

### 6.3 SOLVE MULTI-STEP INEQUALITIES

Don't forget to reverse (flip) the inequality symbol when multiplying or dividing by a negative number!!

#### SOLVE AND GRAPH IF POSSIBLE

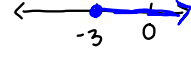
a)  $-7x + 2 < -5$

$$\begin{array}{r} -2 \downarrow -2 \\ -7x < -7 \\ \hline x > 1 \end{array}$$



b)  $\frac{1}{3}(3x+6) \geq -1$

$$\begin{array}{r} \frac{1}{3}(3x) + \frac{1}{3}(6) \geq -1 \\ x + 2 \geq -1 \\ \hline -2 \downarrow -2 \\ x \geq -3 \end{array}$$



#### SOLVE AND GRAPH IF POSSIBLE

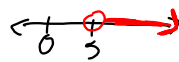
c)  $7x - 4 \leq 5x + 8$

$$\begin{array}{r} +4 \downarrow +4 \\ 7x \leq 5x + 12 \\ \hline -5x \downarrow -5x \\ 2x \leq 12 \\ \hline 2 \downarrow 2 \\ x \leq 6 \end{array}$$



d)  $9x + 6 > 6x + 21$

$$\begin{array}{r} -6 \downarrow -6 \\ 9x > 6x + 15 \\ \hline -6x \downarrow -6x \\ 3x > 15 \\ \hline 3 \downarrow 3 \\ x > 5 \end{array}$$



#### SOLVE AND GRAPH IF POSSIBLE

e)  $18x - 4 > 6(3x - 1)$

f)  $4(x+3) \leq 2(2x-3)$

$$\begin{array}{r} \rightarrow 18x - 4 > 6(3x - 1) \\ 18x - 4 > 18x - 6 \\ \hline +4 \downarrow +4 \\ 18x > 18x - 2 \\ \hline -18x \downarrow -18x \\ 0 > -2 \end{array}$$

True All Real #'s

$$4(x+3) \leq 2(2x-3)$$

$$\begin{array}{r} 4x + 12 \leq 4x - 6 \\ \hline -12 \downarrow -12 \\ 4x \leq 4x - 18 \\ \hline -4x \downarrow -4x \\ 0 \leq -18 \end{array}$$

False No Solution

#### TRANSLATE A VERBAL PHRASE INTO AN INEQUALITY AND GRAPH

Example:

Three times the difference of x and 2 is less than or equal to 9

$$\begin{array}{r} 3(x-2) \leq 9 \\ 3x - 6 \leq 9 \\ \hline +6 \downarrow +6 \\ 3x \leq 15 \\ \hline 3 \downarrow 3 \\ x \leq 5 \end{array}$$

#### WORD PROBLEM

You can work at most 24 hours per week as a nurse's aid. So far this week you have worked 7 hours. If the remaining shifts are 4 hours long, how many possible full shifts can you work? (write and solve using an inequality)

$$\begin{array}{r} 24 \geq 7 + 4x \\ \hline -7 \downarrow -7 \\ 17 \geq 4x \\ \hline 4 \downarrow 4 \\ 4.25 \geq x \end{array}$$

$$7 + 4x \leq 24$$

4 full shifts