

Some Algebra Essentials — R.2

Inequality Signs

The inequality symbol, $<$, means *less than*.

The inequality symbol, \leq , means *less than or equal to*.

The inequality symbol, $>$, means *greater than*.

The inequality symbol, \geq , means *greater than or equal to*.

Homework:

(do after section covered in lecture)

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Translate the following into a mathematical expression.

1. a number is positive
2. a number is negative
3. a number is nonnegative
4. w is less than 8
5. the quotient of x and 3 is greater than or equal to 5
6. the absolute value of x is not less than 2

Absolute Value

First Definition: The **absolute value of a** , denoted $|a|$, is mathematically defined as

$$|a| = \begin{cases} a, & \text{if } a \geq 0 \\ -a, & \text{if } a < 0 \end{cases} \quad \text{or equivalently} \quad |a| = \sqrt{a^2}$$

Rewrite the number (expression) without using the absolute value symbol and simplify the result. Give exact answers.

7. $|3 - 8|$
8. $|-5| + \left| \frac{1}{2} \right| - \left| \frac{3}{2} \right|$
9. $|\sqrt{3} - 1.7|$
10. $|\pi - 4|$
11. $|x + 2|$ if $x > -2$
12. $|x + 6|$ if $x < -6$
13. $|a - b|$ if $a > b$

Second Definition: The **absolute value of a** , $|a|$, is the distance between a and zero.

$$d(a, 0) = |0 - a| \quad \text{or equivalently} \quad |a - 0|$$

Note: The distance between any two points A and B on a number line, with coordinates a and b respectively) is

$$d(A, B) = |b - a| \quad \text{or equivalently} \quad |a - b|$$

Find the distance between 2 and 12.

The given two numbers are coordinates of points A and B , respectively, on a coordinate line. Express the indicated statement as an inequality involving the absolute value symbol.

14. x , $\sqrt{3}$ $d(A, B)$ is less than 8

15. -7 , x $d(A, B)$ is at least 3