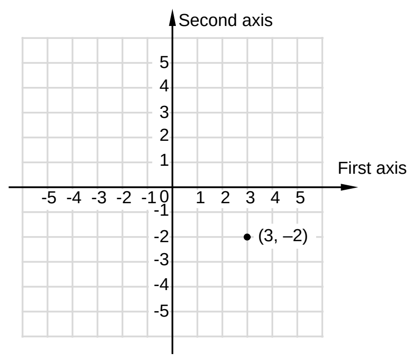
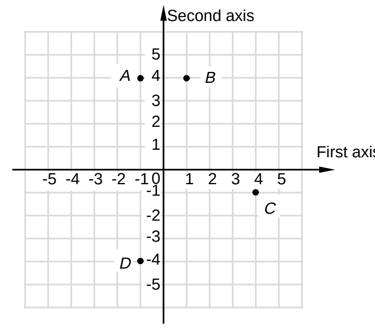
Intermediate Algebra
Chapter 2 Review

<table>
<tr><td colspan="3">Objective [2.1a] Plot points associated with ordered pairs of numbers.</td></tr>
<tr><td>Brief Procedure</td><td>Example</td><td>Practice Exercise</td></tr>
<tr><td>Given a point (a, b), start at the origin and move a units right or left depending on whether a is positive or negative. Then move b units up or down depending on whether b is positive or negative. Make a dot and label the point.</td><td>Plot the point $(3, -2)$.

The first coordinate is positive so, starting at the origin, move 3 units to the right. The second coordinate is negative, so we then move down 2 units.


</td><td>1. Which point is $(-1, 4)$?



A. A
B. B
C. C
D. D</td></tr>
<tr><td colspan="3">Objective [2.1b] Determine whether an ordered pair is a solution of an equation.</td></tr>
<tr><td>Brief Procedure</td><td>Example</td><td>Practice Exercise</td></tr>
<tr><td>Substitute coordinates of the ordered pair for the variables, using the first number to replace the variable that occurs first alphabetically. If a true equation results, the pair is a solution.</td><td>Determine whether $(-2, 2)$ is a solution of $2b - a = 6$.

We substitute -2 for a and 2 for b.
$$\begin{array}{r|l} \multicolumn{2}{c}{2b - a = 6} \\ \hline 2 \cdot 2 - (-2) & ?\ 6 \\ 4 + 2 & \\ 6 & \quad \text{TRUE} \end{array}$$
Since $6 = 6$ is true, $(-2, 2)$ is a solution of the equation.</td><td>2. Determine whether $(-4, 1)$ is a solution of $n - m = -5$.
A. Yes
B. No</td></tr>
</table>

Objective [2.1c] Graph linear equations using tables.

Brief Procedure

1. Select a value for one variable and calculate the corresponding value of the other variable. Form an ordered pair using alphabetical order as indicated by the variables.
2. Repeat step (1) to obtain at least two other ordered pairs. Two points are essential. A third point serves as a check.
3. Plot the ordered pairs and draw a straight line passing through the points.

Example

Graph $2x + 3y = 6$.

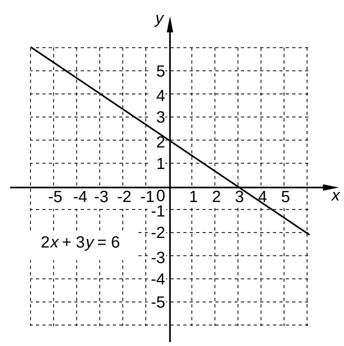
Calculating ordered pairs is usually easiest when y is isolated on one side of the equation, so we solve for y first.

$$\begin{aligned} 2x + 3y &= 6 \\ 3y &= -2x + 6 \\ \frac{1}{3} \cdot 3y &= \frac{1}{3}\Big(-2x + 6\Big) \\ y &= -\frac{2}{3}x + 2 \end{aligned}$$

We now find 3 pairs of solutions, using multiples of 3 to avoid fractions.

x	y
0	2
-3	4
3	0

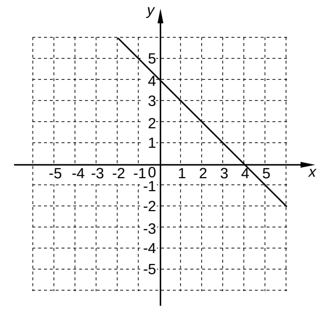
We plot the points, draw the line, and label the graph.



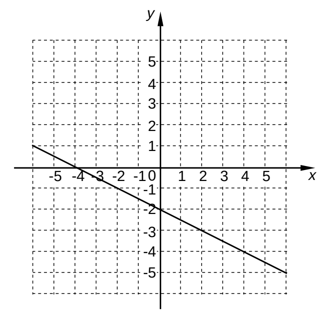
Practice Exercise

3. Graph $x - 2y = 4$.

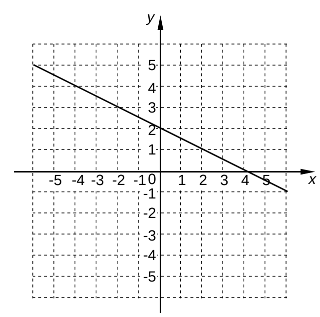
A.



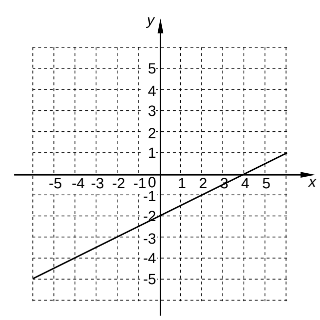
B.



