Algebra 1 Workbook Solutions

Graphing

krista king MATH

CARTESIAN COORDINATE SYSTEM

1. What is the coordinate point of the origin?

Solution:

The coordinate point of the origin is $(0,0)$.

2. Give a coordinate point that lies in Quadrant III.

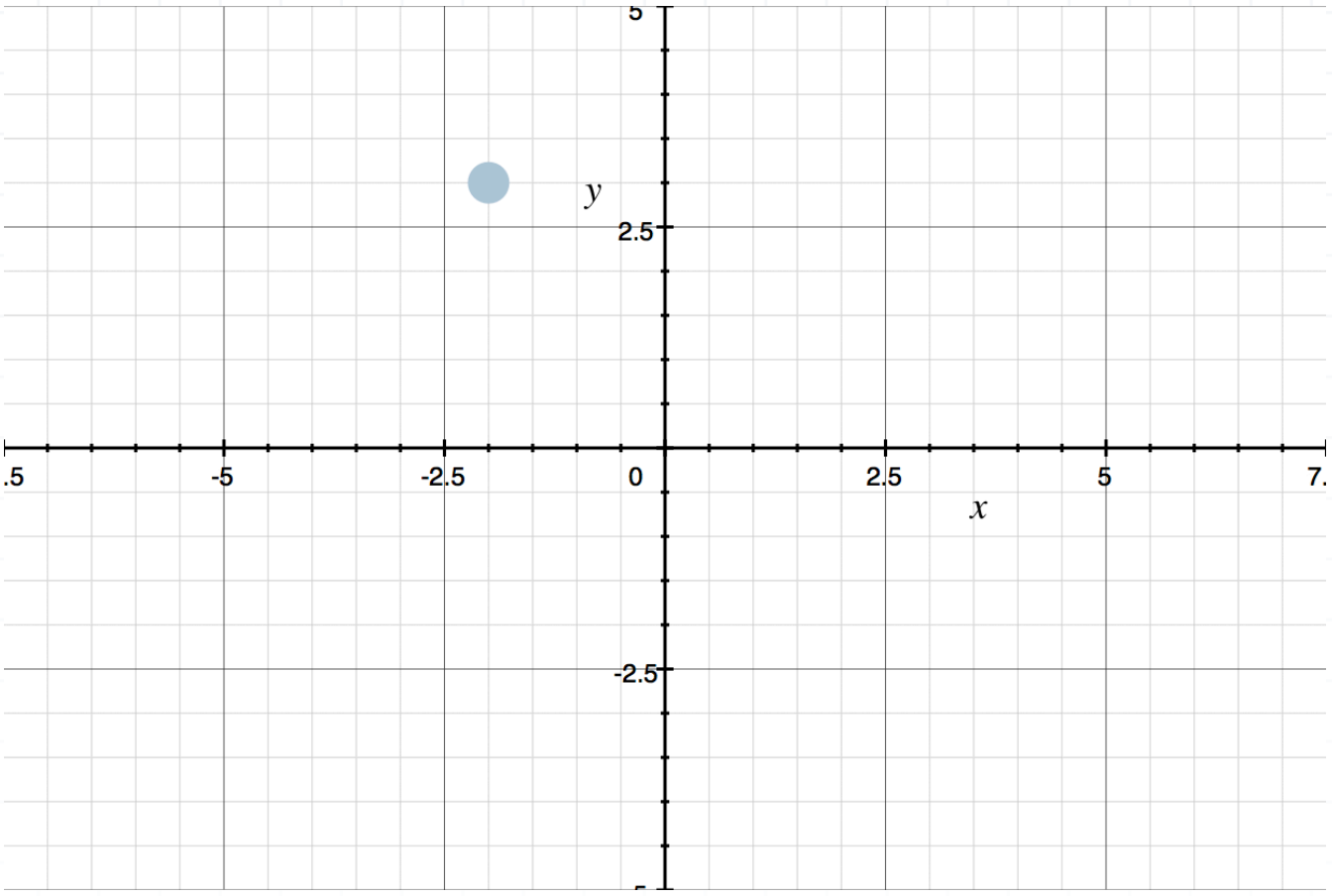
Solution:

There are many possible correct solutions. For example, $(-2, -4)$ or any point for which both the x- and y-coordinate are negative.

3. Graph the point $(-2,3)$ in the Cartesian plane.

Solution:

The graph of the point is



4. In which quadrant would you plot the point $(1,6)$?

Solution:

Since both the x- and the y-coordinates are positive, this point is graphed in Quadrant I.

5. What is the y-coordinate of the points that lie on the x-axis? Give an example of a coordinate point that lies on the x-axis.

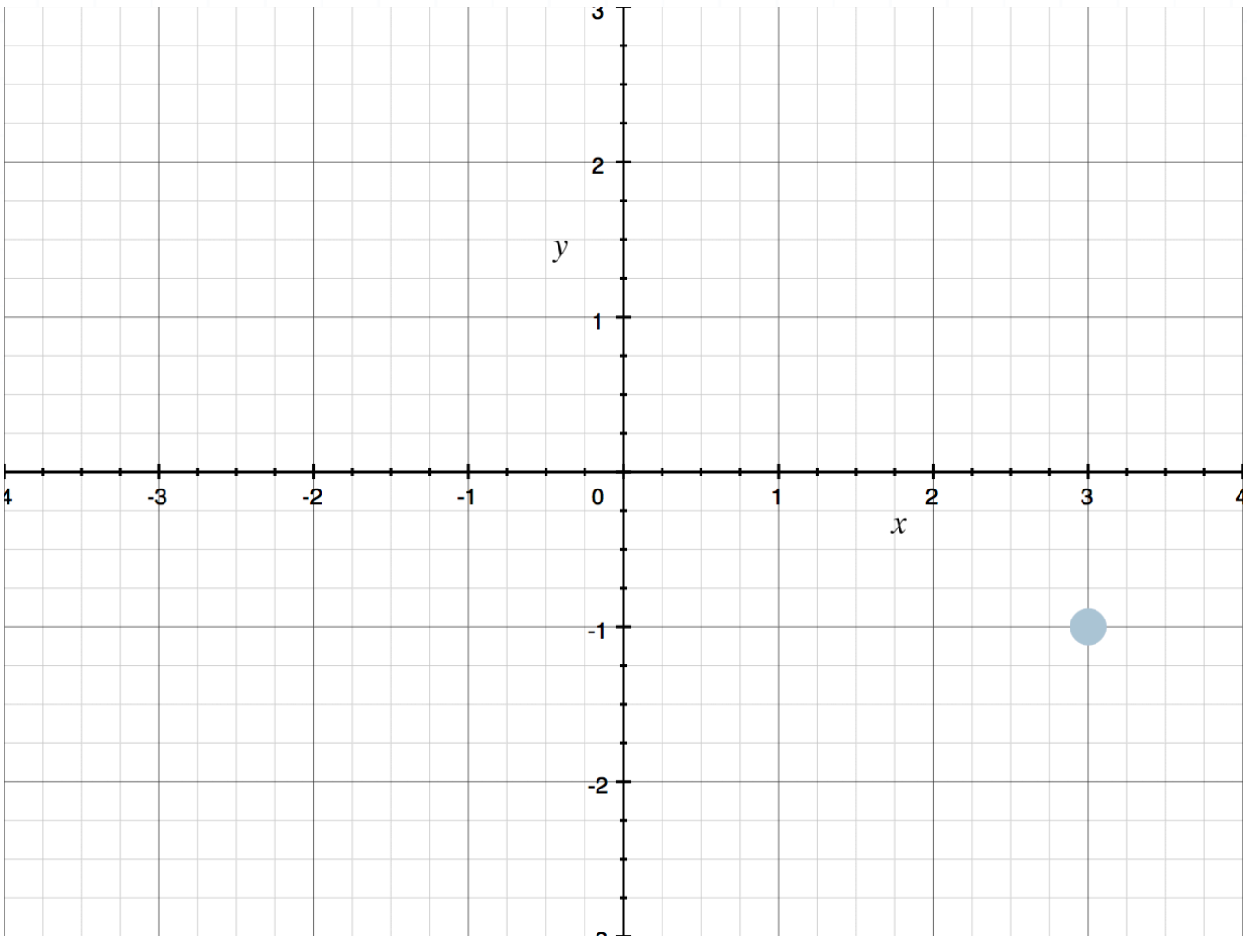
Solution:

The y-coordinate of the points on the x-axis is always $y = 0$. For example, $(3,0)$ is a point on the x-axis.

