



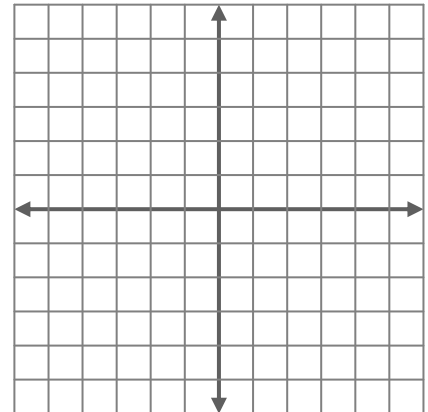
In recent activities, you graphed inequalities of one variable on number lines (one dimension). In this activity, you will investigate linear inequalities of two variables (usually x and y), and graph them on coordinate axes (two dimensions).

Let's start our investigation with the inequality $y \leq \frac{1}{2}x - 2$. Because we don't know either x or y , solutions must include a number for each.

1. Which of the following points satisfy the given inequality? Show how you know.

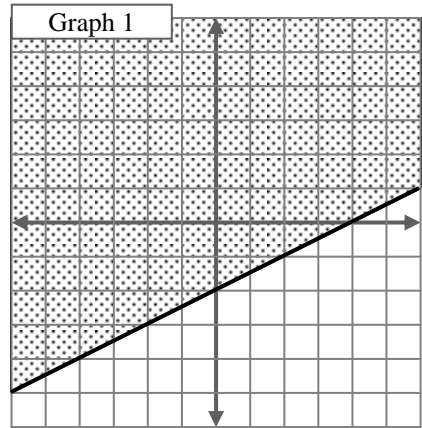
- | | |
|------------|------------|
| A (-3, 2) | B (2, -3) |
| C (0, -1) | D (-2, -1) |
| E (-6, -5) | F (4, 0) |
| G (6, -2) | H (6, 1) |

2. a. Draw the graph of $y = \frac{1}{2}x - 2$.
- b. Which of the points A through H above make $y = \frac{1}{2}x - 2$?
- c. Where do these points lie compared to the graph of $y = \frac{1}{2}x - 2$?
- d. Identify three more points that make $y = \frac{1}{2}x - 2$. Plot these on the graph. Label them I, J, and K.



3. a. Which of the points A through H above make $y < \frac{1}{2}x - 2$?
- b. Where do these points lie compared to the graph of $y = \frac{1}{2}x - 2$?
- c. Identify three more points that make $y < \frac{1}{2}x - 2$. Plot these on the graph above. Label them L, M, and N.
- d. If you colored in every point that makes $y < \frac{1}{2}x - 2$, what would the graph look like?

4. Which graph to the right shows all the solutions to the inequality $y \leq \frac{1}{2}x - 2$? _____



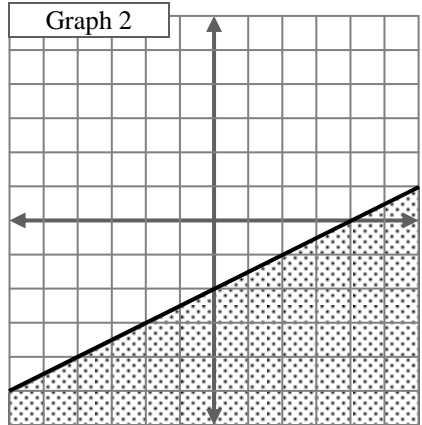
5. Match each inequality with its graph to the right.

a. $y \geq \frac{1}{2}x - 2$ _____

b. $y \leq \frac{2}{3}x + 2$ _____

c. $y \geq \frac{2}{3}x + 2$ _____

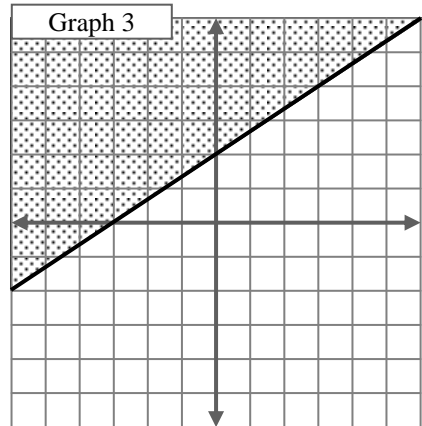
6. How is the graph of an inequality different from the graph of an equation?



