Guided Practice 2.3.1

Example 1

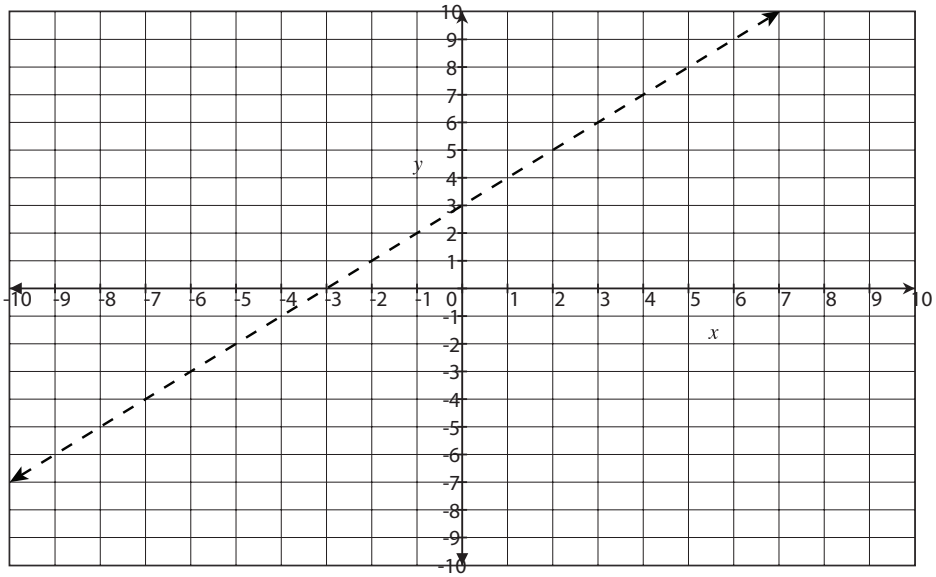
Graph the solutions to the following inequality.

$y > x + 3$

1. Graph the inequality as a linear equation. Since the inequality is non-inclusive, use a dashed line.

   $y = x + 3$

   To graph the line, plot the *y*-intercept first, (0, 3). Then use the slope to find a second point. The slope is 1. Count up one unit and to the right one unit and plot a second point. Connect the two points and extend the line to the edges of the coordinate plane.



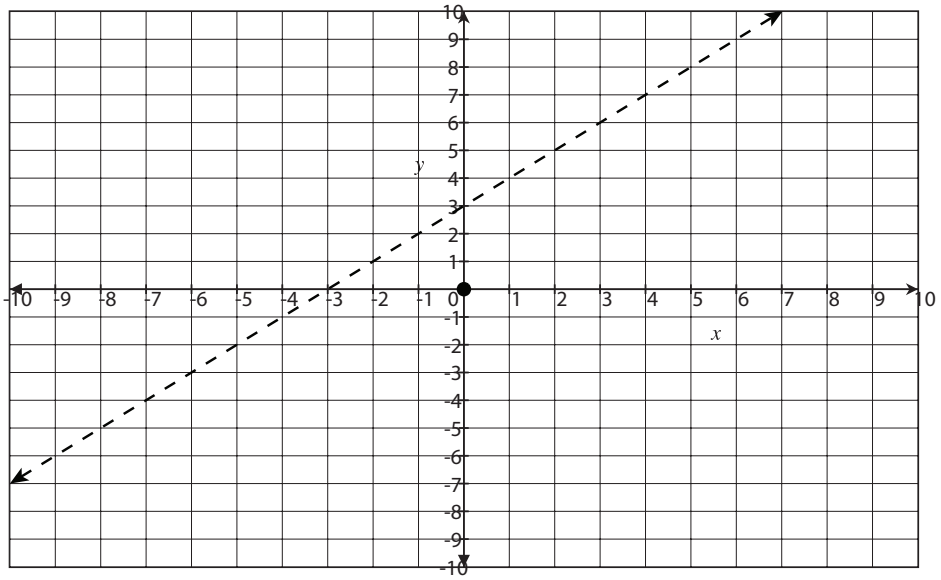
2. Pick a test point above or below the line and substitute the point into the inequality.

