

Properties of Real Numbers

Math A



Let a , b , and c be real numbers, variables, or algebraic expressions.

	Property	Example
1.	Commutative Property of Addition $a + b = b + a$	$2 + 3 = 3 + 2$
2.	Commutative Property of Multiplication $a \cdot b = b \cdot a$	$2 \cdot (3) = 3 \cdot (2)$
3.	Associative Property of Addition $a + (b + c) = (a + b) + c$	$2 + (3 + 4) = (2 + 3) + 4$
4.	Associative Property of Multiplication $a \cdot (b \cdot c) = (a \cdot b) \cdot c$	$2 \cdot (3 \cdot 4) = (2 \cdot 3) \cdot 4$
5.	Distributive Property $a \cdot (b + c) = a \cdot b + a \cdot c$	$2 \cdot (3 + 4) = 2 \cdot 3 + 2 \cdot 4$
6.	Additive Identity Property $a + 0 = a$	$3 + 0 = 3$
7.	Multiplicative Identity Property $a \cdot 1 = a$	$3 \cdot 1 = 3$
8.	Additive Inverse Property $a + (-a) = 0$	$3 + (-3) = 0$
9.	Multiplicative Inverse Property $a \cdot \left(\frac{1}{a}\right) = 1$ Note: a can not = 0	$3 \cdot \left(\frac{1}{3}\right) = 1$

10. Zero Property
 $a \cdot 0 = 0$

$$5 \cdot 0 = 0$$

Name: _____

Score: _____

Identify the Property

Identify the property from the choices below.

<p>1) Commutative</p> <p>A. $6 \times 2 = 2 \times 6$ B. $6 + (2 + 11) = (6 + 2) + 11$ C. $6 \times 1 = 6$ D. $6 + (-6) = 0$</p> <p>Correct Choice: <input style="width: 40px; height: 20px;" type="text"/></p>	<p>2) Inverse</p> <p>A. $11 + 4 = 4 + 11$ B. $11 \times \frac{1}{11} = 1$ C. $11 + 0 = 11$ D. $11 \times (4 + 7) = 11 \times 4 + 11 \times 7$</p> <p>Correct Choice: <input style="width: 40px; height: 20px;" type="text"/></p>
<p>3) Identity</p> <p>A. $5 \times 9 = 9 \times 5$ B. $5 + (9 + 4) = (5 + 9) + 4$ C. $5 + (-5) = 0$ D. $5 + 0 = 5$</p> <p>Correct Choice: <input style="width: 40px; height: 20px;" type="text"/></p>	<p>4) Distributive</p> <p>A. $2 + 8 = 8 + 2$ B. $(2 + 8) + 6 = 2 + (8 + 6)$ C. $2 \times 1 = 2$ D. $2 \times (8 + 6) = 2 \times 8 + 2 \times 6$</p> <p>Correct Choice: <input style="width: 40px; height: 20px;" type="text"/></p>
<p>5) Associative</p> <p>A. $7 + 0 = 7$ B. $7 \times (6 \times 3) = (7 \times 6) \times 3$ C. $7 \times 6 = 6 \times 7$ D. $7 + (-7) = 0$</p> <p>Correct Choice: <input style="width: 40px; height: 20px;" type="text"/></p>	<p>6) Commutative</p> <p>A. $6 \times (8 + 3) = 6 \times 8 + 6 \times 3$ B. $6 + (-6) = 0$ C. $6 + 8 = 8 + 6$ D. $6 + (8 + 3) = (6 + 8) + 3$</p> <p>Correct Choice: <input style="width: 40px; height: 20px;" type="text"/></p>
<p>7) Inverse</p> <p>A. $10 + (-10) = 0$ B. $10 + 0 = 10$ C. $10 \times 5 = 5 \times 10$ D. $10 \times (5 + 3) = 10 \times 5 + 10 \times 3$</p> <p>Correct Choice: <input style="width: 40px; height: 20px;" type="text"/></p>	<p>8) Distributive</p> <p>A. $4 + 6 = 6 + 4$ B. $4 \times (6 + 7) = 4 \times 6 + 4 \times 7$ C. $4 \times 1 = 4$ D. $4 + (6 + 7) = (4 + 6) + 7$</p> <p>Correct Choice: <input style="width: 40px; height: 20px;" type="text"/></p>
<p>9) Commutative</p> <p>A. $11 \times (5 \times 8) = (11 \times 5) \times 8$ B. $11 \times 5 = 5 \times 11$ C. $11 \times (5 + 8) = 11 \times 5 + 11 \times 8$ D. $11 + 0 = 11$</p> <p>Correct Choice: <input style="width: 40px; height: 20px;" type="text"/></p>	<p>10) Associative</p> <p>A. $3 + 4 = 4 + 3$ B. $3 \times (4 + 9) = 3 \times 4 + 3 \times 9$ C. $3 \times \frac{1}{3} = 1$ D. $(3 + 4) + 9 = 3 + (4 + 9)$</p> <p>Correct Choice: <input style="width: 40px; height: 20px;" type="text"/></p>

