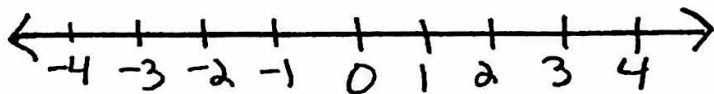


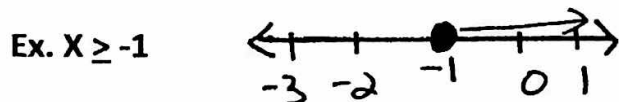
Inequality NOTES:

$<$ Less Than $>$ Greater Than \leq Less than or equal to \geq Greater than or equal to



○ Open Circle means $<$ or $>$

● Closed Circle means \leq or \geq



- If Variable is on the left, then shade direction arrow points

Ex. $n \leq 3$ shade left

Ex. $n \geq 3$ shade right

- When you divide by a negative number, you have to switch the inequality sign.

Ex. $-4x < 12$

$$\frac{-4x}{-4} < \frac{12}{-4}$$
$$x > -3$$

Ex. $4x < -12$

$$\frac{4x}{4} < \frac{-12}{4}$$
$$x < -3$$

Multi-Step Inequalities Notes

SOLVING AND GRAPHING INEQUALITIES:

1) $-36 > 3(3m - 3)$

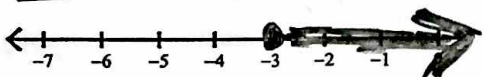


$$\begin{array}{r} -36 > 9m - 9 \\ +9 & +9 \end{array}$$

$$\frac{-27 > 9m}{9 \quad 9}$$

$$\boxed{-3 > m \text{ or } m < -3}$$

3) $-3(2 - 3n) \geq -33$



$$\begin{array}{r} -6 + 9n \geq -33 \\ +6 & +6 \end{array}$$

$$\frac{9n \geq -27}{9 \quad 9}$$

$$\boxed{n \geq -3}$$

DIVIDING BY A NEGATIVE:

5) $3(-5r + 1) \geq 63$



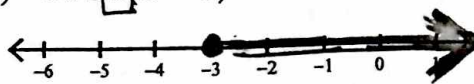
$$\begin{array}{r} -15r + 3 \geq 63 \\ -3 & -3 \end{array}$$

negative # \rightarrow

$$\frac{-15r \geq 60}{-15 \quad -15}$$

$$\boxed{r \leq -4}$$

2) $-36 \leq 3(3r - 3)$



$$\begin{array}{r} -36 \leq 9r - 9 \\ +9 & +9 \end{array}$$

$$\frac{-27 \leq 9r}{9 \quad 9}$$

$$\boxed{-3 \leq r \text{ or } r \geq -3}$$

4) $33 < -r + 3(3 + 3r)$



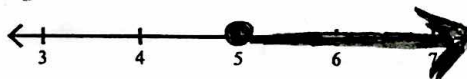
$$33 < -r + 9 + 9r$$

$$\begin{array}{r} 33 < 8r + 9 \\ -9 & -9 \end{array}$$

$$\frac{24 < 8r}{8 \quad 8}$$

$$\boxed{3 < r \text{ or } r > 3}$$

6) $-2(5v + 3) - 4v \leq -76$



$$\begin{array}{r} -10v - 6 - 4v \leq -76 \end{array}$$

$$\begin{array}{r} -14v - 6 \leq -76 \\ +6 & +6 \end{array}$$

negative # \rightarrow

$$\frac{-14v \leq -70}{-14 \quad -14}$$

$$\boxed{v \geq 5}$$

$$7) \boxed{-4}(3x - 4) \geq 64$$

$$\begin{array}{r} -12x + 16 \geq 64 \\ -16 \quad -16 \\ \hline \end{array}$$

negative # \rightarrow

$$\begin{array}{r} -12x \textcircled{7} 48 \\ -12 \quad -12 \\ \hline \end{array}$$

$$\boxed{x \leq -4}$$

$$8) \boxed{5}(5 - 4n) < -55$$

$$\begin{array}{r} 25 - 20n < -55 \\ -25 \quad -25 \\ \hline \end{array}$$

negative # \rightarrow

$$\begin{array}{r} -20n \textcircled{7} -80 \\ -20 \quad -20 \\ \hline \end{array}$$

$$\boxed{n > 4}$$

VARIABLES ON BOTH SIDES:

$$9) \boxed{2}(-4 - 2a) \geq 16 + 2a$$

$$\begin{array}{r} -8 - 4a \geq 16 + 2a \\ +8 - 2a \quad +8 - 2a \\ \hline \end{array}$$

$$\begin{array}{r} -6a \textcircled{7} 24 \\ -6 \quad -6 \\ \hline \end{array}$$

$$\boxed{a \leq -4}$$

$$11) 3p + 11 \leq \boxed{-3}(2p - 4) - 1$$

$$3p + 11 \leq -6p + 12 - 1$$

$$\begin{array}{r} 3p + 11 \leq -6p + 11 \\ +6p - 11 \quad +6p - 11 \\ \hline \end{array}$$

$$\frac{9p}{9} \leq \frac{0}{9}$$

$$\boxed{p \leq 0}$$

$$10) 6 - 2k > \boxed{1}(-1 - 3k)$$

$$\begin{array}{r} 6 - 2k > -1 - 3k \\ -6 - 3k \quad -6 - 3k \\ \hline \end{array}$$

$$\begin{array}{r} -5k \textcircled{7} -5 \\ -5 \quad -5 \\ \hline \end{array}$$

$$\boxed{k < 1}$$

$$12) \boxed{3}(3x + 3) \leq x + 1$$

$$\begin{array}{r} 9x + 9 \leq x + 1 \\ -x - 9 \quad -x - 9 \\ \hline \end{array}$$

$$\frac{8x}{8} \leq \frac{-8}{8}$$

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