



Properties of Addition & Multiplication

for Ms. Davis's
5th-Grade Math Classes

Before We Begin...

- What do these symbols mean?

$()$ = multiply: $6(2)$ or group: $(6 + 2)$

$*$ = multiply

\bullet = multiply

\div = divide

$/$ = divide

Before We Begin...

- The numbers in number sentences have names.
- **ADDITION:**

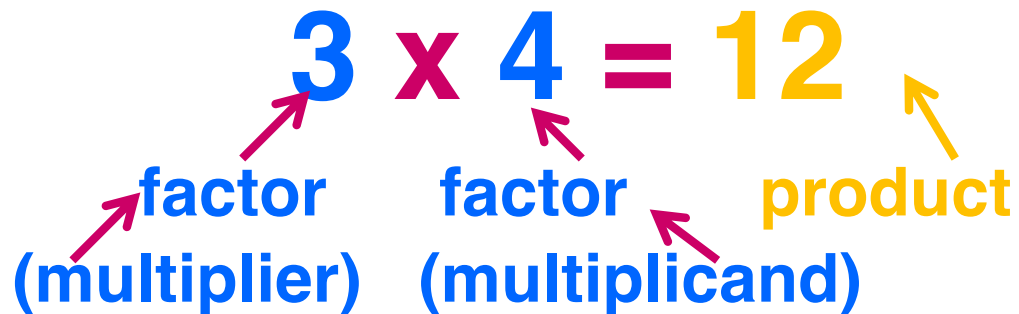
$$\begin{array}{ccccccc} \color{blue}{3} & + & \color{blue}{4} & = & \color{yellow}{7} & & \\ \color{red}{\nearrow} & & \color{red}{\nearrow} & & \color{yellow}{\nwarrow} & & \\ \text{addend} & & \text{addend} & & \text{sum} & & \end{array}$$

Before We Begin...

- The numbers in number sentences have names.
- **MULTIPLICATION:**

$$3 \times 4 = 12$$

factor (multiplier) factor (multiplicand) product



Before We Begin...

- So, **FACTORS** are numbers that are multiplied together.
- Factors of **12** are: **1, 2, 3, 4, 6, & 12**
 $1 \times 12 = 12$ $2 \times 6 = 12$ $3 \times 4 = 12$
- To find factors of a number, just think of all the different numbers we can multiply together to get that number as a product.

Before We Begin...

- **MULTIPLES** are products of given whole numbers.
- Multiples of **5** are: **5, 10, 15, 20, 25, 30...**
 5×1 5×2 5×3 5×4 5×5 5×6
- To find a multiple of a number, just take that number, and multiply it by any other whole number.

Commutative Property

- To **COMMUTATE** is to reverse the direction of something.
- The **COMMUTATIVE** property says that the order of numbers in a number sentence can be reversed.
- Addition & multiplication have **COMMUTATIVE** properties.

Commutative Property

Examples:

$$7 + 5 = 5 + 7$$

$$9 \times 3 = 3 \times 9$$

Note: subtraction & division DO NOT have commutative properties!

Commutative Property

Practice: Show the commutative property of each number sentence.

1. $13 + 18 =$

2. $42 \times 77 =$

3. $5 + 4 =$

4. $7(3) =$

5. $137 \cdot 48 =$

Commutative Property

ANSWERS: Show the commutative property of each number sentence.

1. $13 + 18 = 18 + 13$

2. $42 \times 77 = 77 \times 42$

3. $5 + 4 = 4 + 5$

4. $7(3) = 3(7)$

5. $137 \cdot 48 = 48 \cdot 137$

Associative Property

- To **ASSOCIATE** something is to join, group, or connect it.
- The **ASSOCIATIVE** property says that the way we group numbers in a number sentence can be changed.
- Addition & multiplication have **ASSOCIATIVE** properties.

Associative Property

Examples:

$$2 + (3 + 4) = (2 + 3) + 4$$

$$5 \times (3 \times 7) = (5 \times 3) \times 7$$

Note: subtraction & division DO NOT have associative properties!

Associative Property

Practice: Show the associative property of each number sentence.

1. $(7 + 2) + 5 =$

2. $4 \times (8 \times 3) =$

3. $5 + (1 + 2) =$

4. $7(2 \times 4) =$

Associative Property

ANSWERS: Show the associative property of each number sentence.