6. Graph the point $(3, -1)$ in the Cartesian plane.

Solution:

The graph of the point is



7. Give a coordinate point that lies in Quadrant II.

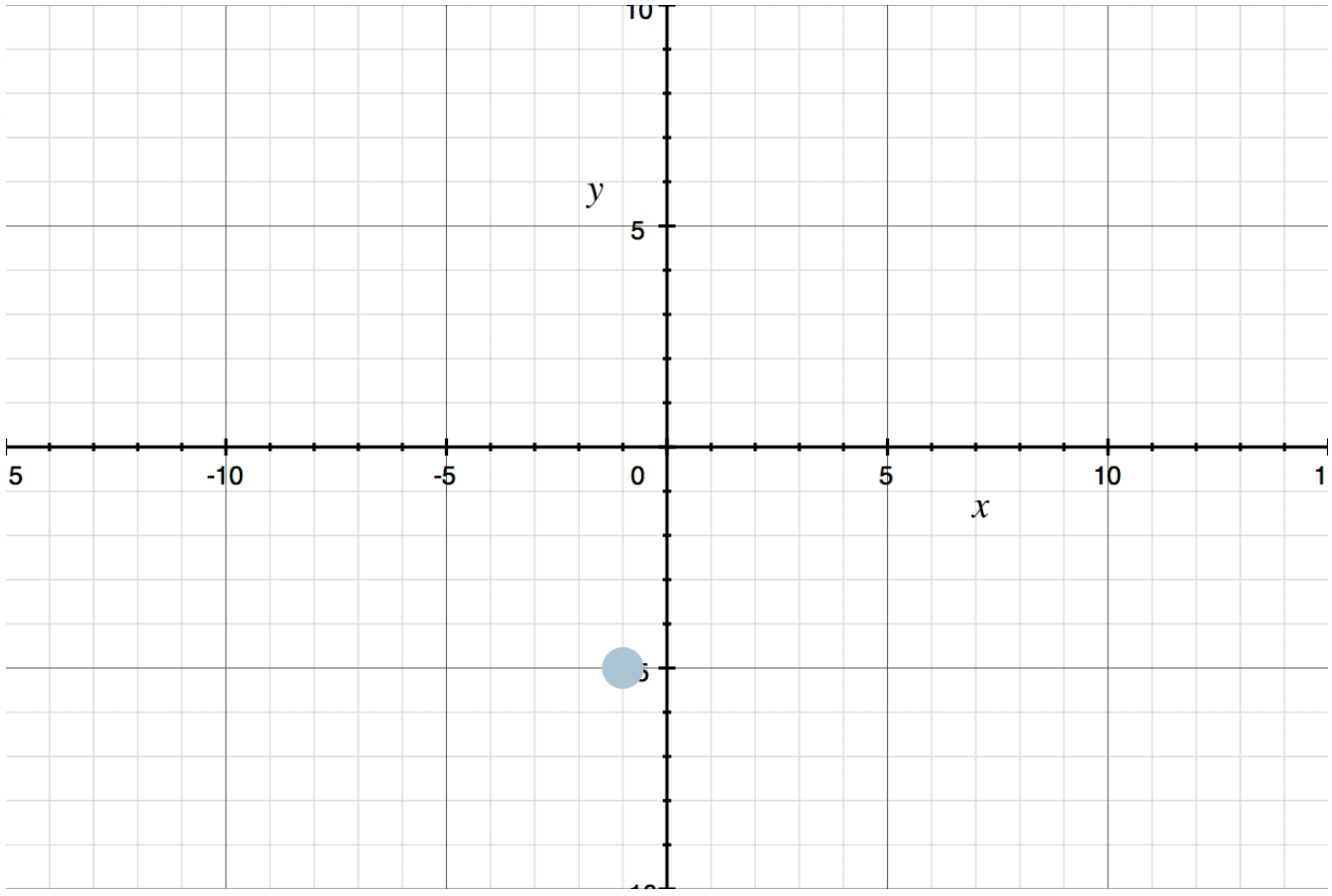
Solution:

There are many possible correct solutions. For example, $(-2,5)$, or any point for which the x-coordinate is negative and the y-coordinate is positive.

8. Graph the point $(-1, -5)$ in the Cartesian plane.

Solution:

The graph of the point is



9. In which quadrant would you plot $(3, -7)$?

Solution:

Since the x-coordinate is positive and the y-coordinate is negative, this point is graphed in Quadrant IV.

10. What is the x-coordinate of the points that lie on the y-axis? Give an example of a coordinate point that lies on the y-axis.

Solution:

The x-coordinate of the points on the y-axis is always $x = 0$. For example, $(0, -7)$ is a point on the y-axis.

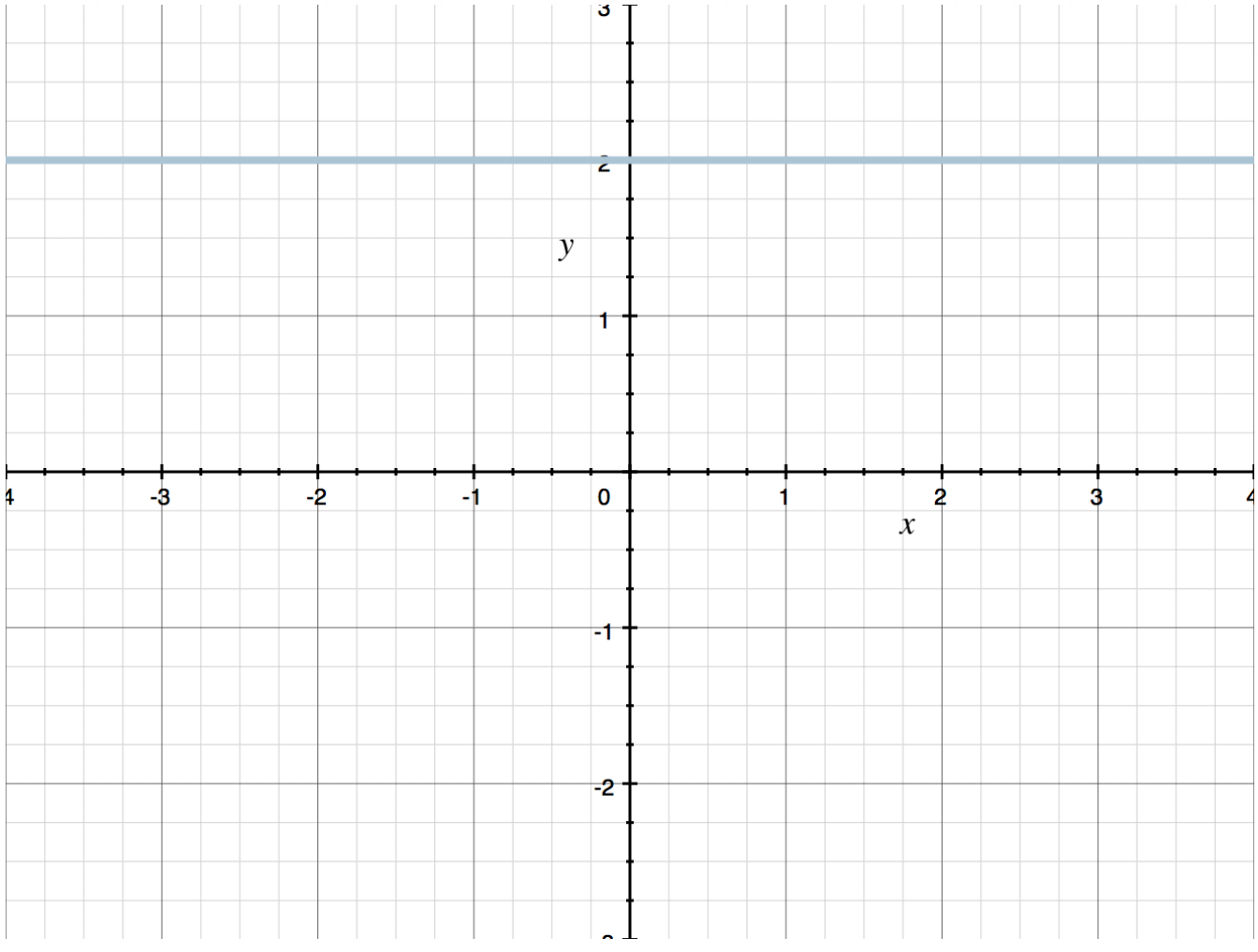
SLOPE

1. In terms of vertical and horizontal movement, define the slope of a line.

Solution:

The slope is defined as the change in vertical movement divided by the change in the horizontal movement, i.e., “rise over run.”

