

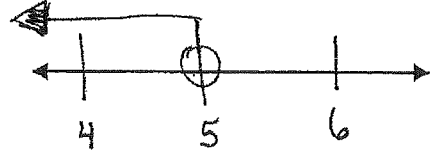
1.5 and 1.6 Solving Inequalities

*The same as solving equations but when you multiply or divide by a Negative number you must Reverse the inequality symbol.
 "flip"

Ex. 1 Solve each inequality and graph the solution.

$$\begin{aligned} \text{a. } 3x - 12 &< 3 \\ +12 \quad +12 & \\ \hline 3x &< 15 \\ \frac{3x}{3} &< \frac{15}{3} \end{aligned}$$

$$x < 5$$

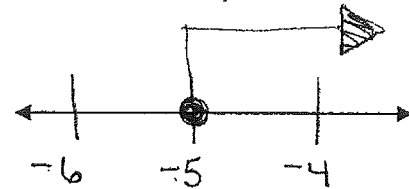


$$\text{b. } 6 + 5(2 - x) \leq 41$$

$$6 + 10 - 5x \leq 41$$

$$\begin{aligned} 16 - 5x &\leq 41 \\ -16 \quad -16 & \\ \hline -5x &\leq 25 \end{aligned}$$

$$\frac{-5x}{-5} \leq \frac{25}{-5} \quad x \geq -5$$

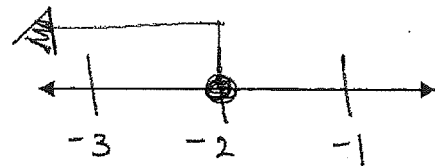


$$\text{c. } 12 \geq 2(3n + 1) + 22$$

$$12 \geq 6n + 2 + 22$$

$$\begin{aligned} 12 &\geq 6n + 24 \\ -24 \quad -24 & \\ \hline -12 &\geq 6n \end{aligned}$$

$$\frac{-12}{6} \geq \frac{6n}{6} \quad -2 \geq n \quad n \leq -2$$



Some inequalities have NO solutions and some are true for ALL REAL numbers.

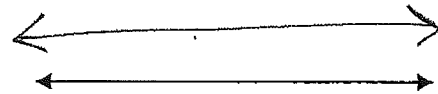
Variable Disappeared

Ex. 2 Solve each inequality and graph the solution.

$$\text{a. } 2x - 3 > 2(x - 5)$$

$$\begin{aligned} 2x - 3 &> 2x - 10 \\ -2x \quad -2x & \\ \hline -3 &> -10 \end{aligned} \quad \text{True Stmt}$$

\mathbb{R} All Real #

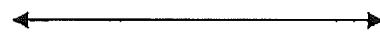


$$\text{b. } 7x + 6 < 7(x - 4)$$

$$\begin{aligned} 7x + 6 &< 7x - 28 \\ -7x \quad -7x & \\ \hline 6 &< -28 \end{aligned}$$

False

No Solution \emptyset



Solving Compound Inequalities

Compound inequality -

"and" stmts

$$3 < x < 5$$



"or" stmts

$$x < 3 \text{ or } x > 5$$

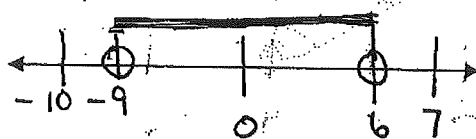


Ex. 1 "AND" inequalities. Solve and graph the solution.

a. $3x - 1 > -28$ and $2x + 7 < 19$

$$\begin{array}{r} +1 \quad +1 \\ \hline 3x > -27 \end{array} \quad \begin{array}{r} -7 \quad -7 \\ \hline 2x < 12 \end{array}$$

$$\boxed{x > -9 \text{ and } x < 6}$$

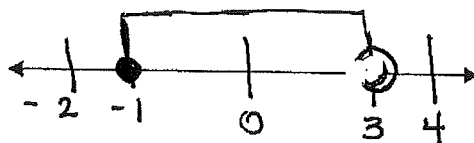


$$\boxed{-9 < x < 6}$$

b. $2x - 1 \leq 3x$ and $x > 4x - 9$

$$\begin{array}{r} -2x \quad -2x \\ \hline -1 \leq x \end{array} \quad \begin{array}{r} -4x \quad -4x \\ \hline -3x > -9 \end{array}$$

$$\boxed{x \geq -1 \text{ and } x < 3}$$



$$\boxed{-1 \leq x < 3}$$

Ex. 2 "OR" inequalities. Solve and graph the solution.

