

## **ALGEBRIC EQUATIONS**

Algebraic equations are polynomial equations. In examination, generally equations of 1 degree, 2 degree or 3 degrees are asked.

### **Linear Equation**

Polynomial equations with degree 1 i.e.,  $ax + c = 0$  are called as linear equations. Some examples of linear equations are as follows –

$$2x + 3y = 4$$

$$x + y + z = 10$$

**Q. In this question two equations numbered I and II are given. You have to solve both the equations and find out the relation between x and y.**

**I.  $5x = 7y + 21$**

**II.  $11x + 4y + 109 = 0$**

**Solution:**

I.  $2x + 3y = 13$  (1)

II.  $3x + 2y = 12$  (2)

$(3 \times \text{Equation 2}) - (2 \times \text{Equation 1})$  gives us

$$\Rightarrow 5x = 10$$

$$\Rightarrow x = 2$$

Putting value of x in equation 1, we get y

$$= 3$$

Hence,  $x < y$ .

**Q. In the given question, two equations numbered I and II are given. You have to solve both the equations and mark the appropriate answer:**

**I.  $4x + 5y = 14$**

**II.  $2x + 3y = 5$**

**Solution:**

$4x + 5y = 14$  (1)

$2x + 3y = 5$  (2)

On multiplying equation (2) by 2

$4x + 6y = 10$  (3)

Subtracting equation (1) from equation (3),

$$y = -4$$

$x = 1$  (on putting value of y in the above equation)

$$\therefore x > y.$$

## Quadratic Equation

Polynomial equations with degree 2 i.e.,  $ax^2 + bx + c = 0$  are called quadratic equations. Some examples of quadratic equations are as follows –

$$x^2 + 2x + 3 = 0$$

$$y^2 - 3y + 4 = 0$$

## Methods to solve quadratic equation

### 1) Factorization method

In this quadratic equation  $ax^2 + bx + c = 0$  is factorized as  $(x - \alpha)(x - \beta) = 0$  and then equation is solved to get  $x = \alpha$  or  $x = \beta$ .

### Q. Solve quadratic equation

$$x^2 - 2x - 15 = 0$$

**Solution:**

$$x^2 - 2x - 15 = 0$$

$$\Rightarrow x^2 - 5x + 3x - 15 = 0$$

$$\Rightarrow x(x - 5) + 3(x - 5) = 0$$

$$\Rightarrow (x + 3)(x - 5) = 0$$

$$\Rightarrow x + 3 = 0 \text{ or } x - 5 = 0$$

$$\Rightarrow x = -3 \text{ or } x = 5$$

### 2) Sridharachrya's Method

In this quadratic equation  $ax^2 + bx + c = 0$  is solved by using formula

$$= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\text{Which gives us } x = \frac{-b + \sqrt{b^2 - 4ac}}{2a} \text{ or } \frac{-b - \sqrt{b^2 - 4ac}}{2a}$$

**Q. Solve quadratic equation  $x^2 - 2x - 15 = 0$**

**Solution:**

$$x_1 = \frac{-b + \sqrt{b^2 - 4ac}}{2a} = 5$$

$$x_2 = \frac{-b - \sqrt{b^2 - 4ac}}{2a} = -3$$

**Q. In the following question two equations are given. You have to solve both the equations and find the relation between x and y.**

**I.  $x^2 = 625$**

**II.  $y = \sqrt{625}$**

**Solution:**

We will solve both the equations separately.  $x^2$

$$= 625$$

$$\Rightarrow x = +25 \text{ or } -25 \text{ (we will consider two values of } x \text{ because of } x^2) \text{ } y =$$

$$\sqrt{625}$$

$$\Rightarrow y = 25 \text{ (The square root is used to refer to only the positive square root i.e.}$$

$$\{\sqrt{x^2} = |x|\}.)$$

$$\therefore x \leq y$$

**Q. In the given question, two equations numbered I and II are given. You have to solve both the equations and find the relation between m and n.**

**I)  $m = \sqrt{324}$**

**II)  $n^2 - 16n - 36 = 0$**

**Solution:**

Value of m	Value of n	Result
18	18	$m = n$
18	-2	$m > n$

$$m = \sqrt{324}$$

$$\Rightarrow m = 18$$

$$n^2 - 16n - 36 = 0$$

$$\Rightarrow n^2 - 18n + 2n - 36 = 0$$

$$\Rightarrow n(n - 18) + 2(n - 18) = 0$$

$$\Rightarrow (n - 18)(n + 2) = 0$$

$$\Rightarrow n = (18, -2)$$

Hence,  $m \geq n$ .

### Cubic Equation

Polynomial equations with degree 3 i.e.,  $ax^3 + bx^2 + cx + d = 0$  are called as cubic equations. Some examples of cubic equations are as follows –

$$x^3 + 2x^2 + 3x + 4 = 0$$

$$2x^3 + 12x^2 + 30x + 48 = 0$$

$$x = \sqrt[3]{625}$$

**Q. In the given question, two equations numbered I and II are given. You have to solve both the equations and mark the appropriate answer.**

$$x = \sqrt[3]{15625}$$

$$y^2 = 625$$

**Solution:**

$$x = \sqrt[3]{15625} = 25$$

$$y = 625$$

$$y = (+25, -25)$$

$$y \leq x$$