

**Graphing Linear Inequalities**

A **linear inequality** is similar to an equation as you learned before, but the equal sign is replaced with an inequality symbol. A **solution** to an inequality is any ordered pair that makes the inequality true.

Ex. Tell whether the ordered pair is a solution to the inequality.

$(7, 3); y < 2x - 3$

$3 < 2(7) - 3$

$3 < 14 - 3$

$3 < 11 \checkmark$  yes

$(4, 5); y < x + 1$

$5 < 4 + 1$

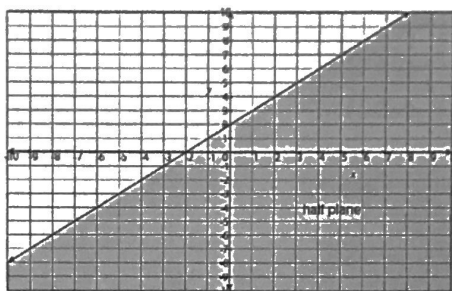
$5 < 5 \times \text{no}$

$(4, 5); y \leq x + 1$

$5 \leq 4 + 1$

$5 \leq 5 \checkmark$  yes

A linear inequality describes a region of a coordinate plane called a **half-plane**. All the points in the shaded region are solutions of the linear inequality. The **boundary line** is the line of the equation you graph.



Symbol	Type of Line	Shading
<	Dashed	Below boundary line
>	Dashed	Above boundary line
≤	Solid	Below boundary line
≥	Solid	Above boundary line

**Graphing Linear Inequalities**

**Step 1:** Solve the inequality for y (if necessary).

**Step 2:** Graph the boundary line using a solid line for ≤ or ≥ OR a dashed line for < or >.

**Step 3:**

If the inequality is > or ≥, shade **above** the boundary line

If the inequality is < or ≤, shade **below** the boundary line

OR

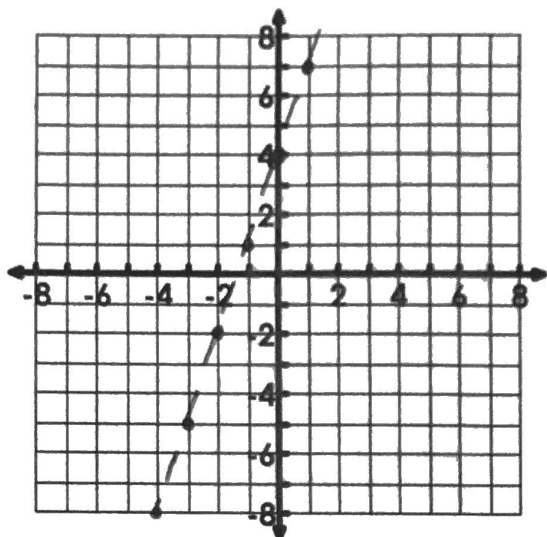
**Step 4:** Select a test point and substitute it into linear inequality.

- If the test point gives you a **true** inequality, you shade the region where the test point is located.
- If the test point gives you a **false** inequality, you shade the region where the test point is NOT located.

Practice Graphing Linear Inequalities

Ex. Graph the inequality:

a.  $y < 3x + 4$



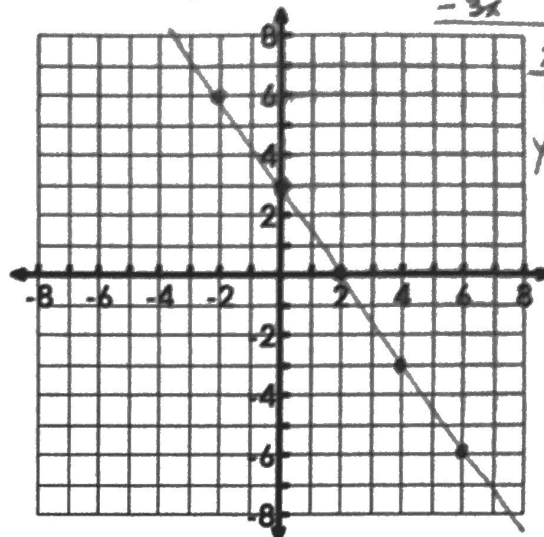
Type of Line: dashed  
 Slope:  $\frac{3}{1}$  Y-int: 4  
 Shade: below

Test Point: (1, 1)  
 $1 < 3(1) + 4$   
 $1 < 3 + 4$   
 $1 < 7 \checkmark$

Ex. Graph the inequality:

b.  $3x + 2y \geq 6$

solve for y:  
 $3x + 2y \geq 6$   
 $-3x$   $-3x$   
 $2y \geq -3x + 6$



$\frac{2y}{2} \geq \frac{-3x+6}{2}$   
 $y \geq -\frac{3}{2}x + 3$

Type of Line: solid  
 Slope:  $-\frac{3}{2}$  Y-int: 3  
 Shade: above

Test Point: (2, 2)  
 $3(2) + 2(2) \geq 6$   
 $6 + 4 \geq 6$   
 $10 \geq 6 \checkmark$

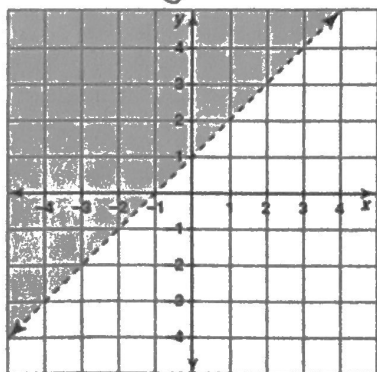
Naming Linear Inequalities

What information do you need to look at to name a linear inequality from a graph?

- Type of Line
- Slope
- y-intercept
- Shade

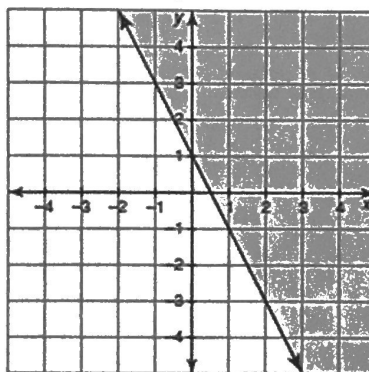
Practice: Name each linear inequality from the graph:

a. Inequality:  $y > 1x + 1$



Type of Line: dashed  
 Slope:  $\frac{1}{1} = 1$  Y-int: +1  
 Shade: above

b. Inequality:  $y \geq -2x + 1$



Type of Line: solid  
 Slope:  $-\frac{2}{1} = -2$  Y-int: +1  
 Shade: above