C.



D.



Objective [2.1d] Graph nonlinear equations using tables.

Brief Procedure

Select numbers for x and find the corresponding y-values. Plot these points. Find enough points so that the shape of the graph is clear. Then draw the graph.

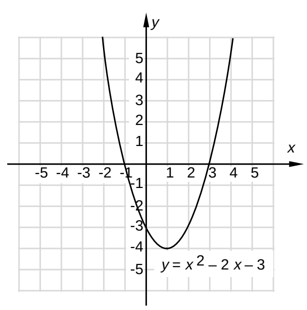
Example

Graph $y = x^2 - 2x - 3$.

Choose some values for x, find the corresponding y-values, plot points, and draw the graph.

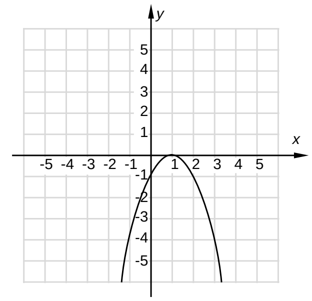
For $x = 1, y = 1^2 - 2 \cdot 1 - 3 = -4$.
For $x = -1, y = (-1)^2 - 2(-1) - 3 = 0$.
For $x = 0, y = 0^2 - 2 \cdot 0 - 3 = -3$.
For $x = 2, y = 2^2 - 2 \cdot 2 - 3 = -3$.
For $x = 3, y = 3^2 - 2 \cdot 3 - 3 = 0$.

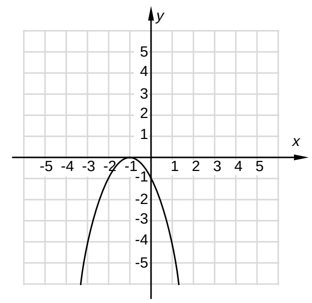
x	y
1	-4
-1	0
0	-3
2	-3
3	0



Practice Exercise

4. Graph: $y = x^2 + 2x + 1$.

A.


B.


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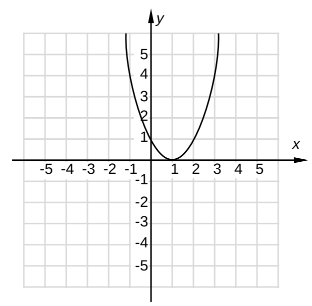

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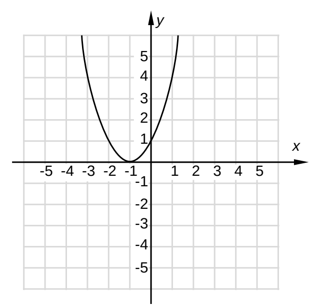
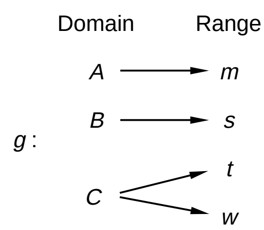
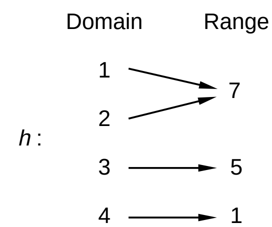


<table>
<tr><td colspan="3">Objective [2.2a] Determine whether a correspondence is a function.</td></tr>
<tr><th>Brief Procedure</th><th>Example</th><th>Practice Exercise</th></tr>
<tr>
<td>A function is a correspondence between a first set, called the domain, and a second set, called the range, such that each member of the domain corresponds to exactly one member of the range.</td>
<td>Determine whether each correspondence is a function.
a)


b)


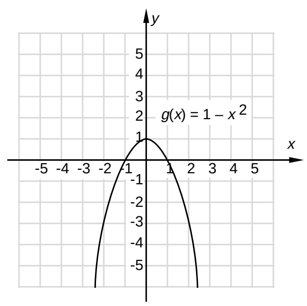
a) f is a function because each member of the domain corresponds to exactly one member of the range.
b) g is not a function because one member of the domain, C, corresponds to more than one member of the range.</td>
<td>5. Determine whether the correspondence is a function.


A. Yes
B. No</td>
</tr>
<tr><td colspan="3">Objective [2.2b] Given a function described by an equation, find function values (outputs) for specified values (inputs).</td></tr>
<tr><th>Brief Procedure</th><th>Example</th><th>Practice Exercise</th></tr>
<tr>
<td>Evaluate the function for the value of the given input.</td>
<td>Find $f(-1)$ for $f(x) = 2x^2 - 1$.
$f(-1) = 2(-1)^2 - 1 = 2 - 1 = 1.$</td>
<td>6. Find $g(2)$ for $g(x) = 3x - 5$.
A. -11
B. -2
C. 1
D. 8</td>
</tr>
</table>

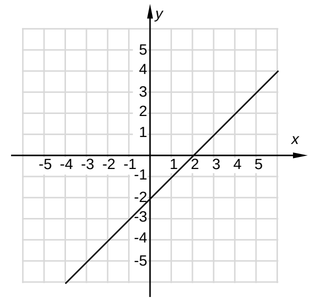
Objective [2.2c] Draw the graph of a function.

Brief Procedure	Example	Practice Exercise
Find some function values, plot points, and draw the graph.	Graph: $g(x) = 1 - x^2$. We find some function values, plot points, and draw the graph.	7. Graph: $f(x) = x - 1$.