2. What is the slope of the line?



Solution:

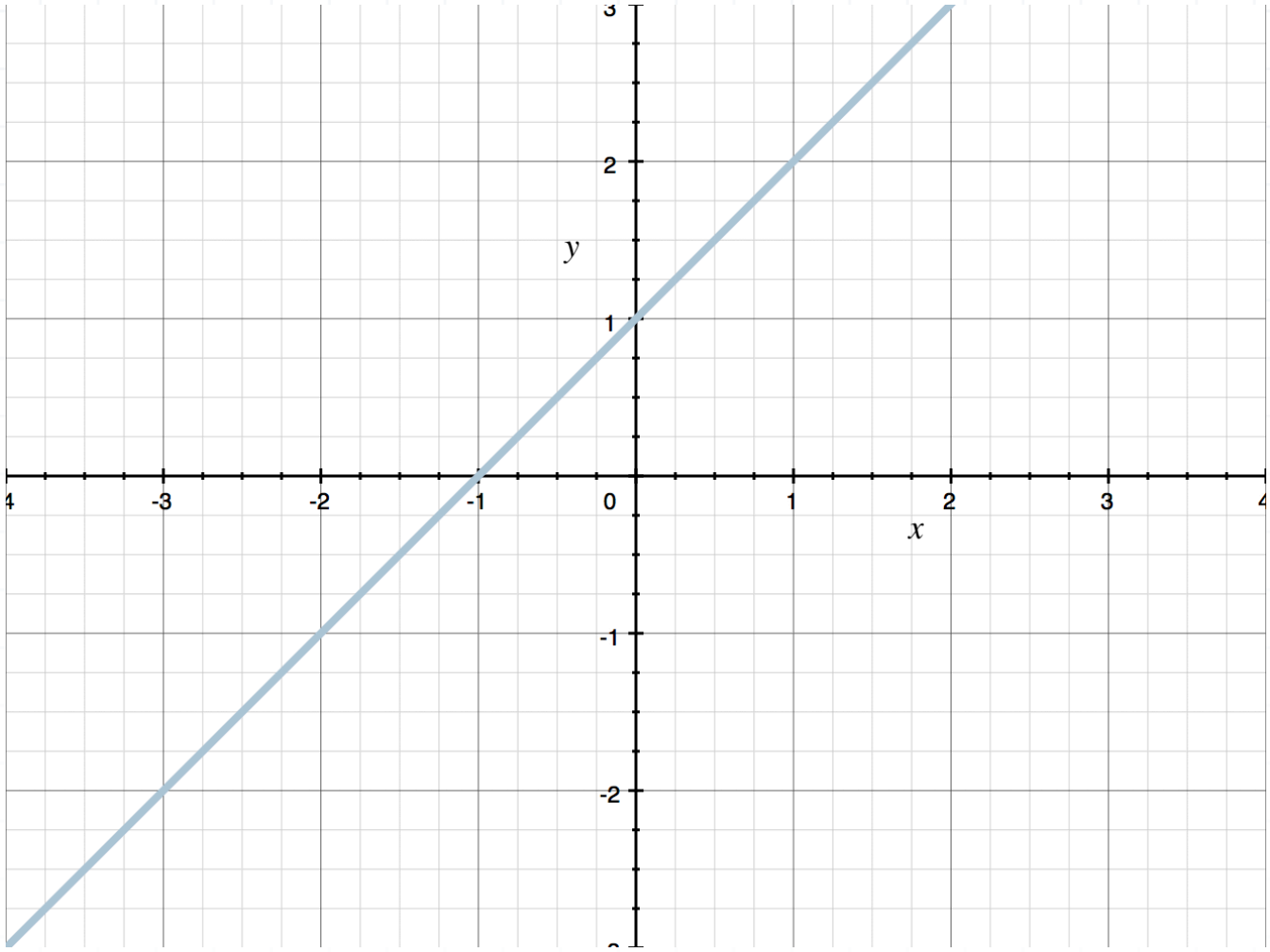
Since the line is a horizontal line, the slope is 0.

3. What direction is an undefined slope: horizontal or vertical? Use the formula for the slope to explain why.

Solution:

The direction of an undefined slope is vertical. It is because the change in x of a vertical line is 0, so the slope has a 0 in the denominator and is therefore undefined.

4. What is the slope of the line?



Solution:

Notice that the graph passes through the points $(-1,0)$ and $(0,1)$, which means the slope can be defined as

$$m = \frac{1-0}{0-(-1)}$$

$$m = \frac{1}{1}$$

$$m = 1$$

5. What is the slope of the line that passes through the points $(-1,3)$ and $(4,-7)$?

Solution:

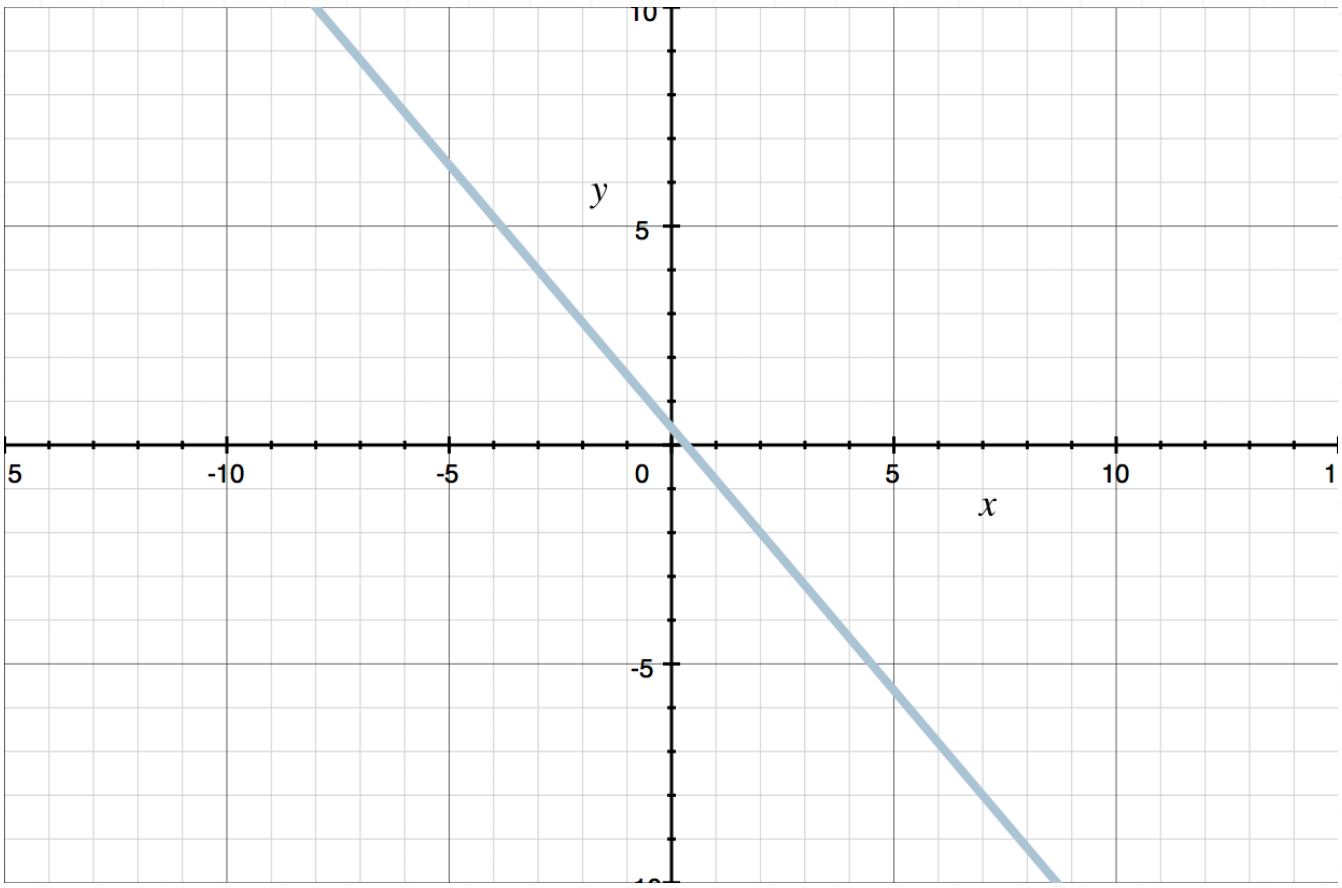
The graph passes through the points $(-1,3)$ and $(4,-7)$, so the slope is defined as

$$m = \frac{-7-3}{4-(-1)}$$

$$m = \frac{-10}{5}$$

$$m = -2$$

6. What is the slope of the line?



Solution:

Notice that the graph passes through the points $(-3,4)$ and $(2,-2)$, so the slope is

$$m = \frac{-2-4}{2-(-3)}$$

$$m = \frac{-6}{5}$$

$$m = -\frac{6}{5}$$

7. Find the slope of the line that passes through $(10,1)$ and $(5,2)$.

Solution:

The graph passes through $(10,1)$ and $(5,2)$, so the slope is

$$m = \frac{2-1}{5-10}$$

$$m = \frac{1}{-5}$$

$$m = -\frac{1}{5}$$

8. Give two points that make a line with a slope of $-2/3$.

Solution:

There are many correct answers. For example, the points $(0,0)$ and $(3,-2)$ create a line with slope $-2/3$.

9. Find the slope of the line that passes through $(3,5)$ and $(-1,5)$.

Solution:

The graph passes through the points $(3,5)$ and $(-1,5)$, so the slope is defined as

$$m = \frac{5-5}{-1-3}$$

$$m = \frac{0}{-4}$$

$$m = 0$$

10. What is the slope of the line through the points (x_1, y_1) and (x_2, y_2)?

Solution:

The graph passes through the points $(x_1,\ y_1)$ and $(x_2,\ y_2)$, so the slope

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

EQUATION OF A LINE IN POINT-SLOPE FORM

1. Find the equation of the line that passes through $(3,0)$ with slope -2.

Solution:

Using point-slope form, the equation of the line is

$$y - 0 = -2(x - 3)$$

$$y = -2x + 6$$

2. Name two (of four possible) pieces of information about a line that are required to write an equation of the line in point-slope form.

