NOTES & HOMEWORK

Name_____
Date _____ Period _____

Linear Inequalities

Quick Review:

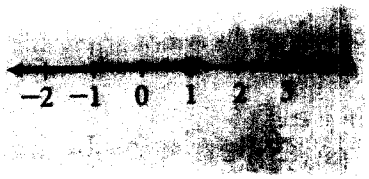
< "Less Than" **> "Greater Than"**

≤ "Less Than or Equal To" **≥ "Greater Than or Equal To"**

Just as you have used inequalities to describe graphs on a number line, you can use inequalities to describe regions of a coordinate plane.

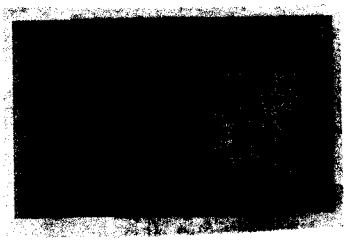
Number Line:

$x < 1$

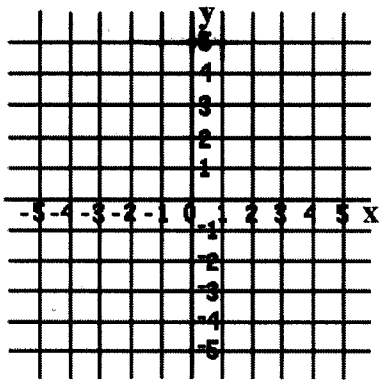


Coordinate Plane:

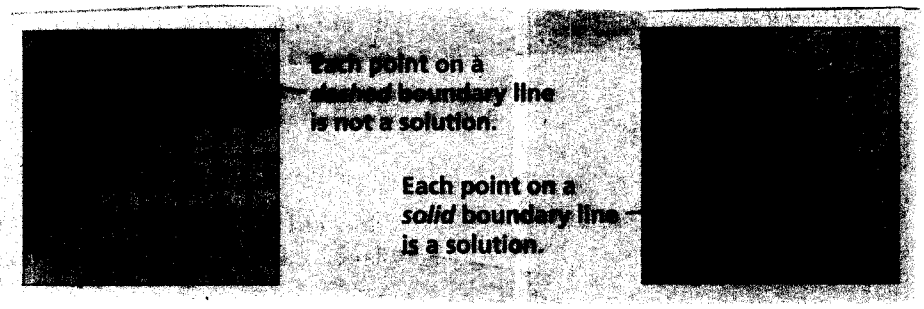
$x < 1$



What do you think the graph of $y > 2$ looks like on a coordinate grid?

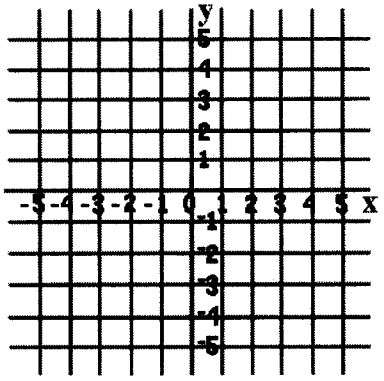


A **linear inequality** describes a region of the **coordinate plane** that has a boundary line. Every point in the region is a **solution of the inequality**.



Is (1, 2) a solution for either inequality **shown above?** Explain.

Example 1:
Graph **$y < 2x + 3$**
First, graph the boundary line $y = 2x + 3$ (Slope = _____, Y-intercept = _____)



Points on the boundary line do *not* make the inequality true.
So, you must use a dashed line.

CHECK:
Next, test a point. Use (0, 0).
$y < 2x + 3$
$0 < 2(0) = 3$
$0 < 3$ "TRUE" ☺

The inequality is true for (0, 0). So, shade the region containing (0, 0).

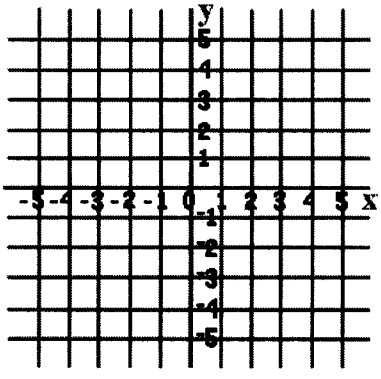
How would the graph look different if the inequality would have been:
$y \geq 2x + 3$

When doing a check you could test any point on the graph. Why is (0, 0) a good choice?

