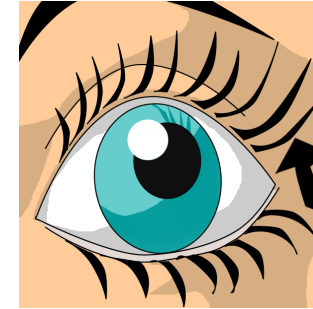


Eye Opener

Solve each equation:

$$-x + 8 + 4x = 14$$

$$x = 2$$

$$-6(2y + 2) = 12$$

$$y = -2$$

$$.5b + 3.5 - 2.5b = 1.5b$$

$$\begin{array}{r}
 -6(2y) + -6(2) = 12 \\
 -12y - 12 = 12 \\
 \quad \quad +12 \quad +12 \\
 \hline
 -12y = 24 \\
 \frac{-12y}{-12} = \frac{24}{-12} \\
 y = -2
 \end{array}
 \quad b = 1$$



### 3-4: Solving Multi-Step Inequalities

#### Essential Understanding:

**You solve a multi-step inequality in the same way you solve a multi-step equation.**

**You use the properties of inequality to transform the original inequality into a series of simpler equivalent inequalities.**

## Steps to Solving an Inequality:

1. Distribute (& Simplify)
2. Isolate variables and constants
3. Divide by coefficient  
(remember to reverse inequality sign if multiplying or dividing by a negative number)
4. Check your answer for correct endpoint **AND** correct shaded region

Solve  $7 + 6a > 19$ 

$$\begin{array}{r} \cdot 7 \\ \hline \end{array} - 7$$

$$\cancel{6} \cdot \cancel{6a} > \cancel{12} / \cancel{6}$$

$$a > 2$$



$$7 + 6 \cdot a > 19$$

$$7 + 12 = 19$$

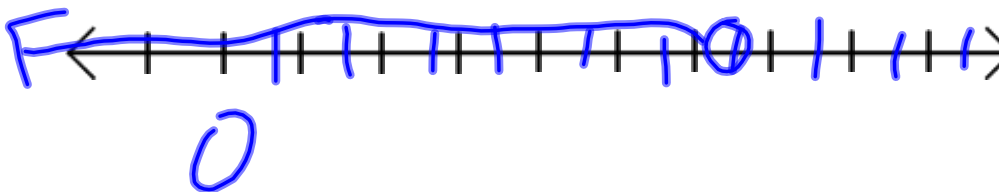
$$7 + 6 \cdot 3 > 19$$

$$7 + 18$$

$$= 25 > 19$$

Solve  $6z - 15 < 4z + 11$ 

$$\begin{array}{r} \cancel{+15} \\ -15 \\ \hline \end{array}$$



$$\begin{array}{r} 6z < 4z + 26 \\ -4z & \quad \quad \quad \cancel{-4z} \\ \hline \end{array}$$

$$\begin{array}{r} \cancel{2z} < \frac{26}{2} \\ \hline 2 < 13 \end{array}$$

Solve  $-3(4 - m) \geq 4(2m + 1)$  

$$-3(4 - m) \geq 4(2m + 1)$$

$$-12 + 3m \geq 8m + 4$$

$$-12 + 12 + 3m \geq 8m + 4 + 12$$

$$3m - 8m \geq 8m - 8m + 16$$

$$\frac{-5m}{-5} \geq \frac{16}{-5}$$

$$m \leq -3\frac{1}{5}$$

4. The school band needs a banner to carry in the parade. The banner committee decides that the length of the banner should be 18 feet. What are the possible widths of the banner if they can use no more than 48 feet of trim on the banner?

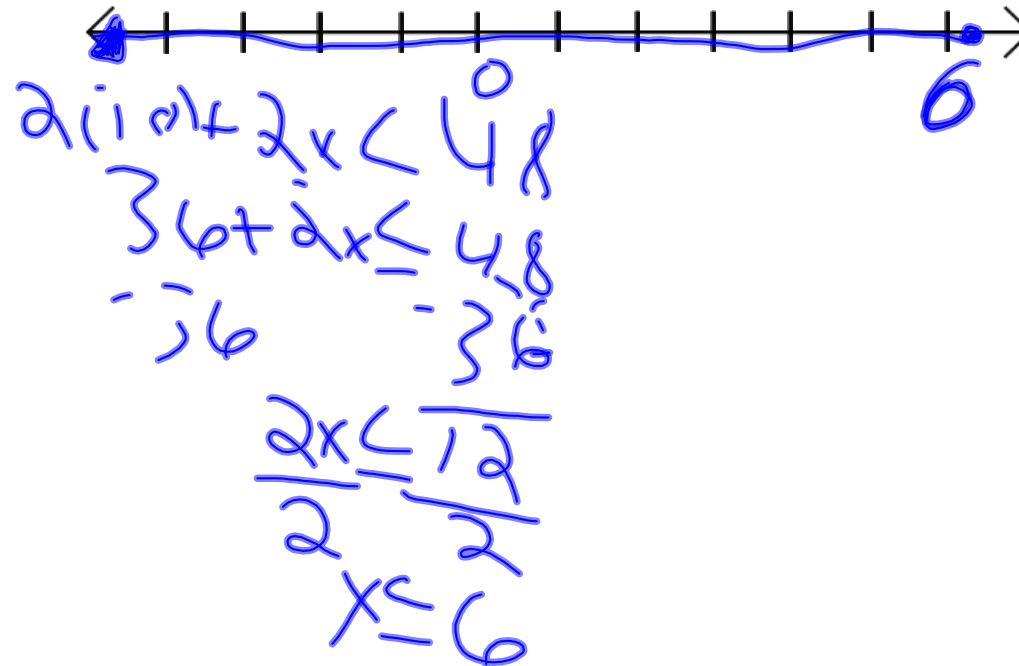
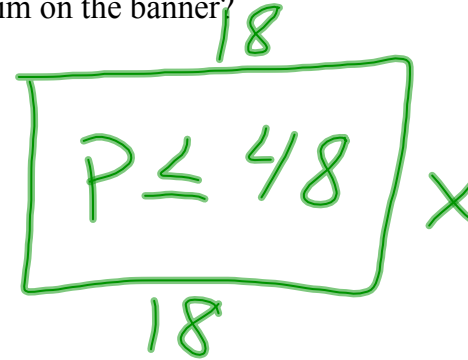
Define variable:  $P = 2L + 2W$