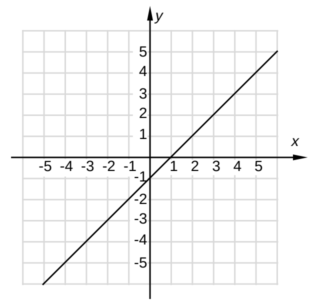
x	$g(x)$
-2	-3
-1	0
0	1
1	0
2	-3



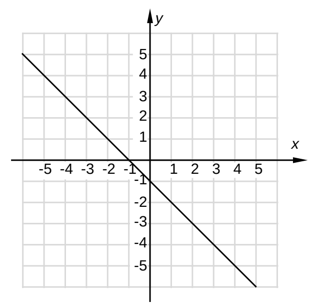
A.



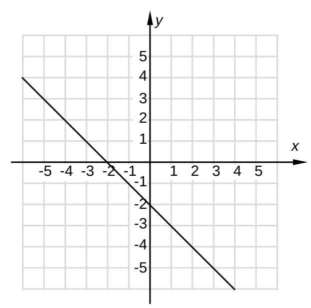
B.

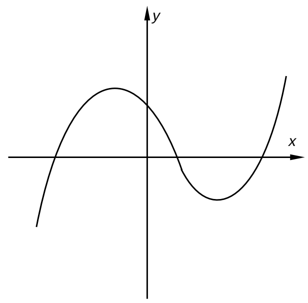


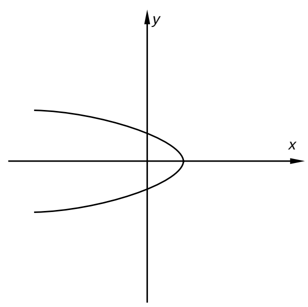
C.

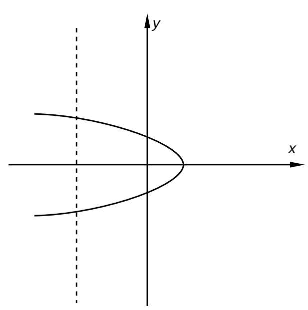


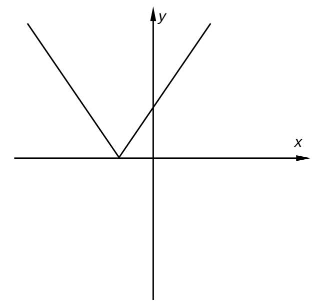
D.



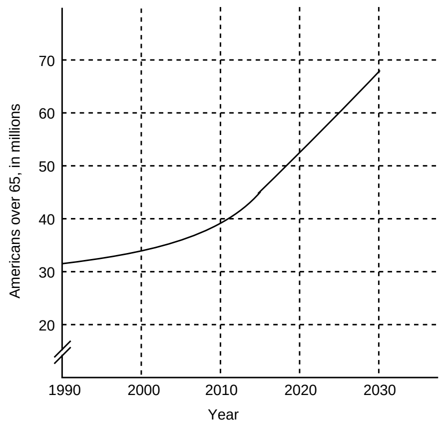
<table>
<tr><th colspan="3">Objective [2.2d] Determine whether a graph is that of a function using a vertical-line test.</th></tr>
<tr><th>Brief Procedure</th><th>Example</th><th>Practice Exercise</th></tr>
<tr>
<td>A graph represents a function if it is impossible to draw a vertical line that intersects the graph more than once. This is the vertical-line test.</td>
<td>Determine whether each is the graph of a function.
a)


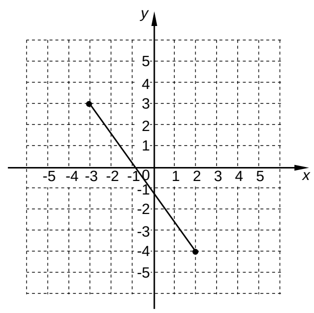
b)


a) The graph is that of a function because no vertical line can cross the graph at more than one point. This can be confirmed with a straight edge.
b) The graph is not that of a function because a vertical line can be drawn that crosses the graph more than once.


</td>
<td>8. Determine whether the graph is the graph of a function.


A. Yes
B. No</td>
</tr>
</table>

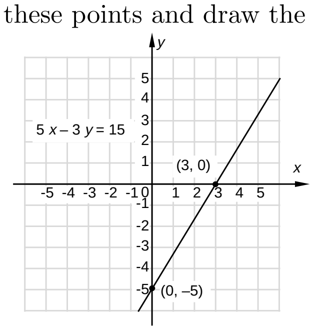
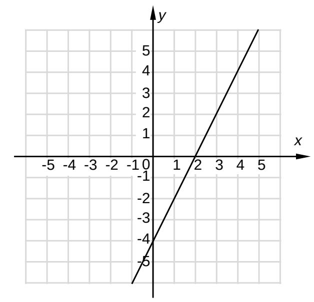
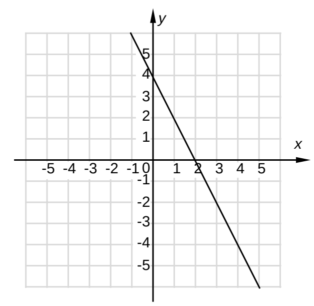
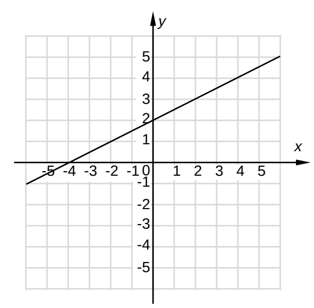
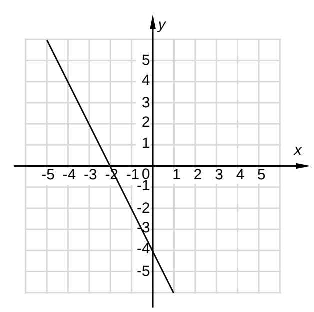
Objective [2.2e] Solve applied problems involving functions and their graphs.		
Brief Procedure	Example	Practice Exercise
Read data from the graph.	The graph below shows the number of Americans over age 65 as a function of the year. (The data is projected for 2000-2030.)  Use the graph to approximate the number of Americans over age 65 in 2000. Locate 2000 on the horizontal axis, move directly up to the graph, and then across to the vertical axis. We see that the output that corresponds to the input 2000 is about 34, so there will be about 34 million Americans over age 65 in 2000.	9. Use the graph at the left to determine the year in which there will be about 52 million Americans over 65. A. 2000 B. 2010 C. 2020 D. 2030