Name : _____

Score : _____

Teacher : _____

Date : _____

Identify the Properties of Mathematics

1) When two numbers are multiplied together, the product is the same regardless of the order of the multiplicands. For example $a \times b = b \times a$

2) The additive inverse of a number, a is $-a$ so that $a + -a = 0$.

3) When two numbers are added, the sum is the same regardless of the order of the addends. For example $a + b = b + a$

4) The product of any number and one is that number. For example $a \times 1 = a$.

5) When three or more numbers are added, the sum is the same regardless of the grouping of the addends. For example $(a + b) + c = a + (b + c)$

6) The sum of two numbers times a third number is equal to the sum of each addend times the third number. For example $a \times (b + c) = a \times b + a \times c$

7) Multiplying any number by 0 yields 0. For example $a \times 0 = 0$.

8) Adding 0 to any number leaves it unchanged. For example $a + 0 = a$.

9) The sum of any number and zero is the original number. For example $a + 0 = a$.

10) When three or more numbers are multiplied, the product is the same regardless of the order of the multiplicands. For example $(a \times b) \times c = a \times (b \times c)$



Name : _____

Score : _____

Teacher : _____

Date : _____

Working with the Properties of Mathematics

1) Which equation shows the Zero Property of Multiplication ?

A. $4 \times 3 = 3 \times 4$

B. $7 \times 0 = 0$ _____

C. $6 + 6 + 6 = 3 \times 6$

D. $5 \times 1 = 5$

2) Which Property of Multiplication is shown ? $(5 + 7) \times 8 = 5 \times 8 + 7 \times 8$

A. Distributive Property

B. Commutative Property _____

C. Associative Property

D. Identity Property

3) Which equation shows the Commutative Property of Multiplication ?

A. $7 \times 3 = 7 + 7 + 7$

B. $6 \times 4 - 2 \times 4 = (6 - 2) \times 4$ _____

C. $9 \times 5 = 5 \times 9$

D. $3 \times 1 = 3$

4) Which property is used in the following ? $9 \times (2 + 5) = 9 \times 2 + 9 \times 5$

A. None of the above

B. Distributive Property _____

C. Associative Property

D. Commutative Property

5) Which equation shows the Identity Property of Multiplication ?

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

B. $a \times 1$ _____

C. $(a + b) + 3 = a + (3 + b)$

D. $a + a + a = 3 \times a$

6) Which of the following does not show the Commutative Property ?

A. $9 + y = y + 9$

B. $x + y = y + x$ _____

C. $yx = xy$

D. $xy - 6 = xy$

7) Which operation will not change the value of any nonzero number ?

A. Adding One

B. Multiplying by Zero _____

C. Multiplying by One

D. Dividing by Zero

8) Which Property of Addition does $8 + 0 = 8$ illustrate ?

A. Distributive Property

B. Commutative Property _____

C. Zero Property

D. Identity Property

9) Which of the following does not show the Commutative Property of Addition ?

