# Properties of Addition and Multiplication

In math, there are certain principles or rules that will always be true. These rules are called **properties**. Knowing and following math properties will help you to solve math problems. There are several math properties.

<table>
<thead>
<tr>
<th><strong>ADDITION PROPERTIES</strong></th>
<th><strong>MULTIPLICATION PROPERTIES</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Commutative Property</strong></td>
<td>Changing the order of factors does not change the product.</td>
</tr>
<tr>
<td>Changing the order of addends does not change the sum.</td>
<td>$a \times b = b \times a$</td>
</tr>
<tr>
<td>$a + b = b + a$</td>
<td>Example: $3 \times 7 = 7 \times 3$</td>
</tr>
<tr>
<td>Example: $3 + 7 = 7 + 3$</td>
<td>$21 = 21$</td>
</tr>
<tr>
<td>$10 = 10$</td>
<td></td>
</tr>
<tr>
<td><strong>Associative Property</strong></td>
<td>Changing the grouping of the factors does not change the product.</td>
</tr>
<tr>
<td>Changing the grouping of the addends does not change the sum.</td>
<td>$(a \times b) \times c = a \times (b \times c)$</td>
</tr>
<tr>
<td>$(a + b) + c = a + (b + c)$</td>
<td>Example: $(8 \times 2) \times 3 = 8 \times (2 \times 3)$</td>
</tr>
<tr>
<td>Example: $(5 + 6) + 4 = 5 + (6 + 4)$</td>
<td>$16 \times 3 = 8 \times 6$</td>
</tr>
<tr>
<td>$11 + 4 = 5 + 10$</td>
<td>$48 = 48$</td>
</tr>
<tr>
<td>$15 = 15$</td>
<td></td>
</tr>
<tr>
<td><strong>Identity Property</strong></td>
<td>The product of one and any number is that number.</td>
</tr>
<tr>
<td>The sum of any number and zero is that number.</td>
<td>$a \times 1 = a$</td>
</tr>
<tr>
<td>$a + 0 = a$</td>
<td>Example: $5 \times 1 = 5$</td>
</tr>
<tr>
<td>Example: $7 + 0 = 7$</td>
<td></td>
</tr>
<tr>
<td><strong>Zero Property</strong></td>
<td>The product of zero and any number is zero.</td>
</tr>
<tr>
<td>$a \times 0 = 0$</td>
<td>$a \times 0 = 0$</td>
</tr>
<tr>
<td>Example: $4 \times 0 = 0$</td>
<td></td>
</tr>
</tbody>
</table>

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Match the Properties

Write the letter of the matching property in the blank next to the equation. Letters may be used more than once.

1. \(5 \times 0 = 0\)  
a. Commutative Property of Addition

2. \((6 \times 4) + (6 \times 11) = 6 \times (4 + 11)\)  
b. Commutative Property of Multiplication

3. \(4 + 9 = 9 + 4\)  
c. Associative Property of Addition

4. \((6 + 2) + 8 = 6 + (2 + 8)\)  
d. Associative Property of Multiplication

5. \(27 + 0 = 27\)  
e. Identity Property of Addition

6. \(36 \times 1 = 36\)  
f. Identity Property of Multiplication

7. \((9 \times 8) \times 15 = 9 \times (8 \times 15)\)  
g. Zero Property of Multiplication

8. \(17 \times 33 = 33 \times 17\)

9. \((2 \times 7) \times 4 = 2 \times (7 \times 4)\)  
h. Distributive Property

10. \((5 + 3) + 9 = 5 + (3 + 9)\)

11. \(2 \times (3 + 7) = (2 \times 3) + (2 \times 7)\)

12. \(4 \times (6 + 3) = 4 \times (3 + 6)\)

13. \(48 \times 0 = 0\)

14. \(51 \times 30 = 30 \times 51\)

15. \(42 \times 1 = 42\)

16. \(2 + (8 + 6) = (2 + 6) + 8\)
Find the Missing Numbers

Use what you have learned about properties to find the missing number in each equation.

1. \((3 + 4) + 7 = 3 + (4 + \_\_\_\_\)\n
2. \(15 + __\) = 15

3. \((4 \times 12) \times 6 = __ \times (12 \times 6)\)

4. \((2 \times 7) \times 5 = 2 \times (__ \times 5)\)

5. \(35 \times __ = 14 \times 35\)

6. \(24 \times 1 = __\)

7. \((15 + __) + 29 = 15 + (8 + 29)\)

8. \(9 \times (4 + 12) = (9 \times 4) + (9 \times __)\)

9. \(8 + (26 + 30) = 8 + (__ + 26)\)

10. \(22 \times 0 = __\)

11. \(25 \times 6 = __ \times 25\)

12. __ \times 1 = 37

13. \(__ + (28 + 4) = (42 + 4) + 28\)

14. \(5 \times __ = 0\)

15. \((5 \times 25) + (__ \times 6) = 5 \times (25 + 6)\)

16. \(6 + __ = 9 + 6\)