

3.4- > SOLVING MULTI-STEP INEQUALITIES

**Undo addition and subtraction first, then multiplication and division.

Solve each inequality, and graph your solution.

$$1. \begin{array}{r} 7 + 6a > 19 \\ -7 \quad -7 \\ \hline \end{array}$$

$$a > 2$$



$$2. \begin{array}{r} -3x - 4 \leq 14 \\ +4 \quad +4 \\ \hline \end{array}$$

$$x \geq -6$$

$$\text{FLIP} \quad \begin{array}{r} -3x \leq 18 \\ -3 \quad -3 \\ \hline \end{array}$$



$$3. \begin{array}{r} 5 < 7 - 2t \\ -7 \quad -7 \\ \hline \end{array}$$

$$t > 1$$

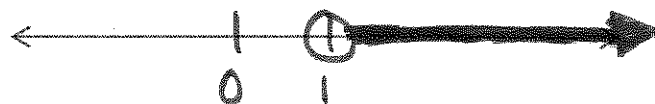
$$\text{FLIP} \quad \begin{array}{r} -2 < -2t \\ -2 \quad -2 \\ \hline \end{array}$$



$$4. \begin{array}{r} 16 - 2c < 14 \\ -16 \quad -16 \\ \hline \end{array}$$

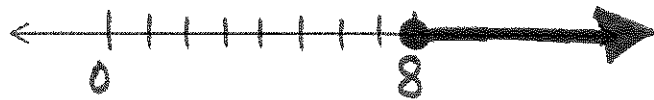
$$c > 1$$

$$\text{FLIP} \quad \begin{array}{r} -2c < -2 \\ -2 \quad -2 \\ \hline \end{array}$$



$$\begin{array}{r}
 5. \quad -4 \leq \frac{x}{4} + 6 \\
 \quad +6 \quad +6 \\
 \hline
 (4) 2 \leq \frac{x(4)}{4} \\
 \quad 8 \leq x
 \end{array}$$

$x \geq 8$



Using Distributive Property:

$$\begin{array}{r}
 6. \quad 2(t+2) - 3t \geq -1 \\
 \quad 2t + 4 - 3t \geq -1 \\
 \quad -t + 4 \geq -1 \\
 \quad \quad -4 \quad -4 \\
 \hline
 \quad -t \geq -5 \\
 \quad \quad -1 \quad -1 \\
 \hline
 \text{FLIP} \quad t \geq -5
 \end{array}$$

$t \leq 5$



$$\begin{array}{r}
 7. \quad 4p + 2(p+7) < 8 \\
 \quad 4p + 2p + 14 < 8 \\
 \quad 6p + 14 < 8 \\
 \quad \quad -14 \quad -14 \\
 \hline
 \quad 6p < -6 \\
 \quad \quad 6 \quad 6 \\
 \hline
 \quad p < -1
 \end{array}$$

$p < -1$



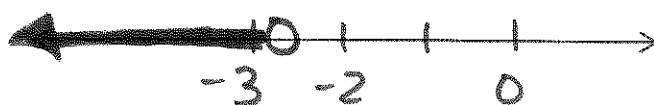
$$\begin{array}{r}
 8. \quad 15 \leq 5 - 2(4m+7) \\
 \quad 15 \leq 5 - 8m - 14 \\
 \quad 15 \leq -8m - 9 \\
 \quad +9 \quad +9 \\
 \hline
 \quad 24 \leq -8m \\
 \quad \quad -8 \quad -8 \\
 \hline
 \text{FLIP} \quad 3 \geq -m \\
 \quad \quad -1 \quad -1 \\
 \hline
 \quad m \leq -3
 \end{array}$$

$m \leq -3$

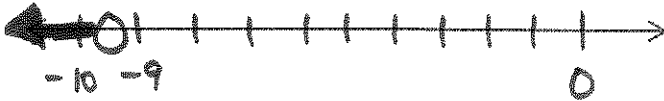


$$\begin{array}{r}
 9. \quad -3(x-1) > 8 \\
 \quad -3x + 3 > 8 \\
 \quad \quad -3 \quad -3 \\
 \hline
 \quad -3x > 5 \\
 \quad \quad -3 \quad -3 \\
 \hline
 \text{FLIP} \quad x < -5/3 \\
 \quad \quad -3 \quad -3 \\
 \hline
 \quad x < -2\frac{2}{3}
 \end{array}$$

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

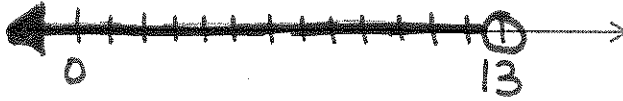


10. $\frac{1}{2}(2d + 3) < -8$


$$\begin{array}{r} d + 1.5 < -8 \\ -1.5 \quad -1.5 \\ \hline d < -9.5 \end{array}$$


Variables on Both Sides:

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

$$\begin{array}{r} 6z - 15 < 4z + 11 \\ -4z \quad -4z \\ \hline 2z - 15 < 11 \\ +15 \quad +15 \\ \hline 2z < 26 \\ \frac{2z}{2} < \frac{26}{2} \\ z < 13 \end{array}$$


12. $8x - 6 < 3x + 12$

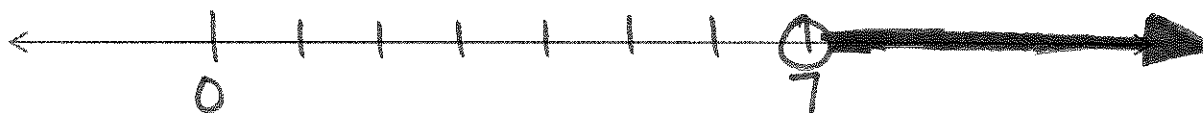
$$\begin{array}{r} 8x - 6 < 3x + 12 \\ -3x \quad -3x \\ \hline 5x - 6 < 12 \\ +6 \quad +6 \\ \hline 5x < 18 \\ \frac{5x}{5} < \frac{18}{5} \\ x < 3\frac{3}{5} \end{array}$$


Word Problems:

13. Four times a number less 6 is greater than 2 times the number plus 8. For what numbers is this true?

$$\begin{array}{r}
 4x - 6 > 2x + 8 \\
 -2x \quad -2x \\
 \hline
 2x - 6 > 8 \\
 +6 \quad +6 \\
 \hline
 2x > 14 \\
 \frac{2x}{2} > \frac{14}{2}
 \end{array}$$

$$x > 7$$



14. Alex's telephone company charges \$10 a month plus \$.05 per minute. Alex wants his monthly bill to be under \$30. What is the greatest number of minutes he can talk?

$$\begin{array}{r}
 10 + .05m < 30 \\
 -10 \quad -10 \\
 \hline
 .05m < 20 \\
 \frac{.05m}{.05} < \frac{20}{.05}
 \end{array}$$

$$\begin{array}{l}
 m < 400 \\
 \text{Up to 400 minutes}
 \end{array}$$

