

Mathematical Properties

Name of Law	Comments	Examples
1) Addition Property of 0 2) Identity Property of Addition	→ Any # added to 0 is itself. → 0 is the additive identity element	$a + 0 = a$ $5 + 0 = 5$
Multiplication Property of 0	Any # multiplied by 0 equals 0.	$a \cdot 0 = 0$ $3 \cdot 0 = 0$
1) Multiplication Property of 1 2) Identity Property of Multiplication	→ Any # multiplied by 1 is itself. → 1 is the multiplicative identity element.	$a \cdot 1 = a$ $4 \cdot 1 = 4$
Associative Property of Addition	Represents a grouping () change. Terms are in the same order	$a + (b + c) = (a + b) + c$ $2 + (3 + 4) = (2 + 3) + 4$
Associative Property of Multiplication	Represents a grouping () change. Terms are in the same order	$a \cdot (b \cdot c) = (a \cdot b) \cdot c$ $2 \cdot (3 \cdot 4) = (2 \cdot 3) \cdot 4$
Commutative Property of Addition	Represents an order change	$a + b = b + a$ $2 + 3 = 3 + 2$
Commutative Property of Multiplication	Represents an order change	$a \cdot b = b \cdot a$ $2 \cdot 3 = 3 \cdot 2$
(Distributive) Property of multiplication over addition (or subtraction)	multiply whatever is outside the paren theses to everything inside the ()	$a(b + c) = ab + ac$ $2(3 + 4) = 2(3) + 2(4)$ $a(b - c) = ab - ac$ $2(8 - 5) = 2(8) - 2(5)$
Additive Inverse Property opposite	Rule: change the sign * Their sum is 0.	$a + (-a) = 0$ $3 + -3 = 0$
Multiplicative Inverse Property (Reciprocal)	Rule: Flip the fraction, don't change the sign. * their product is 1 $\frac{3}{2} \rightarrow \frac{2}{3}$	$a \cdot \left(\frac{1}{a}\right) = 1$

Assoc. are not

Commutative

means to multiply

Examples: Name the Mathematical Property

1. $8 \times 1 = 8$ mult. Prop. of 1 6. $(5 \cdot 2) \cdot 4 = 5 \cdot (2 \cdot 4)$ Assoc. Prop. of mult.
2. $4 + 0 = 4$ Add. Prop. of 0 7. $21 \cdot 0 = 0$ Mult. Prop. of 0 ○
3. $(7 + 5) + 1 = 7 + (5 + 1)$ Assoc. Prop. of + 8. $3(5 - 9) = 3(5) - 3(9)$ Dist Prop
4. $(9)(10) = (10)(9)$ Comm Prop. of • 9. $7(3 + 5) = 7(3) + 7(5)$ Dist Prop
5. $2 + 9 = 9 + 2$ Comm Prop. of +

The commutative property represents a(n) order change.

The associative property represents a(n) grouping () change.

Complete this sentence using DPMA (Distributive Property): $ac + ad = a(c + d)$

What number is the identity element in addition? 0

What number is the identity element in multiplication? 1

Numbers that act as 'mirrors' are called Inverse
opposites

Extra Practice: Replace the blank with a term that makes the sentence true and then name the property that is exhibited.

1. $7 + (3 + 4) = 7 + (4 + 3)$ Comm Prop. of + 4. $5 + (1 + 2) = (5 + 1) + 2$ Associative Prop. of + ○
2. $7 \cdot 0 = 0$ Mult. Prop. of 0 5. $8(1) = 8$ Mult. Prop. of 1
3. $5(7 + 4) = 5(7) + 5(4)$ Dist Prop. 6. $x(y + z) = (y + z)x$ Comm Prop. of •

Examples: Identify which property each one of the following represent

1) $x + 9 = 9 + x$

Comm Prop. of +

4) $3(x + 5) = 3x + 15$

Distributive Prop.

2) $2(x + 3) = 2x + 6$

Distributive Prop.

5) $(xy)z = x(yz)$

Associative Prop. of mult.

3) $x + (y + 3) = (x + y) + 3$

Associative Prop. of +

6) $8 \cdot 9 = 9 \cdot 8$

Comm Prop. of mult. ○