

From 12R 6

$$-3 \leq 1 - 2x < 9$$

$$-4 \leq -2x < 8$$

$$\frac{-4}{-2} \geq \frac{-2x}{-2} > \frac{8}{-2}$$

$$2 \geq x > -4$$

Note: same as:

$$-3 \leq -2x + 1 < 9$$

$$-4 \leq -2x < 8$$

← change the directions of both inequality signs!

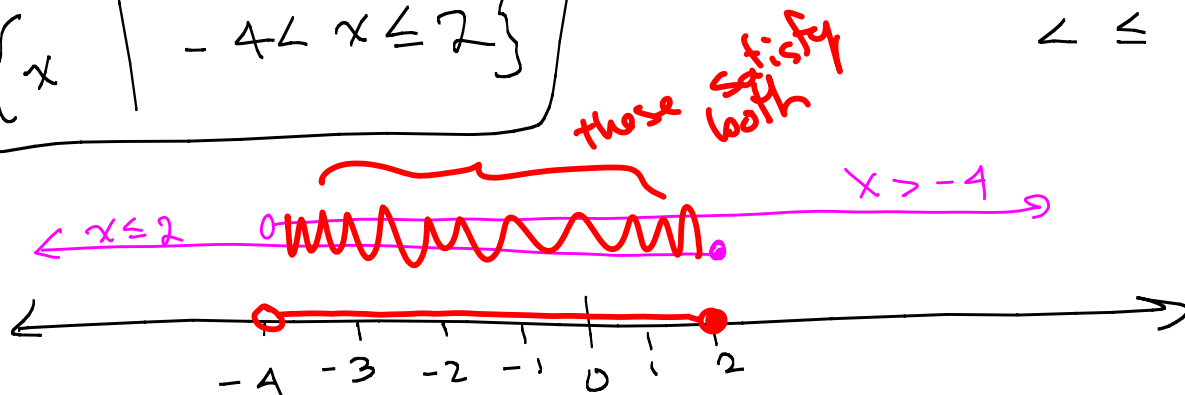
Rewrite it so it goes from smallest to largest left-to-right

(inequality signs flip)

$$-4 < x \leq 2$$

$$\{x \mid -4 < x \leq 2\}$$

$$\begin{aligned} &\leq < \\ \text{or } &\leq \leq \\ &< < \\ &< \leq \end{aligned}$$



$-4 < x \leq 2$ means $-4 < x$ and $x \leq 2$
 $x > -4$

Interval Notation: $[-4, 2]$

Example. Solve.

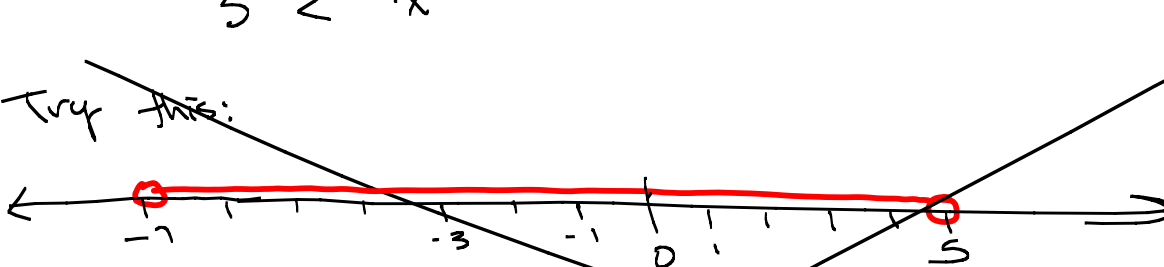
$$11 < 2x+1 < -13$$

$$10 < 2x < -14$$

$$\frac{10}{2} < \frac{2x}{2} < \frac{-14}{2}$$

$$5 < x < -7$$

Try this:



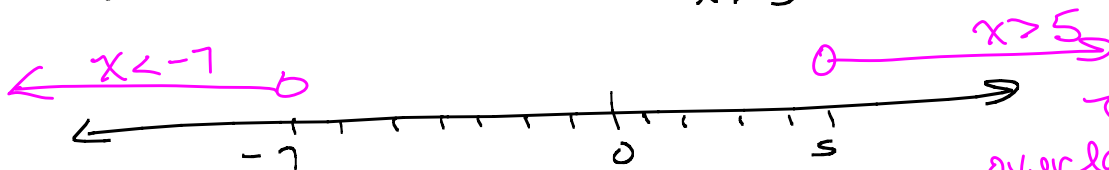
If this were correct, $x=1$ should make the inequality true:

$$5 < 1 < -7$$

No, it's false!

Note: $5 < x < -7$ cannot be true.

Why not? This means $5 < x$ and $x < -7$
 $x > 5$ and $x < -7$



they do not overlap - cannot both be true.

This inequality has

No Solution.

2.8 # 93

2.8.9

$$-1.2a - 0.4 < -0.4a + 2$$

multiply both sides by 10

$$10(-1.2a - 0.4) < 10(-0.4a + 2)$$

$$-12a - 4 < -4a + 20$$

$$-8a - 4 < 20$$

$$-8a < 24$$

$$\frac{-8a}{-8} > \frac{24}{-8} \quad \left[\text{reverse the inequality sign} \right]$$



$$(-3, \infty)$$

$$\{a \mid a > -3\}$$

Ex:

Solve: $\frac{1}{4}x - \frac{3}{8} \geq \frac{2}{3}x + 2$

multiply both sides by 24:

$$24\left(\frac{1}{4}x\right) - 24\left(\frac{3}{8}\right) \geq 24\left(\frac{2}{3}x\right) + 2(24)$$

$$6x - 9 \geq 16x + 48$$

$$-9 \geq 10x + 48$$

$$-57 \geq 10x$$

$$\frac{-57}{10} \geq \frac{10x}{10}$$

$$\frac{-57}{10} \geq x$$

Beginning of Unit 2

2.4.1

2.4: Applications of Linear Equations (Problem Solving - Word Problems)

Example:

One number is 4 more than twice another.
Their sum is 22. Find the numbers.

one number: $2x + 4$
another number: x

sum these.

one number $\xrightarrow{\text{compared to}}$ another number
 x

$$(2x + 4) + x = 22$$

$$2x + 4 + x = 22$$

$$3x + 4 = 22$$

$$3x = 18$$

$$\frac{3x}{3} = \frac{18}{3}$$

$$x = 6$$

another number: $x = 6$

one number: $2x + 4$

Substitute $x = 6$ into

$$\begin{aligned} 2x + 4 &= \\ 2(6) + 4 &= \\ = 12 + 4 &= 16 \end{aligned}$$

Answer in a complete sentence:

The numbers are 16 and 6.

Check: