Prealgebra Textbook

Second Edition

Chapter 8 Odd Solutions

Department of Mathematics
College of the Redwoods

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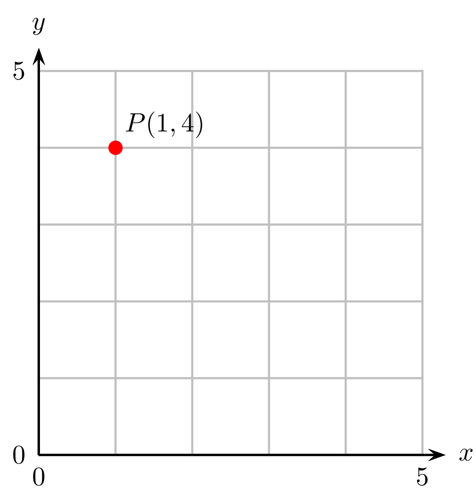
Contents

Chapter 8

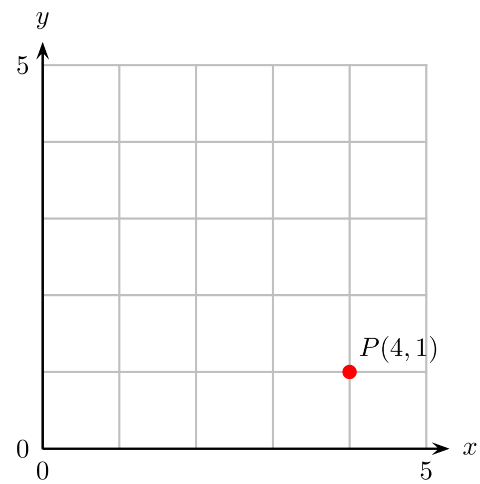
Graphing

8.1 The Cartesian Coordinate System

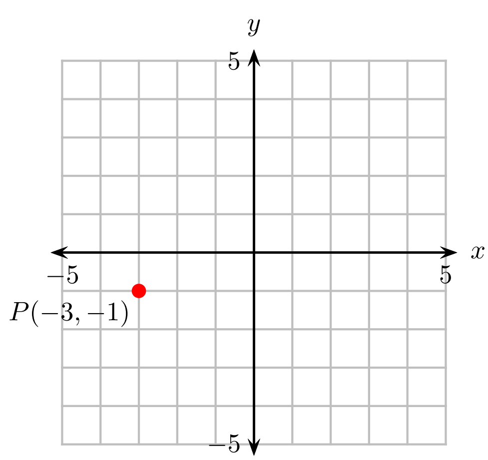
1. Starting from the origin (the point $(0, 0)$), the point P is located 1 unit to the right and 4 units up. Hence, the coordinates of point P are $(1, 4)$.



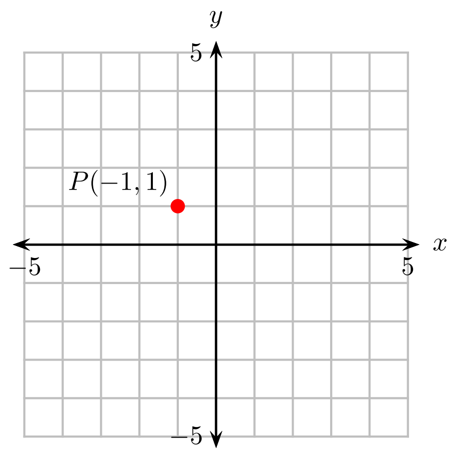
3. Starting from the origin (the point $(0, 0)$), the point P is located 4 units to the right and 1 unit up. Hence, the coordinates of point P are $(4, 1)$.



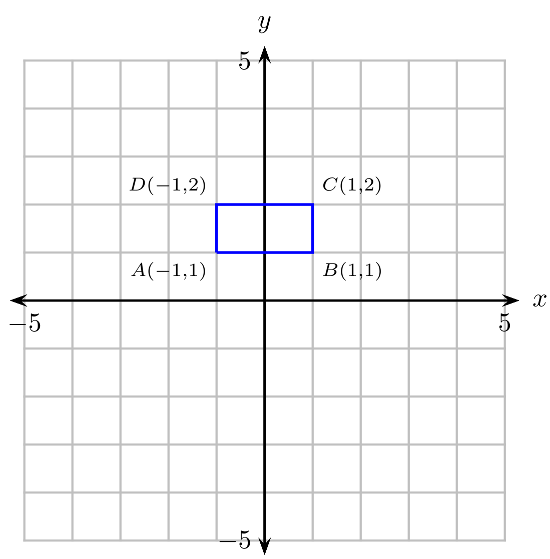
5. Starting from the origin (the point $(0, 0)$), the point P is located 3 units to the left and 1 unit down. Hence, the coordinates of point P are $(-3, -1)$.



7. Starting from the origin (the point $(0, 0)$), the point P is located 1 unit to the left and 1 unit up. Hence, the coordinates of point P are $(-1, 1)$.



9. Plot the points $A(-1, 1)$, $B(1, 1)$, $C(1, 2)$, and $D(-1, 2)$ and draw the rectangle.



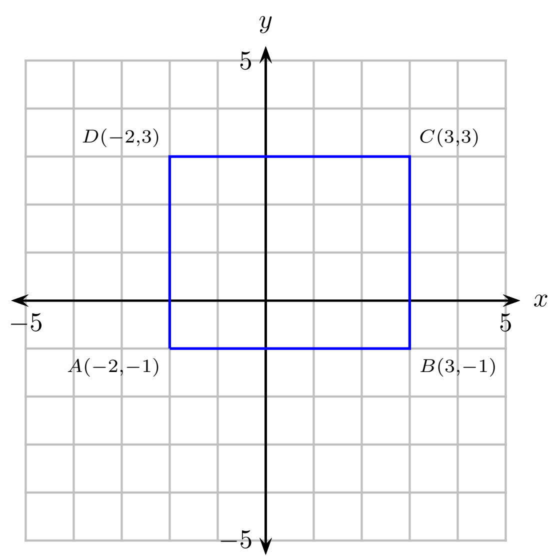
Note that the length of the rectangle is 2 units and the width is 1 unit. Hence, the area is

$$\begin{aligned} A &= LW && \text{Area formula for a rectangle.} \\ A &= (2)(1) && \text{Substitute 2 for } L \text{ and 1 for } W. \\ A &= 2. && \text{Multiply.} \end{aligned}$$

Hence, the area is $A = 2$ square units.

Alternate solution. Note that each square in the grid represents one square unit. Hence, you can also find the area of the square $ABCD$ by counting the number of square units inside the rectangle. There is 1 row of 2 squares. Hence, the area of the square is $A = 2$ square units.

11. Plot the points $A(-2, -1)$, $B(3, -1)$, $C(3, 3)$, and $D(-2, 3)$ and draw the rectangle.



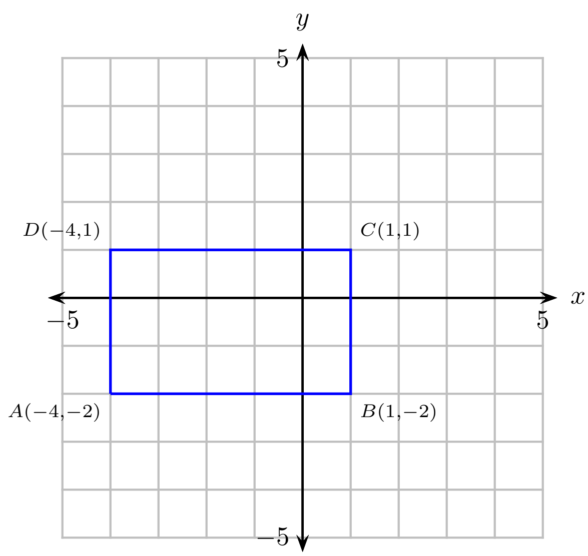
Note that the length of the rectangle is 5 units and the width is 4 units. Hence, the area is

$$\begin{aligned} A &= LW && \text{Area formula for a rectangle.} \\ A &= (5)(4) && \text{Substitute 5 for } L \text{ and 4 for } W. \\ A &= 20. && \text{Multiply.} \end{aligned}$$

Hence, the area is $A = 20$ square units.