1. $(7 + 2) + 5 = 7 + (2 + 5)$

2. $4 \times (8 \times 3) = (4 \times 8) \times 3$

3. $5 + (1 + 2) = (5 + 1) + 2$

4. $7 \cdot (2 \times 4) = (7 \times 2) \cdot 4$

Identity Properties

- An **IDENTITY** is the state of being one's self. Your identity is who you are.
- The **IDENTITY** properties says that with certain operations, a number can stay the same, or keeps its **identity**.
- Addition & multiplication have **IDENTITY** properties.

Identity Properties

Examples:

Additive Identity: $7 + 0 = 7$

(When you add 0 to a number, it stays the same,
or keeps its identity.)

Multiplicative Identity: $7 \times 1 = 7$

(When you multiply by 1, a number stays the same,
or keeps its identity.)

Identity Properties

Practice: Show the ADDITIVE and MULTIPLICATIVE identity properties of each number.

1. $9 =$

2. $17 =$

3. $8 \cdot 3 =$

4. $5 + (6 \times 9) =$

Identity Properties

ANSWERS: Show the ADDITIVE AND MULTIPLICATIVE identity properties of each number.

1. $9 = 9 + 0$ AND 9×1

2. $17 = 17 + 0$ AND 17×1

3. $8 \cdot 3 = 8 \cdot 3 + 0$ AND $8 \cdot 3 \times 1$

4. $5 + (6 \times 9) = 5 + (6 \times 9) + 0$ AND
 $5 + (6 \times 9) \times 1$

Distributive Property

- To **DISTRIBUTE** something is give it out or share it.
- The **DISTRIBUTIVE** property says that we can distribute (share) a multiplier out to each number in a group to make it easier to solve.
- The **DISTRIBUTIVE** property also allows us to decompose, or break numbers apart.
- The **DISTRIBUTIVE** property uses **MULTIPLICATION** and **ADDITION!**

Distributive Property

Examples:

$$2 \times (3 + 4) = (2 \times 3) + (2 \times 4)$$

$$4 \times 9 = (4 \times 5) + (4 \times 4)$$

$$5(37) = 5(30) + 5(7)$$

Note: Do you see that the 2 and the 5 were shared (*distributed*) with the other numbers in the group?

Distributive Property

Practice: Show the distributive property of each number sentence.

1. $8 \times (5 + 6) =$

2. $4(83) =$

3. $5 \cdot (7 + 2) =$

4. $7(12) =$

Distributive Property

ANSWERS: Show the distributive property of each number sentence.

1. $8 \times (5 + 6) = (8 \times 5) + (8 \times 6)$

2. $4(83) = 4(80) + 4(3)$

3. $5 \times (7 + 2) = (5 \times 7) + (5 \times 2)$

4. $7(12) = 7(10) + 7(2)$

Zero Property

- Only **MULTIPLICATION** has a **ZERO** property.
- The **ZERO** property of multiplication says that when we multiply any number by **ZERO**, the answer is always **ZERO**.

Zero Property

Examples:

$$2 \times 0 = 0$$

$$5(3 + 7) \times 0 = 0$$

Zero Property

Practice: Show the zero property of multiplication for each number or number sentence.

1. 5

2. $4 \cdot 3$

3. $9 \times (3 + 6)$

Zero Property

ANSWERS: Show the zero property of multiplication for each number or number sentence.

1. 5: $5 \times 0 = 0$

2. $4 \cdot 3$: $4 \cdot 3 \cdot 0 = 0$

3. $9 \times (3 + 6)$: $9 \times (3 + 6) \times 0 = 0$

POP QUIZ!

Which property is shown?

1. $5 + 0 = 5$

2. $9 \times 8 = 8 \times 9$

3. $(7 + 1) \times 0 = 0$

4. $(8 + 4) + 7 = 8 + (4 + 7)$

5. $9 + 5 \times 1 = 9 + 5$

6. $3(4 + 5) = 3(4) + 3(5)$

7. $5 \times 29 = (5 \times 20) + (5 \times 9)$

C = COMMUTATIVE

A = ASSOCIATIVE

I = IDENTITY

D = DISTRIBUTIVE

Z = ZERO

POP QUIZ ANSWERS!

Which property?

1. $5 + 0 = 5$ (identity)
2. $9 \times 8 = 8 \times 9$ (commutative)
3. $(7 + 1) \times 0 = 0$ (zero)
4. $(8 + 4) + 7 = 8 + (4 + 7)$ (associative)
5. $9 + (5 \times 4) \times 1 = 9 + (5 \times 4)$ (identity)
6. $3(4 + 5) = 3(4) + 3(5)$ (distributive)
7. $5(29) = (5 \times 20) + (5 \times 9)$ (distributive)