Objective [2.3a] Find the domain and the range of a function.		
Brief Procedure	Example	Practice Exercise
If the graph of a function is given, the domain is the set of all x-values , or inputs, of points on the graph, and the range is the set of all y-values, or outputs, of the points on the graph. To find the domain of a function given by an equation, find the largest set of real numbers, or inputs, for which function values can be calculated.	a) Find the domain and the range of the function whose graph is shown below.  b) Find the domain of $g(x) = \dfrac{3}{x-4}$. a) The x-values of the points on the graph extend from -3 to 2, so the domain is $\{x \mid -3 \leq x \leq 2\}$, or $[-3, 2]$. The y-values of the points on the graph extend from -4 to 3, so the range is $\{y \mid -4 \leq y \leq 3\}$, or $[-4, 3]$. b) Since $\dfrac{3}{x-4}$ cannot be calculated when the denominator, $x-4$, is 0, we set the denominator equal to 0 and find the number(s) that must be excluded from the domain. $x - 4 = 0$ $x = 4$ Thus, 4 is not in the domain but all other real numbers are. The domain is $\{x \mid x \text{ is a real number and } x \neq 4\}$, or $(-\infty, 4) \cup (4, \infty)$.	10. Find the domain of $g(x) = \dfrac{x-2}{x+3}$. A. $\{x \mid x$ is a real number and $x \neq 2\}$ B. $\{x \mid x$ is a real number and $x \neq 3\}$ C. $\{x \mid x$ is a real number and $x \neq -3\}$ D. $\{x \mid x$ is a real number and $x \neq -3$ and $x \neq 2\}$

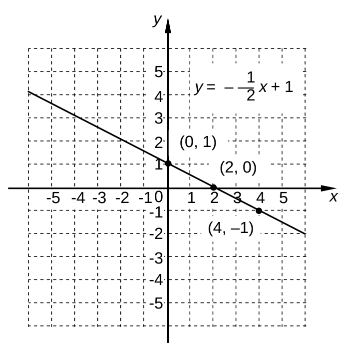
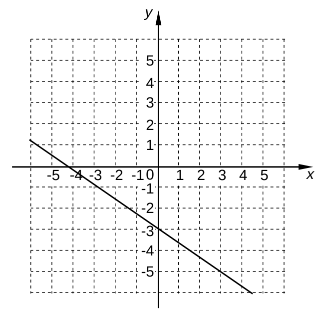
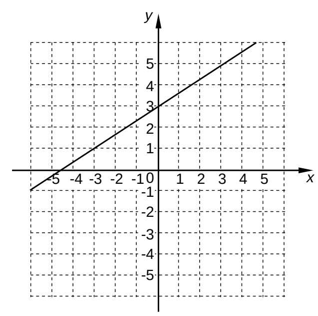
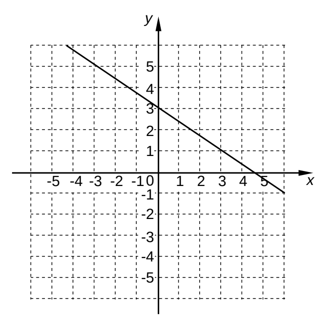
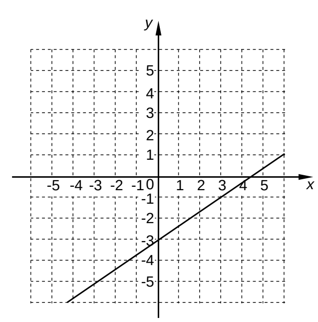
Objective [2.4a] Find the y-intercept of a line from the equation $y = mx + b$ or $f(x) = mx + b$.		
Brief Procedure	Example	Practice Exercise
The y-intercept of the graph of $y = mx + b$ or $f(x) = mx + b$ is the point $(0, b)$, or simply b.	Find the y-intercept of $f(x) = -2x + 7$. The function is in the form $f(x) = mx + b$, so the y-intercept is (0, 7), or simply 7.	11. Find the y-intercept of $y = 3x - 5$. A. $(0, -5)$ B. (0, 5) C. (0, 3) D. $(0, \frac{5}{3})$

