

UNIT 2: EQUATIONS & INEQUALITIES

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Objectives: I can solve and graph one-step linear inequalities including real-world situations.

SOLVING ONE-STEP INEQUALITIES



Solving linear inequalities is pretty much the same as solving equations. Don't panic!



Note: Inequalities have more than one solution!

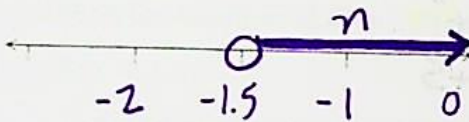
Solution Set

Example #1 --

Solve and graph the inequality.

$$\begin{array}{r} n + 3 > -4.5 \\ n > -1.5 \end{array}$$

open dot

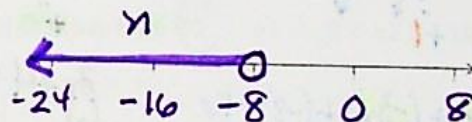


Example #3 --

Solve and graph the inequality.

$$\begin{array}{r} \frac{1}{4}n > -2(4) \\ \frac{1}{4}n > -8 \\ n > -32 \end{array}$$

open dot

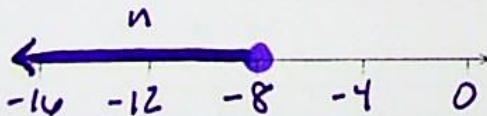


Example #2 --

Solve and graph the inequality.

$$\begin{array}{r} n + 5 \leq -3 \\ n \leq -8 \end{array}$$

solid dot



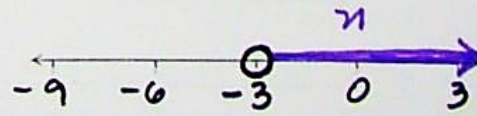
Example #4 --

Solve and graph the inequality.

FIRST! Turn this around

$$\begin{array}{r} -9 < 3n \\ \frac{3n}{3} > \frac{-9}{3} \\ n > -3 \end{array}$$

open dot



Remember we said, solving linear inequalities is pretty much the same as solving equations? There is a VERY IMPORTANT exception!

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Addition

Look at this true statement:

Suppose we add 3 to each side.

What is the relationship between these two numbers?

$$\begin{array}{r|l} 6 & > 3 \\ 6 + 3 & ? 3 + 3 \\ \hline 9 & > 6 \end{array} \text{ still greater!}$$

Is the relationship the same as before you added 3 to each side? Yes!

Subtraction

Look at this true statement:

Suppose we subtract 7 from each side.

What is the relationship between these two numbers?

$$\begin{array}{r|l} 8 & < 9 \\ 8 - 7 & ? 9 - 7 \\ \hline 1 & < 2 \end{array} \text{ still less!}$$

Is the relationship the same as before you subtracted 7 from each side? Yes

Multiplication

Look at this true statement:

Suppose we multiply both sides by -2.

What is the relationship between these two numbers?

$$\begin{array}{r|l} 5 & > 3 \\ (-2)(5) & ? (-2)(3) \\ \hline -10 & < -6 \end{array}$$

$$\begin{array}{r|l} 5 & > 3 \\ (-2)(5) & > (-2)(3) \\ \hline 10 & > 6 \end{array}$$

multiply by a positive
No change!

Is the relationship the same as before you multiplied by -2? No! If not, how do we "fix" the inequality?

Explain. Turn the inequality around if you multiply both sides by a negative

Division

Look at this true statement:

Suppose we divide both sides by -2.

What is the relationship between these two numbers?

$$\begin{array}{r|l} -6 & < 12 \\ -6 & ? 12 \\ \hline -2 & ? -2 \\ 3 & > -6 \end{array}$$

$$\begin{array}{r|l} -6 & < 12 \\ -6 & ? 12 \\ \hline -3 & < 6 \end{array}$$

Divide by a positive
No change!

Is the relationship the same as before you divided by -2? No! If not, how do we "fix" the inequality?

Explain. Turn the inequality around if you divide both sides by a negative

Make a conjecture as to the VERY IMPORTANT difference between solving equations and

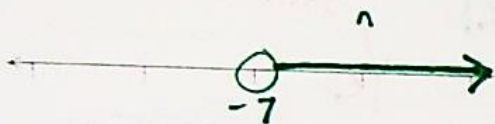
inequalities: If, when solving, you multiply or divide both sides by a negative, you must turn the inequality symbol around.

When you **multiply** or **divide** an inequality by a **negative** number, it changes the direction of the inequality symbol!

Let's try these together...

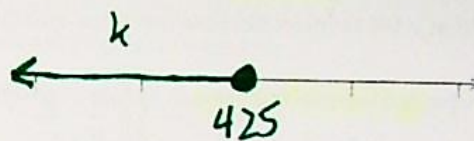
$$1) \quad \frac{3n}{3} \geq \frac{-21}{3}$$

$$n \geq -7$$



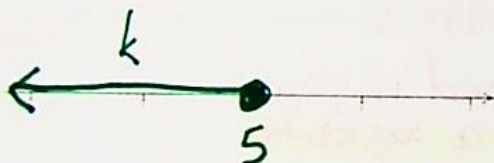
$$2) \quad \frac{k}{5} \leq 85$$

$$k \leq 425$$



$$* 3) \quad \frac{k}{1} \leq -0.5(-10)$$

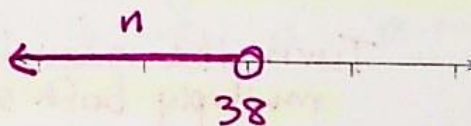
$$k \leq 5$$



$$* 4) \quad -76 < -2n$$

$$\frac{-76}{-2} > \frac{-2n}{-2}$$

$$n < 38$$



5) Write an inequality for the situation. Then solve and graph the inequality.

You must be at least 48 inches tall to ride an amusement park ride, and your little sister is 39 inches tall. How many inches (i) must she grow before she can ride the



I'VE HAD IT UP TO HERE WITH HEIGHT RESTRICTIONS



$$39 + i \geq 48$$

$$\frac{-39}{-39} \quad \frac{-39}{-39}$$

$$i \geq 9$$

