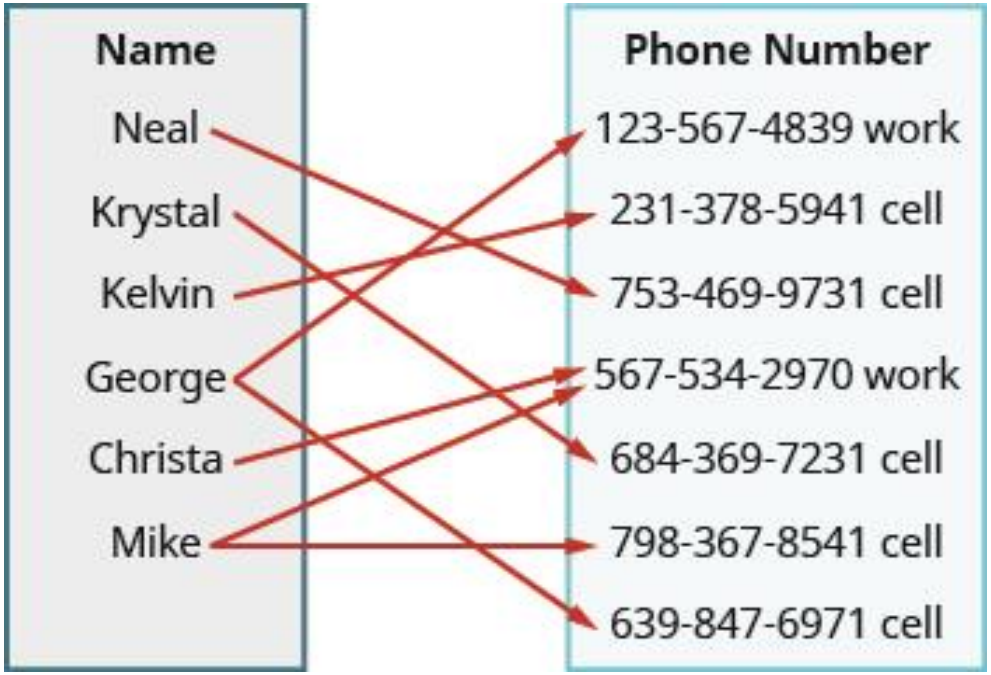
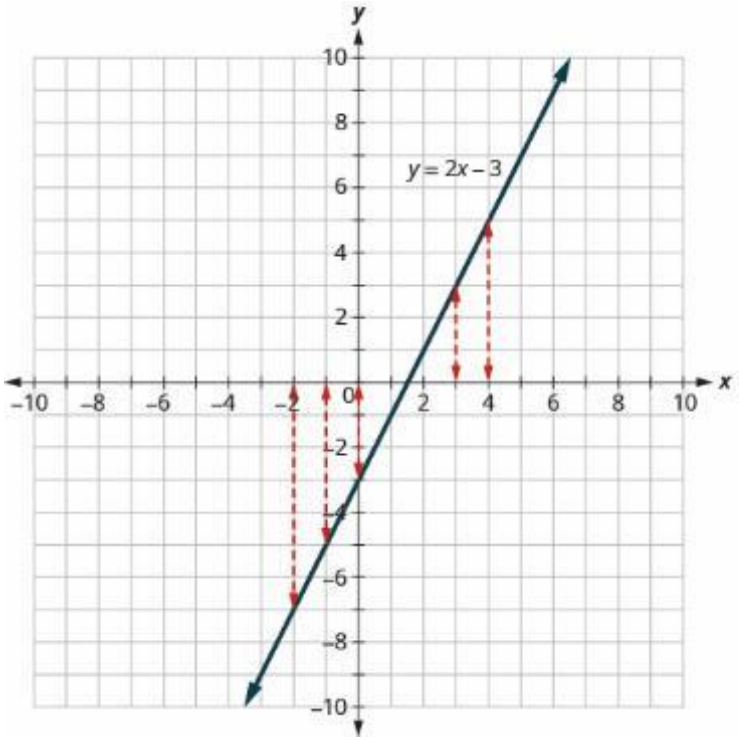
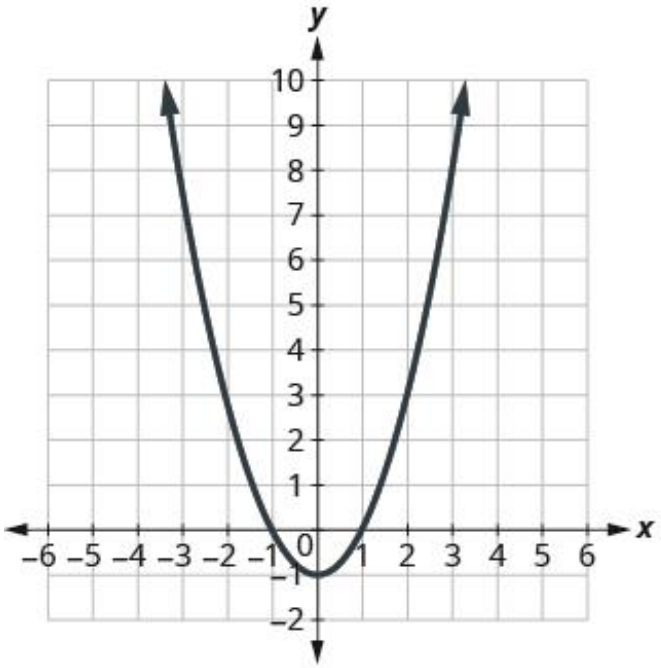

