

How can we find the solution(s) to a linear inequality?

How is an inequality different from an equation?

What does it mean to solve?

☆ Find all values that make a sentence true!

Inequalities:

$<$	is less than
\leq	is less than or equal to
$>$	is greater than
\geq	is greater than or equal to

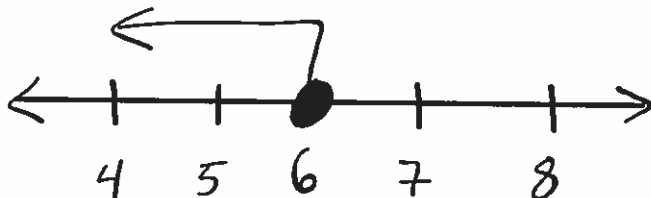
Solve each inequality and graph the solution.

Ex 1: $2x - 5 \leq 7$

$$\begin{array}{r} +5 \quad +5 \\ \hline \end{array}$$

$$\frac{2x}{2} \leq \frac{12}{2}$$

$$\boxed{x \leq 6}$$



😊 Observation:

We used the same steps as if we were solving an equation but we got an infinite number of solutions.

Check:

$$x=6 \quad 7 \leq 7 \checkmark$$

$$x=5 \quad 5 \leq 7 \checkmark$$

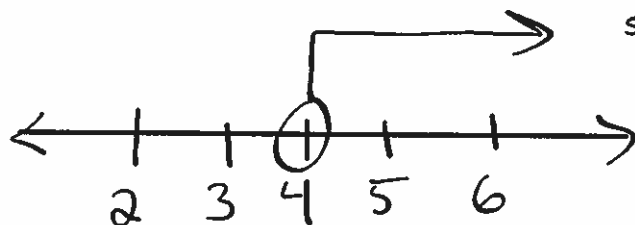
$$x=0 \quad -5 \leq 7 \checkmark$$

$$x=8 \quad 11 \leq 7 \times$$

$$\text{Ex 2: } -6y + 8 < -16$$

$$\begin{array}{r} +(-8) \quad +(-8) \\ -6y < -24 \\ \hline -6 \quad -6 \end{array}$$

$$\boxed{y > 4}$$



"") Observation:
 Multiplying or dividing
 by a negative number
 switches the
 inequality symbol.

"") Observation:
 Graph an "open circle" if
 the boundary is not a
 solution to the inequality.

Check:

$$y=0 \rightarrow 8 < -16 \text{ X}$$

$$y=5 \rightarrow -22 < -16 \checkmark$$

$$y=4 \rightarrow -16 < -16 \text{ X}$$

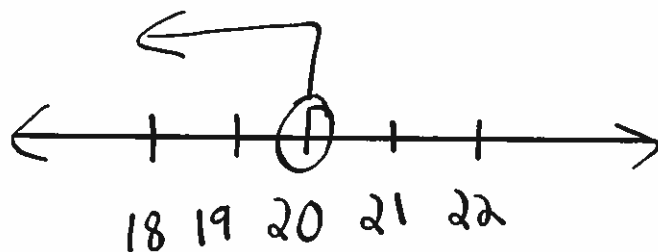
$$\text{Ex 3: } (-4) \left(-\frac{1}{4} \right) (p-12) > -2(-4)$$

$$p + (-12) < 8$$

$$\begin{array}{r} +12 \quad +12 \\ p < 20 \end{array}$$

$$\boxed{p < 20}$$

* Switch symbol
 because we
 multiplied by
 a negative #.



Check:

$$p=0 \rightarrow 3 > 2 \checkmark$$

$$p=24 \rightarrow -3 > 2 \text{ X}$$

Ex 4: $23 \geq 5 - 6z$

$$\begin{array}{r} +(-5) \\ \hline 18 \end{array} \quad \begin{array}{r} +(-5) \\ \hline -6z \end{array}$$

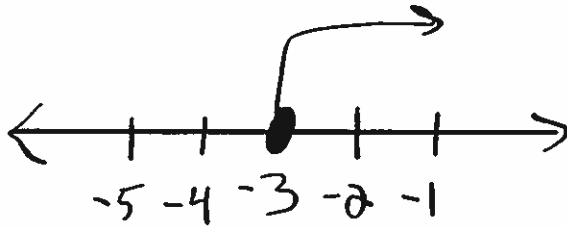
$$\begin{array}{r} 18 \\ -6 \\ \hline -3 \end{array} \geq \begin{array}{r} -6z \\ -6 \\ \hline z \end{array}$$

$$-3 \leq z$$

$$\boxed{z \geq -3}$$

* \div by negative

Read the inequality from z .



Check:

$$z = -3 \rightarrow 23 \geq 23 \checkmark$$

$$z = 0 \rightarrow 23 \geq 5 \checkmark$$

$$z = -5 \rightarrow 23 \geq 35 \times$$

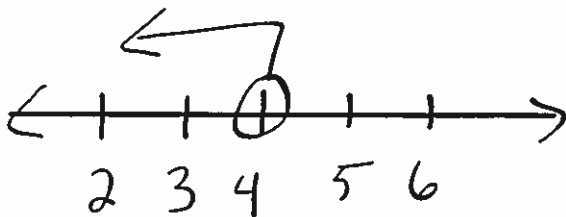
Ex 5: $5x - 12 < 3x - 4$

$$\begin{array}{r} +(-3x) \\ \hline 2x \end{array} \quad \begin{array}{r} +(-3x) \\ \hline -4 \end{array}$$

$$\begin{array}{r} 2x + (-12) \\ +12 \quad +12 \\ \hline 2x \end{array} < \begin{array}{r} -4 \\ +12 \\ \hline 8 \end{array}$$

$$\begin{array}{r} 2x \\ 2 \\ \hline x \end{array} < \begin{array}{r} 8 \\ 2 \\ \hline 4 \end{array}$$

$$\boxed{x < 4}$$



Check:

$$x = 0 \rightarrow -12 < -4 \checkmark$$

$$x = 5 \rightarrow 25 - 12 < 15 - 4 \\ 13 < 11 \times$$

$$\text{Ex 6: } 5(m+5) < 5m+17$$

$$5m+25 < 5m+17$$

$$\begin{array}{r} +(-5m) \quad +(-5m) \\ 25 < 17 \end{array} \quad \begin{array}{l} \text{Always} \\ \text{False} \end{array}$$

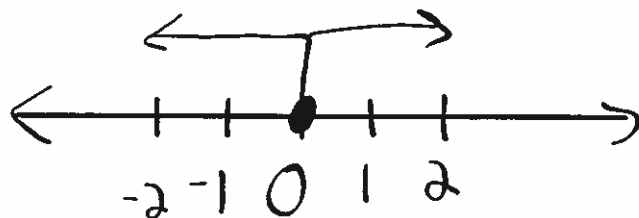
No Real Solution

$$\text{Ex 7: } 1-8y \leq -4(2y-1)$$

$$1+(-8y) \leq -8y+4$$

$$\begin{array}{r} +8y \quad +8y \\ 1 \leq 4 \end{array} \quad \text{Always True}$$

$$y = \{ \text{All Real \#s} \}$$



Check
 $y=0 \rightarrow 1 \leq 4 \checkmark$