A. $3x + 4y = 4y + 3x$

B. $a + b = b + a$ _____

C. $2 + x = x + 2$

D. $ab = ba$

10) Which property would you use to simplify the following expression ? $3(y + 5)$

A. Distributive Property

B. Multiplication Property of Zero _____

C. Commutative Property

D. Associative Property



Name : _____

Score : _____

Teacher : _____

Date : _____

Working with the Properties of Mathematics

- 11) Which property of addition is used in the following ? $(3 + 8) + 7 = 3 + (8 + 7)$
- A. Distributive Property
B. Commutative Property
C. Associative Property
D. Identity Property
- 12) Simplify this expression : $6(y + z)$
- A. $6y + 6z$
B. $6yz$
C. $6y + z$
D. $6z + y$
- 13) The value of any nonzero number will be changed by _____ .
- A. adding zero
B. multiplying by one
C. multiplying by zero
D. dividing by one
- 14) Which is an example of Identity Property of Addition ?
- A. $4 + 3 = 3 + 4$
B. $5 \times 1 = 5$
C. $2 + 0 = 2$
D. $(3 + 8) + 7 = 3 + (8 + 7)$
- 15) Which equation shows the Multiplicative Inverse of a Number ?
- A. $a + -a = 0$
B. $a \times (1/a) = 1$
C. $a \times 0 = 0$
D. $a \times 1 = a$
- 16) Which is an example of Associative Property of Addition ?
- A. $(9 + 4) + 7 = 9 + (4 + 7)$
B. $6 + 9 = 9 + 6$
C. $5 + (-5) = 0$
D. $2 + 0 = 2$
- 17) Which of the following is an example of Commutative Property of Addition ?
- A. $9 \times 1 = 9$
B. $4 + 8 = 8 + 4$
C. $(8 + 7) + 2 = 8 + (7 + 2)$
D. $5 + 3 = 6 + 5$
- 18) Which property is used in the following expression ? $(3 \times 8) \times 6 = 8 \times (6 \times 3)$
- A. Associative Property of Multiplication
B. Commutative Property of Addition
C. Distributive Property of Multiplication
D. Associative Property of Addition
- 19) Which property is used in the following expression ? $(a \times b) \times c = a \times (b \times c)$
- A. Commutative Property of Addition
B. Associative Property of Addition
C. Associative Property of Multiplication
D. Distributive Property
- 20) Which property is used in the following expression ? $4(9 + 5) = 36 + 20$
- A. Associative Property of Multiplication
B. Associative Property of Addition
C. Distributive Property
D. Commutative Property of Addition



Name: Homework 9/12/18

Score:

Identify the Property

Identify the property from the choices below.

<p>1) Associative</p> <p>A. $5 \times (8 + 11) = 5 \times 8 + 5 \times 11$</p> <p>B. $(5 \times 8) \times 11 = 5 \times (8 \times 11)$</p> <p>C. $5 \times 1 = 5$</p> <p>D. $5 + (-5) = 0$</p> <p>Correct Choice: <input type="checkbox"/></p>	<p>2) Identity</p> <p>A. $11 + 4 = 4 + 11$</p> <p>B. $11 \times (4 \times 7) = (11 \times 4) \times 7$</p> <p>C. $11 + 0 = 11$</p> <p>D. $11 \times \frac{1}{11} = 1$</p> <p>Correct Choice: <input type="checkbox"/></p>
<p>3) Distributive</p> <p>A. $4 \times 12 = 12 \times 4$</p> <p>B. $4 + (12 + 3) = (4 + 12) + 3$</p> <p>C. $4 \times (12 + 3) = 4 \times 12 + 4 \times 3$</p> <p>D. $4 + (-4) = 0$</p> <p>Correct Choice: <input type="checkbox"/></p>	<p>4) Commutative</p> <p>A. $9 + 13 = 13 + 9$</p> <p>B. $(9 + 13) + 7 = 9 + (13 + 7)$</p> <p>C. $9 \times 1 = 9$</p> <p>D. $9 \times (13 + 7) = 9 \times 13 + 9 \times 7$</p> <p>Correct Choice: <input type="checkbox"/></p>
<p>5) Identity</p> <p>A. $7 \times 12 = 12 \times 7$</p> <p>B. $(7 \times 12) \times 2 = 7 \times (12 \times 2)$</p> <p>C. $7 \times 1 = 7$</p> <p>D. $7 + 12 = 12 + 7$</p> <p>Correct Choice: <input type="checkbox"/></p>	<p>6) Inverse</p> <p>A. $14 \times 8 = 8 \times 14$</p> <p>B. $14 + (-14) = 0$</p> <p>C. $14 + 0 = 14$</p> <p>D. $14 + (8 + 3) = (14 + 8) + 3$</p> <p>Correct Choice: <input type="checkbox"/></p>
<p>7) Commutative</p> <p>A. $6 + (4 + 5) = (6 + 4) + 5$</p> <p>B. $6 + 4 + 5 = 6 + 5 + 4$</p> <p>C. $6 \times 1 = 6$</p> <p>D. $6 \times (4 + 5) = 6 \times 4 + 6 \times 5$</p> <p>Correct Choice: <input type="checkbox"/></p>	<p>8) Associative</p> <p>A. $2 + 8 = 8 + 2$</p> <p>B. $2 \times (8 + 3) = 2 \times 8 + 2 \times 3$</p> <p>C. $2 \times 1 = 2$</p> <p>D. $(2 + 8) + 3 = 2 + (8 + 3)$</p> <p>Correct Choice: <input type="checkbox"/></p>
<p>9) Inverse</p> <p>A. $3 \times \frac{1}{3} = 1$</p> <p>B. $3 + 0 = 3$</p> <p>C. $(3 \times 9) \times 7 = 3 \times (9 \times 7)$</p> <p>D. $3 \times 9 = 9 \times 3$</p> <p>Correct Choice: <input type="checkbox"/></p>	<p>10) Distributive</p> <p>A. $12 \times 5 = 5 \times 12$</p> <p>B. $(12 + 5) + 7 = 12 + (5 + 7)$</p> <p>C. $12 \times (5 + 7) = 12 \times 5 + 12 \times 7$</p> <p>D. $12 + (-12) = 0$</p> <p>Correct Choice: <input type="checkbox"/></p>