7. On the same grid as Graph 1, draw the graph of the inequality $y \leq -2x + 3$.

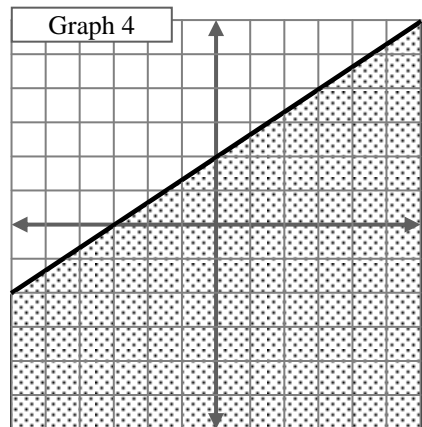
8. On the same grid as Graph 2, draw the graph of the inequality $y \leq -\frac{3}{2}x + 2$.

9. On the same grid as Graph 3, draw the graph of the inequality $y \geq -\frac{1}{2}x - 4$.



10. On the same grid as Graph 4, draw the graph of the inequality $y \leq -\frac{1}{3}x - 1$.

11. How would the graph of $y \leq -\frac{1}{3}x - 1$ have to change in order to graph $y < -\frac{1}{3}x - 1$? (How would you not include the points where $y = -\frac{1}{3}x - 1$?)





We have seen how the graphs of linear inequalities can be made by graphing the line represented by the equation and shading the side of the line that is represented by the inequality. Sometimes, though, the inequality must be solved for y first.

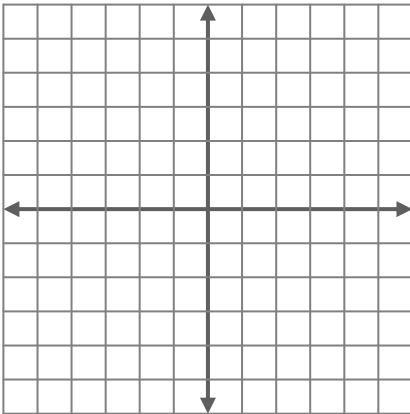
Graphing Linear Inequalities (Part of Skill 11)

To graph a linear inequality:

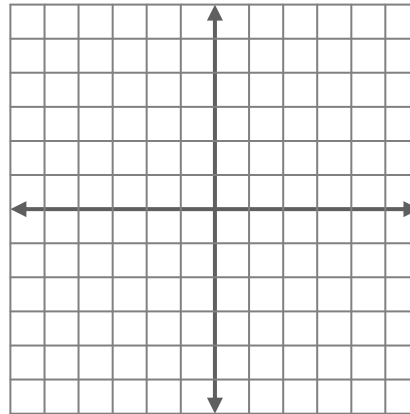
1. Solve the inequality for y .
2. Graph the line that would be represented by the inequality if it were an equation instead.
If the inequality allows the line to be included ($y \leq \dots$ or $y \geq \dots$), make the line solid.
If the inequality does not allow the line to be included ($y < \dots$ or $y > \dots$), make the line dotted.
3. Shade the appropriate side of the line.
If the inequality shows y is less than the line ($y < \dots$ or $y \leq \dots$), shade below the line.
If the inequality shows y is more than the line ($y > \dots$ or $y \geq \dots$), shade above the line.

Use the above information to graph each inequality on the grid provided. Check by using a test point.

