

## 4.4 - Solving Multi-Step Inequalities

Vocabulary:

- Distribute
- Like Terms
- Isosceles Triangle
- Congruent Sides

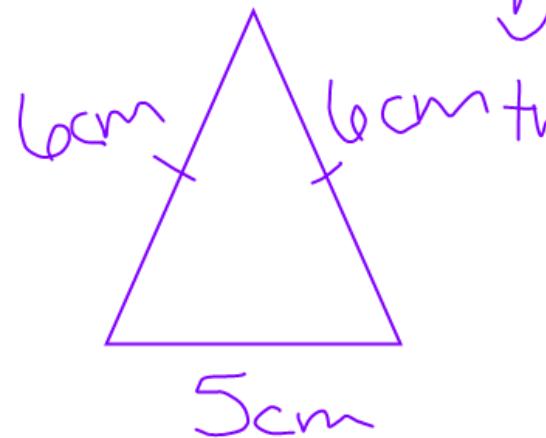
$$5y^2 + 12y^2$$

$$4y + 7y$$

$$3(x + 4)$$

$$3x + 12$$

$\approx$



two sides that are congruent

**1 EXAMPLE**Solve  $5 + 4b < 21$ .

$$\cancel{-5} \quad -5$$

$$\frac{4b}{4} < \frac{16}{4}$$

$$b < 4$$

Solve each inequality.

$$\#1. \quad 4d + 7 \leq 23$$
$$\begin{array}{rcl} -7 & & -7 \\ \hline 4d & \leq & 16 \end{array}$$

$$\frac{4d}{4} \leq \frac{16}{4}$$
$$d \leq 4$$

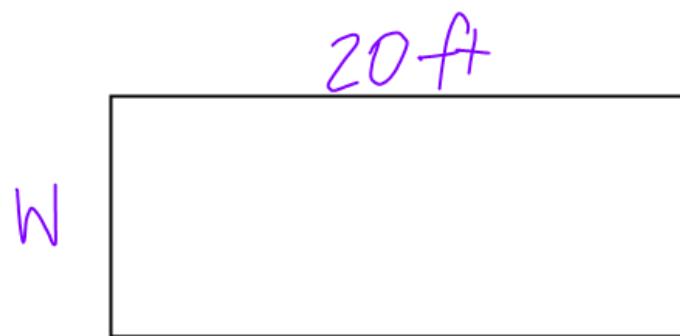
$$\#3. \quad -4x + 2 < 8$$
$$\begin{array}{rcl} +2 & & +2 \\ \hline -4x & < & 10 \end{array}$$

$$\begin{array}{rcl} -4x & < & 10 \\ \hline -4 & & -4 \end{array}$$

$$x > -2\frac{1}{2}$$

**2 EXAMPLE**

The band is making a rectangular banner that is 20 feet long. with trim around the edges. What are the possible widths the banner can be if there is no more than 48 feet of trim?



20 ft.

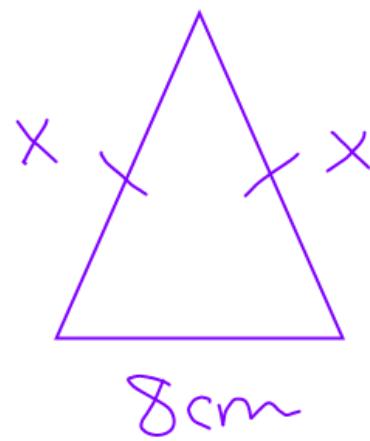
$$\cancel{40} + 2W \leq 48$$

$$-40 \quad \quad \quad -40$$

$$\frac{2W}{2} \leq \frac{8}{2}$$

$$W \leq 4 \text{ ft.}$$

11. The perimeter of an isosceles triangle is at most 27cm. The base is 8cm long. Find the possible lengths of the two congruent sides.



$$x + x + 8 \leq 27$$

$$\begin{aligned} 2x + 8 &\leq 27 \\ 2x &\leq 19 \end{aligned}$$

$$\frac{2x}{2} \leq \frac{19}{2}$$

$$x \leq 9.5\text{cm}$$

**3 EXAMPLE**

Solve  $3x + 4(6 - x) < 2$ .

$$3x + 24 - 4x < 2$$

$$\begin{array}{rcl} -x \cancel{+ 4} & < & 2 \\ -24 & & -24 \end{array}$$

$$\begin{array}{rcl} \cancel{+ x} & < & -22 \\ \hline & & -1 \end{array}$$

$$x > 22$$

$$\#13. \quad 2(j-4) \geq -6$$

$$2j-8 \geq -6$$
$$+8 \quad +8$$

$$\cancel{2} j \geq \cancel{2}$$

$$j \geq 1$$

**4 EXAMPLE**Solve  $8z - 6 < \cancel{3z} + 12$ .

$$\begin{array}{r} -3z \\ -3z \end{array}$$

$$\begin{array}{r} 5z \cancel{- 6} < 1z \\ + 6 \qquad \qquad + 6 \end{array}$$

$$\begin{array}{r} \cancel{5z} < 18 \\ \hline 5 \end{array}$$

$$\begin{array}{l} z < 3.6 \\ \text{or} \\ z < 3\frac{3}{5} \end{array}$$

$$\#23. \quad \begin{array}{rcl} 3t + 7 & \geq & 5t + 9 \\ -3t & & -3t \end{array}$$

$$\begin{array}{rcl} 7 & \geq & 2t + 9 \\ -9 & & -9 \end{array}$$

$$\frac{-2}{2} \geq \frac{2t}{2}$$

$$\boxed{-1 \geq t}$$

**5 EXAMPLE**

Solve  $5(-3 + d) \leq 3(3d - 2)$ .

$$\begin{array}{r} -15 + 5d \leq 9d - 6 \\ \cancel{-5d} \quad \cancel{-5d} \\ -15 \leq 4d \end{array}$$

$$\begin{array}{r} -15 \leq 4d \\ + 6 \quad \cancel{+ 6} \\ -9 \leq 4d \end{array}$$

$$\frac{-9}{4} \leq \frac{4d}{4}$$

$$-2\frac{1}{2} \leq d$$

#31.  $-3(v-3) \geq 5 - 4v$

$$\begin{array}{rcl} -3v + 9 & \geq & 5 \\ +4v & & \end{array}$$

~~$-3v$~~   ~~$+4v$~~

$$v + 9 \geq 5$$

~~$+9$~~   ~~$-9$~~

$$v \geq -4$$

Homework: pg. 222 #2, 6, 10, 12, 16, 24, 30, 32, 36, 46, 48, 88