Name: _____

What is the multiplicative inverse of -4?

- A) -4 B) 4 C) $\frac{1}{4}$ D) $-\frac{1}{4}$

2) What is the multiplicative inverse of 5?

- A) $-\frac{1}{5}$ B) 1 C) $\frac{1}{5}$ D) -5

3) What is the additive inverse of $\frac{2}{3}$?

- A) 0 B) $\frac{3}{4}$ C) $-\frac{2}{3}$ D) $-\frac{3}{2}$

4) What property is illustrated by the statement $a + (-a) = 0$?

Questions 5 through 7 refer to the following:

Determine which number property is illustrated by the given statement:

5) $7 \cdot 3 = 3 \cdot 7$

- A) Property of Multiplicative Inverse C) Associative Property of Multiplication
B) Distributive Property D) Commutative Property of Multiplication

6) $x + 0 = x$

- A) Addition Property of Zero C) Commutative Property of Addition
B) Property of Additive Inverse D) Associative Property of Addition

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

8) The sentence $3 + (5 + 2) = (5 + 2) + 3$ illustrates

- A) the associative property of addition
B) the additive identity element
C) the commutative property of addition
D) the distributive property of multiplication over addition

9) What number is the additive identity element?

- A) 1 B) $\frac{1}{2}$ C) 0 D) -1

Which equation illustrates the multiplicative identity element?

- A) $x \cdot 1 = x$ B) $x - x = 0$ C) $x + 0 = x$ D) $x \cdot \frac{1}{x} = 1$

TRY THESE

Use the Distributive Property to simplify.

1. $2(r-1)$

Multiply each term in the parentheses by 2.

Simplify the expression.

$$2(r-1) = \square$$

$$2(r-1)$$

$$\square \cdot r + \square \cdot (-1)$$

$$\square r + (-\square)$$

$$\square$$

2. $4(a+c)$

Multiply each term in the parentheses by 4.

Simplify the expression.

$$4(a+c) = \square$$

$$4(a+c)$$

$$\square \cdot a + \square \cdot c$$

$$\square a + \square c$$

Practice

Use the Distributive Property to simplify.

1. $7(2-y)$

2. $12(t+2)$

3. $2(-12+k)$

4. $5(r-8)$

5. $-5(3-x)$

6. $-(a+4)$

7. $4(a-7)$

8. $7(s+3)$

9. $-6(3-d)$

10. $3(m-4)$

11. $2(3-2n)$

12. $-(m-7)$

13. $2(x+k)$

14. $4(q+4r)$

15. $5(2w+4)$

Put It Together!

- 1. Explain to a partner how to use the Distributive Property to simplify number 11 in Practice.
- 2. Write a variable expression like one of the practice exercises. Have a partner use the Distributive Property to complete the equation.