Name
Neal
Krystal
Kelvin
George
Christa
Mike
Phone Number
123-567-4839 work
231-378-5941 cell
753-469-9731 cell
567-534-2970 work
684-369-7231 cell
798-367-8541 cell
639-847-6971 cell

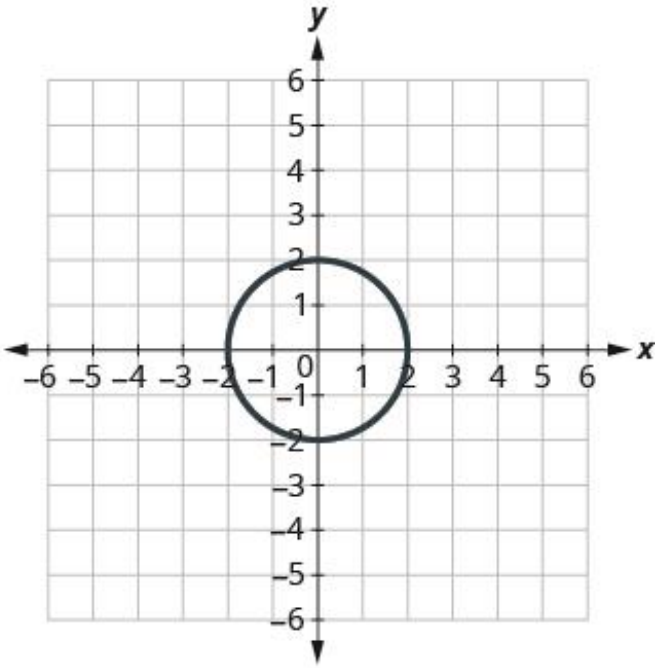
FIGURE 3.14



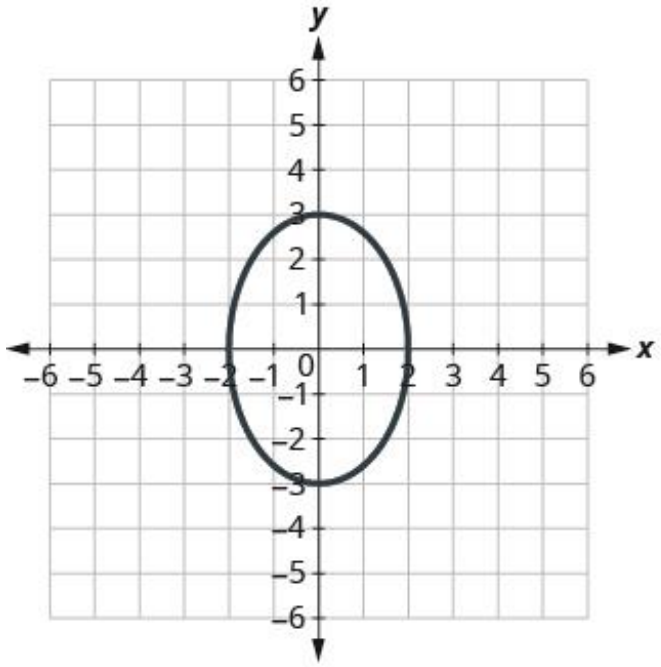
$y = 2x - 3$		
x	y	(x, y)
–2	–7	(–2, –7)
–1	–5	(–1, –5)
0	–3	(0, –3)
3	3	(3, 3)
4	5	(4, 5)


