

## VARIABLES AND CONSTANTS

The diameter  $d$  of a circle of radius  $r$  is given by the formula  $d = 2r$ . In this formula, 2 is a fixed number whereas the literal numbers  $d$  and  $r$  are not fixed because they depend upon the size of the circle.

A symbol which takes various numerical values is called a variable.

A symbol having a fixed numerical value is called a constant.



## BASIC OPERATIONS ON LITERALS AND NUMBERS ADDITION OF LITERALS

The sum of the literal  $x$  and a number 8 is denoted by  $x + 8$  and is read as 'x plus 8'.

$x + 8$  can also be read as '8 more than  $x$  or increase  $x$  by 8'.



# PROPERTIES OF ADDITION OF LITERALS

Addition of literals obey all properties of addition of numbers.

## Commutative Property

For any two literals  $a$  and  $b$ , we have

$$a + b = b + a$$



# PROPERTIES OF ADDITION OF LITERALS

## Associativity Property

For any three literals  $a$ ,  $b$  and  $c$ , we have

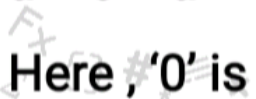
$$(a + b) + c = a + (b + c)$$

## Additive Property

For any literal  $a$ , we have

$$a + 0 = a = 0 + a$$

Here, '0' is known as the Additive identity.



## SUBTRACTION OF LITERALS

*If  $b$  is to be subtracted from  $a$ , we write  $a - b$ . We can also read ' $a$  minus  $b$ ' as ' $b$  less than  $a$ '.*

**Commutativity and Associativity of subtraction are not true for literals**



# MULTIPLICATION OF LITERALS

Multiplication is repeated addition.

If  $m$  is a literal, then  $m + m + m + m$  is 4 times  $m$  and is written as  $4 \times m$ .

The product of literals  $x$  and  $y$  is written as  $xy$



## PROPERTIES OF MULTIPLICATION OF LITERALS

Multiplication of literals obey all properties of multiplication of numbers.

### Commutative property

For any two literals  $m$  and  $n$ , we have  $mn = nm$   
*i.e.*, the multiplication of literals is commutative.



## PROPERTIES OF MULTIPLICATION OF LITERALS

### Associative Property

For any three literals  $a$ ,  $b$  and  $c$ , we have  
 $(ab) c = a (bc)$   
*i.e.*, the multiplication of literals is associative.

### Multiplicative Property

For any literal  $a$ , we have  $a \times 1 = a = 1 \times a$   
Here '1' is known as the Multiplicative Identity.



## PROPERTIES OF MULTIPLICATION OF LITERALS

### Distributive property of Multiplication over Addition:

For any three literals  $a$ ,  $b$  and  $c$ , we have

(a)  $a(b + c) = ab + ac$  [Left distributivity]

(b)  $(b + c)a = ba + ca$ . [Right distributivity]

## DIVISION OF LITERALS

In the case of literal numbers also  $a \div b$  read as ' $a$  by  $b$ ' means that the literal  $a$  is to be divided by the literal  $b$  and is written as

$$\frac{a}{b}$$

(a) 8 more than thrice a number  $x$ .

Ans. Thrice a number  $x = 3x$

$\therefore$  8 more than thrice a number  $x = 3x + 8$ .