Alternate solution. Note that each square in the grid represents one square unit. Hence, you can also find the area of the square $ABCD$ by counting the number of square units inside the rectangle. There are 4 rows of 5 squares. Hence, the area of the square is $A = 20$ square units.

13. Plot the points $A(-4,-2)$, $B(1,-2)$, $C(1,1)$, and $D(-4,1)$ and draw the rectangle.

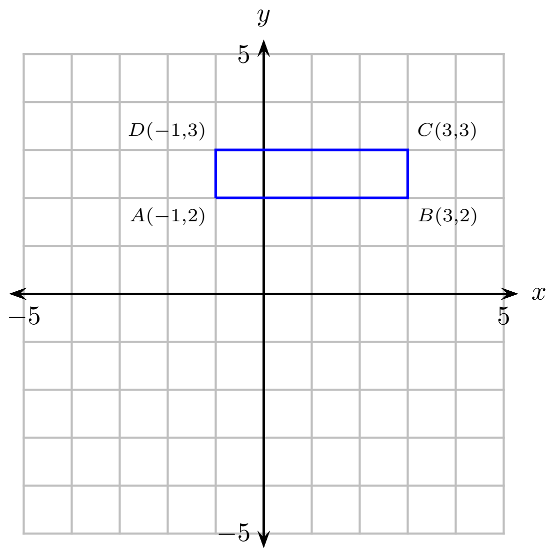


Note that the length of the rectangle is 5 units and the width is 3 units. Hence, the perimeter is

$P = 2L + 2W$	Perimeter formula for a rectangle.
$P = 2(5) + 2(3)$	Substitute 5 for L and 3 for W.
$P = 10 + 6$	Multiply.
$P = 16.$	Add.

Hence, the perimeter is $P = 16$ units.

15. Plot the points $A(-1,2)$, $B(3,2)$, $C(3,3)$, and $D(-1,3)$ and draw the rectangle.

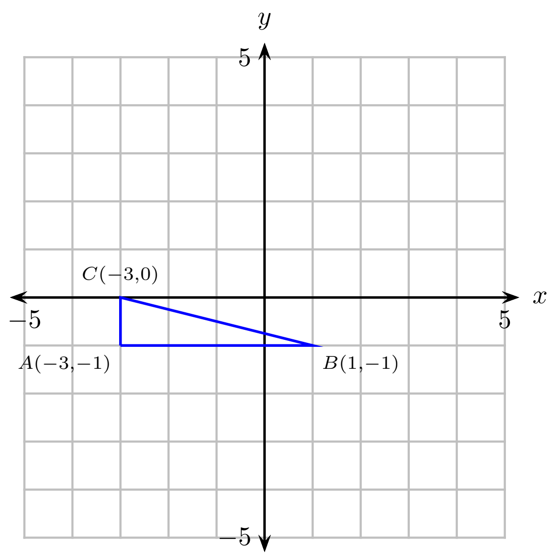


Note that the length of the rectangle is 4 units and the width is 1 unit. Hence, the perimeter is

$P = 2L + 2W$	Perimeter formula for a rectangle.
$P = 2(4) + 2(1)$	Substitute 4 for L and 1 for W.
$P = 8 + 2$	Multiply.
$P = 10.$	Add.

Hence, the perimeter is $P = 10$ units.

17. Plot the points $A(-3,-1)$, $B(1,-1)$, and $C(-3,0)$ and draw the triangle.

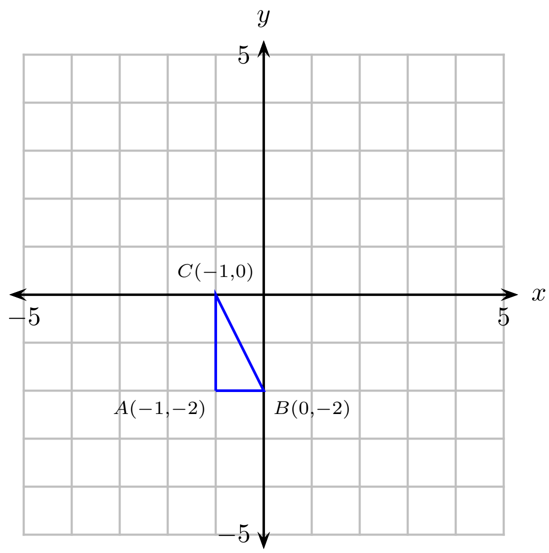


Note that the triangle is a right triangle, with base $b = 4$ units and hieght $h = 1$ unit. . Hence, the area is

$$\begin{aligned} A &= \frac{1}{2}bh && \text{Area formula for a triangle.} \\ A &= \frac{1}{2} \cdot 4 \cdot 1 && \text{Substitute 4 for } b \text{ and 1 for } h. \\ A &= 2 && \text{Multiply.} \end{aligned}$$

Therefore, the area is $A = 2$ square units.

19. Plot the points $A(-1,-2)$, $B(0,-2)$, and $C(-1,0)$ and draw the triangle.



Note that the triangle is a right triangle, with base $b = 1$ unit and hieght $h = 2$ units. . Hence, the area is

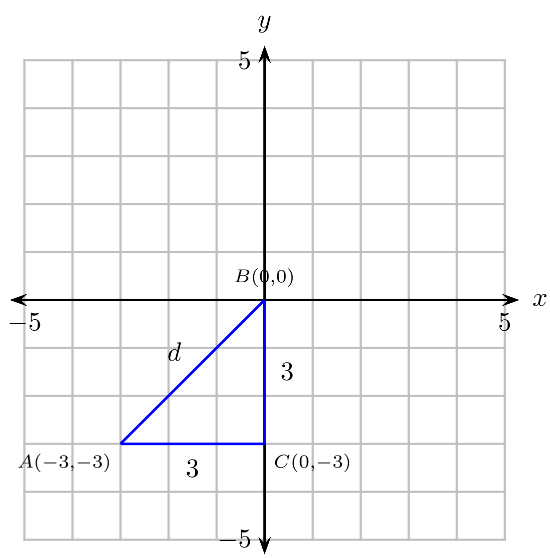
$$A = \frac{1}{2}bh \qquad \text{Area formula for a triangle.}$$

$$A = \frac{1}{2} \cdot 1 \cdot 2 \qquad \text{Substitute 1 for } b \text{ and 2 for } h.$$

$$A = 1 \qquad \text{Multiply.}$$

Therefore, the area is $A = 1$ square unit.

21. Plot the points $A(-3,-3)$, $B(0,0)$. We'll use the Pythagorean Theorem to find the distance between these two points. First, draw a right triangle having legs parallel to the coordinate axes. The hypotenuse is the requested distance between the points A and B.

