

Linear Functions

Common Core Review

Learning Targets:

Solving Compound Inequalities

Graphing Linear Inequalities

Solve Systems with 3 Variables

Compound Inequalities

Solve for x

$$5 \leq \frac{x}{3} + 5 < 6$$

Key Concept: Any algebra to the middle must be “balanced” on both sides

Key Concept: Pay attention to signs

Remember \leq, \geq are closed circles and $<, >$ are open circles

If you multiply or divide by a negative, then you must flip the inequality sign

Compound Inequalities

$$5 \leq \frac{x}{3} + 5 < 6$$

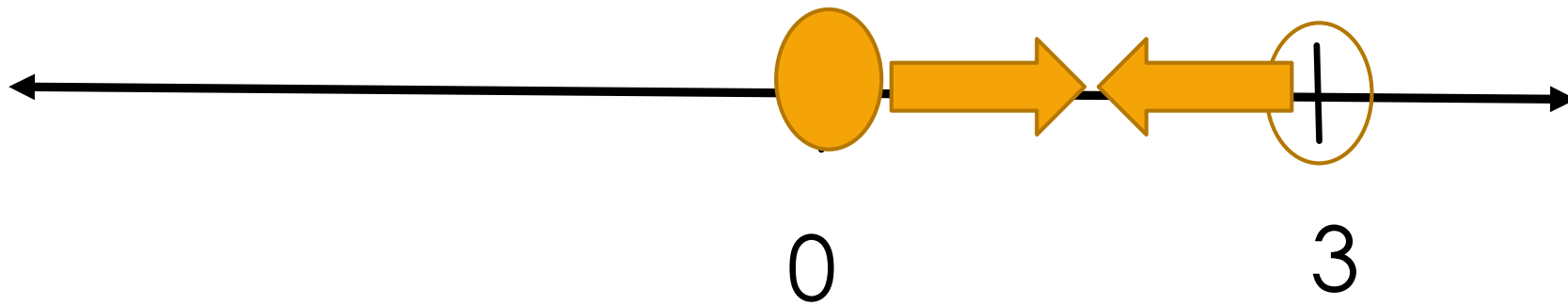
$$-5 \quad -5 \quad -5$$

$$\times 3 \quad 0 \leq \frac{x}{3} < 1 \times 3$$

$$0 \leq x < 3$$

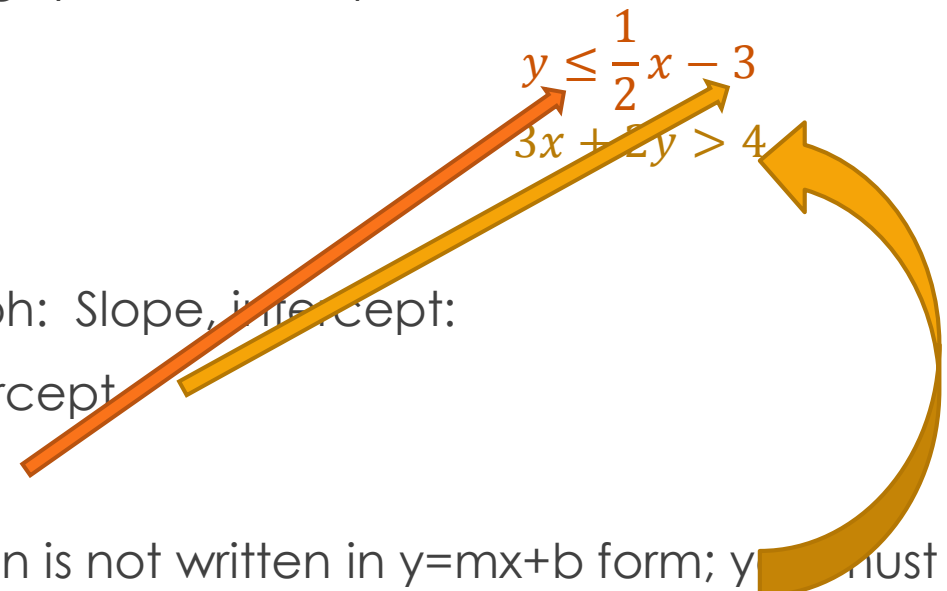
Let's Graph!

$$0 \leq x < 3$$



Example 2: Graphing Linear Inequalities

Graph the following system of inequalities:

$$y \leq \frac{1}{2}x - 3$$
$$3x + 2y > 4$$


Easiest way to graph: Slope, intercept:

- 1) Find the y-intercept
- 2) Find the slope

But... if the equation is not written in $y=mx+b$ form; you must manipulate the equation to solve for y .

