

# Inequalities and Their Graphs Guide Notes

**INEQUALITY** is a mathematical sentence that uses an inequality symbol to compare the values of two expressions.

$$a < b \quad a \text{ less than } b$$

$$a > b \quad a \text{ greater than } b$$

$$a \neq b \quad a \text{ is not equal to } b$$

$$a \leq b \quad a \text{ less than or equal to } b$$

$$a \geq b \quad a \text{ greater than or equal to } b$$

**Sample Problem 1:** Determine if each inequality is true or false.

A.  $3 + 2 > 7 - 3$  **TRUE**

$$5 > 4$$

C.  $5 + 6 \geq 10 + 2$  FALSE

$$11 \geq 12$$

B.  $-8 + 3 \leq 3 - 8$  **TRUE**

$$-5 \leq -5$$

D.  $9 + 4 < 6 + 1 + 6$  FALSE

$$13 < 13$$

**Sample Problem 2:** Write each algebraic expression from the verbal expression.

A. The sum of  $x$  and 16 is greater than or equal to 32.  $x + 16 \geq 32$

B. The product of 13 and  $x$  is less than 36.  $13x < 36$

C. The difference of  $x$  and 9 is greater than 21.  $x - 9 > 21$

D. The ratio of  $x$  and 4 is less than or equal to 15.  $\frac{x}{4} \leq 15$

**SOLUTION OF AN INEQUALITY** is any number that produces a true statement when it is substituted for the variable in the inequality.

**Sample Problem 3:** Determine whether 6 is the solution for each inequality.

A.  $2x - 3 < 8$  **6 is not a solution**

$$2(6) - 3 < 8$$

$$12 - 3 < 8$$

$$9 < 8$$

B.  $x - 5 \geq 1$  **6 is a solution**

$$6 - 5 \geq 1$$

$$1 \geq 1$$

C.  $x + 6 > 11$  **6 is a solution**

$$6 + 6 > 11$$

$$12 > 11$$

D.  $12 + x \leq 17$  **6 is not a solution**

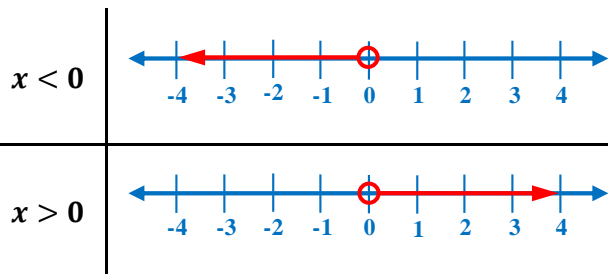
$$12 + 6 \leq 17$$

$$18 \leq 17$$

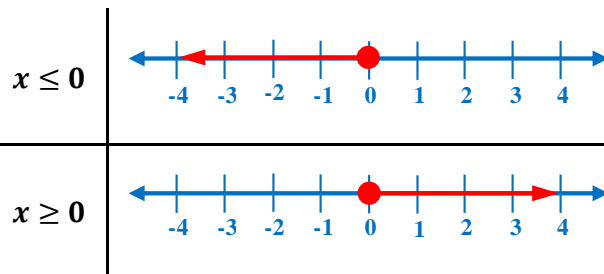
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**GRAPH** an inequality is the set of points on a number line that represent all solutions of the inequality.

**OPEN CIRCLE**



**CLOSED CIRCLE**

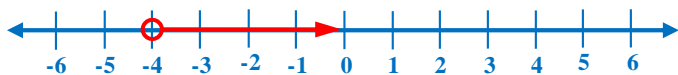


**Sample Problem 4:** Graph each inequality.

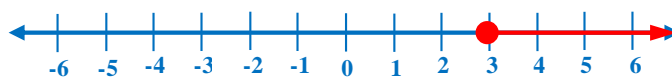
A.  $x < -5$



C.  $x > -4$



B.  $x \geq 3$



D.  $x \leq 8$