Objective [2.4b] Given two points of a line, find the slope; given a linear equation, derive the equivalent slope-intercept equation and determine the slope and the y-intercept.		
Brief Procedure	**Example**	**Practice Exercises**
The slope of a line containing points (x_1, y_1) and (x_2, y_2) is given by $m = \frac{\text{rise}}{\text{run}} = \frac{\text{the change in } y}{\text{the change in } x} = \frac{y_2 - y_1}{x_2 - x_1}.$	Find the slope, if it exists, of the line containing the points $(-1, 5)$ and $(2, -3)$. Consider (x_1, y_1) to be $(-1, 5)$ and (x_2, y_2) to be $(2, -3)$. $\text{Slope} = \frac{\text{the change in } y}{\text{the change in } x} = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-3-5}{2-(-1)} = \frac{-8}{3}, \text{ or } -\frac{8}{3}$ Note that we would have gotten the same result if we had considered (x_1, y_1) to be $(2, -3)$ and (x_2, y_2) to be $(-1, 5)$. We can subtract in either order as long as the x-coordinates are subtracted in the same order in which the y-coordinates are subtracted.	12. Find the slope, if it exists, of the line containing the points $(6, -2)$ and $(8, -1)$. A. -2 B. $-\frac{1}{2}$ C. $\frac{1}{2}$ D. 2
Given a linear equation, derive the equivalent slope-intercept equation $y = mx+b$ by solving for y. The coefficient of the x-term, m, is the slope of the line. The y-intercept is the point $(0, b)$.	Find the slope and y-intercept of $3x + 4y = 8$. We solve for y to get the equation in the form $y = mx + b$. $3x + 4y = 8$ $4y = -3x + 8$ $y = \frac{-3x+8}{4}$ $y = -\frac{3}{4}x + 2$ The slope is $-\frac{3}{4}$, and the y-intercept is (0, 2).	13. Find the slope and y-intercept of $2x - 3y = 12$. A. Slope: $\frac{3}{2}$; y-intercept: (0, 6) B. Slope: $\frac{2}{3}$; y-intercept: (0, −4) C. Slope: $-\frac{2}{3}$; y-intercept: (0, 4) D. Slope: −4; y-intercept: $\left(0, \frac{2}{3}\right)$

Objective [2.4c] Find the slope or rate of change in an applied problem involving slope.		
Brief Procedure	**Example**	**Practice Exercise**
Determine the rise and run, or the change in y and the change in x, and compute the slope, or rate of change.	A road rises 40 m over a horizontal distance of 1250 m. Find the grade of the road. $\text{Slope} = \frac{\text{rise}}{\text{run}} = \frac{40}{1250} = 0.032 = 3.2\%$	14. A set of stairs rises 12 ft over a horizontal distance of 150 ft. Find the grade of the stairs. A. 8% B. 12% C. 12.5% D. 15%

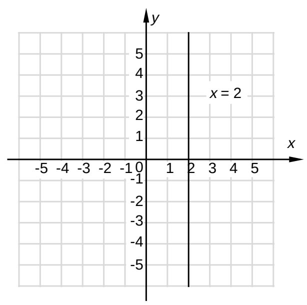
Objective [2.5a] Graph linear equations using intercepts.		
Brief Procedure	Example	Practice Exercise
The y-intercept has the form $(0, b)$. To find b, let $x = 0$ and solve for y. The x-intercept has the form $(a, 0)$. To find a, let $y = 0$ and solve for x. To graph using intercepts, find and plot the intercepts and draw the line containing them. As a check that the graph is correct, find a third solution of the equation. If it is on the graph, then the graph is probably correct.	Find the intercepts of $5x - 3y = 15$ and then graph the line. To find the y-intercept, let $x = 0$. Then solve for y. $5x - 3y = 15$ $5 \cdot 0 - 3y = 15$ $-3y = 15$ $y = -5$ Thus, $(0, -5)$ is the y-intercept. To find the x-intercept, let $y = 0$. Then solve for x. $5x - 3y = 15$ $5x - 3 \cdot 0 = 15$ $5x = 15$ $x = 3$ Thus, $(3, 0)$ is the x-intercept. Plot these points and draw the line.  A third point should be used as a check. We substitute any value for x and solve for y. We let $x = 6$. Then $5x - 3y = 15$ $5 \cdot 6 - 3y = 15$ $30 - 3y = 15$ $-3y = -15$ $y = 5$ The point $(6, 5)$ is on the graph, so the graph is probably correct.	15. Find the intercepts of $2x - y = 4$. Then use the intercepts to graph the equation. A.  B.  C.  D. 

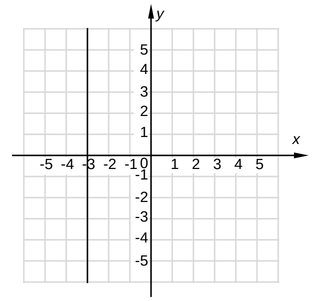
Objective [2.5b] Given a linear equation in slope-intercept form, use the slope and the y-intercept to graph the line.

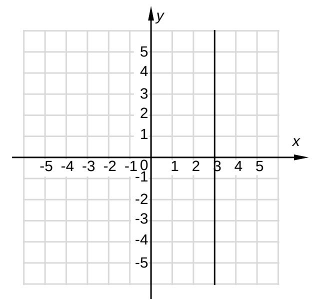
Brief Procedure	Example	Practice Exercise
First plot the y-intercept. Then move up or down and left or right according to the slope to find another point. Move again from this point or from the y-intercept to find a third point. Then draw the line.	Graph $y = -\frac{1}{2}x + 1$ using the slope and y-intercept. First we plot the y-intercept (0, 1). Then we think of the slope as $\frac{-1}{2}$. Starting at (0, 1), we find another point by moving 1 unit down (since the numerator is negative and corresponds to the change in y) and 2 units to the right (since the denominator is positive and corresponds to the change in x). We get to the point (2, 0). Now, from (2, 0), move 1 unit down and 2 units to the right again, arriving at the point $(4, -1)$. (Alternatively, we could have returned to the y-intercept, considered the slope as $\frac{1}{-2}$, and moved 1 unit up and 2 units to the left to find a third point.) We draw the line through the three points we found. 	16. Graph $y = \frac{2}{3}x - 3$ using the slope and y-intercept. A.  B.  C.  D. 