Write inequality:  $2(18) + 2x \leq 48$

Solve inequality:

Check answer:

- Accurate
- Reasonable
- Complete

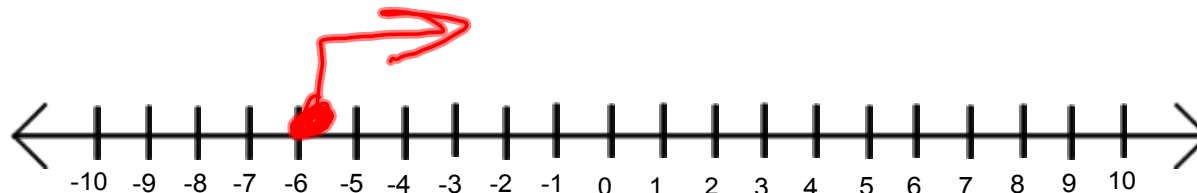


More practice:

$$-3x - 4 \leq 14$$

$$\begin{aligned} &+4 \quad +4 \\ -3x &\leq 18 \\ \underline{-3} &\quad \underline{-3} \end{aligned}$$

$$x \geq -6$$



$$4p - 2(p + 7) < 8$$

$$\begin{aligned} 4p - 2p + \underline{-14} &< 8 \\ +14 \quad +14 & \\ \hline 2p - 14 &< 8 \\ \underline{+14} &\quad \underline{+14} \\ 2p &< 22 \\ \underline{2} &\quad \underline{2} \\ p &< 11 \end{aligned}$$



$$-6(x - 4) \geq 7(2x - 3)$$



$$3(x + 4) - 2(x - 3) < 5(x + 7) - 12 + 3x$$



$$3x + 12 + 2x + 6 < 5x + 35 - 12 + 3x$$

$$x + 18 < 8x + 23$$

$$x + 5 < 8x$$

$$\frac{5}{7} < \frac{7x}{7}$$

$$x > \frac{5}{7}$$

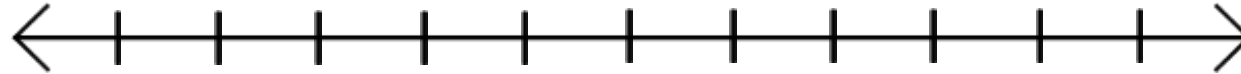
$$-6(x - 4) \geq 7(2x - 3)$$

$$\begin{array}{r} -6x + 24 \geq 14x - 21 \\ +6x \qquad \underline{+6x} \end{array}$$

$$\begin{array}{r} 24 \geq 20x - 21 \\ +21 \qquad \qquad \underline{+21} \\ \hline 45 \geq 20x \quad 20 \quad \left[ \begin{array}{r} 2 \\ 45 \\ \hline -20 \end{array} \right. \end{array}$$

$$\begin{array}{l} x \leq 2.25 \\ x \leq 2\frac{1}{4} \end{array}$$

Mandela is starting a part-time word processing business and plans to charge \$15 per hour. It will cost him \$490 for equipment rental, \$45 for materials and \$65 for a business phone each month. Find the number of hours he must work each month to make a profit of at least \$600.



$$3(x-2) - 2(x+3) \geq 4(x-2) - 5x$$

$$3x + 6 - 2x - 6 \geq 4x - 8 - 5x$$

$$x + -12 > -x - 8$$

$$-x \quad -12 \geq -x - 8$$

$$+8 \quad \quad +8$$

$$\frac{-4}{-2} > \frac{-2x}{-2}$$

$$x > 2$$

$$15 \left[ \frac{1}{3} \cdot (x+2) - 12x \right] \leq 15 \left[ \frac{2}{5}(x+2) - 5 \right]$$

$$\cancel{15} \cdot \frac{1}{3}^5 (x+2) - 12x(15) \leq \cancel{15}^3 \cdot \frac{2}{5} (x+2) + 15(-5)$$

$$5(x+2) - 12x(15) \leq 6(x+2) + 15(-5)$$

$$\begin{array}{r} 5x + 10 - 180x \leq 6x + 12 - 75 \\ -6x \qquad \qquad \qquad -6x \end{array}$$

$$\begin{array}{r} 10 - 181x \leq -63 \\ -10 \qquad \qquad \qquad -10 \end{array}$$

$$\begin{array}{r} -181x \leq -73 \\ \hline -181 \qquad \qquad \qquad -181 \end{array}$$

$$x \geq 73/181$$

$$3x + 12 > 5x + 5 + 2x$$

$$\begin{array}{r} 3x + 12 > 3x + 5 \\ -5 \quad \quad -5 \\ \hline \end{array}$$

$$\begin{array}{r} 3x + 7 > 3x \\ -3x \quad \quad -3x \\ \hline \end{array}$$

$7 > 0$   
 Identity  
 (1)

$$4x - 2 + 3x \leq 7(x - 1) + 9$$