

Real Numbers and Algebraic Expressions

Definition of real numbers

The real numbers are the numbers that have a one-to-one correspondence with the points on a real number line.

What are some examples of real numbers?

What are some numbers that are not real numbers?

Subsets of the real numbers:

Natural Numbers:

Whole Numbers:

Integers:

Rational Numbers:

Irrational Numbers:

Interval Notation:

$$(2, 6)$$

$$[-2, 4]$$

$$\left(-\frac{1}{2}, \frac{13}{2}\right]$$

$$(-\infty, 4]$$

$$(-2, \infty)$$

$$(-2, 4) \cup (2, 7]$$

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Absolute Value:

$$|x| = \begin{cases} x & \text{for } x \geq 0 \\ -x & \text{for } x < 0 \end{cases}$$

Simplify the following

$$|2 - 5|$$

$$- |3 + 4|$$

$$|3 - |2 - 5||$$

$$|x|$$

Order of Operations (*PEMDAS*)

Evaluate the following $2 + 3 \div (4 + 2) 3 - 2$

Evaluate the following using a calculator:

$$\frac{2 + \frac{5}{2.12 + 3.14} - 2.12 \times 4.21}{\sqrt{4.15 - 2.67} + 2.143}$$

Field Properties of Algebra:

Name Of Property	Additive Version	Multiplicative Version
Closure	$a + b$ is a real number	ab is a real number
Commutative	$a + b = b + a$	$ab = ba$
Associative	$a + (b + c) = (a + b) + c$	$a(bc) = (ab)c$
Identity	$a + 0 = a$	$a(1) = a$
Inverse	$a + (-a) = 0$	$a(\frac{1}{a}) = 1$ for $a \neq 0$
Distributive	$a(b + c) = ab + ac$	$a(b + c) = ab + ac$

Zero Factor Property:

If $AB = 0$ then $A = 0$ or $B = 0$.

Cancellation Properties:

If $A = B$ then $A + C = B + C$

Adding the same quantity to both sides of an equation results in an equivalent equation.

For $C \neq 0$, If $A = B$ then $AC = BC$

Multiplying both sides of an equation by the same non-zero quantity results in an equivalent equation.