Name: _____ Date: _____

# GRAPHS OF LINEAR INEQUALITIES
# COMMON CORE ALGEBRA I

So, we have graphed linear functions and in the last lesson learned that the points that lie on a graph are simply the $(x, y)$ pairs that make the equation true. Graphing an inequality in the *xy*-plane is exactly the same

**GRAPHING INEQUALITIES**

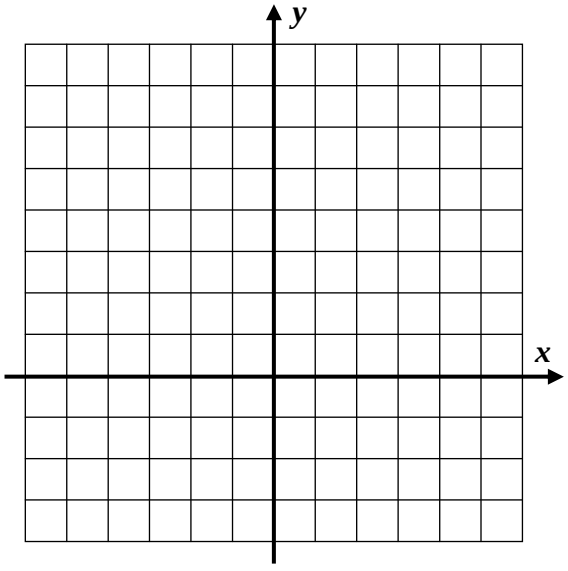
To graph an inequality simply means to plot (or shade) **all** $(x, y)$ pairs that make the inequality true

***Exercise* #1:** Consider the inequality $y > x + 3$.

(a) Determine whether each of the following points lies in the solution set (and thus on the graph of) the inequality given.

$(2, 7)$ $(0, 1)$ $(1, 4)$

(b) Graph the line $y = x + 3$ on the grid below in **dashed form**. Why are points that lie on this line **not** part of the **solution set** of the inequality?




(c) Plot the three points from part (a) and use them to help you shade the proper region of the **plane** that represents the solution set of the inequality.

(d) Choose a fourth point that lies in the region you shaded and show that it is in the solution set of the inequality.

(e) The point $(10, 12)$ cannot be drawn on the graph grid above, so it is difficult to tell if it falls in the shaded region. Is $(10, 12)$ part of the solution set of this inequality? Show how you arrive at your answer.

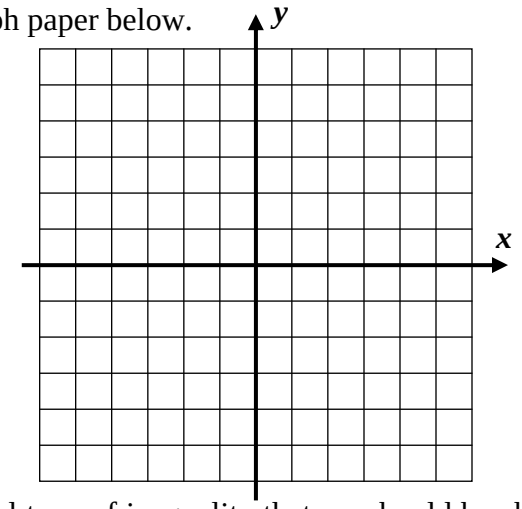
There are some challenges to graphing linear inequalities, especially if the output, *y*, has not been solved for. Let's look at the **worst case scenario**.

***Exercise* #2:** Consider the inequality $3x - 2y \geq 2$

(a) Rearrange the left-hand side of this inequality using the commutative property of addition.

(b) Solve this inequality for *y* by applying the **properties of inequality** that we used in Unit #2.

(c) Shade the solution set of this inequality on the graph paper below.



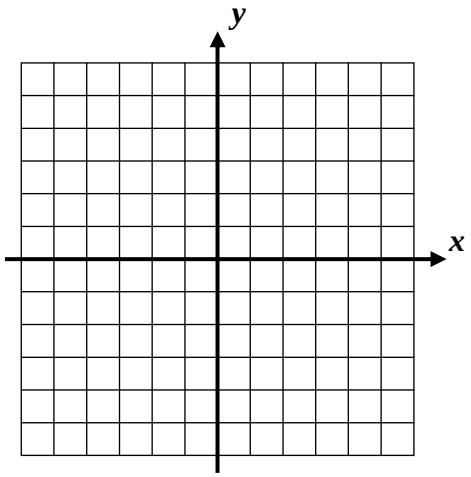

(d) Pick a point in the shaded region and show that it is a solution to the **original** inequality.

The final type of inequality that we should be able to graph quickly and effectively is one that involves either a **horizontal line** or a **vertical line**.

***Exercise* #3:** Shade the solution set for each of the following inequalities in the *xy*-planes provided. First, state in your own words the $(x, y)$ pairs that the inequality is describing.

