

Two-Step Inequalities

- We are still using inverse operations to isolate the variable.
- We have to UNDO what is being done to the variable.

Ex. 1

$$\begin{array}{r} -2x - 5 < 3 \\ +5 \quad +5 \\ \hline -2x < 8 \\ -2 \quad -2 \\ \hline x > -4 \end{array}$$

WordsThe variable is being MULTIPLIED by -2 , and then SUBTRACT 5 from that product.We need to UNDO so we work **backwards**. FIRST we ADD 5 (to undo -5).

subtraction

THEN we DIVIDE by -2 (to undo 2 times x).Since we divide by a negative #, we reverse the symbol!**Ex. 2**

$$\begin{array}{r} -5n + 3 > -7 \\ -3 \quad -3 \\ \hline -5n > -10 \\ -5 \quad -5 \\ \hline n < 2 \end{array}$$

$$\begin{array}{r} -5n > -10 \\ -5 \quad -5 \\ \hline n < 2 \end{array}$$

$$n < 2$$

**Ex. 3**

$$\begin{array}{r} \frac{y}{3} - 6 \leq -4 \\ +6 \quad +6 \\ \hline \frac{y}{3} \leq 2 \end{array}$$

$$\begin{array}{r} \frac{y}{3} \leq 2 \\ \times 3 \quad \times 3 \\ \hline y \leq 6 \end{array}$$

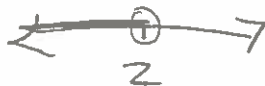
$$y \leq 6$$

**You Try 4**

$$\begin{array}{r} 6h - 1 < 11 \\ +1 \quad +1 \\ \hline 6h < 12 \\ \div 6 \quad \div 6 \\ \hline h < 2 \end{array}$$

$$\begin{array}{r} 6h < 12 \\ \div 6 \quad \div 6 \\ \hline h < 2 \end{array}$$

$$h < 2$$

**You Try 5**

$$\begin{array}{r} -\frac{k}{5} + 7 \geq 6 \\ -7 \quad -7 \\ \hline -\frac{k}{5} \geq -1 \\ \times 5 \quad \times 5 \\ \hline -k \geq -5 \\ \div -1 \quad \div -1 \\ \hline k \geq 5 \end{array}$$

$$\begin{array}{r} -\frac{k}{5} \geq -1 \\ \times 5 \quad \times 5 \\ \hline -k \geq -5 \end{array}$$

$$k \geq 5$$

$$k \geq 5$$

**Key Ideas**

- First, add or subtract to get rid of constant terms.
- Then, multiply or divide to make the coefficient be 1.
- REVERSE THE SYMBOL if you multiply or divide by a negative number!

2-Step Inequality Word Problems

Read the problem. Identify:

- inequality symbol words/phrases
- math operation words

Write the inequality. Solve:

- Add or subtract.
- Divide or multiply.
- Reverse/keep symbol!

Answer the question.

- Round up or down **BASED ON SYMBOL.**
- Use units.

Ex. 6

An airplane is at 10,000 feet when it starts to descend. It descends at a rate of 600 feet per minute. The wheels drop when the plane is at most 1,200 feet. After how many minutes would you expect the wheels to drop?

$$600m + 10,000 \leq 1,200$$

$$\begin{array}{r} -10,000 \\ \hline 600m \leq 8800 \\ \div 600 \\ \hline m \geq 14.6 \\ 15 \end{array}$$

↳ m: minutes
 $10,000 - 600m \leq 1,200$

After at least 15 min wheels drop.

Ex. 7

Triniti had \$500 in her bank account at the beginning of the summer. She wants to have no less than \$200 in the account by the end of the summer. She withdraws \$18 each week for expenses. How many weeks, w , can Triniti withdraw this much from her account?

$$200 \leq 500 - 18w$$

$$\begin{array}{r} -500 \\ \hline -300 \leq -18w \\ \div -18 \\ \hline 16.\bar{6} \geq w \end{array}$$

round down
 Triniti can withdraw for no more than 16 weeks.

You Try 8

StuCo is considering planning a fundraising event at a banquet hall, which costs \$700 to rent. If they charge \$15 per ticket, how many tickets, t , do they need to sell in order to raise a minimum of \$1000?

Round

$$-700 + 15t \geq 1000$$

$$\begin{array}{r} +700 \\ \hline 15t \geq 1700 \\ \div 15 \\ \hline t \geq 113.\bar{3} \end{array}$$

StuCo must sell a minimum of 114 tickets