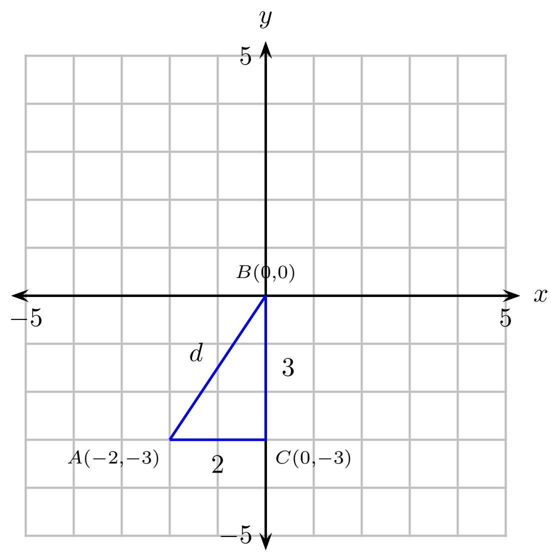


Note that the triangle is a right triangle, with one leg having length 3 and the second leg having length 3. Let d represent the length of the hypotenuse and the distance between the points A and B. Then, by the Pythagorean Theorem,

$d^2 = 3^2 + 3^2$	Pythagorean Theorem.
$d^2 = 9 + 9$	Square first.
$d^2 = 18$	Add.
$d = \sqrt{18}$	Take the square root.

Therefore, the distance between points $A(-3,-3)$ and $B(0,0)$ is $\sqrt{18}$.

23. Plot the points $A(-2,-3)$, $B(0,0)$. We'll use the Pythagorean Theorem to find the distance between these two points. First, draw a right triangle having legs parallel to the coordinate axes. The hypotenuse is the requested distance between the points A and B.

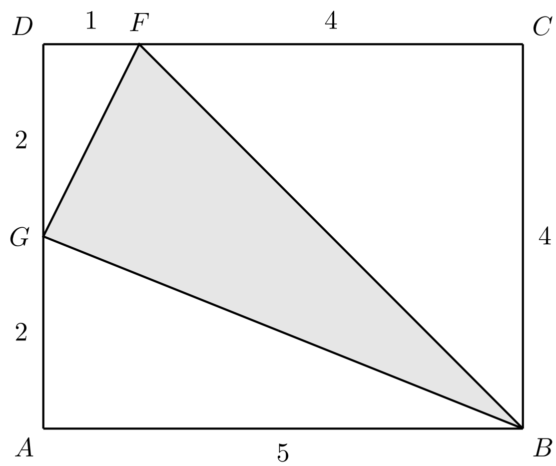


Note that the triangle is a right triangle, with one leg having length 2 and the second leg having length 3. Let d represent the length of the hypotenuse and the distance between the points A and B. Then, by the Pythagorean Theorem,

$$\begin{aligned} d^2 &= 2^2 + 3^2 && \text{Pythagorean Theorem.} \\ d^2 &= 4 + 9 && \text{Square first.} \\ d^2 &= 13 && \text{Add.} \\ d &= \sqrt{13} && \text{Take the square root.} \end{aligned}$$

Therefore, the distance between points $A(-2,-3)$ and $B(0,0)$ is $\sqrt{13}$.

25. Finding the area directly would be difficult. Instead, let's try a "backdoor" and note that we can find the area of the shaded triangle in two steps: (1) Find the area of the three right triangles that bound the the shaded triangle, then (2) subtract the result from the area of the rectangle.



Thus:

i) The area of $\triangle ABG$ is:

$$\begin{aligned}\text{Area}\triangle ABG &= \frac{1}{2}(5)(2)\\ &= 5\end{aligned}$$

(ii) The area of $\triangle BCF$ is

$$\begin{aligned}\text{Area}\triangle BCF &= \frac{1}{2}(4)(4)\\ &= 8\end{aligned}$$

(iii) The area of $\triangle FDG$ is

$$\begin{aligned}\text{Area}\triangle FDG &= \frac{1}{2}(1)(2)\\ &= 1\end{aligned}$$

The sum of the areas of these three triangles is:

$$\begin{aligned}\text{sum of triangles} &= 5 + 8 + 1\\ &= 14\end{aligned}$$

The area of the rectangle $ABCD$ is:

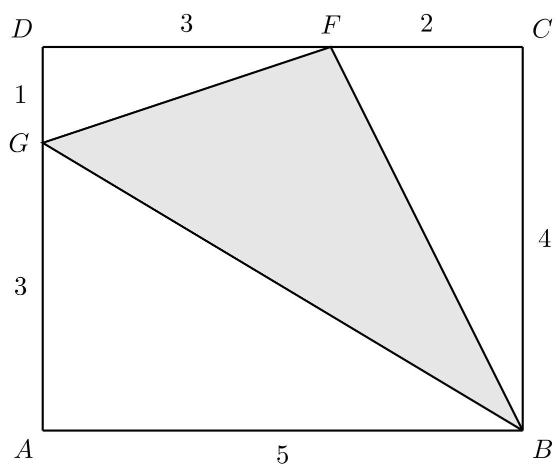
$$\begin{aligned}\text{Area} ABCD &= (5)(4)\\ &= 20.\end{aligned}$$

Hence, the area of the shaded triangle is

$$\begin{aligned}\text{Area Shaded Triangle} &= \text{Area of Rectangle} - \text{Sum of Three Triangles}\\ &= 20 - 14\\ &= 6.\end{aligned}$$

Hence, the area of the shaded triangle is 6.

27. Finding the area directly would be difficult. Instead, let's try a "backdoor" and note that we can find the area of the shaded triangle in two steps: (1) Find the area of the three right triangles that bound the the shaded triangle, then (2) subtract the result from the area of the rectangle.



Thus:

i) The area of $\triangle ABG$ is:

$$\begin{aligned}\text{Area}\triangle ABG &= \frac{1}{2}(5)(3)\\ &= \frac{15}{2}\end{aligned}$$

(ii) The area of $\triangle BCF$ is

$$\begin{aligned}\text{Area}\triangle BCF &= \frac{1}{2}(4)(2)\\ &= 4\end{aligned}$$

(iii) The area of $\triangle FDG$ is

$$\begin{aligned}\text{Area}\triangle FDG &= \frac{1}{2}(3)(1)\\ &= \frac{3}{2}\end{aligned}$$

The sum of the areas of these three triangles is:

$$\begin{aligned}\text{sum of triangles} &= \frac{15}{2} + 4 + \frac{3}{2}\\ &= 13\end{aligned}$$

The area of the rectangle $ABCD$ is:

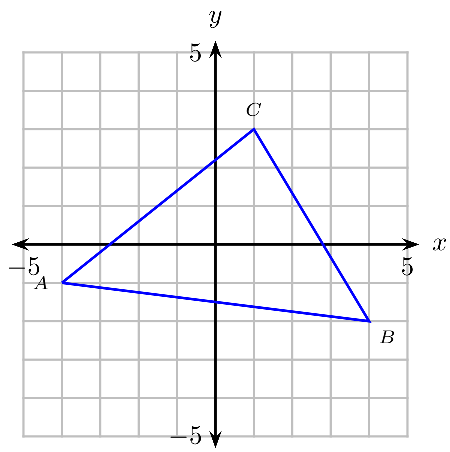
$$\begin{aligned}\text{Area}ABCD &= (5)(4)\\ &= 20.\end{aligned}$$

Hence, the area of the shaded triangle is

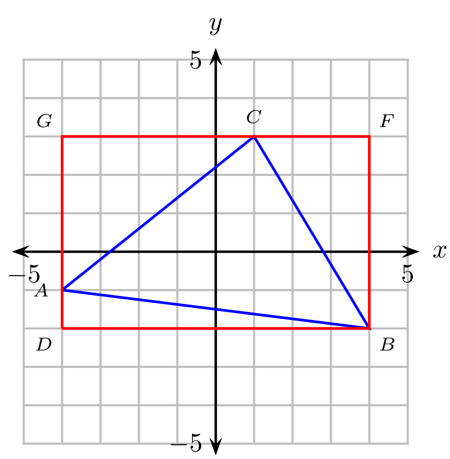
$$\begin{aligned}\text{Area Shaded Triangle} &= \text{Area of Rectangle} - \text{Sum of Three Triangles}\\ &= 20 - 13\\ &= 7.\end{aligned}$$

Hence, the area of the shaded triangle is 7.

