Properties of multiplication of integers

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• **Closure Property:** If a and b are two integers, then a × b will also be an integer. This is called the closure property of multiplication of integers.

Example: 7 × (-5) = (-35)

• **Commutative Property:** If a and b are two integers, then a × b = b × a, i.e., on changing the order of integers, we get the same result. This is called the commutative property of multiplication of integers.

Example: $6 \times 9 = 9 \times 6 = 54$

Thus, the commutative property holds good for the multiplication of integers.

 Associative Property: If a, b and c are three integers, then a × (b × c) = (a × b) × c. This is called the associative property of multiplication of integers.

Example: $[(-5) \times 2] \times (-3) = (-5) \times [2 \times (-3)]$ Or $(-10) \times (-3) = (-5) \times (-6)$ Or 30 = 30

Thus, associative property holds good for the multiplication of integers.

Multiplicative Identity: The product of any integer and 1 gives the same integer.
If 'a' is an integer, then a × 1 = a = 1 × a. Hence, 1 is called the multiplicative identity.

Example: 19 × 1 = 1 × 19 = 19

• Multiplicative Inverse: If 'a' is an integer, then a $\times \frac{1}{a} = 1 = \frac{1}{a} \times a$. Thus, an integer and its reciprocal are called the multiplicative inverse of each other.

Example: $9 \times \frac{1}{9} = 1 = \frac{1}{9} \times 9$

 Property of Zero: The product of any integer and zero gives the result as zero. If 'a' is an integer, then a × 0 = 0 = 0 × a.

Example: $9 \times 0 = 0 = 0 \times 9$

Associative Property	$(a \times b) \times = c = a \times (b \times c)$
Commutative Property	$a \times b = b \times a$
Distributive Property	a(b + c) = ab + ac a(b - c) = ab - ac
Identity Property	a × 1 = a
Zero Property	a × 0 = 0

Distributive Property

Multiplication distributes over addition. If a, b, and c are three integers, then

 $a \times (b + c) = ab + ac.$

This is called the distributive property of multiplication of integers.

Let us understand with some examples:

Example: $(-7) \times [3 + (-4)] = (-7) \times (3) + (-7) \times (-4)$ Or $(-7) \times (-1) = (-21) + 28$ Or 7 = 7

Hence, integers possess the distributive property of multiplication.

Example:
$$3 \times [4 - 8] = (3 \times 4) - (3 \times 8)$$

$$Or 3 \times (-4) = (12) - (24)$$