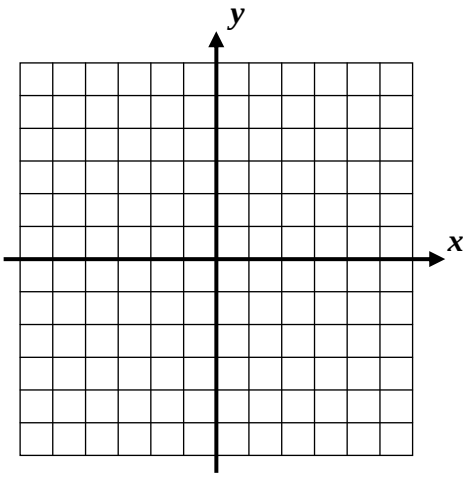
(a) $x < 4$

Your own words:




(b) $y \geq -2$

Your own words:



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# GRAPHS OF LINEAR INEQUALITIES
# COMMON CORE ALGEBRA I HOMEWORK

## FLUENCY

1. Determine which of following points lie in the solution set of the inequality $y \geq 2x - 4$ and which do not. Justify each choice.

   (a) $(5, 4)$ (b) $(0, -1)$

   (c) $(10, 16)$ (d) $(2, -1)$

2. Which of the following points lies in the solution set of the inequality $y \geq 3x + 10$?

   (1) $(1, 10)$ (3) $(4, 20)$

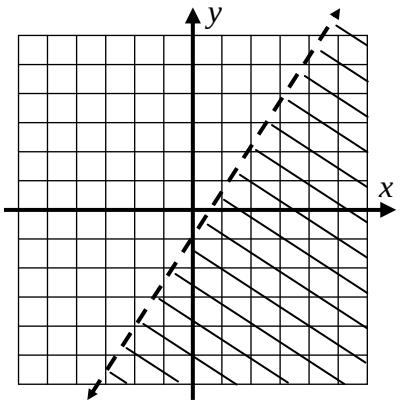
   (2) $(-1, 3)$ (4) $(2, 16)$

3. Which of the following points does *not* lie in the solution set to the inequality $y \geq -\frac{1}{3}x + 5$?

   (1) $(6, 3)$ (3) $(-3, 8)$

   (2) $(-6, 5)$ (4) $(12, 3)$

4. Which of the following linear inequalities is shown graphed below?



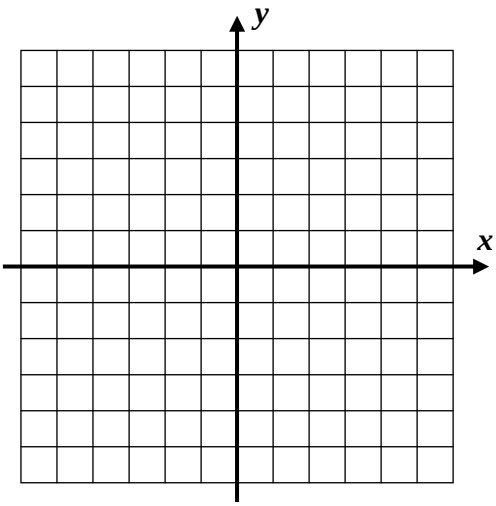

   (1) $y < \frac{3}{2}x - 1$ (3) $y > \frac{2}{3}x - 1$

   (2) $y \leq \frac{2}{3}x - 1$ (4) $y \geq \frac{3}{2}x - 1$

5. Graph the solution set to the inequality shown below. State one point that lies in the solution set and one point that does not.

$y < -2x + 4$

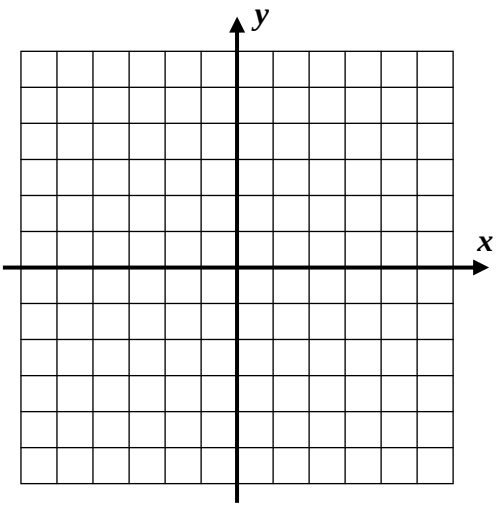
One Point In Solution: One Point Not In Solution:




6. Rearrange the inequality below so that it is easier to graph and then sketch its solution set on the grid given. Be careful when dividing by a negative and remember to switch the inequality sign.

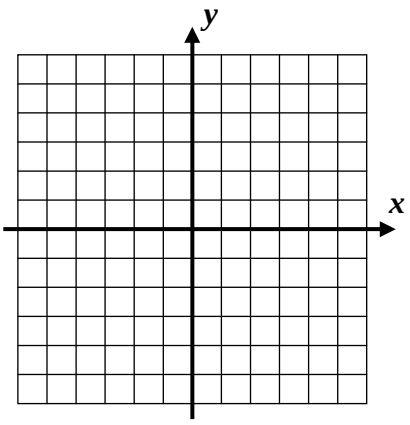
$x - 2y \leq 6$

One Point In Solution: One Point Not In Solution:




7. Graph the solution set to each of the following inequalities.

(a) $y \leq 4$




(b) $x > 1$