y
x
10
9
8
7
6
5
4
3
2
1
0
−1
−2
−6 −5 −4 −3 −2 −1 1 2 3 4 5 6

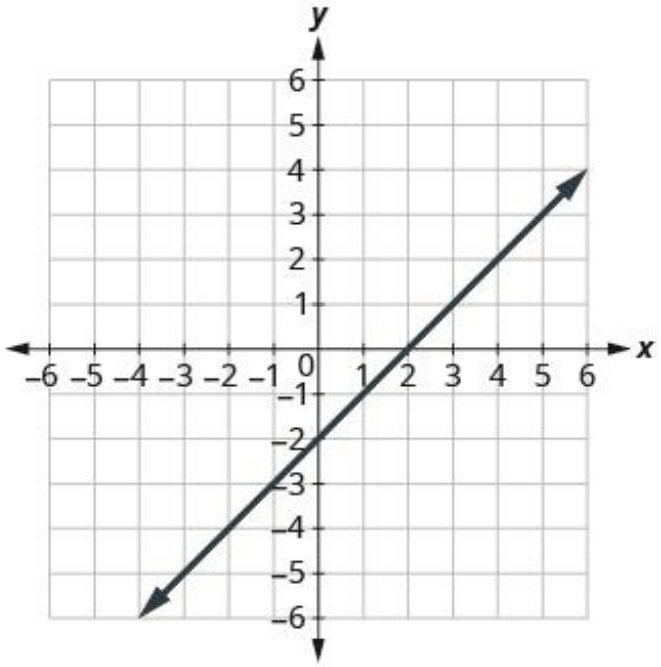
(a)


y
x
6
5
4
3
2
1
0
−1
−2
−3
−4
−5
−6
−6 −5 −4 −3 −2 −1 1 2 3 4 5 6

(b)

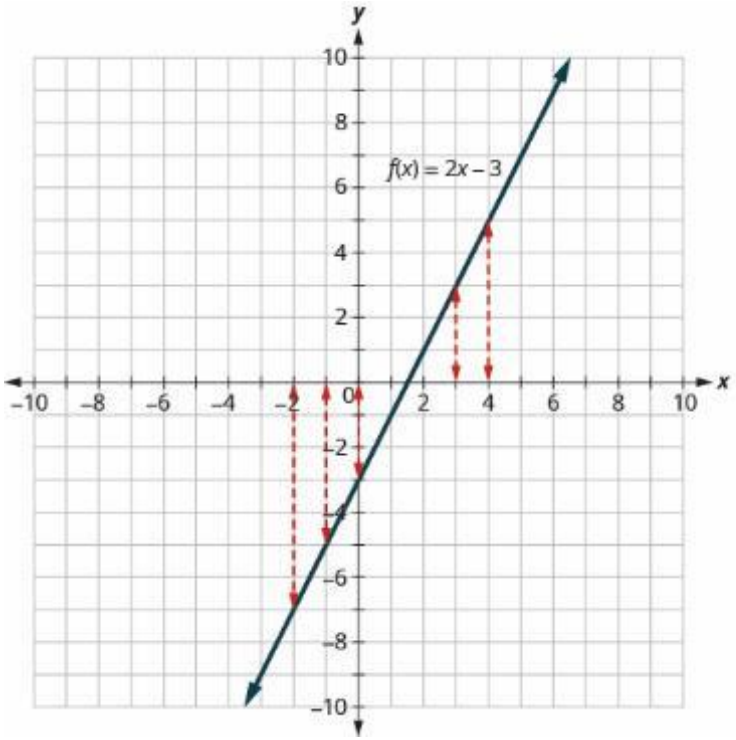

y
x
6
5
4
3
2
1
0
−1
−2
−3
−4
−5
−6
−6 −5 −4 −3 −2 −1 1 2 3 4 5 6

(a)