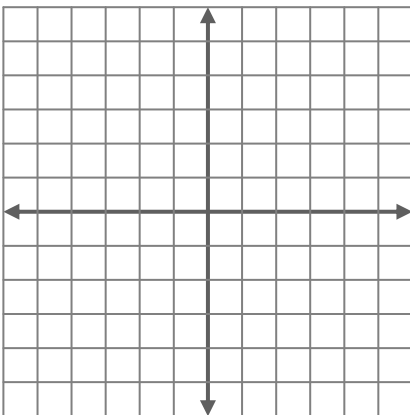
1. $y \leq x$



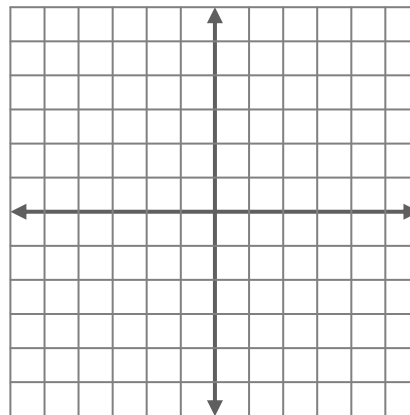
2. $y > x - 1$



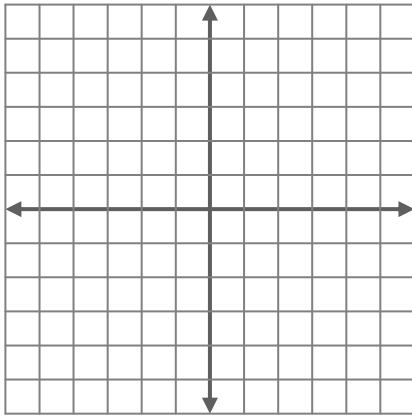
3. $x + y > 1$



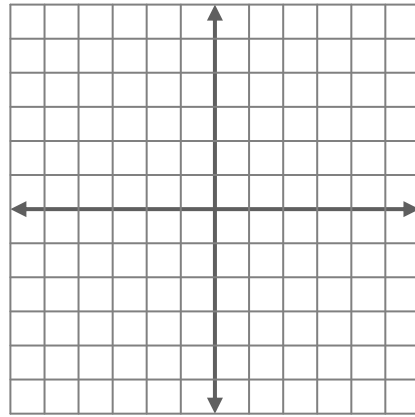
4. $-y \geq x$



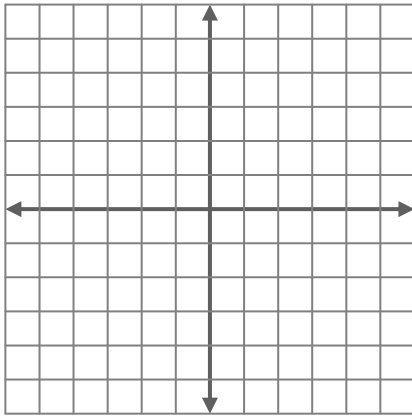
5. $3x + y > 4$



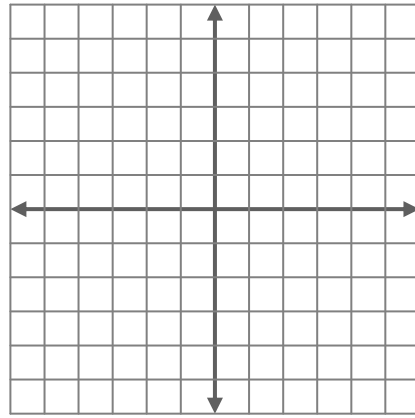
6. $x - y < -4$



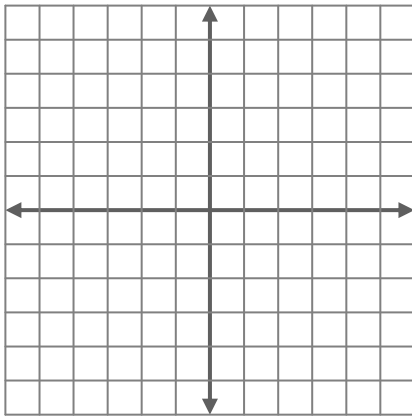
7. $3x - 2y < 6$



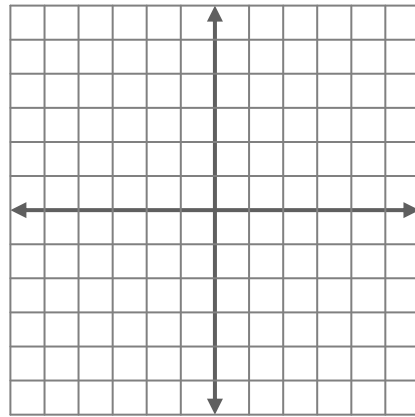
8. $y \leq 3$



9. $x > -1$



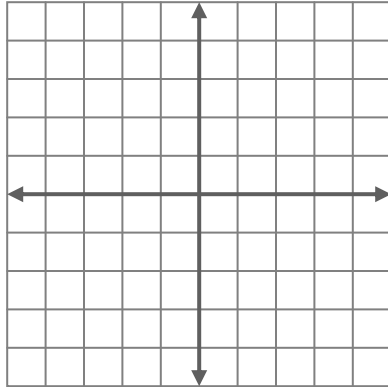
10. $2x - 5y \leq 10$





Graph each linear inequality on the graph provided. Then name one point in the truth set and verify that it does work in the inequality.