29. Draw the triangle $\triangle ABC$ with vertices at $A(-4,-1)$, $B(4,-2)$, and $C(1,3)$.



Surround the triangle with a rectangle like the one shown in the following figure.



Calculate the areas of the three bounding right triangles.

i) Area of triangle $\triangle ADB$.

$$\begin{aligned}\triangle ADB &= \frac{1}{2}\cdot 8\cdot 1\\ &= 4\end{aligned}$$

ii) Area of triangle $\triangle BFC$.

$$\begin{aligned}\triangle BFC &= \frac{1}{2}\cdot 5\cdot 3\\ &= \frac{15}{2}\end{aligned}$$

iii) Area of triangle $\triangle CGA$.

$$\begin{aligned}\triangle CGA &= \frac{1}{2}\cdot 5\cdot 4\\ &= 10\end{aligned}$$

The sum of the three bounding right triangles is

$$\begin{aligned}\text{Sum of triangles} &= 4+\frac{15}{2}+10\\ &= \frac{43}{2}\end{aligned}$$

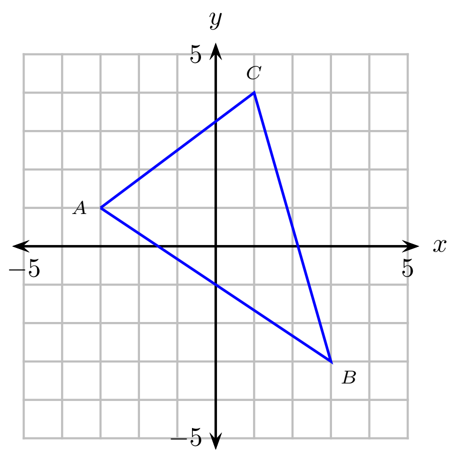
The area of the containing rectangle is 40.

$$\begin{aligned}\text{Area of rectangle} &= 8\cdot 5\\ &= 40\end{aligned}$$

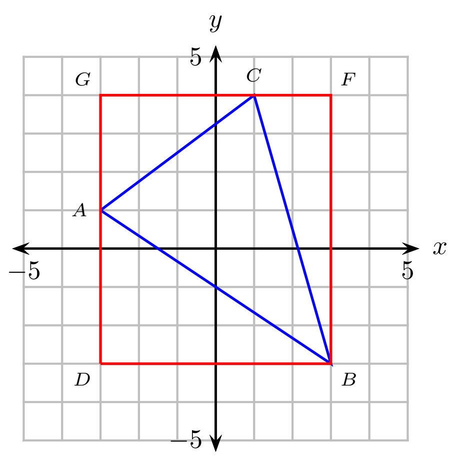
Therefore, the area of the triangle through the points $A(-4,-1)$, $B(4,-2)$, and $C(1,3)$ is found by subtracting the sum of the three bounding right triangles from the containing rectangle.

$$\begin{aligned}\text{Area }\triangle ABC &= \text{Area of Rectangle} - \text{Sum of Areas of Bounding Triangles}\\ &= 40-\frac{43}{2}\\ &= \frac{37}{2}\end{aligned}$$

31. Draw the triangle $\triangle ABC$ with vertices at $A(-3,1)$, $B(3,-3)$, and $C(1,4)$.



Surround the triangle with a rectangle like the one shown in the following figure.



Calculate the areas of the three bounding right triangles.

i) Area of triangle $\triangle ADB$.

$$\begin{aligned}\triangle ADB &= \frac{1}{2}\cdot 6\cdot 4\\ &= 12\end{aligned}$$

ii) Area of triangle $\triangle BFC$.

$$\begin{aligned}\triangle BFC &= \frac{1}{2}\cdot 7\cdot 2\\ &= 7\end{aligned}$$

iii) Area of triangle $\triangle CGA$.

$$\begin{aligned}\triangle CGA &= \frac{1}{2}\cdot 4\cdot 3\\ &= 6\end{aligned}$$

The sum of the three bounding right triangles is

$$\begin{aligned}\text{Sum of triangles} &= 12+7+6\\ &= 25\end{aligned}$$

The area of the containing rectangle is 42.

$$\begin{aligned}\text{Area of rectangle} &= 6\cdot 7\\ &= 42\end{aligned}$$

Therefore, the area of the triangle through the points $A(-3,1)$, $B(3,-3)$, and $C(1,4)$ is found by subtracting the sum of the three bounding right triangles from the containing rectangle.

$$\begin{aligned}\text{Area }\triangle ABC &= \text{Area of Rectangle} - \text{Sum of Areas of Bounding Triangles}\\ &= 42-25\\ &= 17\end{aligned}$$

8.2 Graphing Linear Equations

1. Substitute $(x, y) = (-1, -6)$ into the equation $y = -2x - 8$.

$$\begin{aligned}y &= -2x-8 && \text{Original equation.}\\ -6 &= -2(-1)-8 && \text{Substitute: } -1 \text{ for } x,\ -6 \text{ for } y.\\ -6 &= 2-8 && \text{Multiply: } -2(-1)=2.\\ -6 &= -6 && \text{Subtract: } 2-8=-6.\end{aligned}$$

Because this last statement is a true statement, $(-1, -6)$ satisfies (is a solution of) the equation $y = -2x - 8$.

For contrast, consider the point $(3, -13)$.

$$\begin{aligned} y &= -2x - 8 && \text{Original equation.} \\ -13 &= -2(3) - 8 && \text{Substitute: 3 for } x, -13 \text{ for } y. \\ -13 &= -6 - 8 && \text{Multiply: } -2(3) = -6. \\ -13 &= -14 && \text{Subtract: } -6 - 8 = -14. \end{aligned}$$

Note that this last statement is false. Hence, the pair $(3, -13)$ is **not** a solution of $y = -2x-8$. In similar fashion, readers should also check that the remaining two points are **not** solutions.

3. Substitute $(x, y) = (-4, 31)$ into the equation $y = -6x + 7$.

$$\begin{aligned} y &= -6x + 7 && \text{Original equation.} \\ 31 &= -6(-4) + 7 && \text{Substitute: } -4 \text{ for } x, 31 \text{ for } y. \\ 31 &= 24 + 7 && \text{Multiply: } -6(-4) = 24. \\ 31 &= 31 && \text{Add: } 24 + 7 = 31. \end{aligned}$$

Because this last statement is a true statement, $(-4, 31)$ satisfies (is a solution of) the equation $y = -6x + 7$.

For contrast, consider the point $(-2, 20)$.

$$\begin{aligned} y &= -6x + 7 && \text{Original equation.} \\ 20 &= -6(-2) + 7 && \text{Substitute: } -2 \text{ for } x, 20 \text{ for } y. \\ 20 &= 12 + 7 && \text{Multiply: } -6(-2) = 12. \\ 20 &= 19 && \text{Add: } 12 + 7 = 19. \end{aligned}$$

Note that this last statement is false. Hence, the pair $(-2, 20)$ is **not** a solution of $y = -6x+7$. In similar fashion, readers should also check that the remaining two points are **not** solutions.