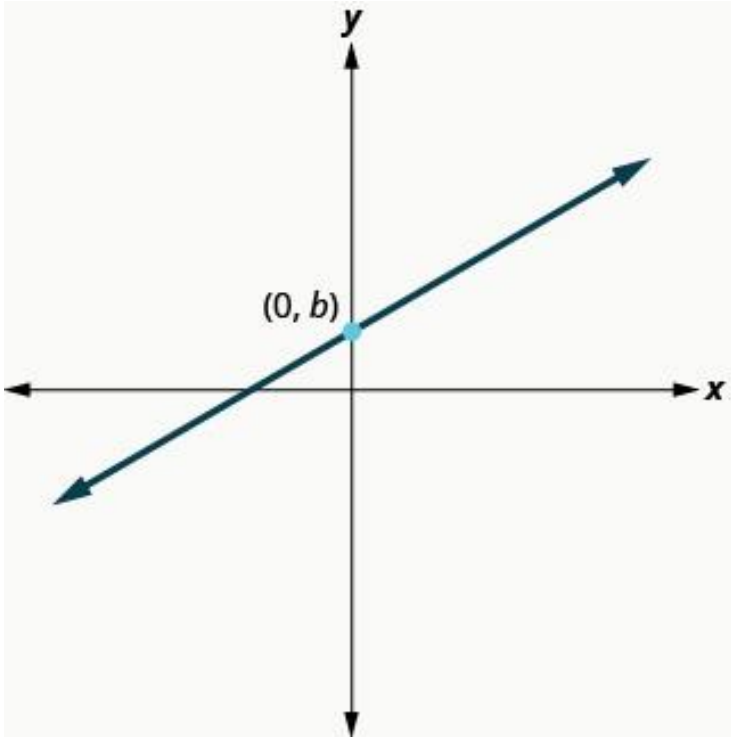

y
x
6
5
4
3
2
1
0
−1
−2
−3
−4
−5
−6
−6 −5 −4 −3 −2 −1 1 2 3 4 5 6

(b)

FIGURE 3.15



$f(x) = 2x - 3$		
x	$f(x)$	$(x, f(x))$
–2	–7	(–2, –7)
–1	–5	(–1, –5)
0	–3	(0, –3)
3	3	(3, 3)
4	5	(4, 5)