Solution:

Naming any two of the following is correct:

(1) A point

(2) Another point

(3) The slope

(4) The y-intercept

3. Find the equation of the line that passes through the points $(-2,3)$ and $(2,-4)$.

Solution:

We first need to calculate the slope of the line as follows

$$m = \frac{-4-3}{2-(-2)}$$

$$m = \frac{-7}{4}$$

$$m = -\frac{7}{4}$$

Using point-slope form, the equation of the line is either of the following:

$$y-3 = -\frac{7}{4}(x+2)$$

$$y+4 = -\frac{7}{4}(x-2)$$

4. Find the equation of the line that passes through $(-2,-5)$ with a slope 6.

Solution:

Using point-slope form, the equation of the line is

$$y + 5 = 6(x + 2)$$

$$y + 5 = 6x + 12$$

$$y = 6x + 7$$

5. Identify the point (x_1, y_1) and slope m in the equation of the line.

$$y + 3 = \frac{1}{4}(x - 6)$$

Solution:

Using point-slope form, we can see that the point is $(6, -3)$ and the slope is $1/4$.

6. Write the following equation in point-slope form.

$$y = -\frac{1}{2}x + 4$$

Solution:

Subtract 4 from both sides.

$$y - 4 = -\frac{1}{2}x$$

Subtract 0 from the right side, which doesn't change the value of the equation.

$$y - 4 = -\frac{1}{2}x - 0$$

Factor out the $-1/2$ to separate the slope.

$$y - 4 = -\frac{1}{2}(x - 0)$$

7. Find the equation of the line that passes through the points $(5, -4)$ and $(6,0)$.

Solution:

We first need to calculate the slope of the line as

$$m = \frac{0 - (-4)}{6 - 5}$$

$$m = \frac{4}{1}$$

$$m = 4$$

Using point-slope form, the equation of the line is then either of the following:

$$y + 4 = 4(x - 5)$$

$$y = 4(x - 6)$$

EQUATION OF A LINE IN SLOPE-INTERCEPT FORM

1. Find the equation of a line through the point $(0,5)$ with slope -2. Write the solution in slope-intercept form.

Solution:

Using slope-intercept form, the equation of the line is

$$y = -2x + 5$$

2. Identify the y-intercept and slope m defining the line.

$$y = -\frac{1}{4}(x + 12)$$

Solution:

Notice that the slope of the line given is $-1/4$ and the y-intercept (when $x = 0$) is $(0, -3)$.

3. Convert the following point-slope equation into a slope-intercept equation.

$$y - 3 = \frac{1}{3}(x - 6)$$

Solution:

Converting to slope-intercept form means that we need to solve for y, and simplify as much as we can.

$$y - 3 = \frac{1}{3}(x - 6)$$

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

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

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

4. Find the equation of a line that passes through the points $(1, -1)$ and $(0,3)$. Write the solution in slope-intercept form.

Solution:

We first need to calculate the slope of the line as

$$m = \frac{3 - (-1)}{0 - 1}$$

$$m = \frac{4}{-1}$$

$$m = -4$$

Using slope-intercept form, noting that the y-intercept is 3, the equation of the line is

$$y = -4x + 3$$

5. Determine the y-intercept of a line with slope -3 that passes through the point $(1,1)$. Write your solution as a coordinate point.

Solution:

In point-slope form, the equation of the line is

$$y - 1 = -3(x - 1)$$

$$y = -3x + 3 + 1$$

$$y = -3x + 4$$

From the new form of the equation of the line, we can see that the y-intercept is $(0,4)$.

6. Name two (of four possible) pieces of information about a line that are required to write an equation of the line in point-slope form.

Solution:

Naming any two of the following is correct:

(1) A point

(2) Another point

(3) The slope

(4) The y-intercept

7. Find the equation of a line that passes through the points $(-3, -2)$ and $(2, -4)$. Write the solution in slope-intercept form.

Solution:

We first need to calculate the slope of the line as

$$m = \frac{-4-(-2)}{2-(-3)}$$

$$m = \frac{-2}{5}$$

$$m = -\frac{2}{5}$$

Using point-slope form, the equation of the line is

$$y+2=-\frac{2}{5}(x+3)$$

$$y+2=-\frac{2}{5}x-\frac{6}{5}$$

$$y=-\frac{2}{5}x-\frac{6}{5}-\frac{10}{5}$$

$$y=-\frac{2}{5}x-\frac{16}{5}$$

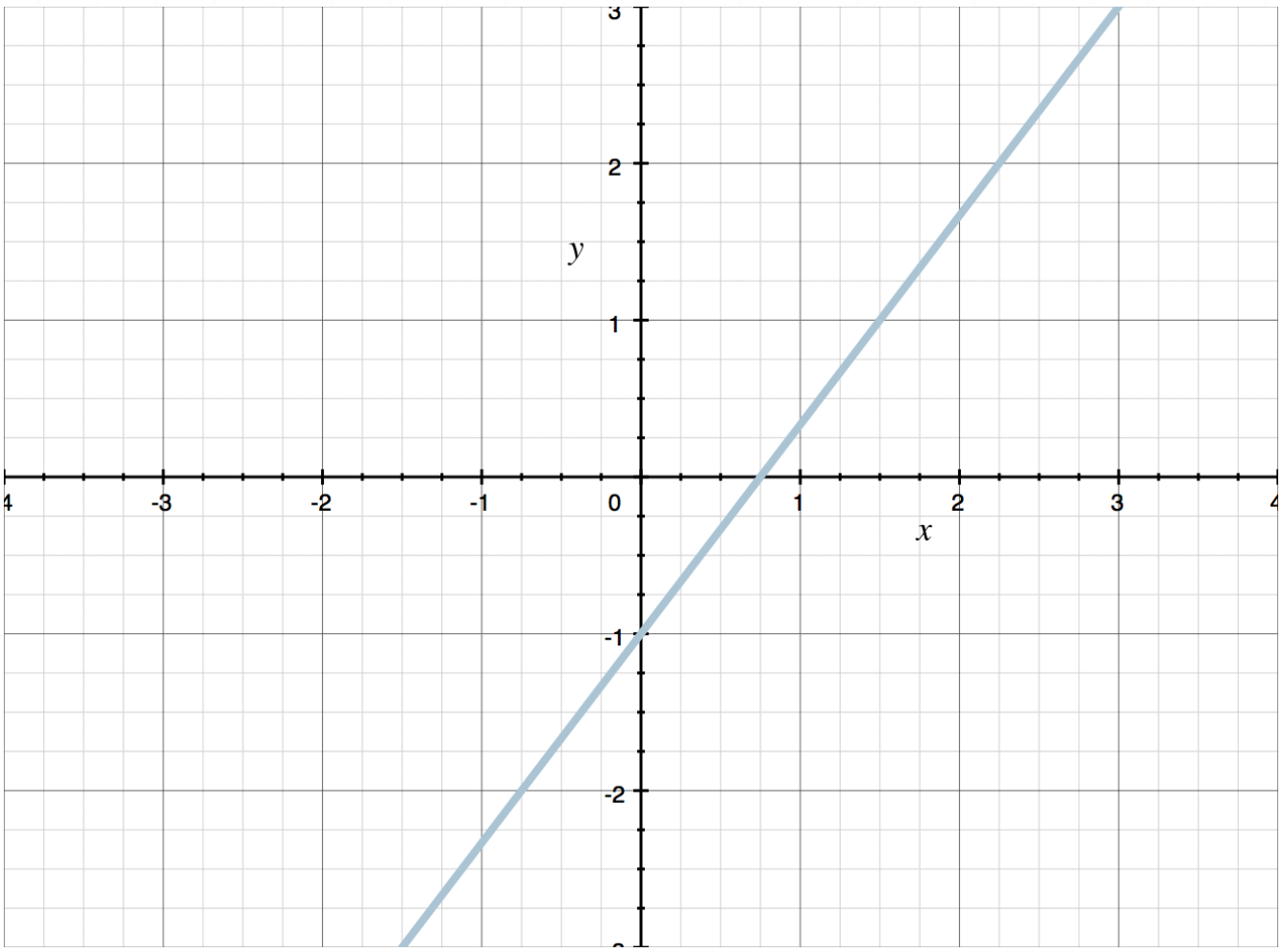
GRAPHING LINEAR EQUATIONS

1. Graph the line.

$$y = \frac{4}{3}x - 1$$

Solution:

The graph of the line is



2. Describe how you would use the slope to find another point on the graph if the slope is $m = 2/3$ and the line passes through $(x_1, y_1) = (-1,2)$.

Solution:

Starting at the point $(-1,2)$, move up 2 and to the right 3 to get the point $(2,4)$, or move down 2 and to the left 3 to get the point $(-4,0)$.