   Choose (0, 0) because this point is easy to substitute into the inequality.

   $y > x + 3$

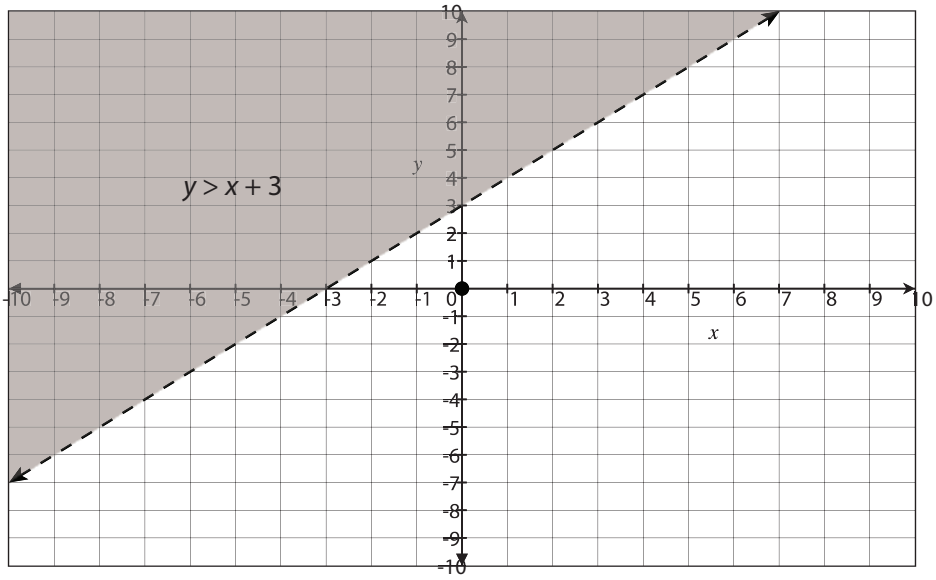
   $(0) > (0) + 3$

   $0 > 3$ This is false!



3. Shade the appropriate half plane.

   Since the test point makes the inequality false, all points on that side of the line make the inequality false. Shade above the line instead; this is the half plane that does NOT contain the point.



Example 2

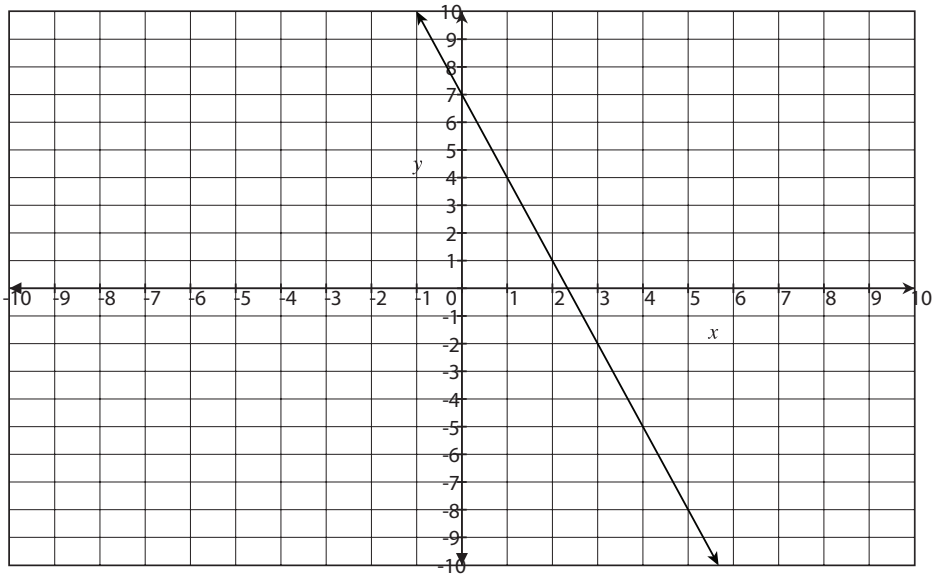
Graph the solution to the following inequality.

