Day 9 – 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. Plug in point

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

$y < 2x - 3$
$3 < 2(7) - 3$
$3 < 11$
True: Solution

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

$y < x + 1$
$5 < 4 + 1$
$5 < 5$
False: Not a Solution

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

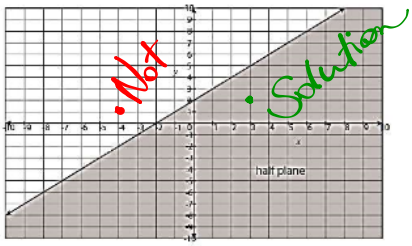
$5 \leq 4 + 1$
$5 \leq 5$
True: Solution

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.

$y \leq x + 2$

$2 \leq 3 + 2$
$2 \leq 5$

$1 \leq -4 + 2$
$1 \leq -2$



(3, 2)

(-4, 1)

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). $y = mx + b$ (slope, start y-int)

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

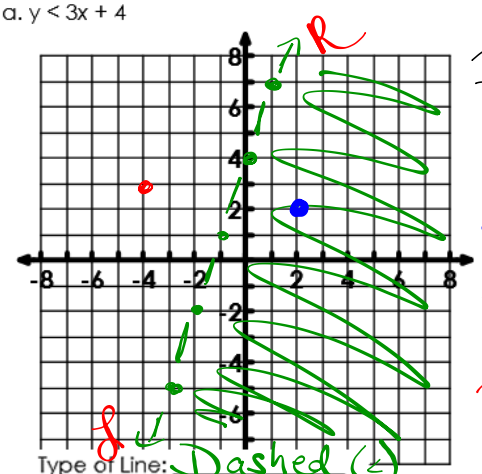
OR

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

a. $y < 3x + 4$



Type of Line: Dashed (<)

Slope: $\frac{3}{1}$ Y-int: (0,4)

Shade: Below

Test Point

$y < 3x + 4$

(2, 2)

$2 < 3(2) + 4$

$2 < 10$

True! Solution

Test (-4, 3)

$y < 3x + 4$

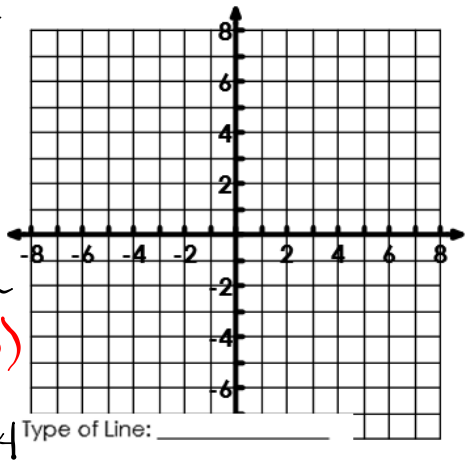
$3 < 3(-4) + 4$

$3 < -8$

False

Not Solution

b. $y \geq -\frac{2}{3}x + 1$



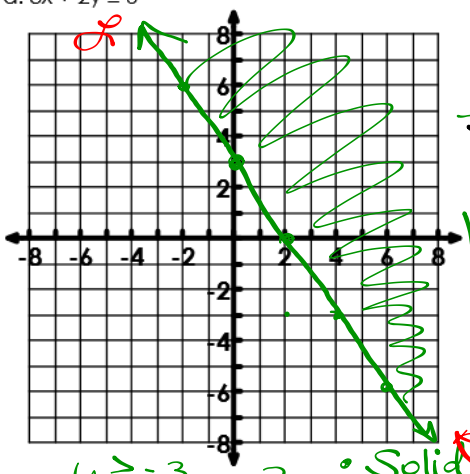
Type of Line: _____

Slope: _____ Y-int: _____

Shade: _____

Ex. Graph the inequality:

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



① Get it $y = mx + b$

$3x + 2y \geq 6$

$-3x \quad -3x$

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

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

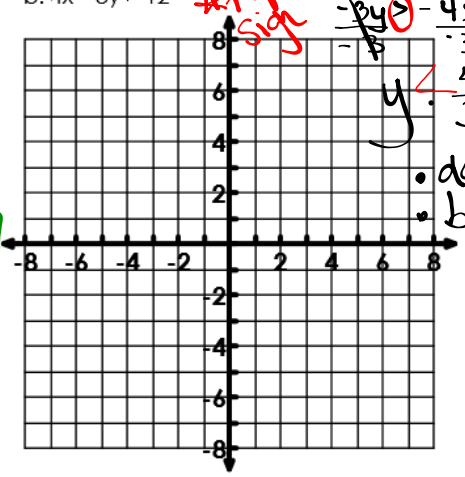
$y \geq -\frac{3}{2}x + 3$

b: (0, 3)

m: $-\frac{3}{2}$ ↓ →

Ex. Graph the inequality:

b. $4x - 3y > 12$



$4x - 3y > 12$

$-4x \quad -4x$

$\frac{-3y}{-3} > \frac{-4x}{-3} + \frac{12}{-3}$

flip sign

$y < \frac{4}{3}x - 4$

• dashed

• below