

**Properties of multiplication:**

**Closure property:**

For any two whole numbers a and b,their product  ax b is always a whole number.

E.g. 12 x 7 =  84,     12, 7 and 84 all are whole numbers.

**Commutative property:**

For any two whole numbers a and b, a a x b = b x a Order of multiplication is not important.

E.g  11 x 6 =  66 and   6 x 11 = 66

Therefore, 11 x 6 = 6 x 11

**Associative property:**

For any three whole numbers a, b and c, (a x b) x c = a x (b x c),   this means the product is regardless of how grouping is done.

E.g   8 x (4 x 5) = 8 x 20 = 160;   (8 x 4) x 5 = 32 x 5 = 160

Therefore,  8 x (4 x 5) = (8 x 4) x 5

We can explain the associative property with the help of following example

Count the number of dots in figure (a) and figure (b)



In figure (a), there are 2 rows and 2 columns which means 2 x 2 dots in each box. So the total number of dots are (2 x 2) x 3 = 12

In figure (b), there are 3 rows and 2 columns which means 3 x 2 dots in each box. So the total number of dots are 2 x (3 x 2) = 12

This explain the associative property of multiplication.

**Multiplicative identity:**

For any whole number a, a x 1 = a  Since any number multiplied by 1 doesn’t change its identity hence 1 is called as multiplicative identity of a whole number. E.g. 21 x 1 = 21

**Multiplication by zero:**

For any whole number a, a x 0 = 0,

E.g 25 x 0 = 0

**Distributive property of multiplication over Addition:**

This property is used when we have to multiply a number by the sum.

 For any three whole numbers a, band c a × (b + c) =  a × b + a × c

In order to verify this property, we take any three whole numbers a, b and c and find the values of the expressions a × (b + c) and a × b + a × c as shown below:

Find 3 × (4 + 5).

In this case either you can add the numbers 4 and 5 and then multiply them by 3

3 × (4 + 5) = 3 × 9 = 27

 OR you can multiply each addend by 3 and then add the products

3 × 4 + 3 × 5 = 12 + 15 = 27
Therefore, 3 × (4 + 5) = 3 × 4 + 3 × 5

***Questions***:Find using distributive property : (a) 728 × 101 ( 504 x 35

***Solution***:

1. 728 x 101 = 728 x (100 + 1) = 72800 + 728 = 73528
2. 504 x 35 = ( 500 + 4) x 35 = 500 x 35 + 4 x 35 = 17500 + 140 = 17640

***Match the following:***

1. 425 × 136 = 425 × (6 + 30 +100)
2. 2 × 49 × 50 = 2 × 50 × 49

 (i) Commutativity under  multiplication

(ii) Commutativity under addition

(iii) Distributivity of multiplication over addition

**Solution:**

1. **(iii)**
2. **(i)**