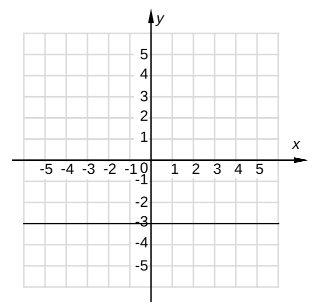
<table>
<tr><td colspan="3">Objective [2.5c] Graph linear equations of the form $x = a$ or $y = b$.</td></tr>
<tr><td>Brief Procedure</td><td>Example</td><td>Practice Exercises</td></tr>
<tr><td>The graph of $x = a$ is a vertical line.</td><td>Graph $x = 2$.

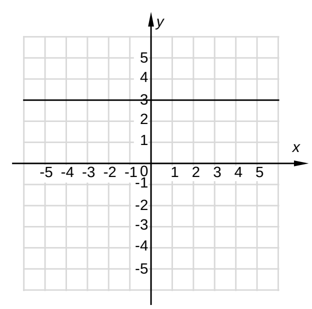
We can think of this equation as $x + 0 \cdot y = 2$. No matter what number we choose for y, x must be 2. We make a table of values and plot and connect the corresponding points.

$$\begin{array}{c|c} x & y \\ \hline 2 & -4 \\ 2 & 0 \\ 2 & 3 \end{array}$$

</td><td>17. Graph $x = -3$.

A.


B.


C.


D.
</td></tr>
</table>

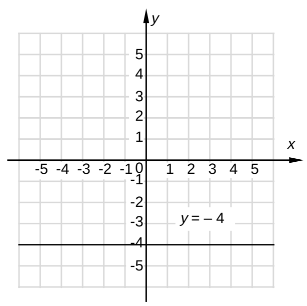
Objective [2.5c] (continued)

Brief Procedure	Example	Practice Exercises
The graph of $y = b$ is a horizontal line.	Graph $y = -4$.	18. Graph $y = 1$.

Example

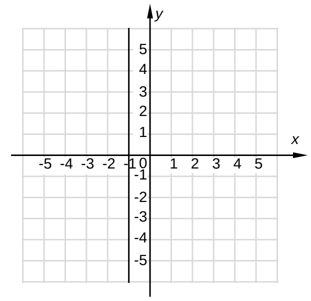
We can think of this equation as $0 \cdot x + y = -4$. No matter what number we choose for x, y must be -4. We make a table of values and plot and connect the corresponding points.

x	y
-2	-4
0	-4
3	-4

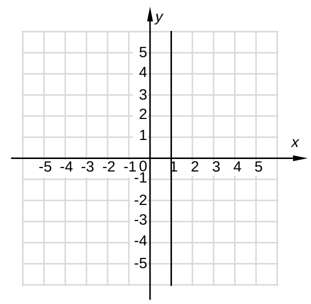


Practice Exercises

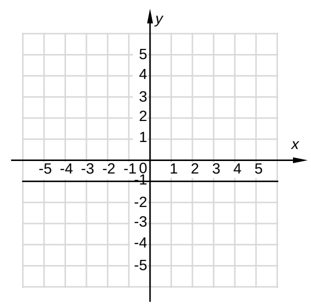
A.



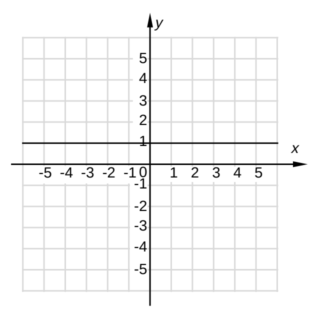
B.



C.



D.



Objective [2.5d] Given the equations of two lines, determine whether their graphs are parallel or whether they are perpendicular.

<table>
<tr><th>Brief Procedure</th><th>Example</th><th>Practice Exercises</th></tr>
<tr>
<td>Parallel nonvertical lines have the same slope and different y-intercepts.

Parallel vertical lines have equations $x = p$ and $x = q$, where $p \neq q$.</td>
<td>Determine whether the graphs of the lines $y = -2x + 1$ and $4x + 2y = 5$ are parallel.

The first equation is in slope-intercept form ($y = mx + b$), so we see that it has slope -2 and y-intercept (0,1).

We solve the second equation for y.

$$\begin{aligned} 4x + 2y &= 5 \\ 2y &= -4x + 5 \\ y &= \frac{1}{2}(-4x + 5) \\ y &= -2x + \frac{5}{2} \end{aligned}$$
Thus, the slope of the second line is -2 and its y-intercept is $\left(0, \frac{5}{2}\right)$.

Since the two lines have the same slope, -2, and different y-intercepts, (0,1) and $\left(0, \frac{5}{2}\right)$, they are parallel.</td>
<td>19. Determine whether the graphs of the lines $x+y = 3$ and $x-y = 3$ are parallel.

A. Yes

B. No</td>
</tr>
<tr>
<td>Two nonvertical lines are perpendicular if the product of their slopes is -1.

If one line in a pair of perpendicular lines is vertical, then the other is horizontal. That is, two lines with equations $x = a$ and $y = b$ are perpendicular.</td>
<td>Determine whether the graphs of the lines $2x + y = 4$ and $x + 2y = 3$ are perpendicular.