$f(x) = mx + b$

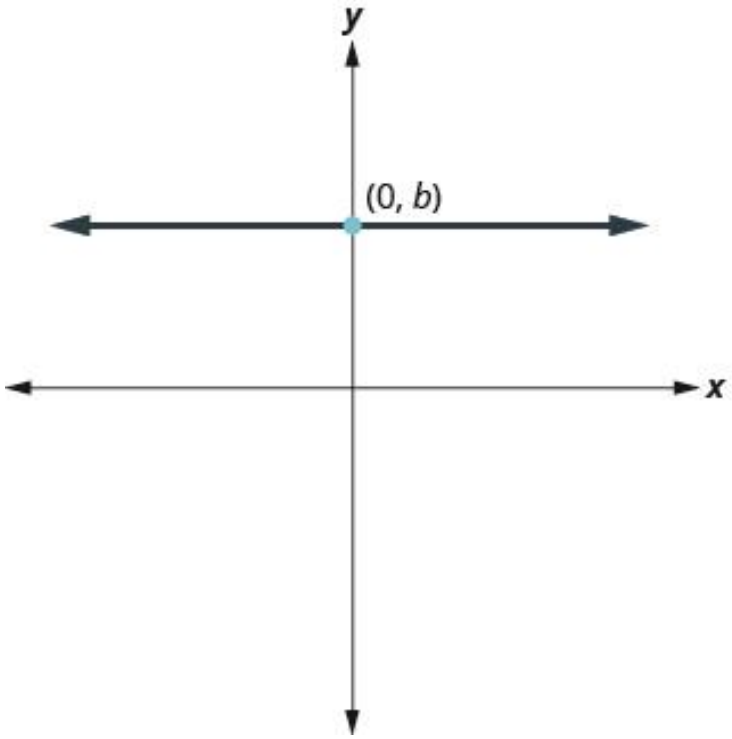
m, b: all real numbers

m: slope of the line

b: y-intercept

Domain: $(-\infty, \infty)$

Range: $(-\infty, \infty)$



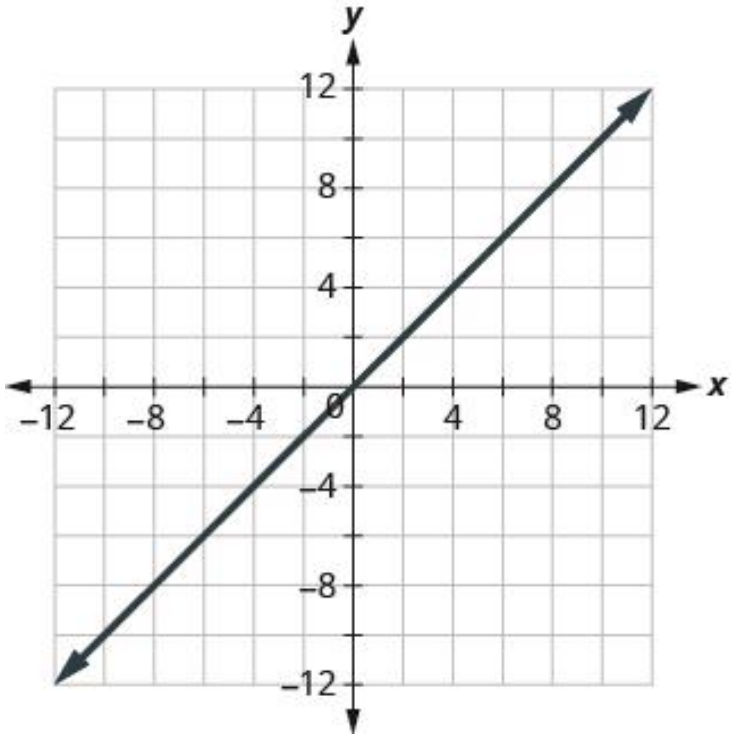
$f(x) = b$

b: any real number

b: y-intercept

Domain: $(-\infty, \infty)$