3. What is the best way to write the equation of a line when graphing?

Solution:

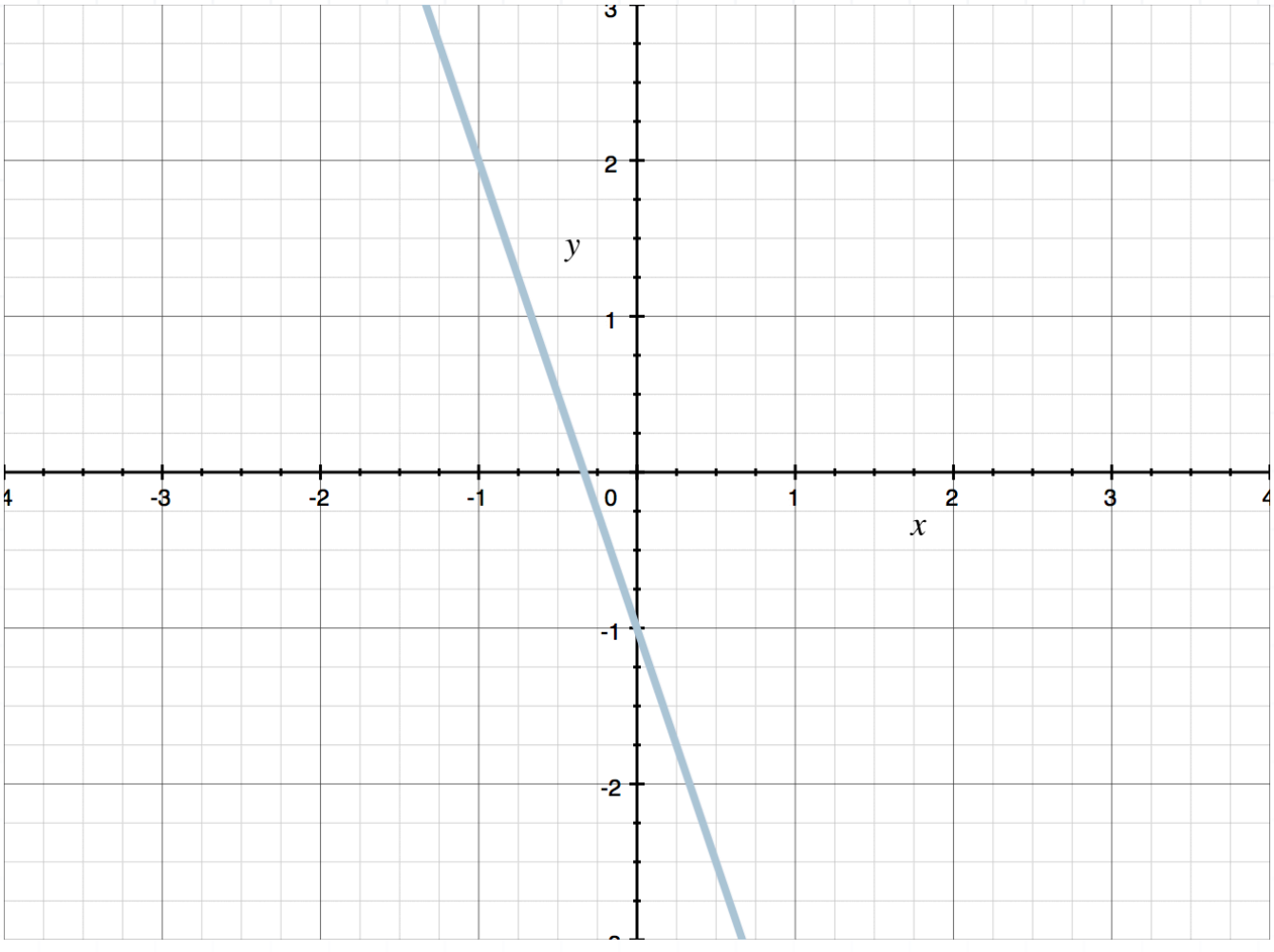
The best way to write the equation of a line when graphing is slope-intercept form, because directly from the equation, you can plot the y-intercept, and then use the slope to plot another point, and then connect them.

4. Graph the line.

$$y + 2 = -3x + 1$$

Solution:

The graph of the line is



5. Give two points that lie on the line.

$$y = -x - 6$$

Solution:

There are many possible solutions. For example, the points $(0, -6)$ and $(-6,0)$ are on the line.

6. Use the slope $m = 1/3$ to find two more points on the line passing through $(1,2)$. Go forward to determine one point and backwards to determine another.

Solution:

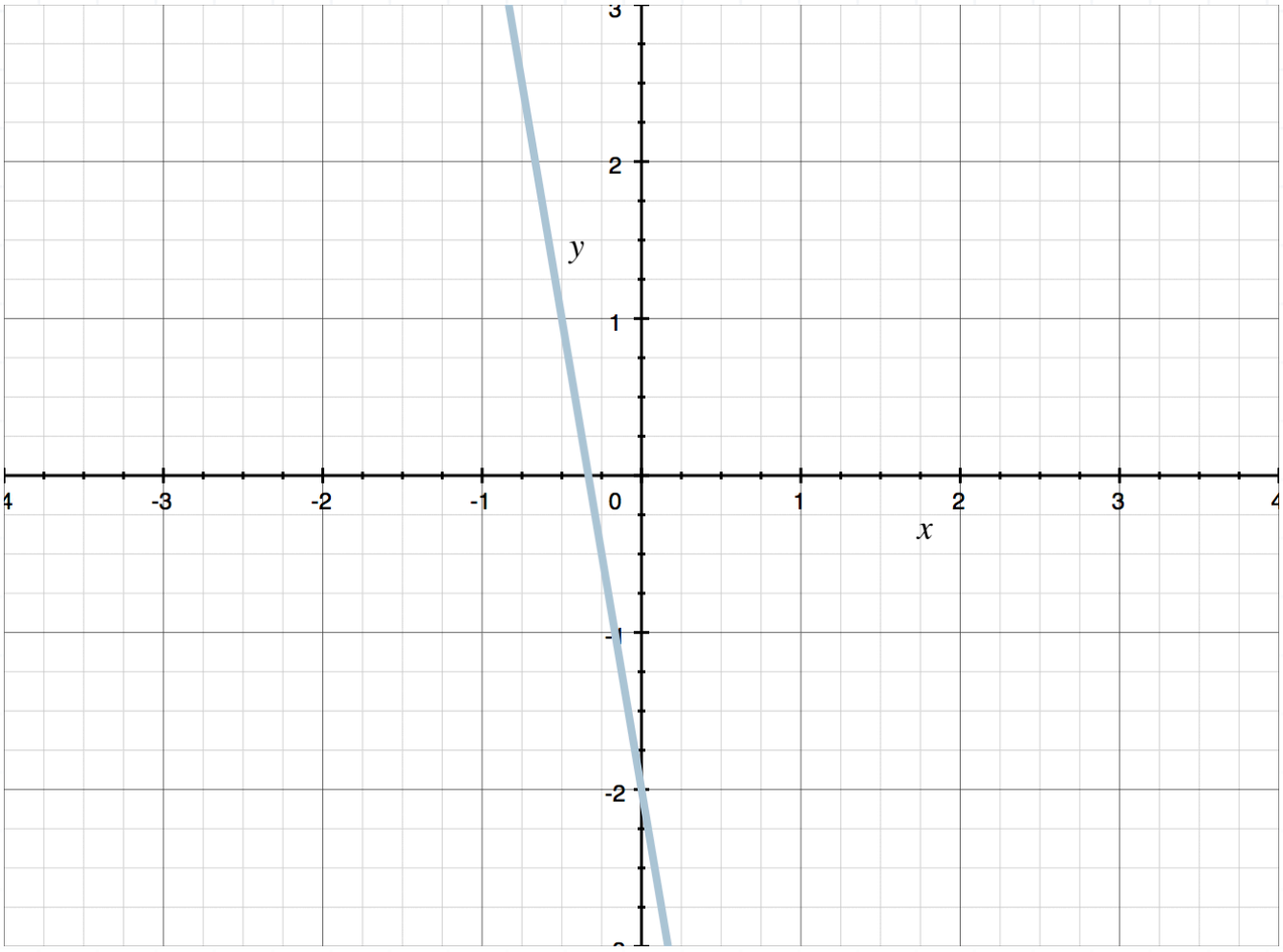
Going forward, we get the point $(4,3)$. Going backwards, we get the point $(-2,1)$.

7. Graph the line.

$$y = -2(3x + 1)$$

Solution:

The graph of the line is



8. Give two points that lie on the following line.

$$y + 3 = -\frac{1}{2}(4x + 10)$$

Solution:

There are many possible solutions. For example, the points $(0, -8)$ and $(-1, -6)$ are on the line.

