



Properties of Real Numbers

KEY IDEA

A property is a rule that is always true, for every number. Commutative means order can change ($a + b = b + a$). Associative means grouping can change ($(a + b) + c = a + (b + c)$). Distributive spreads a multiplier across a sum ($a(b + c) = ab + ac$). Identity leaves a number unchanged ($+ 0$ or $\times 1$). Inverse undoes a number ($a + (-a) = 0$, $a \cdot 1/a = 1$).

How to do it

1. Look at what changed between the two sides of the equal sign.
2. If only the *order* changed, it is Commutative.
3. If only the *parentheses* moved, it is Associative.
4. If a number outside parentheses was multiplied through, it is Distributive.
5. If the result is the number you started with, it is Identity; if the result is 0 or 1, it is Inverse.

Worked examples

Example 1. $3 \cdot \frac{1}{3} = 1$

Example 2. $(12 \cdot 2) \cdot n = 12 \cdot (2 \cdot n)$

Associative Property of Multiplication

Example 3. $(8 + 11) + x = 8 + (11 + x)$

Associative Property of Addition

Example 4. $5(x + 2) = 5x + 10$

Distributive Property





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Directions: Name the property illustrated by each statement.

1. $(6 + 2) + y = 6 + (2 + y)$

2. $7 + (-7) = 0$

3. $3 + n = n + 3$

4. $8 + y = y + 8$

5. $m + 0 = m$

6. $(9 + 10) + m = 9 + (10 + m)$

7. $x + 0 = x$

8. $4x = x \cdot 4$

9. $9 + (-9) = 0$

10. $6y \cdot 1 = 6y$

11. $12m = m \cdot 12$

12. $2 + (-2) = 0$

13. $(3 \cdot 8) \cdot y = 3 \cdot (8 \cdot y)$

14. $2m \cdot 1 = 2m$

15. $4 \cdot \frac{1}{4} = 1$

16. $11m \cdot 1 = 11m$

17. $y + 0 = y$

18. $3m \cdot 1 = 3m$

19. $6 \cdot \frac{1}{6} = 1$

20. $n + 0 = n$