$y \leq -3x + 7$

1. Graph the inequality as a linear equation. Since the inequality is inclusive, use a solid line.

   $y = -3x + 7$

   To graph the line, plot the *y*-intercept first, (0, 7). Then use the slope to find a second point. The slope is –3. Count down 3 units and to the right one unit and plot a second point. Connect the two points and extend the line to the edges of the coordinate plane.



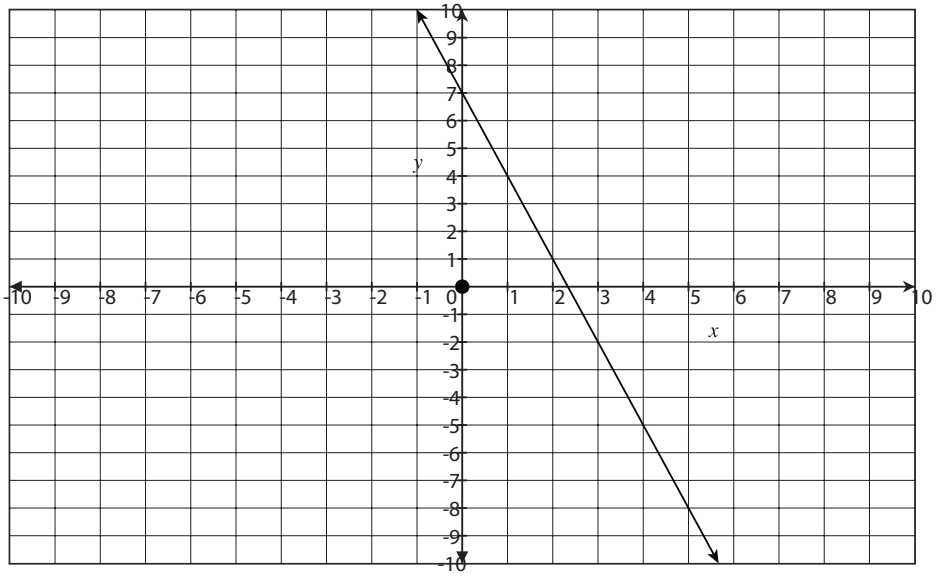
2. Pick a test point above or below the line and substitute the point into the inequality.

   Choose (0, 0) because this point is easy to substitute into the inequality.

   $y \leq -3x + 7$

   $(0) \leq -3(0) + 7$

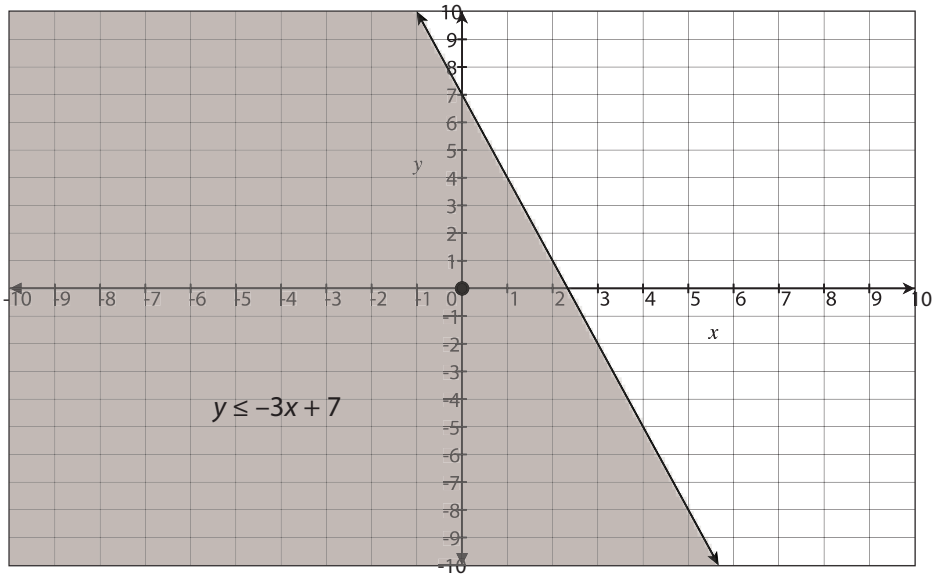
   $0 \leq 7$ This is true!



