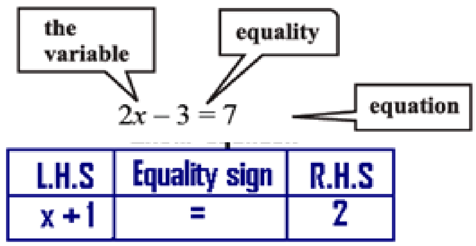
Simple Equation

A variable is a number which does not have a fixed value, that is, it can take different numerical value. Variables are denoted usually by letters of the alphabet.
For example: x, y, z, l, m, n, p etc.

An equation is a condition on a variable. It has an equality sign. The value of the expression on the left hand side (L.H.S) and the right hand side (R.H.S) must be equal.



Example:

Write the following statements in the form of equations:

(i) The sum of three times x and 11 is 32.

(ii) If you subtract 5 from 6 times a number, you get 7.

(iii) One fourth of m is 3 more than 7.

(iv) One third of a number plus 5 is 8.

Solution:

(i) Three times x is 3x.

Sum of 3x and 11 is 3x + 11. The sum is 32.

The equation is 3x + 11 = 32.

(ii) Let us say the number is z; z multiplied by 6 is 6z.

Subtracting 5 from 6z, one gets 6z – 5. The result is 7.

The equation is 6z – 5 = 7

(iii) One fourth of m is m/4 .

It is greater than 7 by 3. This means the difference $(m/4-7)$ is 3.

The equation is $m/4-7 = 3$.

(iv) Take the number to be n. One third of n is $n/3$.

The number plus 5 is $n/3 + 5$. It is 8.

The equation is $n/3 + 5 = 8$.

Example:

Write the following statements in the form of equations:

(a) The sum of 10 times x and 5 is 55.

(b) If you subtract 8 from 3 times m, you get 22.

(c) The sum of x and 2, divided by 4 gives 50.

(d) One third of a number minus 6 gives 25.

Solution:

(a). $10x + 5 = 55$

(b). $3m – 8 = 22$

(c). $(x+2)/4 = 50$

(d). $x/3 - 6= 25$

Example: Convert the following in statement form:

(a) $x + 5 = 15$

(b) $3x – 4 = 12$

(c) $5y/4 = 20$

(d) $4p-12 = 8$

Solution:

(a) The sum of x and 5 gives 15.

(b) Subtract 4 from 3 times x to get 12.

(c) Times y gives 20.

d) Taking away 12 from 4 times p gives 8.

Solving an Equation

Finding the value of a numeral that makes a statement true is said to be solving the equation.In the following sections, we will consider solving equation involving addition, subtraction, multiplication and division.

Equations Involving Addition

Consider the equation

$$16 + 8 = 4 \times 6$$

Clearly,

$$\text{Left-hand side} = 24$$
$$\text{Right-hand side} = 24$$
$$\therefore \text{LHS} = \text{RHS}$$

If we subtract 8 from both sides of the equation, then we obtain:

$$16 + 8 - 8 = 4 \times 6 - 8$$

$$\begin{aligned}\text{Now, LHS} &= 16 + 8 - 8 \\ &= 16\end{aligned}$$

$$\begin{aligned}\text{RHS} &= 4 \times 6 - 8 \\ &= 24 - 8 \\ &= 16\end{aligned}$$

$$\therefore \text{LHS} = \text{RHS}$$

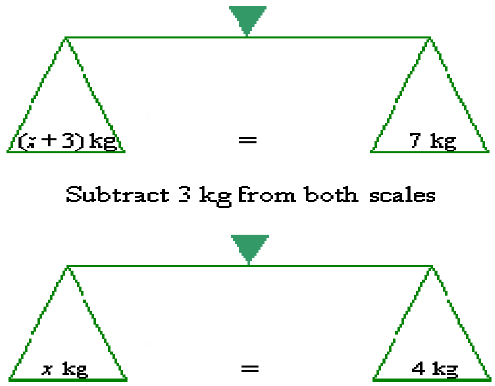
We notice that the statement 16 + 8 = 4 x 6 remains a true statement when 8 is subtracted from both sides of the equation.

This suggests that equations behave like a balance. If the same mass is taken away from both scales of a balance, it still remains balanced. This implies that we can subtract the same number from both sides of an equation to get a new equation.

Consider the equation x + 3 = 7.

If you put $(x + 3)$ kilograms in one of a pair of scales and add 7 kilograms to the other, the scales will show that $(x + 3)$ kg is equal to 7 kg. That is, $x + 3 = 7$.

Subtracting 3 kg from each scale will result in x kg on one scale and 4 kg on the other scale. The scales will show that x kg is equal to 4 kg. That is, $x = 4$.



From the preceding discussion, we can state that:

The same number can be subtracted from both sides of an equation.

Example: Say whether the equation is satisfied:

(a) x + 5 = 0 ; x = 5

(b) x + 10 = 0; x = -10

(c) 3x = 0; x = 0

(d) 5x = 15; x = -3

(e) m/3 = 15; m = 45

Solution:

(a) 5 + 5 = 10 ≠ 0

∴Equation is not satisfied.

(b) -10 + 10 = 0

∴ Equation is satisfied.

(c) 3 × 0 = 0

∴ Equation is satisfied.

(d) 5 × -3 = -15 ≠ 15

∴Equation is not satisfied.

(e) 45/3= 15

∴ Equation is not satisfied.