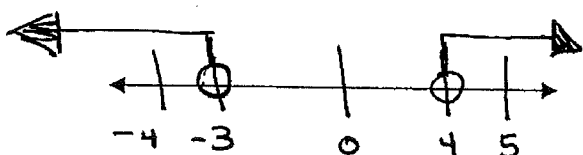
a. $4y - 2 > 14$ or $3y - 4 < -13$

$$\begin{array}{r} +2 \quad +2 \\ \hline 4y > 16 \end{array} \quad \begin{array}{r} +4 \quad +4 \\ \hline 3y < -9 \end{array}$$

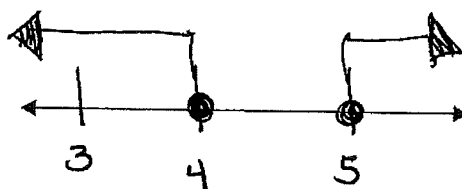
$$y > 4 \text{ or } y < -3$$

b. $x - 1 \leq 3$ or $x + 3 \geq 8$

$$\begin{array}{r} +1 \quad +1 \\ \hline x \leq 4 \end{array} \quad \begin{array}{r} -3 \quad -3 \\ \hline x \geq 5 \end{array}$$



$$\boxed{y < -3 \text{ or } y > 4}$$

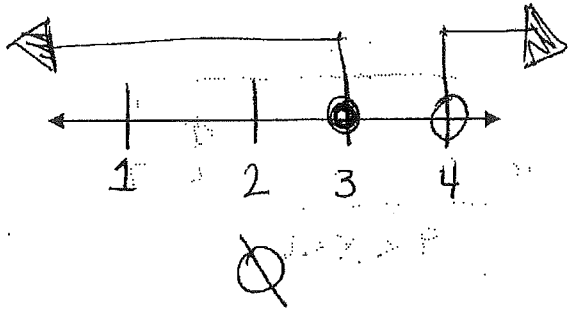


$$\boxed{x \leq 4 \text{ or } x \geq 5}$$

Ex. 3 Special Cases. Solve and graph the solution.

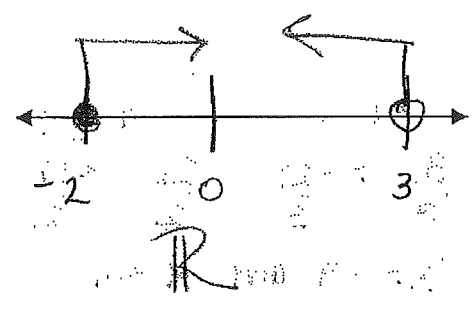
a. $3 \geq x > 4$

$3 \geq x$
 $x > 4$
 $x \leq 3$



No Solution

b. $x \geq -2$ or $x < 3$

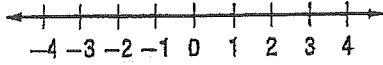


\mathbb{R}

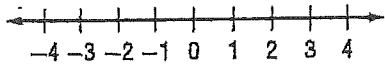
Solving Inequalities Practice

Solve each inequality. Graph the solution set on a number line.

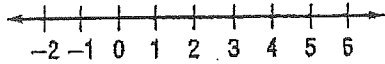
1. $-3k - 8 \leq 5k$



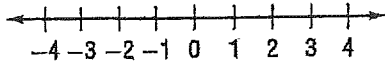
2. $7t - (t - 4) \leq 25$



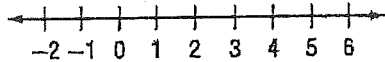
3. $0.7m + 0.3m \geq 2m - 4$



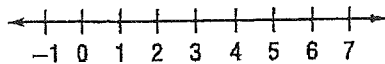
4. $4(5x + 7) \leq 13$



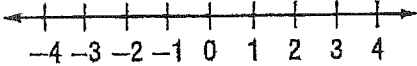
5. $1.7y - 0.78 > 5$



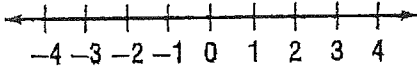
6. $4x - 9 > 2x + 1$



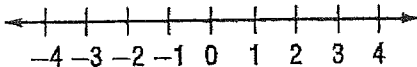
7. $2c + 1 > 5$ or $c < 0$



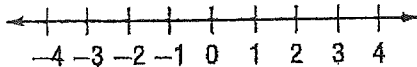
8. $-11 \leq 4y - 3 \leq 1$



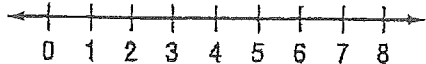
9. $10 > -5x > 5$



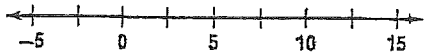
10. $4a \geq -8$ or $a < -3$



11. $8 < 3x + 2 \leq 23$



12. $w - 4 \leq 10$ or $-2w \leq 6$



13. **HOTELS** The Lincoln's hotel room costs \$90 a night. An additional 10% tax is added. Hotel parking is \$12 per day. The Lincoln's expect to spend \$30 in tips during their stay. Solve the inequality $90x + 90(0.1)x + 12x + 30 \leq 600$ to find how many nights the Lincoln's can stay at the hotel without exceeding total hotel costs of \$600.

14. **BANKING** Jan's account balance is \$3800. Of this, \$750 is for rent. Jan wants to keep a balance of at least \$500. Write and solve an inequality describing how much she can withdraw and still leave enough for rent and a \$500 balance.

15. The U.S. Mint produces quarters that weigh about 5.67 grams each. After the quarters are produced, a machine weighs them. If the quarter weighs 0.02 grams more or less than the desired weight, the quarter is rejected. Write and solve an equation to find the heaviest and lightest quarters the machine will approve.