Example 2:
Graph **$2x - 5y \leq 10$**

First, rearrange the inequality so that it is written in slope-intercept form ($y \leq a + bx$)
$2x - 5y \leq 10$
$-2x \quad -2x$
$-5y \leq 10 - 2x$
$\div -5 \quad \div -5$ *Don't forget that you have to divide the entire right side by –5. So,* ***10÷-5*** AND ***-2x÷-5.***
$y \geq -2 + {}^{2}/_{5}\,x$ ***AND*** *since you divided by a negative 5, you have to flip the inequality sign.*

Now, graph $y \geq -2 + {}^{2}/_{5}\,x$ (Slope = _____, y-intercept = _____)



Dashed line or solid line?

Which part will you shade? Just use the CHECK by substituting in the point (0, 0).

$y \geq -2 + {}^{2}/_{5}\,x$
$0 \geq -2 + {}^{2}/_{5}\,(0)$
$0 \geq -2$ TRUE ☺ So, shade the region containing (0, 0).

Homework:

Determine which ordered pairs are part of the solution set for each inequality. Circle those points that ARE solutions.

1.) $y > 3x$ {(1, 5), (1, 0), (-1, 0), (5, 1)}

Example:
Insert (1, 5) and see if it is true.
$y > 3x$
$5 > 3(1)$
$5 > 3$ TRUE ☺ So, it is a solution.
Now check the rest:

2.) $y \geq x + 3$ {(2, -3), (-2, -1), (1, 6), (3, 4)}

3

Graph each inequality.

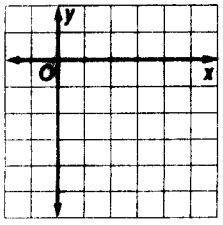
Is the inequality in the slope-intercept form? If not, rearrange.

$y \geq x - 5$

Slope =

y-intercept =

Graph:



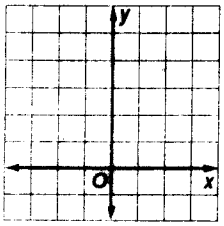
CHECK to see which part of the graph should be shaded. Insert point (0, 0) into the inequality.

4. **Is the inequality in the slope-intercept form? If not, rearrange.**

$y \leq 2x + 4$ Slope =

y-intercept =

Graph: (Should you use a dashed or solid line?)



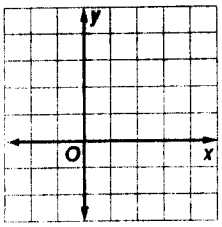
CHECK to see which part of the graph should be shaded. Insert point (0, 0) into the inequality.

5. **Is the inequality in the slope-intercept form? If not, rearrange.**

$y + x > 3$ Slope =

y-intercept =

Graph: (Should you use a dashed or solid line?)



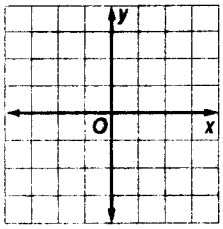
CHECK to see which part of the graph should be shaded. Insert point (0, 0) into the inequality.

6. **Is the inequality in the slope-intercept form? If not, rearrange.**

$y - x \geq 1$ Slope =

y-intercept =

Graph: (Should you use a dashed or solid line?)



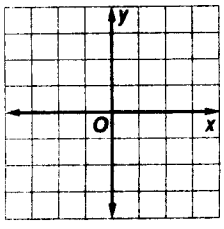
CHECK to see which part of the graph should be shaded. Insert point (0, 0) into the inequality.

7. **Is the inequality in the slope-intercept form? If not, rearrange.**

$y > 3x$ Slope =

y-intercept =

Graph: (Should you use a dashed or solid line?)



CHECK to see which part of the graph should be shaded. Insert point (0, 0) into the inequality.