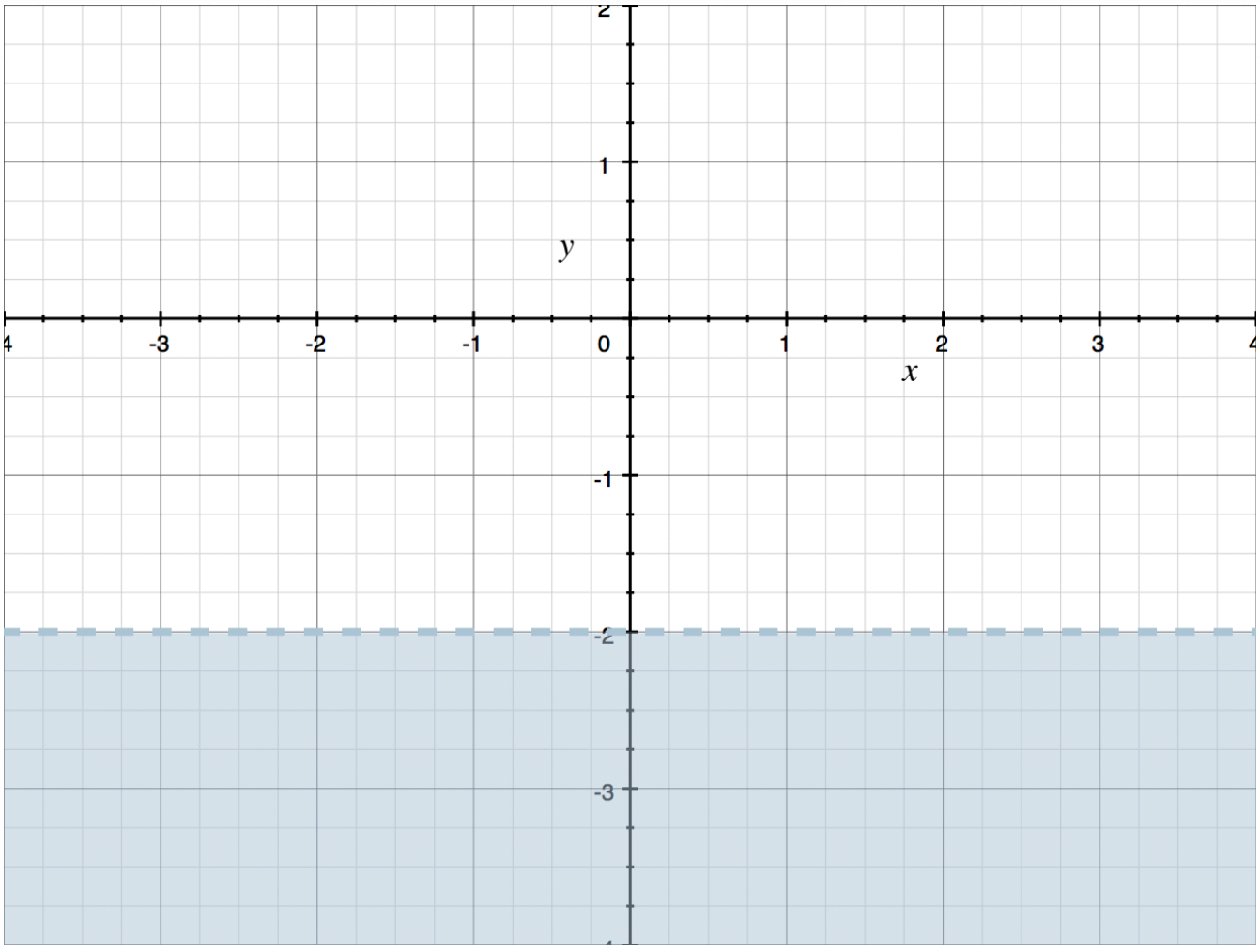
GRAPHING LINEAR INEQUALITIES

1. Graph the inequality in the cartesian coordinate plane.

$$y < -2$$

Solution:

Start by graphing the horizontal line $y = -2$. Make it a dotted line since the inequality is strictly "less than." Since the inequality is "less than," we'll shade below the horizontal line.

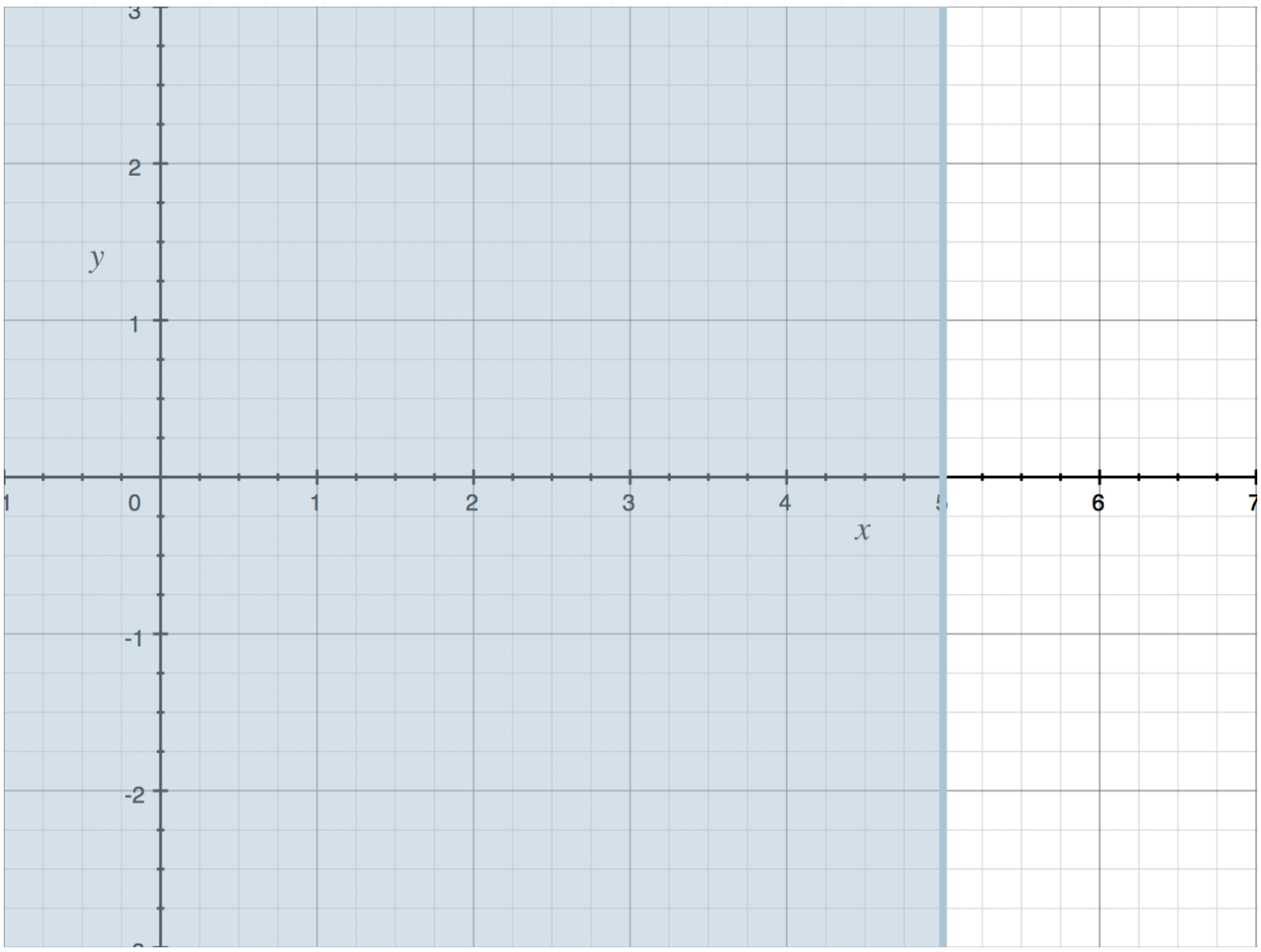


2. Graph the inequality in the cartesian coordinate plane.

$$x \leq 5$$

Solution:

Start by graphing the vertical line $x = 5$. Make it a solid line since the inequality is "less than or equal to." Since the inequality is "less than," we'll shade to the left of the vertical line.