5. Substitute $(x, y) = (2, 15)$ into the equation $y = 9x - 3$.

$$\begin{aligned} y &= 9x - 3 && \text{Original equation.} \\ 15 &= 9(2) - 3 && \text{Substitute: 2 for } x, 15 \text{ for } y. \\ 15 &= 18 - 3 && \text{Multiply: } 9(2) = 18. \\ 15 &= 15 && \text{Subtract: } 18 - 3 = 15. \end{aligned}$$

Because this last statement is a true statement, $(2, 15)$ satisfies (is a solution of) the equation $y = 9x - 3$.

For contrast, consider the point $(-8, -74)$.

$$\begin{aligned} y &= 9x - 3 && \text{Original equation.} \\ -74 &= 9(-8) - 3 && \text{Substitute: } -8 \text{ for } x,\ -74 \text{ for } y. \\ -74 &= -72 - 3 && \text{Multiply: } 9(-8) = -72. \\ -74 &= -75 && \text{Subtract: } -72 - 3 = -75. \end{aligned}$$

Note that this last statement is false. Hence, the pair $(-8, -74)$ is **not** a solution of $y = 9x - 3$. In similar fashion, readers should also check that the remaining two points are **not** solutions.

7. Substitute $(x, y) = (-2, 14)$ into the equation $y = -5x + 4$.

$$\begin{aligned} y &= -5x + 4 && \text{Original equation.} \\ 14 &= -5(-2) + 4 && \text{Substitute: } -2 \text{ for } x,\ 14 \text{ for } y. \\ 14 &= 10 + 4 && \text{Multiply: } -5(-2) = 10. \\ 14 &= 14 && \text{Add: } 10 + 4 = 14. \end{aligned}$$

Because this last statement is a true statement, $(-2, 14)$ satisfies (is a solution of) the equation $y = -5x + 4$.

For contrast, consider the point $(3, -10)$.

$$\begin{aligned} y &= -5x + 4 && \text{Original equation.} \\ -10 &= -5(3) + 4 && \text{Substitute: } 3 \text{ for } x,\ -10 \text{ for } y. \\ -10 &= -15 + 4 && \text{Multiply: } -5(3) = -15. \\ -10 &= -11 && \text{Add: } -15 + 4 = -11. \end{aligned}$$

Note that this last statement is false. Hence, the pair $(3, -10)$ is **not** a solution of $y = -5x+4$. In similar fashion, readers should also check that the remaining two points are **not** solutions.

9. Substitute $(x, y) = (9, k)$ into the equation $y = -6x + 1$.

$$\begin{aligned} y &= -6x + 1 && \text{Original equation.} \\ k &= -6(9) + 1 && \text{Substitute: } 9 \text{ for } x,\ k \text{ for } y. \\ k &= -54 + 1 && \text{Multiply: } -6(9) = -54. \\ k &= -53 && \text{Add: } -54 + 1 = -53. \end{aligned}$$

Thus, $k = -53$.

11. Substitute $(x, y) = (k, 7)$ into the equation $y = -4x + 1$.

$$\begin{aligned} y &= -4x + 1 && \text{Original equation.} \\ 7 &= -4(k) + 1 && \text{Substitute: } k \text{ for } x,\ 7 \text{ for } y. \\ 7 - 1 &= -4k + 1 - 1 && \text{Subtract 1 from both sides.} \\ 6 &= -4k && \text{Simplify: } 7 - 1 = 6. \\ \frac{6}{-4} &= \frac{-4k}{-4} && \text{Divide both sides by } -4. \\ -\frac{3}{2} &= k && \text{Reduce.} \end{aligned}$$

Thus, $k = -3/2$.

13. Substitute $(x, y) = (k, 1)$ into the equation $y = 4x + 8$.

$$\begin{aligned} y &= 4x + 8 && \text{Original equation.} \\ 1 &= 4(k) + 8 && \text{Substitute: } k \text{ for } x,\ 1 \text{ for } y. \\ 1 - 8 &= 4k + 8 - 8 && \text{Subtract 8 from both sides.} \\ -7 &= 4k && \text{Simplify: } 1 - 8 = -7. \\ \frac{-7}{4} &= \frac{4k}{4} && \text{Divide both sides by 4.} \\ -\frac{7}{4} &= k && \text{Simplify.} \end{aligned}$$

Thus, $k = -7/4$.

15. Substitute $(x, y) = (-1, k)$ into the equation $y = -5x + 3$.

$$\begin{aligned} &y = -5x + 3 && \text{Original equation.} \\ &k = -5(-1) + 3 && \text{Substitute: } -1 \text{ for } x,\ k \text{ for } y. \\ &k = 5 + 3 && \text{Multiply: } -5(-1) = 5. \\ &k = 8 && \text{Add: } 5 + 3 = 8. \end{aligned}$$

Thus, $k = 8$.

17. An equation is linear if and only if it has the form $y = mx + b$. Of the offered choices, only $y = 6x + 4$ has this form, where $m = 6$ and $b = 4$. The remaining choices do not have the form $y = mx + b$, so they are not linear equations.

19. An equation is linear if and only if it has the form $y = mx + b$. Of the offered choices, only $y = x + 7$ has this form, where $m = 1$ and $b = 7$. The remaining choices do not have the form $y = mx + b$, so they are not linear equations.

21. An equation is linear if and only if it has the form $y = mx + b$. The equation $y = -2x - 2$ can be written

$$y = -2x + (-2),$$

which has the form $y = mx + b$, where $m = -2$ and $b = -2$. Hence, this equation is linear. The remaining choices do not have the form $y = mx + b$, so they are not linear equations.

23. An equation is linear if and only if it has the form $y = mx + b$. The equation $y = 7x - 3$ can be written

$$y = 7x + (-3),$$

which has the form $y = mx + b$, where $m = 7$ and $b = -3$. Hence, this equation is linear. The remaining choices do not have the form $y = mx + b$, so they are not linear equations.

25. Consider the equation $y = -3x + 1$. Let's calculate two points that satisfy this equation. First, substitute 0 for x.

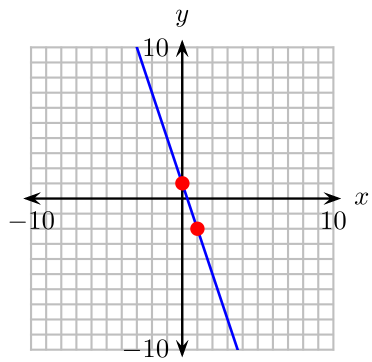
$$\begin{aligned} y &= -3x + 1 \\ &= -3(0) + 1 \\ &= 1 \end{aligned}$$

This computation tells us that $(0, 1)$ satisfies the linear equation $y = -3x + 1$ and is a point on the graph. Now, let's substitute 1 for x.

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

This computation tells us that $(1, -2)$ satisfies the linear equation $y = -3x + 1$ and is a point on the graph.

The equation $y = -3x + 1$ is linear. We need only plot our two points $(0, 1)$ and $(1, -2)$ and draw a line through them. The result follows.



Note that this line is identical to the given graph.

For contrast, consider the equation $y = -\frac{3}{2}x + 2$. Let's calculate two points that satisfy this equation. First, substitute 0 for x.

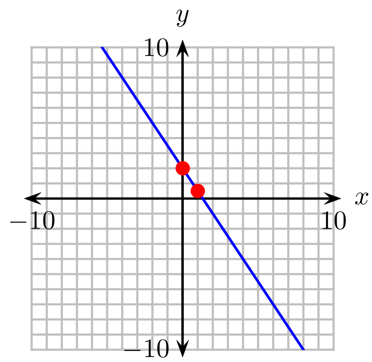
$$\begin{aligned} y &= -\frac{3}{2}x + 2 \\ &= -\frac{3}{2}(0) + 2 \\ &= 2 \end{aligned}$$

This computation tells us that $(0, 2)$ satisfies the linear equation $y = -\frac{3}{2}x + 2$ and is a point on the graph. Now, let's substitute 1 for x.

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

This computation tells us that $(1, 1/2)$ satisfies the linear equation $y = -\frac{3}{2}x+2$ and is a point on the graph.

The equation $y = -\frac{3}{2}x + 2$ is linear. We need only plot our two points $(0, 2)$ and $(1, 1/2)$ and draw a line through them. The result follows.



Note that this line differs from the given graph. Readers should use the same procedure to show that the lines produced by the remaining two equations are also different from the original.

27. Consider the equation $y = \frac{3}{2}x + 1$. Let's calculate two points that satisfy this equation. First, substitute 0 for x.

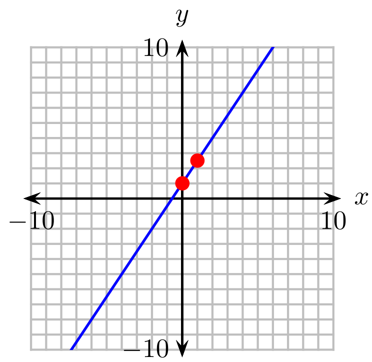
$$\begin{aligned} y &= \frac{3}{2}x + 1 \\ &= \frac{3}{2}(0) + 1 \\ &= 1 \end{aligned}$$

This computation tells us that $(0, 1)$ satisfies the linear equation $y = \frac{3}{2}x + 1$ and is a point on the graph. Now, let's substitute 1 for x.

$$\begin{aligned} y &= \frac{3}{2}x + 1 \\ &= \frac{3}{2}(1) + 1 \\ &= \frac{5}{2} \end{aligned}$$

This computation tells us that $(1, 5/2)$ satisfies the linear equation $y = \frac{3}{2}x + 1$ and is a point on the graph.

The equation $y = \frac{3}{2}x + 1$ is linear. We need only plot our two points $(0, 1)$ and $(1, 5/2)$ and draw a line through them. The result follows.



Note that this line is identical to the given graph.

For contrast, consider the equation $y = \frac{1}{2}x + 1$. Let's calculate two points that satisfy this equation. First, substitute 0 for x.

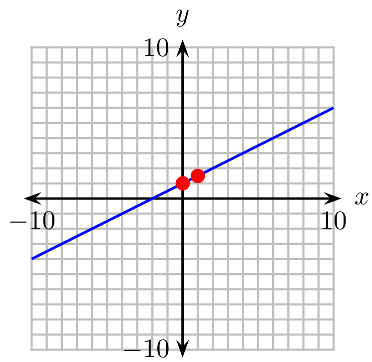
$$\begin{aligned} y &= \frac{1}{2}x + 1 \\ &= \frac{1}{2}(0) + 1 \\ &= 1 \end{aligned}$$

This computation tells us that $(0, 1)$ satisfies the linear equation $y = \frac{1}{2}x + 1$ and is a point on the graph. Now, let's substitute 1 for x.

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

This computation tells us that $(1, 3/2)$ satisfies the linear equation $y = \frac{1}{2}x + 1$ and is a point on the graph.

The equation $y = \frac{1}{2}x + 1$ is linear. We need only plot our two points $(0, 1)$ and $(1, 3/2)$ and draw a line through them. The result follows.



Note that this line differs from the given graph. Readers should use the same procedure to show that the lines produced by the remaining two equations are also different from the original.

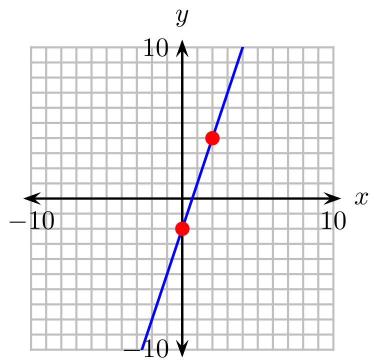
29. The equation $y = 3x - 2$ is linear. Thus, to plot the equation, we need only calculate two points that satisfy the equation, plot them, then draw a line through them. First, substitute 0 for x.

$$\begin{aligned} y &= 3x - 2 \\ &= 3(0) - 2 \\ &= -2 \end{aligned}$$

This computation tells us that $(0, -2)$ satisfies the linear equation $y = 3x - 2$ and is a point on the graph. Now, let's substitute 2 for x.

$$\begin{aligned} y &= 3x - 2 \\ &= 3(2) - 2 \\ &= 4 \end{aligned}$$

This computation tells us that $(2, 4)$ satisfies the linear equation $y = 3x - 2$ and is a point on the graph. Finally, plot these points and draw a line through them. The graph of $y = 3x - 2$ follows.



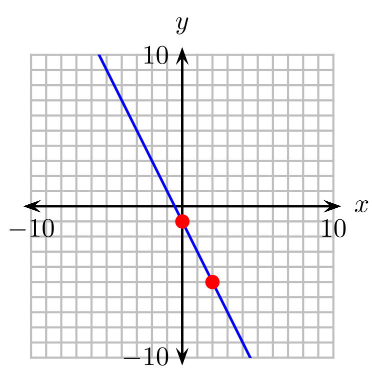
31. The equation $y = -2x - 1$ is linear. Thus, to plot the equation, we need only calculate two points that satisfy the equation, plot them, then draw a line through them. First, substitute 0 for x.

$$\begin{aligned} y &= -2x - 1 \\ &= -2(0) - 1 \\ &= -1 \end{aligned}$$

This computation tells us that $(0, -1)$ satisfies the linear equation $y = -2x - 1$ and is a point on the graph. Now, let's substitute 2 for x.

$$\begin{aligned} y &= -2x - 1 \\ &= -2(2) - 1 \\ &= -5 \end{aligned}$$

This computation tells us that $(2, -5)$ satisfies the linear equation $y = -2x - 1$ and is a point on the graph. Finally, plot these points and draw a line through them. The graph of $y = -2x - 1$ follows.



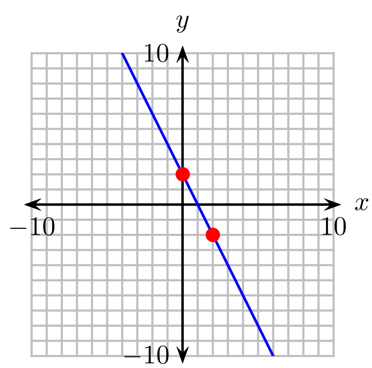
33. The equation $y = -2x + 2$ is linear. Thus, to plot the equation, we need only calculate two points that satisfy the equation, plot them, then draw a line through them. First, substitute 0 for x.

$$\begin{aligned} y &= -2x + 2 \\ &= -2(0) + 2 \\ &= 2 \end{aligned}$$

This computation tells us that $(0, 2)$ satisfies the linear equation $y = -2x + 2$ and is a point on the graph. Now, let's substitute 2 for x.

$$\begin{aligned} y &= -2x + 2 \\ &= -2(2) + 2 \\ &= -2 \end{aligned}$$

This computation tells us that $(2, -2)$ satisfies the linear equation $y = -2x + 2$ and is a point on the graph. Finally, plot these points and draw a line through them. The graph of $y = -2x + 2$ follows.