Range: b



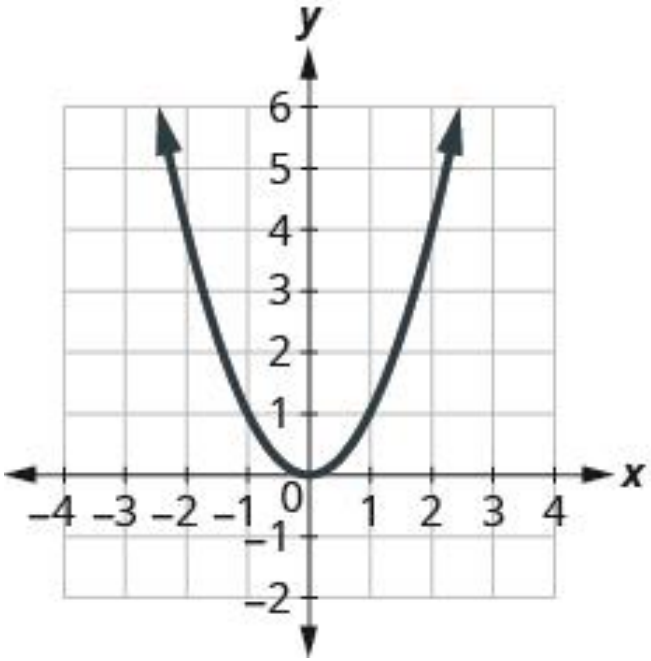
$f(x) = x$

m: 1

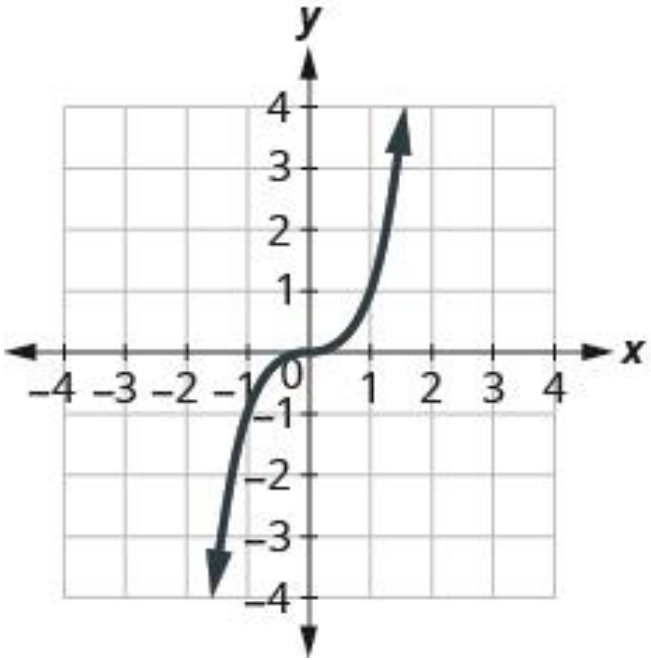
b: 0

Domain: $(-\infty, \infty)$

Range: $(-\infty, \infty)$



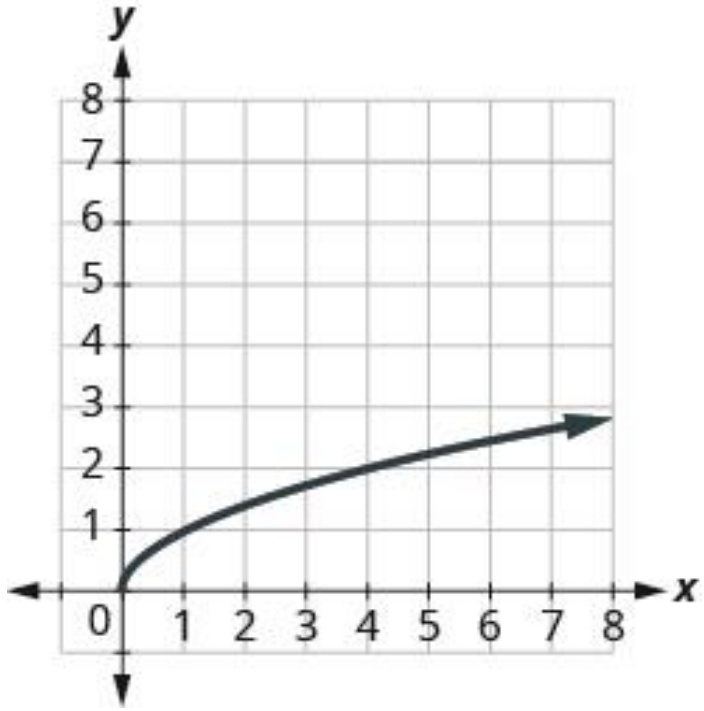
$f(x) = x^2$
Domain: $(-\infty, \infty)$
Range: $[0, \infty)$



