

Notes 2.4 & 2.5: Solving Multi-step Inequalities

ex) $7x - 4 > -25$

$$\begin{array}{r} +4 \quad +4 \\ \hline 7x > -21 \\ \frac{7x}{7} > \frac{-21}{7} \end{array}$$

$$x > -3$$



ex) $-5 \geq \frac{x}{7} + 1$

Turn The Equ: $\frac{x}{7} + 1 \leq -5$

$$\frac{x}{7} \leq -6$$

$$x \leq -42$$



ex) $\frac{2}{3}x + 15 < 27$

$$\begin{array}{r} -15 \quad -15 \\ \hline \frac{2}{3}x < 12 \end{array}$$

$$\frac{\frac{2}{3}x}{\frac{2}{3}} < \frac{12}{\frac{2}{3}}$$

← keep
← change
← Flip

$$x < 12 \left(\frac{3}{2} \right)$$

$$x < \frac{36}{2}$$

$$x < 18$$



A "Normal" 2 step equation:

- 1) Get rid of number away from variable by doing the opposite (addition or subtraction)
- 2) Multiply or Divide by the ENTIRE number in front of the variable.

*If inequality DOESN'T look normal:

Check for:

- 1) Distributing
- 2) Combining like terms on the SAME side of the equation

ex) $5x + 2 > 3x - 15$

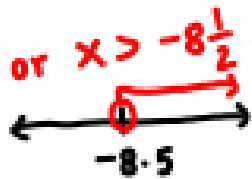
$$\begin{array}{r} -3x \quad -3x \\ \hline \end{array}$$

$$2x + 2 > -15$$

$$\begin{array}{r} -2 \quad -2 \\ \hline \end{array}$$

$$\frac{2x}{2} > \frac{-17}{2}$$

$$x > -\frac{17}{2}$$



ex) $-5x - (2x + 3) \geq 1$

$$\underbrace{-5x - 2x - 3}_{\text{combine}} \geq 1$$

combine

$$-7x - 3 \geq 1$$

$$\begin{array}{r} +3 \quad +3 \\ \hline \end{array}$$

$$\frac{-7x}{-7} \geq \frac{4}{-7}$$

$$x \leq -\frac{4}{7}$$

Flip the sign b/c $\div -7$



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

$$\begin{array}{r} 5x + 20 \geq 3x - 12 \\ -3x \quad -3x \\ \hline \end{array}$$

$$2x + 20 \geq -12$$

$$\begin{array}{r} -20 \quad -20 \\ \hline \end{array}$$

$$\frac{2x}{2} \geq \frac{-32}{2}$$

$$x \geq -16$$



$$\text{ex) } 4 + 9y - 3 \geq 3(3y + 2)$$

$$9y + 1 \geq 9y + 6$$

$$\underline{-9y} \quad \underline{-9y}$$

$$1 \geq 6 \text{ False !!}$$

Answer: No Solution

$$\text{ex) } 2(4x + 7) \geq 8(x - 3)$$

$$8x + 14 \geq 8x - 24$$

$$\underline{-8x} \quad \underline{-8x}$$

$$14 \geq -24 \text{ True !!}$$

Answer: All Real #'s

$$\text{ex) } 4x + 1 > 2(2x - 3)$$

$$4x + 1 > 4x - 6$$

$$\underline{-4x \quad -4x}$$

$$1 > -6 \quad \text{True}$$

All Real #'s

$$\text{ex) } -2(8 - 3x) \geq 6x + 2$$

$$-16 + 6x \geq 6x + 2$$

$$\underline{-6x \quad -6x}$$

$$-16 \geq 2 \quad \text{False}$$

No Solution

*SET UP & SOLVE:

ex) Four times the sum of x and ten is greater than or equal to twenty.

$$4(x+10) \geq 20$$

$$\begin{array}{r} 4x + 40 \geq 20 \\ -40 \quad -40 \\ \hline \end{array}$$

$$\frac{4x}{4} \geq \frac{-20}{4}$$

$$x \geq -5$$

ex) Twelve less than the product of five and a number is than less four more than three times the number.

$$\begin{array}{r} 5x - 12 < 4 + 3x \\ -3x \quad \quad -3x \\ \hline \end{array}$$

$$\begin{array}{r} 2x - 12 < 4 \\ +12 \quad +12 \\ \hline \end{array}$$

$$\frac{2x}{2} < \frac{16}{2}$$

$$x < 8$$

ex) To rent a vehicle, Rent-a-Ride charges \$55 per day with unlimited miles. For a similar vehicle, We-got-Wheels charges \$38 per day plus \$.20 a mile. For what number of miles is the cost at Rent-A-Ride less than the cost at We-got-Wheels?

$$55 < 38 + .20x$$

Turn the Equ.

$$\begin{array}{r} .20x + 38 > 55 \\ - 38 \quad - 38 \\ \hline \end{array}$$

$$.2x > 17$$

$$\begin{array}{r} .2 \\ \hline \end{array} \quad \begin{array}{r} .2 \\ \hline \end{array}$$

$$x > 85$$

X
For more than 85 mile
the cost of Rent-a-Ride
is less than We-got-Wheel

ex) The Cypress Circuit charges a fee of \$650 plus \$80 per week to run an ad. The Bay Baddie charges \$145 per week to run the same ad. For how many weeks will the total cost at The Cypress Circuit be less expensive than the cost at the Bay Baddie ✗

$$\begin{array}{r} 650 + 80X < 145X \\ -80X \quad -80X \\ \hline \end{array}$$

$$\begin{array}{r} 650 < 65X \\ \hline 65 \quad 65 \end{array}$$

$$10 < X$$

$$X > 10$$

For more than 10 weeks the cost of Cypress Circuit is less expensive than the bay Baddie.