Instruction

3. Shade the appropriate half plane.

   Since the test point makes the inequality true, that means all points on that side of the line make the inequality true. Shade the half plane that contains the test point.



Example 3

A company that manufactures MP3 players needs to hire more workers to keep up with an increase in orders. Some workers will be assembling the players and others will be packaging them. The company can hire no more than 15 new employees. Write and graph an inequality that represents the number of new workers who can be hired.

1. Create an inequality from the context.

   There are two jobs to perform.

   Let x = the number of workers who will assemble the MP3 players.

   Let y = the number of workers who will package the MP3 players.

   $x + y \leq 15$

2. Graph the inequality as a linear equation. Since the inequality is inclusive, use a solid line.

   $x + y = 15$

   To graph the line, convert the standard form of the equation to slope-intercept form.

   $y = -x + 15$

   Plot the *y*-intercept first, (0, 15). Then use the slope to find a second point. The slope is –1. Count down one unit and to the right one unit and plot a second point. Connect the two points and extend the line.

3. Determine where to stop the line.

   Stop the line at the intercepts because there cannot be negative employees.

   To find the *y*-intercept, look at the equation in slope-intercept form. The *y*-intercept is 15. The *y*-intercept coordinates are (0, 15).

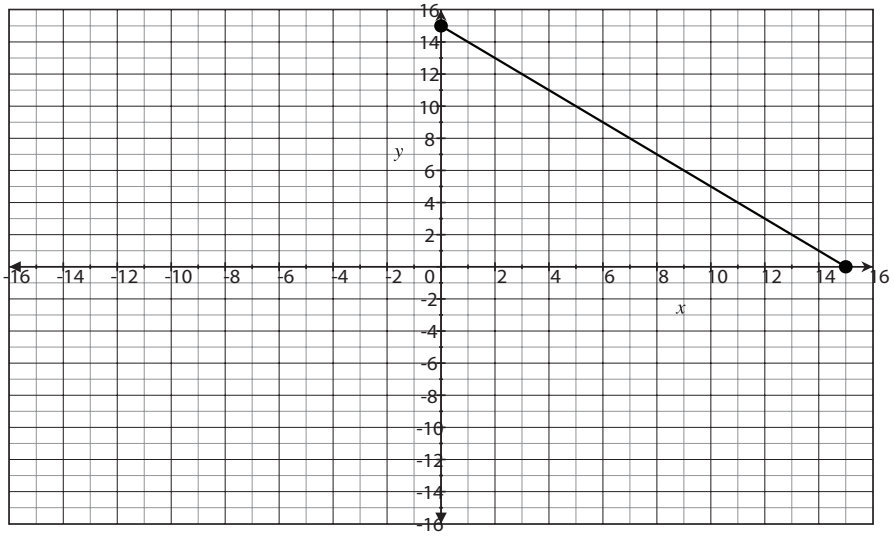
   To find the *x*-intercept, use the standard form of the equation and set $y = 0$.

   $x + y = 15$

   $x + (0) = 15$

   $x = 15$

   The coordinates of the *x*-intercept are (15, 0).