We first solve each equation for y in order to determine the slopes.

a) $2x + y = 4$
$y = -2x + 4$

b) $x + 2y = 3$
$$\begin{aligned} 2y &= -x + 3 \\ y &= \frac{1}{2}(-x + 3) \\ y &= -\frac{1}{2}x + \frac{3}{2} \end{aligned}$$
The slopes are -2 and $-\frac{1}{2}$. The product of the slopes is $-2\left(-\frac{1}{2}\right) = 1$. Since the product of the slopes is not -1, the lines are not perpendicular.</td>
<td>20. Determine whether the graphs of the lines $3x - 2y = 4$ and $4x + 6y = 3$ are perpendicular.

A. Yes

B. No</td>
</tr>
</table>

Objective [2.6a] Find an equation of a line when the slope and the y-intercept are given.		
Brief Procedure	Example	Practice Exercise
When the slope m and the y-intercept $(0, b)$ of a line are given, find an equation of the line by substituting in the equation $y = mx + b$.	A line has slope -3 and y-intercept (0,2). Find an equation of the line. We substitute -3 for m and 2 for b in the slope-intercept equation. $y = mx + b$ $y = -3x + 2$	21. A line has slope 4 and y-intercept $(0, -1)$. Find an equation of the line. A. $y = -x + 4$ B. $y = -x - 4$ C. $y = 4x - 1$ D. $y = 4x + 1$

Objective [2.6b] Find an equation of a line when the slope and a point are given.		
Brief Procedure	Example	Practice Exercise
Substitute the given slope for m in the slope-intercept equation $y = mx+b$ and then substitute the coordinates of the given point to find b.	Find an equation of the line with slope -2 that contains the point $(3, -1)$. We know that the slope is -2, so the equation is $y = -2x + b$. Using the point $(3, -1)$, we substitute 3 for x and -1 for y in $y = -2x + b$. $y = -2x + b$ $-1 = -2 \cdot 3 + b$ $-1 = -6 + b$ $5 = b$ Then the equation is $y = -2x + 5$.	22. Find an equation of the line with slope 4 that contains the point $(-2, -5)$. A. $y = 4x - 5$ B. $y = 4x + 18$ C. $y = 4x - 2$ D. $y = 4x + 3$

Objective [2.6c] Find an equation of a line when two points on the line are given.		
Brief Procedure	Example	Practice Exercise
Use the two given points to find the slope of the line. Next, substitute the slope for m in the slope-intercept equation $y = mx+b$ and then substitute the coordinates of either of the given points to find b.	Find an equation of the line containing the points $(4, 3)$ and $(-2, 5)$. First, we find the slope. $m = \frac{3-5}{4-(-2)} = \frac{-2}{6} = -\frac{1}{3}$ Thus, $y = -\frac{1}{3}x + b$. Now use either of the given points to find b. We use (4,3) and substitute 4 for x and 3 for y. $y = -\frac{1}{3}x + b$ $3 = -\frac{1}{3} \cdot 4 + b$ $3 = -\frac{4}{3} + b$ $\frac{13}{3} = b$ Then the equation of the line is $y = -\frac{1}{3}x + \frac{13}{3}$.	23. Find an equation of the line containing $(-3, -2)$ and (3,4). A. $y = x + 1$ B. $y = x - 7$ C. $y = -x + 1$ D. $y = -x - 7$

Objective [2.6d] Given a line and a point not on the given line, find an equation of the line parallel to the line and containing the point, and find an equation of the line perpendicular to the line and containing the point.

Brief Procedure	Example	Practice Exercises
A given line and a line parallel to it have the same slope. Once the slope is determined, substitute the slope for m and the coordinates of the given point for x and y in the slope-intercept equation to find b.	Find an equation of the line containing the point $(-2, 4)$ and parallel to the line $3x + y = 4$. To find the slope of the given line, we first find the slope-intercept equation by solving for y. $3x + y = 4$ $y = -3x + 4$ Thus, the new line through $(-2, 4)$ must have slope -3. Now we substitute -3 for m, -2 for x, and 4 for y in $y = mx + b$ and solve for b. $y = mx + b$ $4 = -3(-2) + b$ $4 = 6 + b$ $-2 = b$ Finally, we substitute -3 for m and -2 for b in $y = mx + b$ to find the desired equation: $y = -3x - 2$.	24. Find an equation of the line containing the point $(1, -3)$ and parallel to the line $4x - 2y = 5$. A. $y = 2x - 5$ B. $y = -2x - 1$ C. $y = 4x - 7$ D. $y = x - 4$
Given a line, the slope of a line perpendicular to it is the opposite of the reciprocal of the slope of the given line. Find the slope of the new line and then substitute the slope for m and the coordinates of the given point for x and y in the slope-intercept equation to find b.	Find an equation of the line containing $(2, -3)$ and perpendicular to the line $x - 2y = 6$. First we find the slope of the given line by solving for y to obtain the slope-intercept equation. $x - 2y = 6$ $-2y = -x + 6$ $y = \frac{1}{2}x - 3$ The slope of the new line through $(2, -3)$ is the opposite of the reciprocal of $\frac{1}{2}$, or -2. Now we substitute -2 for m, 2 for x, and -3 for y in $y = mx + b$ and solve for b. $y = mx + b$ $-3 = -2 \cdot 2 + b$ $-3 = -4 + b$ $1 = b$ Finally, we substitute -2 for m and 1 for b in $y = mx + b$ to find the desired equation: $y = -2x + 1$.	25. Find an equation of the line containing the point $(-4, 1)$ and perpendicular to the line $3x + 6y = 5$. A. $y = -\frac{1}{2}x - 1$ B. $y = -2x + 1$ C. $y = 2x + 9$ D. $y = \frac{1}{2}x + 3$