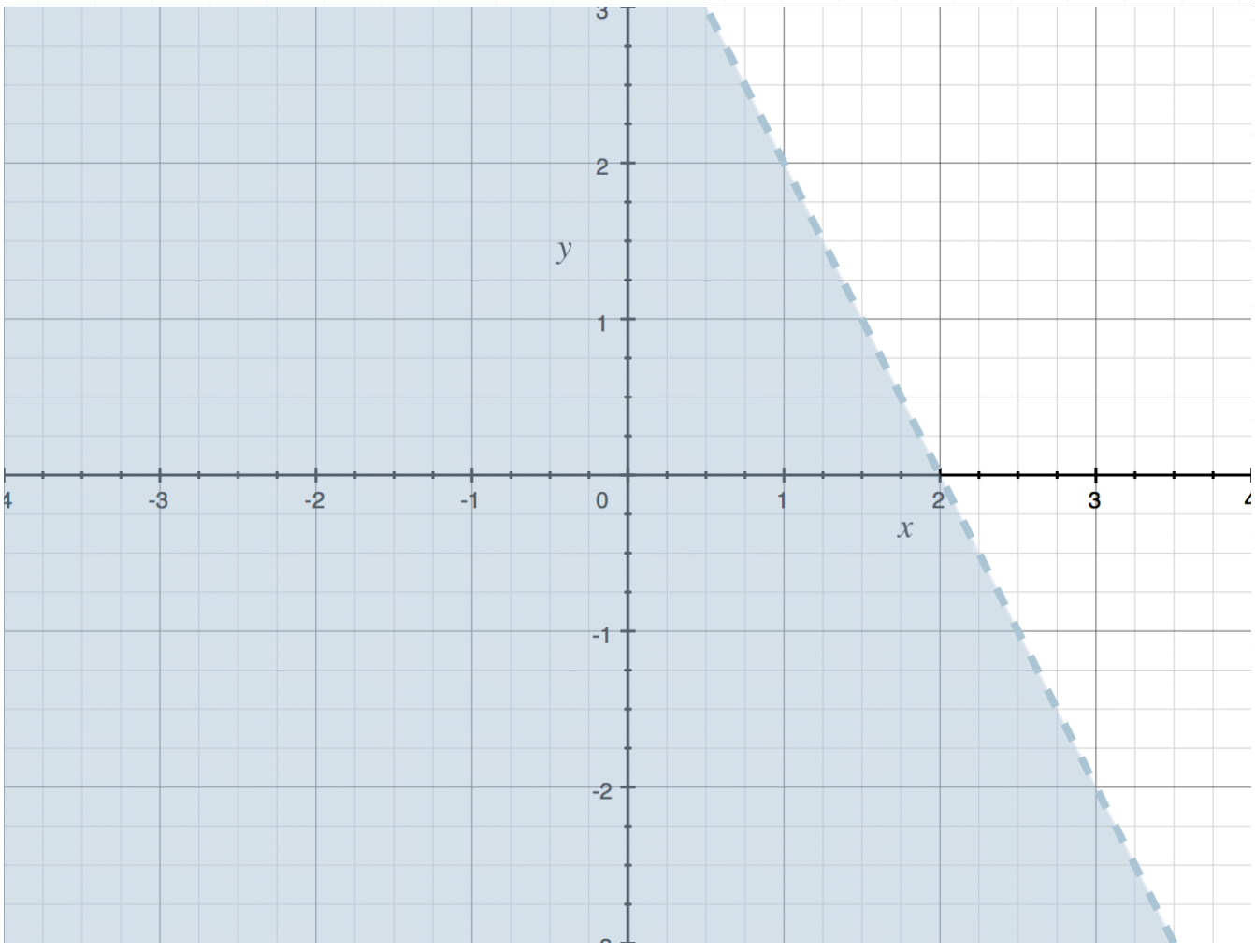


3. Graph the inequality in the cartesian coordinate plane.

$$y < -2x + 4$$

Solution:

Start by graphing the line $y = -2x + 4$. Make it a dotted line since the inequality is strictly "less than." Since the inequality is "less than," we'll shade below the line.

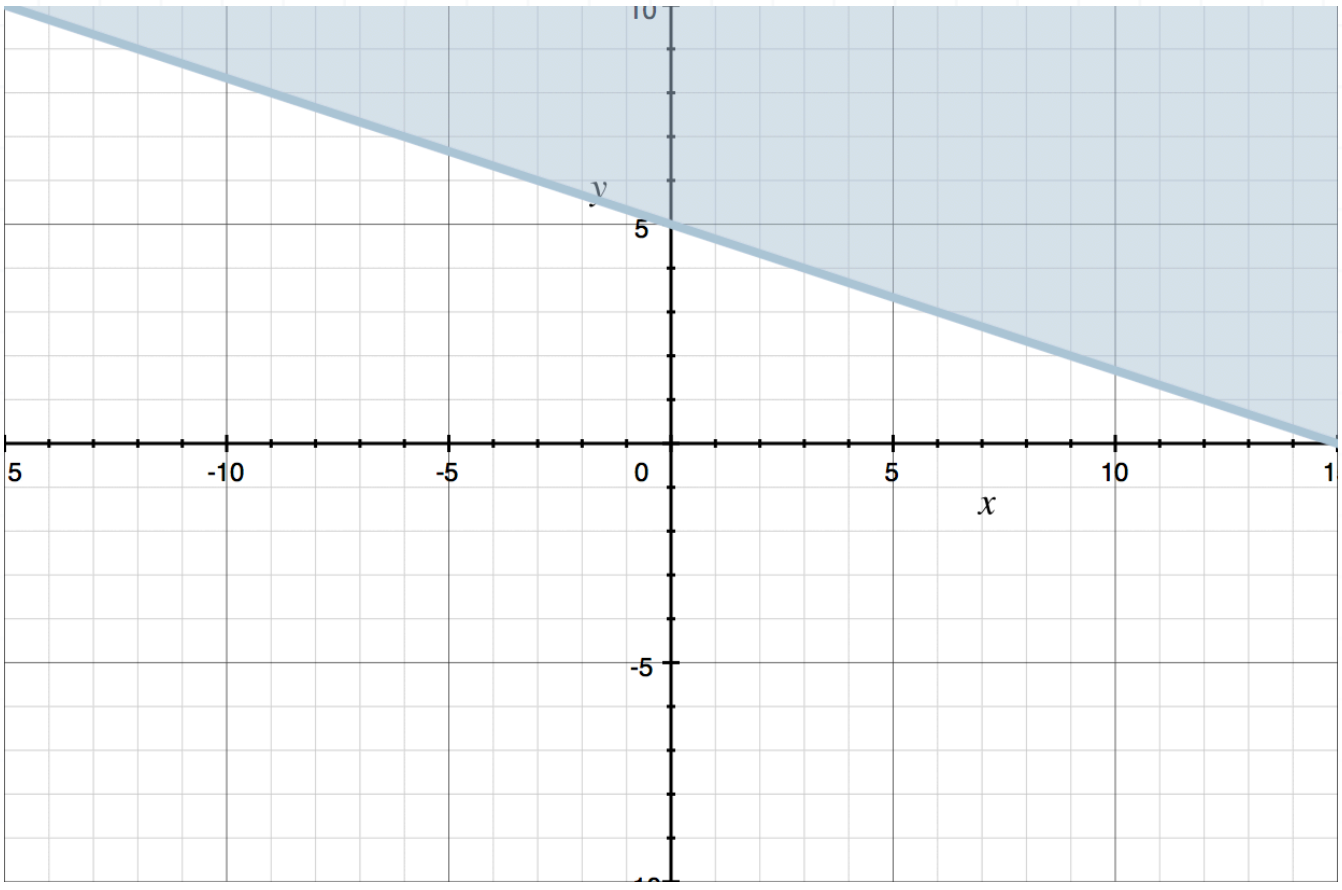


4. Graph the inequality in the cartesian coordinate plane.

$$y \geq -\frac{1}{3}x + 5$$

Solution:

Start by graphing the line $y = -(1/3)x + 5$. Make it a solid line since the inequality is "greater than or equal to." Since the inequality is "greater than," we'll shade above the line.

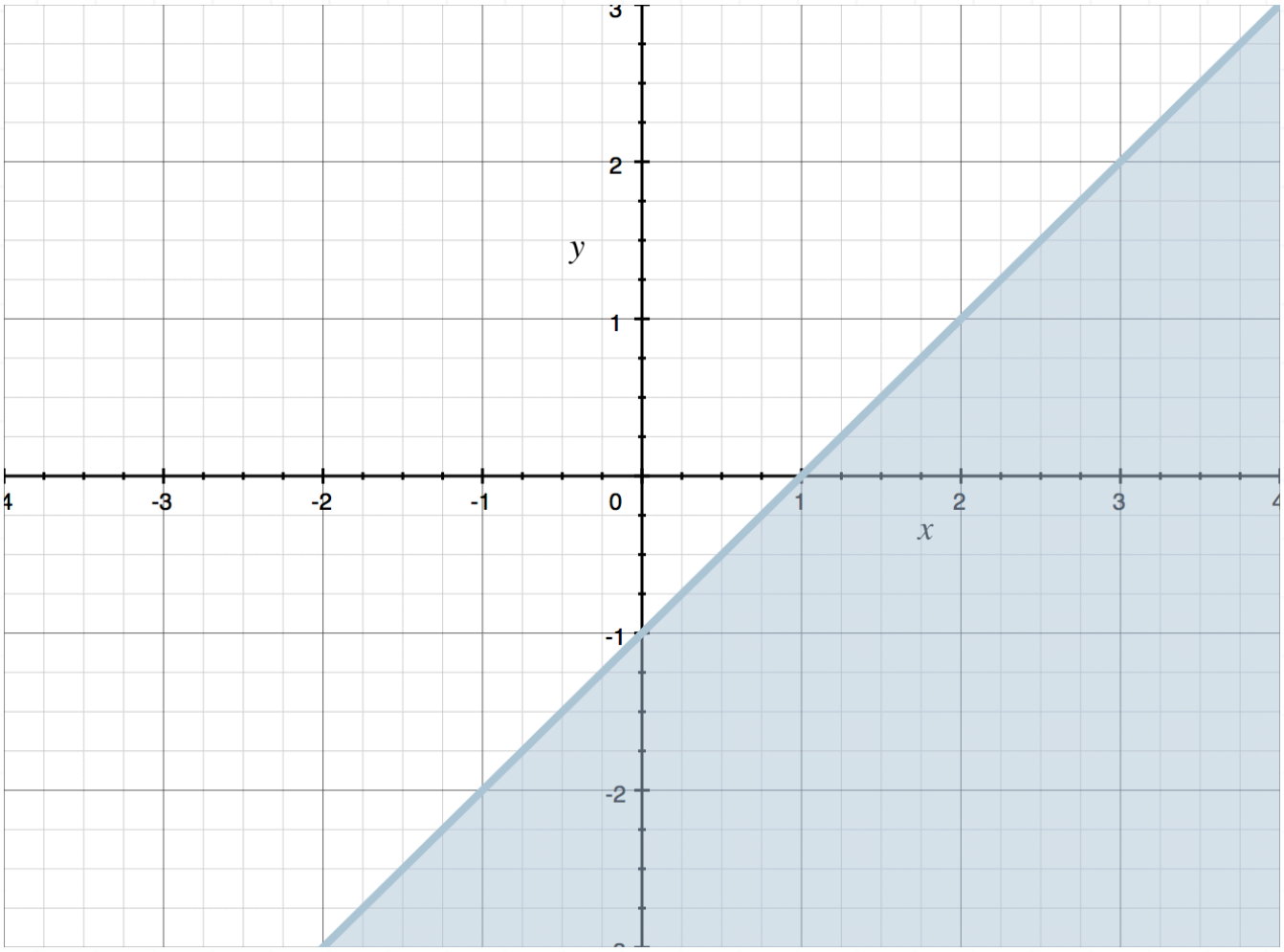


5. Graph the inequality in the cartesian coordinate plane.

$$y \leq x - 1$$

Solution:

Start by graphing the line $y = x - 1$. Make it a solid line since the inequality is "less than or equal to." Since the inequality is "less than," we'll shade below the line.