$f(x) = x^3$

Domain: $(-\infty, \infty)$

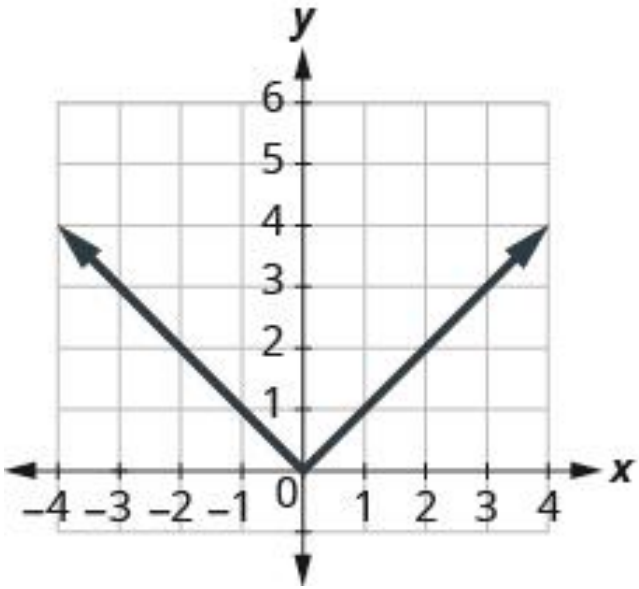
Range: $(-\infty, \infty)$



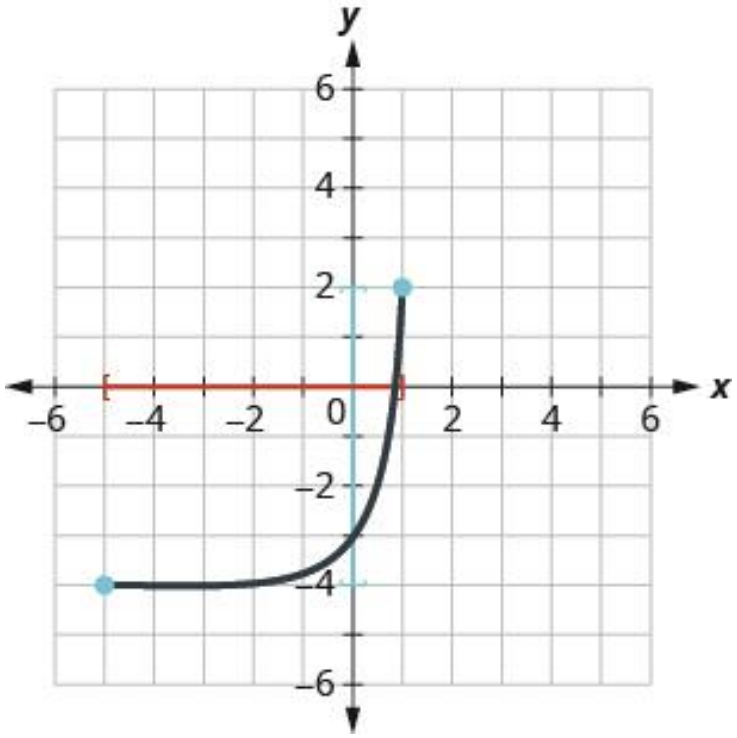
$f(x) = \sqrt{x}$

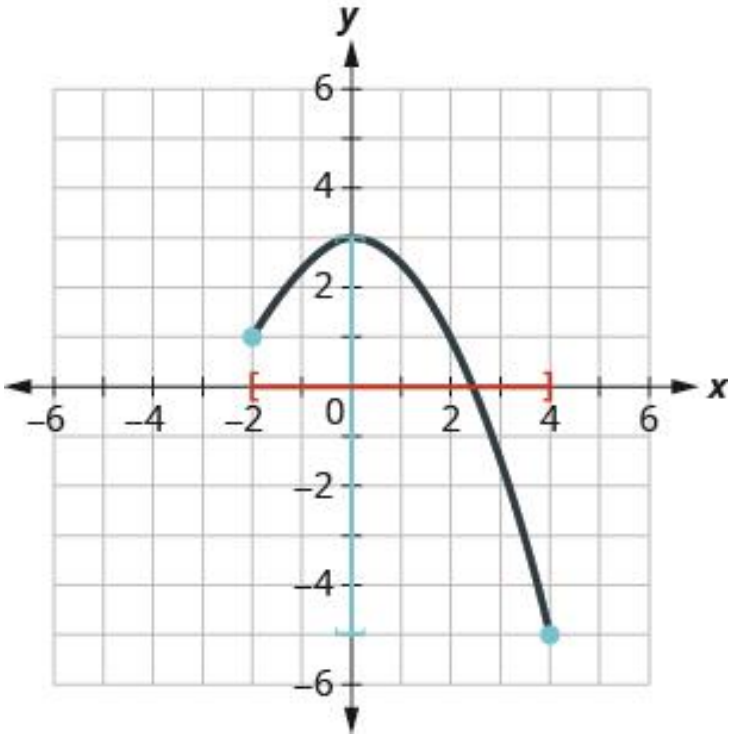
Domain: $[0, \infty)$

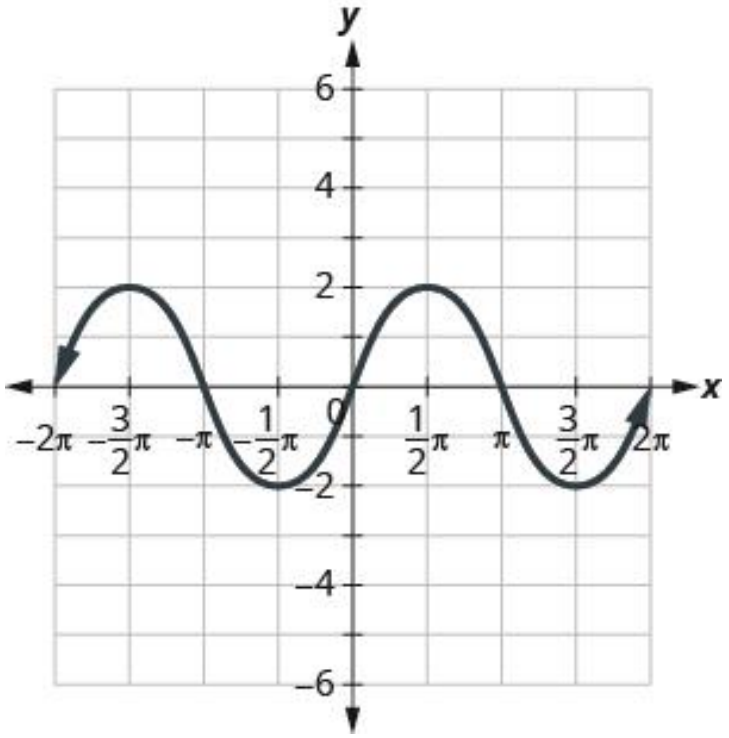
Range: $[0, \infty)$

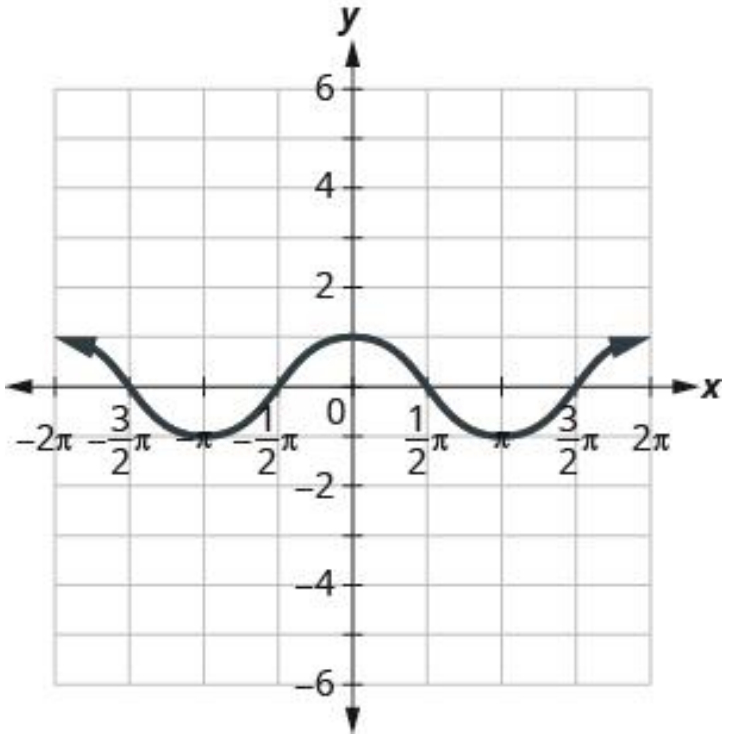


$f(x) = |x|$
Domain: $(-\infty, \infty)$
Range: $[0, \infty)$


y
6
4
2
x
−6
−4
−2
0
2
4
6
−2
−4
−6


y
6
4
2
x
−6
−4
−2
0
2
4
6
−2
−4
−6


y
6
4
2
x
-2π
$-\frac{3}{2}\pi$
$-\pi$
$-\frac{1}{2}\pi$
0
$\frac{1}{2}\pi$
π
$\frac{3}{2}\pi$
2π
−2
−4
−6


y
6
4
2
x
0
-2π
$-\frac{3}{2}\pi$
$-\pi$
$-\frac{1}{2}\pi$
$\frac{1}{2}\pi$
π
$\frac{3}{2}\pi$
2π
−2
−4
−6