

More Practice: Variables on Both Sides

a.  $x < 3x + 8$

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



b.  $2(3y - 2) - 4 \geq 3(2y + 7)$

$$\begin{array}{r} 6y - 4 - 4 \geq 6y + 21 \\ 6y - 8 \geq 6y + 21 \\ -6y \quad -6y \\ \hline -8 \geq 21 \\ \text{False} \\ \boxed{\emptyset} \end{array}$$



c.  $2(x - 2) \leq -2(1 - x)$

$$\begin{array}{r} 2x - 4 \leq -2 + 2x \\ -2x \quad -2x \\ \hline -4 \leq -2 \\ \text{TRUE} \\ \boxed{TR} \end{array}$$



d.  $-\frac{2}{5}x \leq \frac{4}{5} - \frac{3}{5}x$

$$\begin{array}{r} +\frac{3}{5}x \quad +\frac{3}{5}x \\ \hline \frac{5}{1} \cdot \frac{1}{5}x \leq \frac{4}{5} \cdot \frac{5}{1} \\ \boxed{x \leq 4} \end{array}$$



**Example 1:** The school band will sell pizzas to raise money for new uniforms. The supplier charges \$100 plus \$4 per pizza. If the band members sell the pizzas for \$7 each, how many pizzas will they have to sell to make a profit?

$x = \#$  of pizzas

$$\begin{aligned} \text{Profit} &> \text{Expense} \\ 7x &> 100 + 4x \\ -4x & \quad -4x \\ \hline 3x &> 100 \\ \frac{3x}{3} &> \frac{100}{3} \end{aligned}$$

34 pizzas or more

$$x > 33.33$$

**Example 2:** The Inquirer charges a fee of \$650 plus \$80 per week to run an ad. The Courier charges \$145 per week. For how many weeks will the total cost at the Inquirer be less expensive than the cost at the Courier?

$x = \#$  of weeks

$$\begin{aligned} \text{Inquirer} &< \text{Courier} \\ 650 + 80x &< 145x \\ -80x & \quad -80x \\ \hline 650 &< 65x \\ \frac{650}{65} &< \frac{65x}{65} \end{aligned}$$

11 weeks or more

$$10 < x \\ x > 10$$

**Example 3:** A-Plus Advertising charges a fee of \$24 plus \$0.10 per flyer to print and deliver flyers. Print and More charges \$0.25 per flyer. For how many flyers is the cost at A-Plus Advertising less than the cost at Print and More?

$x = \#$  of flyers

$$\begin{aligned} \text{A-PLUS} &< \text{P \& M} \\ 24 + 0.10x &< 0.25x \\ -0.10x & \quad -0.10x \\ \hline 24 &< 0.15x \\ \frac{24}{0.15} &< \frac{0.15x}{0.15} \end{aligned}$$

161 flyers or more

$$160 < x \\ x > 160$$

Write an inequality to represent each relationship. Then, solve.

- 1.) 4 more than 2 times a number is less than 4 times that same number

$$\begin{aligned} 2x + 4 &< 4x \\ -2x & \quad -2x \\ \hline 4 &< 2x \\ \frac{4}{2} &< \frac{2x}{2} \end{aligned}$$

$$2 < x \\ x > 2$$

- 2.) 10 less than 5 times a number is less than 6 times the number decreased by 1

$$\begin{aligned} 5x - 10 &< 6x - 1 \\ -5x & \quad -5x \\ \hline -10 &< x - 1 \\ +1 & \quad +1 \\ \hline -9 &< x \end{aligned}$$

$$x > -9$$

- 3.) Three-fourths of a number is greater than or equal to five less than the number

$$\begin{aligned} \frac{3}{4}x &\geq x - 5 \\ -x & \quad -x \\ \hline -\frac{1}{4}x &\geq -5 \\ -4 \cdot -\frac{1}{4}x &\geq -5 \cdot -4 \end{aligned}$$

$$x \leq 20$$