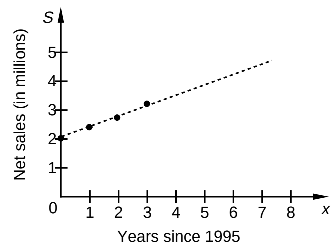
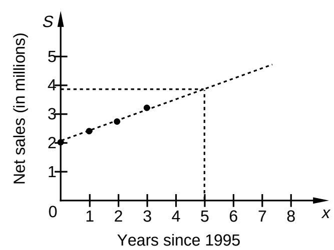
Objective [2.6e] Solve applied problems involving linear functions.

Brief Procedure	Example	Practice Exercise
Write a linear function that models the situation and use the model to find the desired function values.	Riggins County Cable charges a \$40 installation fee and \$25 per month for basic service. a) Formulate a linear function $C(t)$ for the cost of t months of cable service. b) Use the model to determine the cost for 9 months of service. a) For t months of service the cost is \$40 for installation plus \$25 per month times the number of months. Thus, we have $C(t) = 40 + 25t$, where $t \geq 0$. b) To find the cost for 9 months of service, we find $C(9)$. $C(9) = 40 + 25 \cdot 9 = 265$ The cost for 9 months of service is \$265.	26. Dorsey plumbing charges \$45 for a service call plus \$40 per hour. Formulate a linear function $C(t)$ for the cost of t hours of service and use the function to find the cost of a $1\frac{1}{2}$ hour service call. A. \$85 B. \$105 C. \$135 D. \$145

Objective [2.7a] Using a set of data, draw a representative graph of a linear function and make predictions from the graph.

Brief Procedure	Example	Practice Exercise
Use the data to determine ordered pairs. Then graph these pairs, obtaining a scatterplot, and determine if it appears that a straight line can be used to approximate the data. If so, draw a representative line and use the line to estimate data values that go beyond the given values. This process is called extrapolation.	The following table gives the net sales of Simmons Merchandise. Years, x (since 1995) | Net Sales, S (in millions) 0. 1995 | \$2.0 1. 1996 | \$2.4 2. 1997 | \$2.7 3. 1998 | \$3.2 a) Make a scatterplot of the data, and then draw a representative graph of a linear function. b) Use the graph to predict net sales in 2000. a) To make a scatterplot we graph the data points (0, 2.0), (1, 2.4), (2, 2.7), and (3, 3.2). It appears that a straight line might fit the data, so we draw a representative line through the data and beyond it. (continued)	27. The following table shows the relationship between study time and test scores. Study Time (in hours) | Test Score (in percent) 8 | 80 9 | 82 10 | 84 11 | 85 Make a scatterplot of the data, and then draw a representative graph of a linear function. Use the graph to predict the test score if a student studies for 12 hr. A. About 87 B. About 90 C. About 91 D. About 95

Objective [2.7a] (continued)

Brief Procedure	Example	Practice Exercise
	 b) The year 2000 is 5 years after 1995. To predict the net sales in 2000 we draw a vertical line up from 5 on the x-axis to the line and then move to the left to read a value from the S-axis. We predict that sales in 2000 will be about \$3.9 million. 	

Objective [2.7b] Using a set of data, choose two representative points, find a linear function using the two points, and make predictions from the function.

Brief Procedure	Example	Practice Exercise
Choose two data points and use them to find a linear function using the method in Section 2.6. Then make predictions by finding the appropriate function values.	The following table gives the net sales of Simmons Merchandise. <table><tr><td>Years, x (since 1995)</td><td>Net Sales, S (in millions)</td></tr><tr><td>0. 1995</td><td>\$2.0</td></tr><tr><td>1. 1996</td><td>\$2.4</td></tr><tr><td>2. 1997</td><td>\$2.7</td></tr><tr><td>3. 1998</td><td>\$3.2</td></tr></table>a) Use the points (0, 2.0) and (2, 2.7) to find a linear function $S(x)$ that fits the data. b) Use the function to predict the net sales in 2000. a) First we find the slope of the line. $m = \frac{2.7 - 2.0}{2 - 0} = \frac{0.7}{2} = 0.35$ (continued)	28. The following table shows the relationship between study time and test scores. <table><tr><td>Study Time (in hours)</td><td>Test Score (in percent)</td></tr><tr><td>8</td><td>80</td></tr><tr><td>9</td><td>82</td></tr><tr><td>10</td><td>84</td></tr><tr><td>11</td><td>85</td></tr></table>Use the points (8, 80) and (10, 84) to find a linear function that fits the data. Then use the function to predict the test score if a student studies for 14 hr. A. 88 B. 90 C. 92 D. 94

Objective [2.7b] (continued)		
Brief Procedure	Example	Practice Exercise
	Now use the slope and either point to find b. We use (0, 2.0) and substitute 0.35 for m, 0 for x, and 2.0 for y in $y = mx + b$. $y = mx + b$ $2.0 = 0.35(0) + b$ $2.0 = b$ Now substitute $S(x)$ for y, 0.35 for m, and 2.0 for b in $y = mx + b$ to find the desired function. $S(x) = 0.35x + 2.0$ b) The year 2000 is 5 years after 1995, so we find $S(5)$. $S(5) = 0.35(5) + 2.0 = 3.75$ Sales in 2000 will be \$3.75 million.	