Example:

$$3x + 2y > 4$$

$$\begin{array}{r} -3x \qquad \qquad -3x \\ 3x + 2y > 4 \\ \hline \end{array}$$

$$2y > -3x + 4$$

$$\begin{array}{r} \div 2 \qquad \qquad \div 2 \\ 2y > -3x + 4 \\ \hline \end{array}$$

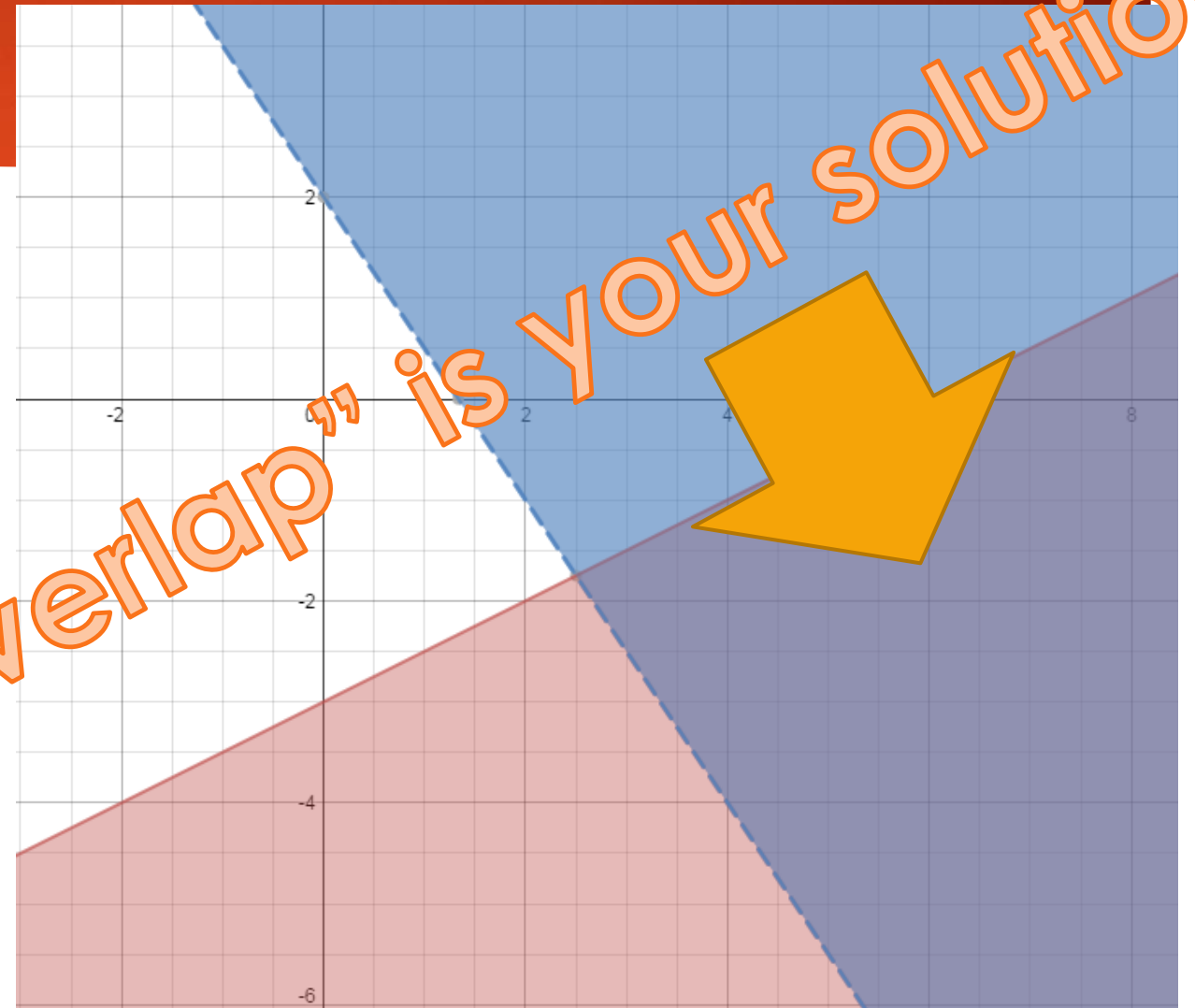
$$y > -\frac{3}{2}x + 2$$

▶ Let's Graph!!!

$$y \leq \frac{1}{2}x - 3$$

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

- ▶ $<, >$ are dotted lines
- ▶ \leq, \geq are solid lines
- ▶ Shade "under" for less than
- ▶ Shade "over" for greater than



Example 3:

- ▶ Solve the System of equations (with three variables)

$$x - 3y + 3z = -4$$

$$2x + 3y - z = 15$$

$$4x - 3y - z = 19$$

Key Concepts:

You can solve this easily using Matrix functions on your calculator

$$x - 3y + 3z = -4$$

$$2x + 3y - z = 15$$

$$4x - 3y - z = 19$$

Process

- 1) Create two matrices (coefficients and answers)
- 2) Multiply the inverse of the coefficients matrix by the answers

$$A^{-1} * B$$

$$x - 3y + 3z = -4$$

$$2x + 3y - z = 15$$

$$4x - 3y - z = 19$$

Process

1) Use coefficients to form Matrix A. $A = \begin{bmatrix} 1 & -3 & 3 \\ 2 & 3 & -1 \\ 4 & -3 & -1 \end{bmatrix}$

2) Use the solutions to form Matrix B. $B = \begin{bmatrix} -4 \\ 15 \\ 19 \end{bmatrix}$

In your calculator: $A^{-1} * B$

$$= \begin{bmatrix} 5 \\ 1 \\ -2 \end{bmatrix} = \begin{matrix} x \\ y \\ z \end{matrix}$$