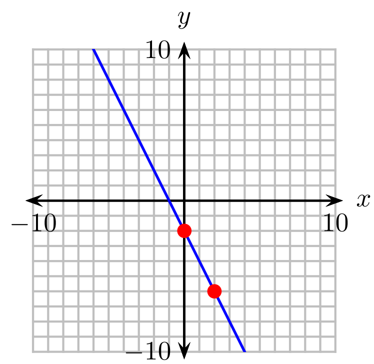
35. The equation $y = -2x - 2$ is linear. Thus, to plot the equation, we need only calculate two points that satisfy the equation, plot them, then draw a line through them. First, substitute 0 for x.

$$\begin{aligned} y &= -2x - 2 \\ &= -2(0) - 2 \\ &= -2 \end{aligned}$$

This computation tells us that $(0, -2)$ satisfies the linear equation $y = -2x - 2$ and is a point on the graph. Now, let's substitute 2 for x.

$$\begin{aligned} y &= -2x - 2 \\ &= -2(2) - 2 \\ &= -6 \end{aligned}$$

This computation tells us that $(2, -6)$ satisfies the linear equation $y = -2x - 2$ and is a point on the graph. Finally, plot these points and draw a line through them. The graph of $y = -2x - 2$ follows.



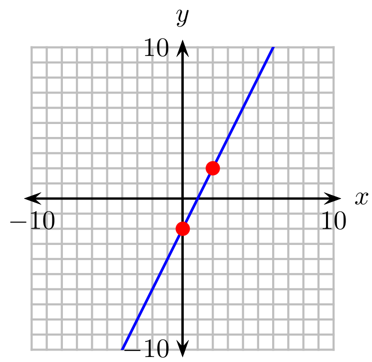
37. The equation $y = 2x - 2$ is linear. Thus, to plot the equation, we need only calculate two points that satisfy the equation, plot them, then draw a line through them. First, substitute 0 for x.

$$\begin{aligned} y &= 2x - 2 \\ &= 2(0) - 2 \\ &= -2 \end{aligned}$$

This computation tells us that $(0, -2)$ satisfies the linear equation $y = 2x - 2$ and is a point on the graph. Now, let's substitute 2 for x.

$$\begin{aligned} y &= 2x - 2 \\ &= 2(2) - 2 \\ &= 2 \end{aligned}$$

This computation tells us that $(2, 2)$ satisfies the linear equation $y = 2x - 2$ and is a point on the graph. Finally, plot these points and draw a line through them. The graph of $y = 2x - 2$ follows.



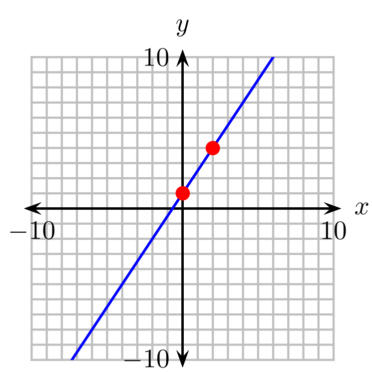
39. The equation $y = \frac{3}{2}x + 1$ is linear. Thus, to plot the equation, we need only calculate two points that satisfy the equation, plot them, then draw a line through them. First, substitute 0 for x.

$$\begin{aligned} y &= \frac{3}{2}x + 1 \\ &= \frac{3}{2}(0) + 1 \\ &= 1 \end{aligned}$$

This computation tells us that $(0, 1)$ satisfies the linear equation $y = \frac{3}{2}x + 1$ and is a point on the graph. Now, let's substitute 2 for x.

$$\begin{aligned} y &= \frac{3}{2}x + 1 \\ &= \frac{3}{2}(2) + 1 \\ &= 4 \end{aligned}$$

This computation tells us that $(2, 4)$ satisfies the linear equation $y = \frac{3}{2}x + 1$ and is a point on the graph. Finally, plot these points and draw a line through them. The graph of $y = \frac{3}{2}x + 1$ follows.



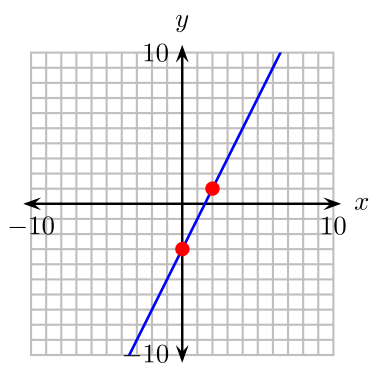
41. The equation $y = 2x - 3$ is linear. Thus, to plot the equation, we need only calculate two points that satisfy the equation, plot them, then draw a line through them. First, substitute 0 for x.

$$\begin{aligned} y &= 2x - 3 \\ &= 2(0) - 3 \\ &= -3 \end{aligned}$$

This computation tells us that $(0, -3)$ satisfies the linear equation $y = 2x - 3$ and is a point on the graph. Now, let's substitute 2 for x.

$$\begin{aligned} y &= 2x - 3 \\ &= 2(2) - 3 \\ &= 1 \end{aligned}$$

This computation tells us that $(2, 1)$ satisfies the linear equation $y = 2x - 3$ and is a point on the graph. Finally, plot these points and draw a line through them. The graph of $y = 2x - 3$ follows.



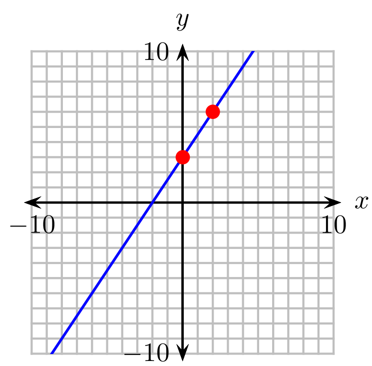
43. The equation $y = \frac{3}{2}x + 3$ is linear. Thus, to plot the equation, we need only calculate two points that satisfy the equation, plot them, then draw a line through them. First, substitute 0 for x.

$$\begin{aligned} y &= \frac{3}{2}x + 3 \\ &= \frac{3}{2}(0) + 3 \\ &= 3 \end{aligned}$$

This computation tells us that $(0, 3)$ satisfies the linear equation $y = \frac{3}{2}x + 3$ and is a point on the graph. Now, let's substitute 2 for x.

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

This computation tells us that $(2, 6)$ satisfies the linear equation $y = \frac{3}{2}x + 3$ and is a point on the graph. Finally, plot these points and draw a line through them. The graph of $y = \frac{3}{2}x + 3$ follows.



45. The equations $y = \frac{1}{2}x - 1$ and $y = \frac{5}{2}x - 2$ are linear. Thus, to plot these equations, we need only calculate two points that satisfy each equation, plot them, then draw a line through them. First, substitute 0 for x in $y = \frac{1}{2}x - 1$.

$$\begin{aligned} y &= \frac{1}{2}x - 1 \\ &= \frac{1}{2}(0) - 1 \\ &= -1 \end{aligned}$$

This computation tells us that $(0, -1)$ satisfies the linear equation $y = \frac{1}{2}x - 1$ and is a point on its graph. Now, let's substitute 2 for x in $y = \frac{1}{2}x - 1$.

$$\begin{aligned} y &= \frac{1}{2}x - 1 \\ &= \frac{1}{2}(2) - 1 \\ &= 0 \end{aligned}$$

This computation tells us that $(2, 0)$ satisfies the linear equation $y = \frac{1}{2}x - 1$ and is a point on its graph. Plot these points and draw a line through them.