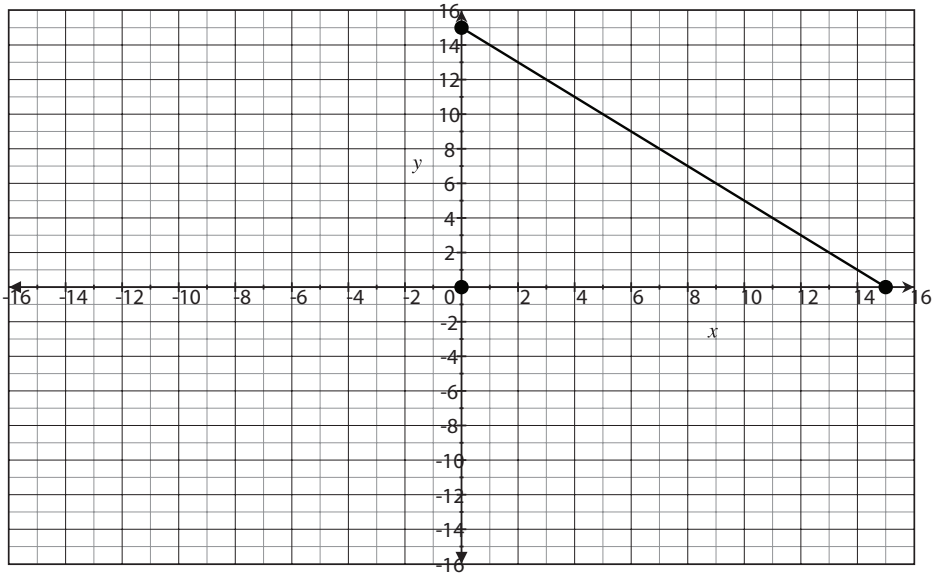
4. Pick a test point above or below the line and substitute the point into the inequality.

   Choose (0, 0) because this point is easy to substitute into the inequality.

   $x + y \leq 15$

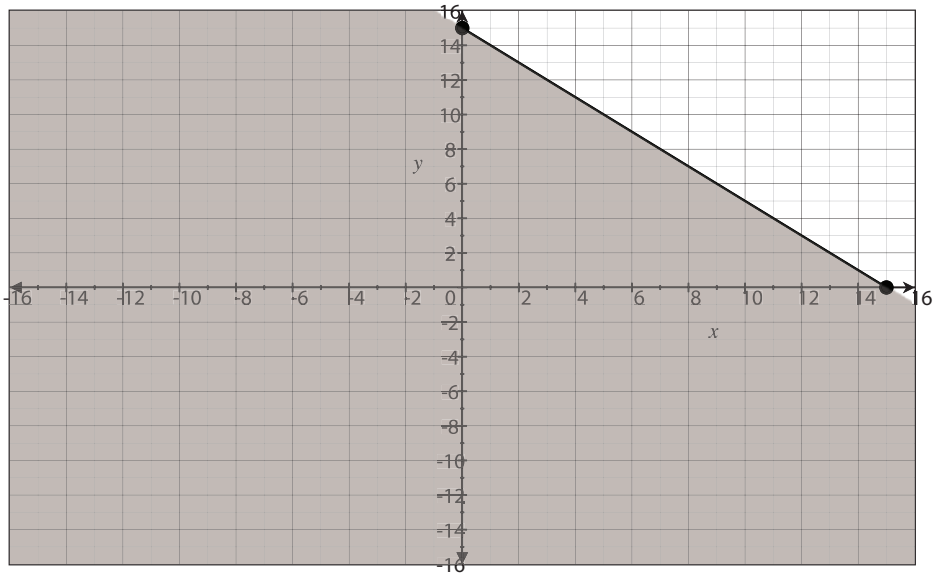
   $(0) + (0) \leq 15$

   $0 \leq 15$ This is true!



5. Shade the appropriate half plane.

   Since the test point makes the inequality true, that means all points on that side of the line make the inequality true. Shade the half plane that contains the test point.



6. Reduce the shading to fit the context of the problem and add labels.

   Having negative employees doesn't make sense. Stop the shading at the *x*-axis, the *y*-axis, and the boundary line so that the shading ends at (0, 15) and (15, 0).