

INEQUALITIES

Math I/Algebra II

INEQUALITIES

Symbol	Words	Example
$>$	greater than	$x + 14 > 7$
$<$	less than	$10x < 40$
\geq	greater than or equal to	$2x - 1 \leq 5$
\leq	less than or equal to	$3y + 3 \leq 18$

HOW TO SOLVE

- ⦿ Our goal is to have x (or whatever the variable is) by its self on the left of the inequality sign
- ⦿ Example: $x < 5$ or: $y \geq 11$. We call that "solved".
- ⦿ Solving inequalities is very like solving equations. You do the same things, except using the inequality signs instead of the $=$ signs.

CHANGING DIRECTIONS

- ⦿ The difference is that you must pay attention to the direction of the inequality, when solving the problems and when multiplying and dividing by a negative number.
- ⦿ Pay attention to the direction or the way the arrow points because some things you do will change the direction!
- ⦿ $<$ would become $>$
- ⦿ $>$ would become $<$
- ⦿ \leq would become \geq
- ⦿ \geq would become \leq

EXAMPLES

1. Example: $3x < 7+3$ -----→ $3x < 10$

You can simplify $7+3$ without affecting the inequality.

2. Example: $x + 3 < 7$ -----→ $x < 4$

If we subtract 3 from both sides, you can simplify without affecting the inequality.

3. Example: $12 < x + 5$ -----→ $7 < x$ or $x > 7$

If we subtract 5 from both sides, you can simplify without affecting the inequality.

EXAMPLES

4. Example: $3y < 15$ ----- $\rightarrow y < 5$

If we divide both sides by 3, the inequality is not affected.

5. Example: $(x / 4) > 5$ ----- $\rightarrow x > 20$

If we multiply both sides by 4, the inequality is not affected.

6. Example: $(x/3)+2 > 5$ ----- $\rightarrow x > 9$

If we subtract 2 from both sides and then multiply by 3, the inequality is not affected.

WHEN TO CHANGE THE INEQUALITY

When you multiply or divide by a **negative number**, you have to **reverse** the inequality.

1. **Example:** $-2y < -8$ ----- $\rightarrow y > 4$

If we divide both sides by -2 , then you must reverse the inequality.

2. **Example:** $(x/-6) > 12$ ----- $\rightarrow x < -72$

If we multiply both sides by -6 , then you must reverse the inequality.

NOW YOU TRY SOME PROBLEMS:

1. $m - 4 < 3$

2. $13 > 18 + r$

3. $p - 6 > 3$

4. $4 > h - 26$

5. $-9 + 2a < 3a$

6. $3y + 6 < 2y$

7. $8 < -2r - 14$

8. $-7 > 20 + c$

USING THE NUMBER LINE TO REPRESENT INEQUALITIES

- A small, open circle is used for $<$ and $>$ to indicate that the number is not included.
- A small, filled-in circle is used for \leq and \geq to indicate that the number is included.
- A dotted line with an arrow indicates that the line continues to infinity in the direction of the arrow.
- A solid line with an arrow indicates that the line continues to infinity in the direction of the arrow.

EXAMPLES

Represent each inequality on a number line.

- ⦿ a) $x \leq 0$
- ⦿ b) $x > -2$
- ⦿ c) $x < 1$
- ⦿ d) $x \geq 1$

SOLUTIONS

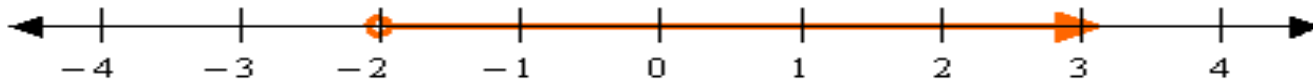
a)

$$x \leq 0$$



b)

$$x > -2$$



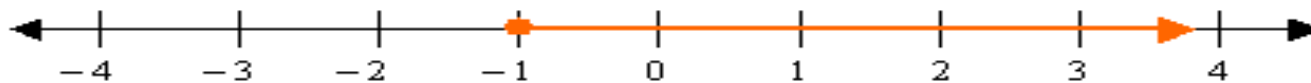
c)

$$x < 1$$



d)

$$x \geq -1$$



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