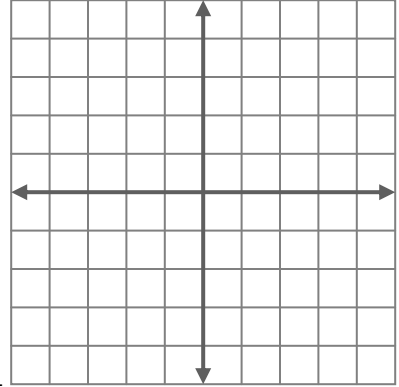
1. $x < 1$



Point: _____

Check: _____

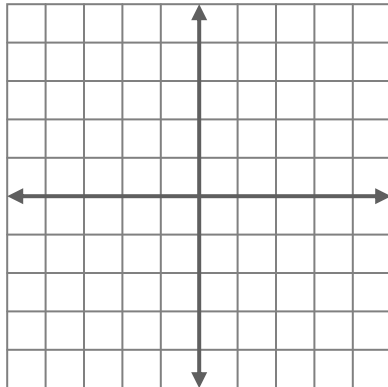
2. $x > -4$



Point: _____

Check: _____

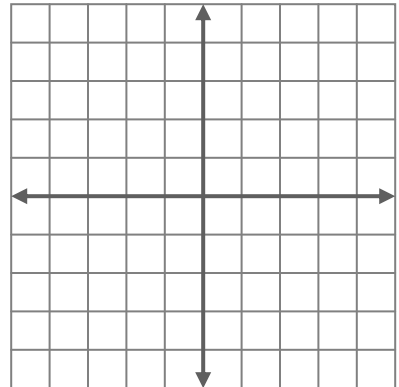
3. $y \geq -2$



Point: _____

Check: _____

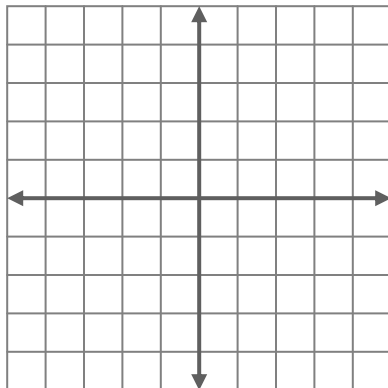
4. $y - x < 1$



Point: _____

Check: _____

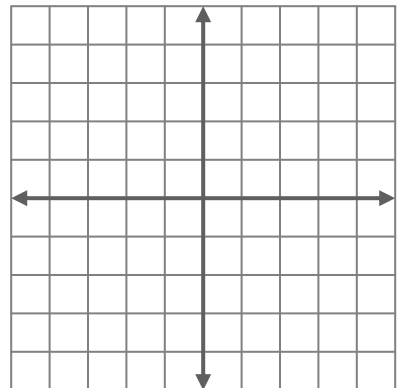
5. $y \geq 2x + 1$



Point: _____

Check: _____

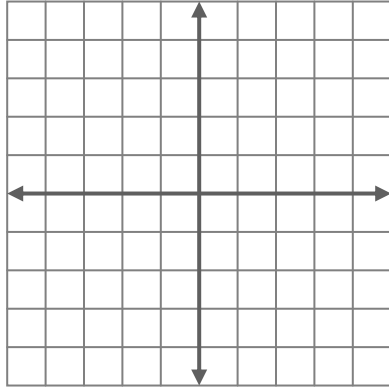
6. $y \leq -x + 1$



Point: _____

Check: _____

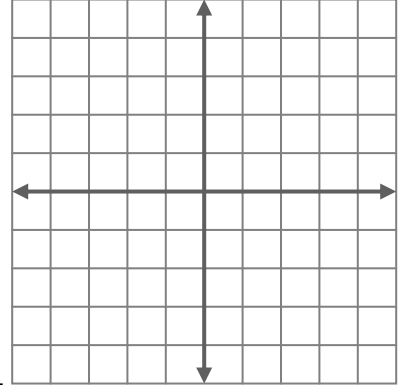
7. $y \geq 3x$



Point: _____

Check:

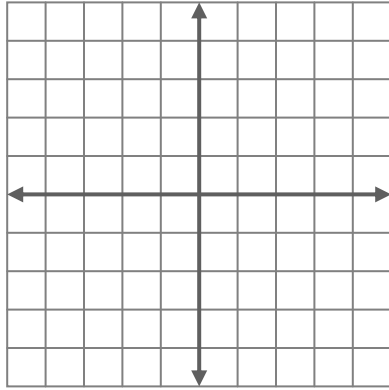
8. $3y < 5x$



Point: _____

Check:

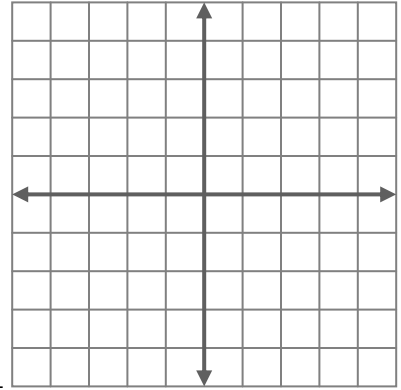
9. $y + x < 1$



Point: _____

Check:

