

Name _____ Period _____

Linear Inequalities

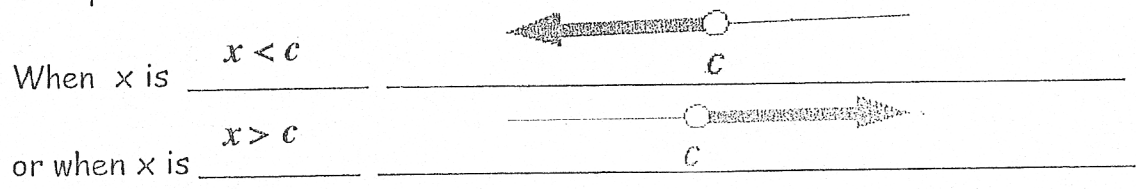
- Inequality signs:
- a $<$ b a is less than b
 - a \leq b a is less than or = to b
 - a $>$ b a is greater than b
 - a \geq b a is greater than = to b

Graphing: When x is less than a constant, you draw an arrow going to the left of the constant.

When x is greater than a constant, you draw an arrow going to the right of the constant.

An open circle is used to show $>$ or $<$ on a graph.

Example:



a closed circle is used to show \geq or \leq on a graph.

Example:



Addition/Subtraction Property for Inequalities:

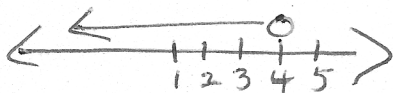
If $a < b$, then $a + c < b + c$

If $a < b$, then $a - c < b - c$

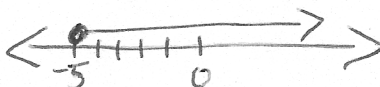
In other words, adding or subtracting the same expression to both sides of an inequality does not change the inequality.

Examples:

$$\begin{array}{r} x - 7 < -3 \\ +7 \quad +7 \\ \hline x < 4 \end{array}$$



$$\begin{array}{r} x + 10 \geq 5 \\ -10 \quad -10 \\ \hline x \geq -5 \end{array}$$



Multiplication/Division Properties for Inequalities:

If $a < b$ AND c is POSITIVE, then $ac < bc$

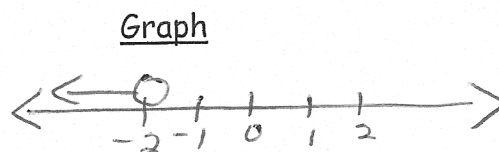
If $a < b$ AND c is POSITIVE, then $a/c < b/c$

Example:

$$\frac{5x < -10}{5 \quad 5}$$

Solve

$$\frac{5x < -10}{5 \quad 5}$$

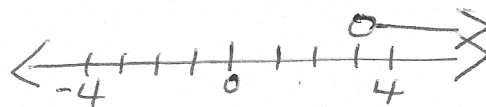


$$3 \cdot \frac{x}{3} > 1 \cdot 3$$

$$x < -2$$

$$\frac{3}{3}x > 3$$

$$x > 3$$



Multiplying or dividing both sides by the same positive value does not change the inequality.

If $a < b$ AND c is NEGATIVE, then $ac > bc$

If $a < b$ AND c is NEGATIVE, then $a/c > b/c$

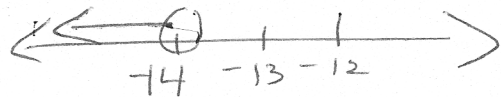
Example:

Solve

Graph

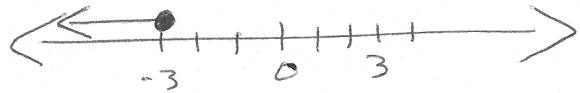
$$(-2) \cdot \frac{-x}{2} > 7(-2)$$

$$\boxed{x < -14}$$



$$\frac{-3x}{-3} \geq \frac{9}{-3}$$

$$\boxed{x \leq -3}$$



Strategy for Solving a Linear Inequality:

Step 1: Simplify each side, if needed.

Step 2: Use Add/sub. properties to move the variable term on one side and the other terms on the other side.

Step 3: Use mult./Div properties to isolate the variable on one side.

Practice:

$$\begin{array}{r} -3x - 3 < 6 \\ +3 \quad +3 \\ \hline -3x < 6 \\ \hline -3 \quad -3 \end{array}$$

$$\boxed{x > -3}$$

$$4(x+1) > 6$$

$$4x+4 > 6$$

$$4x-4 > -4+6$$

$$\frac{4x}{4} > \frac{6}{4}$$

$$x > \frac{3}{2}$$

$$\boxed{x > 1\frac{1}{2}}$$