

# Properties of Real Numbers

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## Commutative Properties

Addition:  $a + b = b + a$

$$(11 + r) + 8 = (r + 11) + 8$$

Multiplication:  $a \cdot b = b \cdot a$

$$3 \cdot 5 = 5 \cdot 3$$

## Examples:

## Associative Properties

Addition:  $(a + b) + c = a + (b + c)$

$$2 + (x + 5) = (2 + x) + 5$$

Multiplication:  $(a \cdot b) \cdot c = a \cdot (b \cdot c)$

$$(4 \cdot y) \cdot 9 = 4 \cdot (y \cdot 9)$$

## Distributive Property of Multiplication over Addition

$$a(b + c) = ab + ac$$

$$9(3 + r) = 9 \cdot 3 + 9 \cdot r$$

## Identities for Addition and Multiplication

Addition:  $a + 0 = a$  &  $0 + a = a$

$$0 + 6 = 6$$

Multiplication:  $a \cdot 1 = a$  &  $1 \cdot a = a$

$$1 \cdot 9 = 9$$

## Additive or Multiplicative Inverses

Additive:  $a + (-a) = 0$

$$5 + (-5) = 0$$

Multiplicative:  $a \cdot \frac{1}{a} = 1$

$$5 \cdot \frac{1}{5} = 1$$