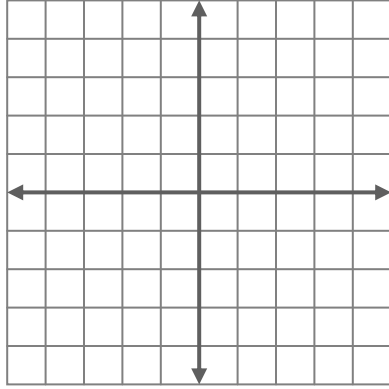
10. $y - x > 3$



Point: _____

Check:

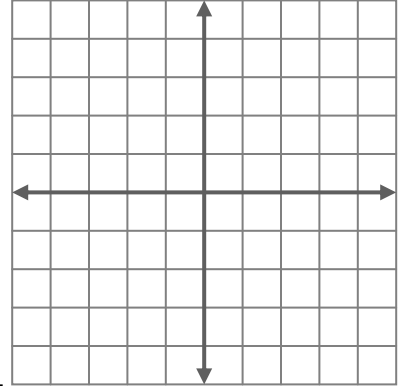
11. $2x + y \leq 4$



Point: _____

Check:

12. $3x - y \geq 4$



Point: _____

Check:

Systems Practice



Solve each system algebraically, using either *substitution* or *elimination*.

1.
$$\begin{aligned} 5x + y &= 46 \\ x - 2y &= 7 \end{aligned}$$

2.
$$\begin{aligned} 4x - 3y &= 6 \\ y &= 2x \end{aligned}$$

3.
$$\begin{aligned} y &= 2x - 1 \\ 3x - y &= 4 \end{aligned}$$

4.
$$\begin{aligned} 0.25x + 0.05y &= 12.40 \\ x + y &= 100 \end{aligned}$$

5.
$$\begin{aligned} 100x - 40y &= 180 \\ x &= 0.55y \end{aligned}$$

6.
$$\begin{aligned} x + y &= 300 \\ 5x + 3y &= 1200 \end{aligned}$$

Scrambled answers: -6, -3, 1, 3, 5, 6.6, 9, 12, 37, 63, 150, 150