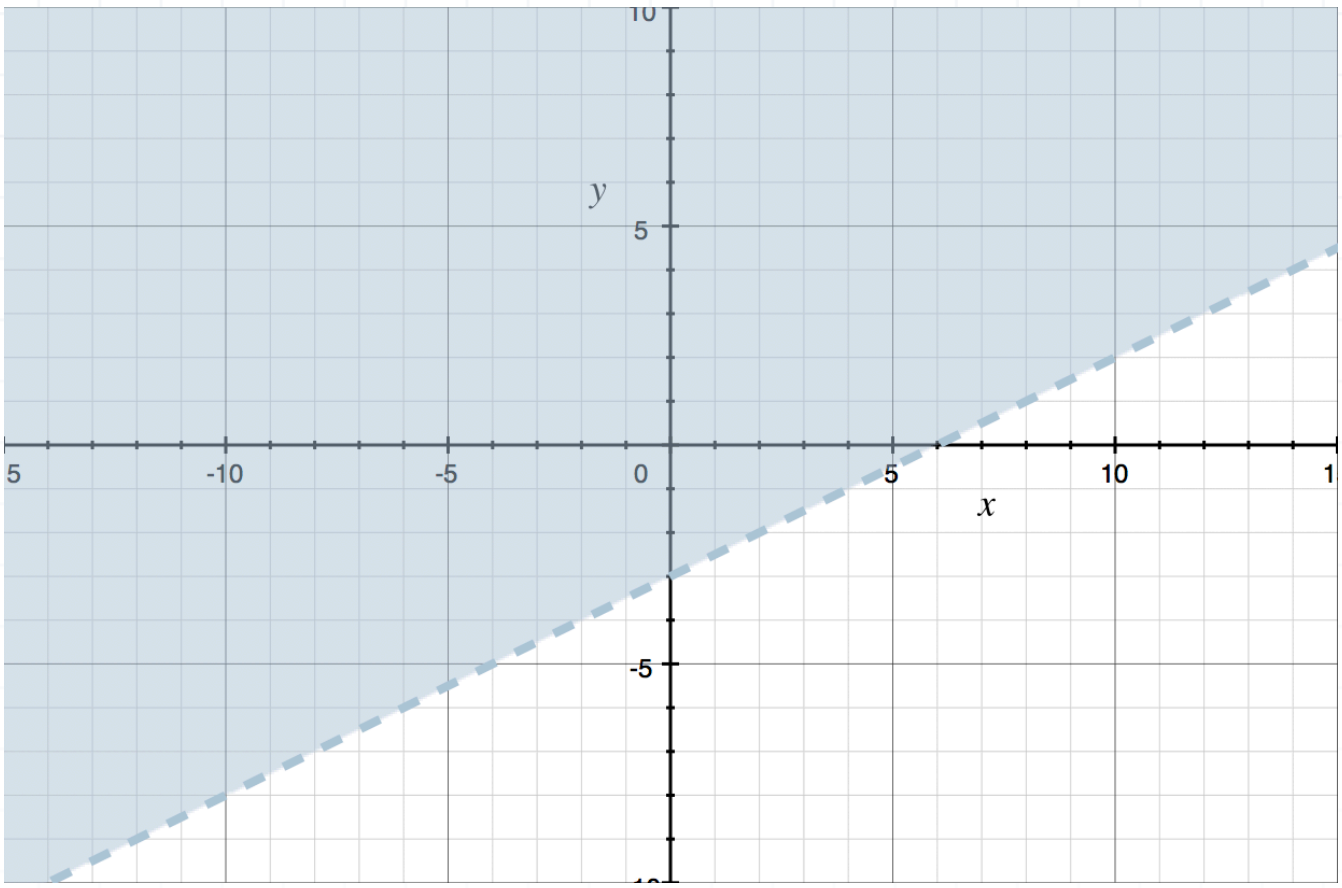


6. Graph the inequality in the cartesian coordinate plane.

$$y > \frac{1}{2}x - 3$$

Solution:

Start by graphing the line $y = (1/2)x - 3$. Make it a dotted line since the inequality is strictly "greater than." Since the inequality is "greater than," we'll shade above the line.

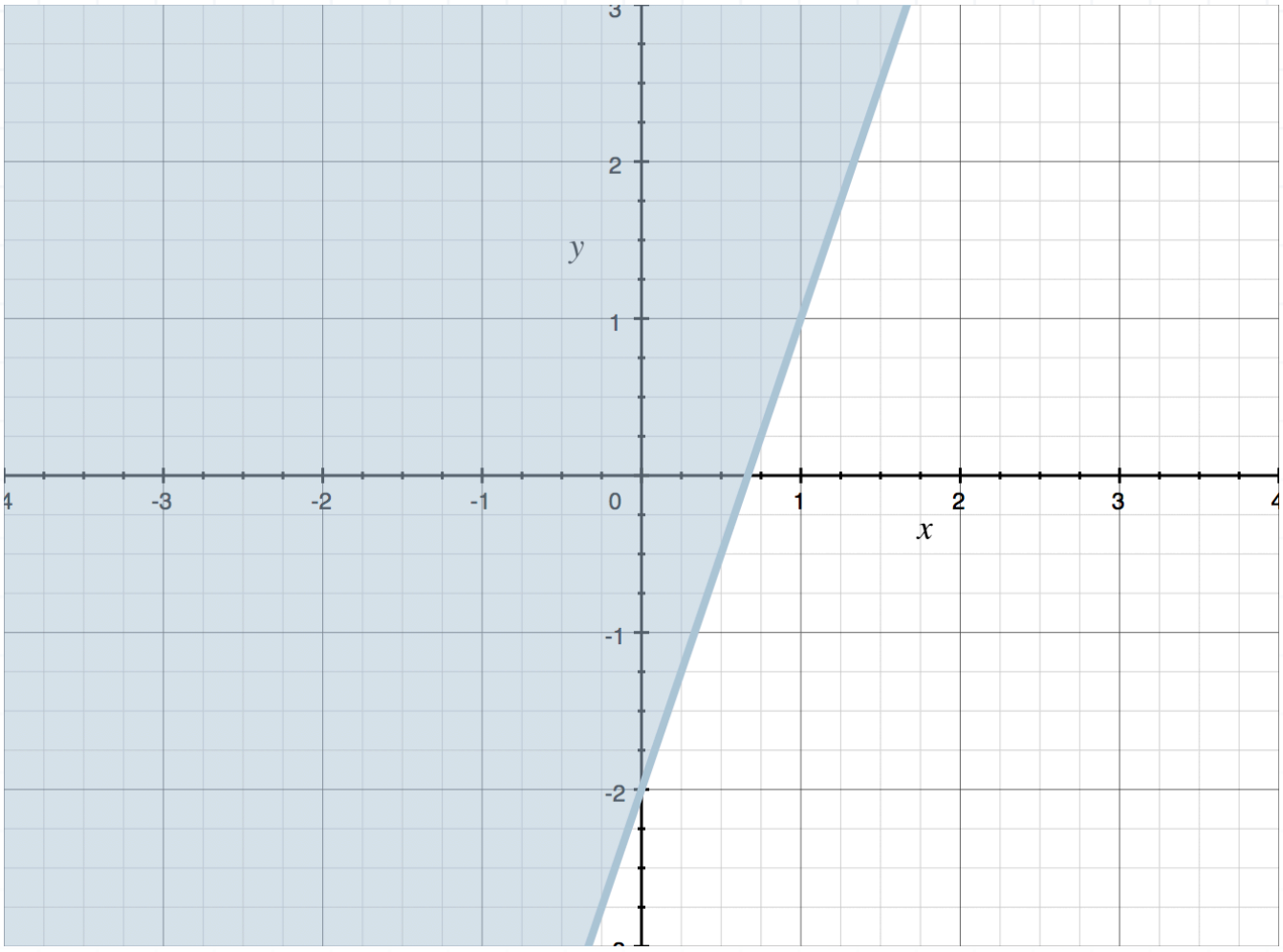


7. Graph the inequality in the cartesian coordinate plane.

$$y \geq 3x - 2$$

Solution:

Start by graphing the line $y = 3x - 2$. Make it a solid line since the inequality is “greater than or equal to.” Since the inequality is “greater than,” we’ll shade above the line.

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