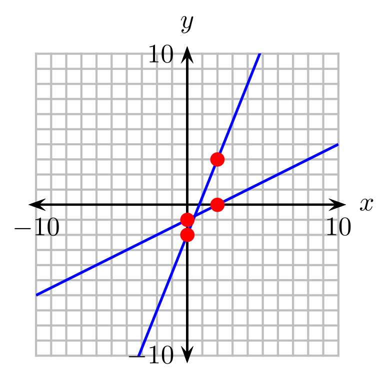
Make similar computations with $y = \frac{5}{2}x - 2$. First substitute 0 for x.

$$\begin{aligned} y &= \frac{5}{2}x - 2 \\ &= \frac{5}{2}(0) - 2 \\ &= -2 \end{aligned}$$

This computation tells us that $(0, -2)$ satisfies the linear equation $y = \frac{5}{2}x - 2$ and is a point on the graph. Now, let's substitute 2 for x in $y = \frac{5}{2}x - 2$.

$$\begin{aligned} y &= \frac{5}{2}x - 2 \\ &= \frac{5}{2}(2) - 2 \\ &= 3 \end{aligned}$$

This computation tells us that $(2, 3)$ satisfies the linear equation $y = \frac{5}{2}x - 2$ and is a point on the graph.



Note that the graph of $y = \frac{5}{2}x - 2$ rises more quickly than does the graph of $y = \frac{1}{2}x - 1$.

47. The equations $y = -\frac{1}{2}x + 1$ and $y = -3x + 3$ are linear. Thus, to plot these equations, we need only calculate two points that satisfy each equation, plot them, then draw a line through them. First, substitute 0 for x in $y = -\frac{1}{2}x + 1$.

$$\begin{aligned} y &= -\frac{1}{2}x + 1 \\ &= -\frac{1}{2}(0) + 1 \\ &= 1 \end{aligned}$$

This computation tells us that $(0, 1)$ satisfies the linear equation $y = -\frac{1}{2}x + 1$ and is a point on its graph. Now, let's substitute 2 for x in $y = -\frac{1}{2}x + 1$.

$$\begin{aligned} y &= -\frac{1}{2}x + 1 \\ &= -\frac{1}{2}(2) + 1 \\ &= 0 \end{aligned}$$

This computation tells us that $(2, 0)$ satisfies the linear equation $y = -\frac{1}{2}x + 1$ and is a point on its graph. Plot these points and draw a line through them.

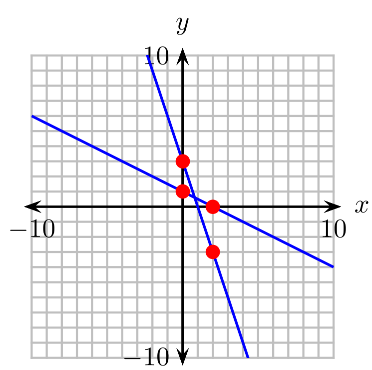
Make similar computations with $y = -3x + 3$. First substitute 0 for x.

$$\begin{aligned} y &= -3x + 3 \\ &= -3(0) + 3 \\ &= 3 \end{aligned}$$

This computation tells us that $(0, 3)$ satisfies the linear equation $y = -3x + 3$ and is a point on the graph. Now, let's substitute 2 for x in $y = -3x + 3$.

$$\begin{aligned} y &= -3x + 3 \\ &= -3(2) + 3 \\ &= -3 \end{aligned}$$

This computation tells us that $(2, -3)$ satisfies the linear equation $y = -3x + 3$ and is a point on the graph.



Note that the graph of $y = -3x + 3$ falls more quickly than does the graph of $y = -\frac{1}{2}x + 1$.

49. The equations $y = -3x - 1$ and $y = -\frac{1}{2}x - 2$ are linear. Thus, to plot these equations, we need only calculate two points that satisfy each equation, plot them, then draw a line through them. First, substitute 0 for x in $y = -3x - 1$.

$$\begin{aligned} y &= -3x - 1 \\ &= -3(0) - 1 \\ &= -1 \end{aligned}$$

This computation tells us that $(0, -1)$ satisfies the linear equation $y = -3x - 1$ and is a point on its graph. Now, let's substitute 2 for x in $y = -3x - 1$.

$$\begin{aligned} y &= -3x - 1 \\ &= -3(2) - 1 \\ &= -7 \end{aligned}$$

This computation tells us that $(2, -7)$ satisfies the linear equation $y = -3x - 1$ and is a point on its graph. Plot these points and draw a line through them.

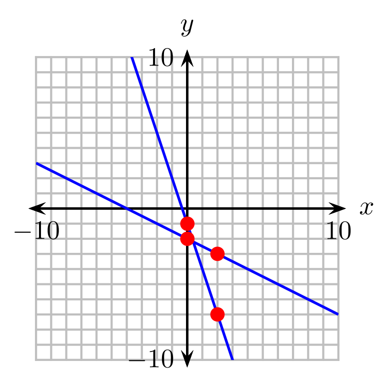
Make similar computations with $y = -\frac{1}{2}x - 2$. First substitute 0 for x.

$$\begin{aligned} y &= -\frac{1}{2}x - 2 \\ &= -\frac{1}{2}(0) - 2 \\ &= -2 \end{aligned}$$

This computation tells us that $(0, -2)$ satisfies the linear equation $y = -\frac{1}{2}x - 2$ and is a point on the graph. Now, let's substitute 2 for x in $y = -\frac{1}{2}x - 2$.

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

This computation tells us that $(2, -3)$ satisfies the linear equation $y = -\frac{1}{2}x - 2$ and is a point on the graph.



Note that the graph of $y = -3x - 1$ falls more quickly than does the graph of $y = -\frac{1}{2}x - 2$.

51. The equations $y = \frac{3}{2}x - 2$ and $y = 3x + 1$ are linear. Thus, to plot these equations, we need only calculate two points that satisfy each equation, plot them, then draw a line through them. First, substitute 0 for x in $y = \frac{3}{2}x - 2$.

$$\begin{aligned} y &= \frac{3}{2}x - 2 \\ &= \frac{3}{2}(0) - 2 \\ &= -2 \end{aligned}$$

This computation tells us that $(0, -2)$ satisfies the linear equation $y = \frac{3}{2}x - 2$ and is a point on its graph. Now, let's substitute 2 for x in $y = \frac{3}{2}x - 2$.

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

This computation tells us that $(2, 1)$ satisfies the linear equation $y = \frac{3}{2}x - 2$ and is a point on its graph. Plot these points and draw a line through them.

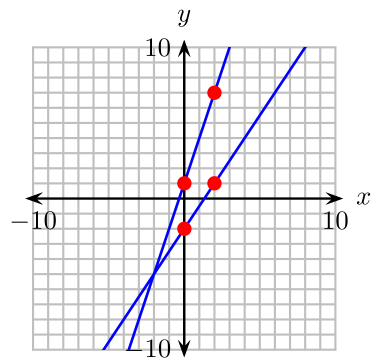
Make similar computations with $y = 3x + 1$. First substitute 0 for x.

$$\begin{aligned} y &= 3x + 1 \\ &= 3(0) + 1 \\ &= 1 \end{aligned}$$

This computation tells us that $(0, 1)$ satisfies the linear equation $y = 3x + 1$ and is a point on the graph. Now, let's substitute 2 for x in $y = 3x + 1$.

$$\begin{aligned} y &= 3x + 1 \\ &= 3(2) + 1 \\ &= 7 \end{aligned}$$

This computation tells us that $(2, 7)$ satisfies the linear equation $y = 3x + 1$ and is a point on the graph.



Note that the graph of $y = 3x + 1$ rises more quickly than does the graph of $y = \frac{3}{2}x - 2$.