

INEQUALITIES

One Variable

QUICK REVIEW

>	<
Means: Greater Than Open Circle (doesn't actually include the number) Shade to the right (BIG!)	Means: Less Than Open Circle (doesn't actually include the number) Shade to the left (LITTLE!)
≥	≤
Means: Greater Than or equal to Closed Circle (= so it includes the number!) Shade to the right (BIG!)	Means: Less Than or equal to Closed Circle (= so it includes the number!) Shade to the left (LITTLE!)

EXAMPLE 1: SOLVE THEN GRAPH ON A NUMBER LINE

$$3x - 1 \leq -4$$

$$+1 \quad +1$$

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

$$x \leq -1$$



EXAMPLE 2: SOLVE THEN GRAPH ON A NUMBER LINE

$$-22 > -2x + 4$$

$$-4 \quad -4$$

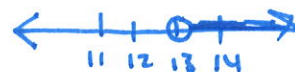
$$\frac{-26}{-2} > \frac{-2x}{-2}$$

*WHEN MULTIPLYING OR DIVIDING BY A FRACTION THE SIGN FLIPS!

~~$$13 < x$$~~

$$13 < x$$

THESE ARE THE SAME → THIS ACTUALLY READS AS X IS GREATER THAN 13 → $x > 13$



EXAMPLE 3: SOLVE THEN GRAPH ON A NUMBER LINE

$$5x - 6 < 7x + 14$$

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

$$-6 < 2x + 14$$

$$-14 \quad -14$$

$$\frac{-20}{2} < \frac{2x}{2}$$

$$-10 < x$$

↑
REMEMBER, THIS IS THE SAME AS $x > -10$

DON'T CHANGE SIGNS HERE, EVEN THOUGH 20 IS NEGATIVE YOU ONLY FLIP SIGNS IF THE NUMBER YOU ARE DIVIDING BY (2) IS NEGATIVE



EXAMPLE 4: NO SOLUTIONS

$$2x + 4 \leq 2x + 1$$

$$-2x \quad -2x$$

$$4 \leq 1$$

THE Xs CANCEL OUT SO ASK, IS $4 \leq 1$? NEVER! SO NO SOLUTIONS.

EXAMPLE 5: INFINITE SOLUTIONS

$$x + 4 > x + 1$$

$$\begin{array}{r} -x \quad -x \\ \hline 4 > 1 \end{array}$$

THE Xs CANCEL OUT
 SO ASK YOURSELF IS
 4 > 1 ?
 ALWAYS!
 SO INFINITE
 SOLUTIONS!

WORD PROBLEM: KEY WORDS:

LESS THAN < No more than (\leq) At Most (\leq)	GREATER THAN > No less than (\geq) At Least (\geq)
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EXAMPLE 1:

Your grandma gave you \$25 for your birthday. You want to buy comic books which cost \$2.99 each. What is the maximum amount of comic books you can buy with your birthday money?

$$\frac{2.99x}{2.99} \leq \frac{25}{2.99}$$

$$x \leq 8.36$$

WHATEVER YOU SPEND ON COMIC BOOKS CANNOT GO OVER \$25, IN OTHER WORDS YOUR COMIC BOOK PURCHASES MUST BE LESS THAN \$25

So you can buy 8 comic books BUT NOT 9

$$8 \times 2.99 = \$23.92$$

$$9 \times 2.99 = \$26.91$$

EXAMPLE 2:

You are selling cookies at a bake sale for \$1.50. It cost you \$16 to buy ingredients. How many cookies will you need to sell to make a profit of at least \$50?

$$1.50x - 16 \geq 50$$

$$+16 \quad +16$$

$$1.50x \geq 66$$

$$x \geq 44$$

\$1.50 PER COOKIES MINUS THE COST OF INGREDIENTS

So AT LEAST 44 COOKIES. EVERYTHING AFTER THAT IS MORE THAN \$50 PROFIT!