

ALGEBRAIC 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 –

$$2x + 3y = 4$$

$$x + y + z = 10$$

Q1. 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, $x < y$.

Q2. 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) Factorisation method

In it 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 $x = \beta$.

Q3. 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) Sridharacharya's method

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

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

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

Q4. Solve quadratic equation $x^2 - 2x - 15 = 0$

Solution:

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

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

Q5. 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

$$= 625$$

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

$$y = \sqrt{625}$$

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

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

$$\therefore x \leq y$$

Q6. 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 –

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

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

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

Q7. 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:

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

$$Y = 625$$

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

$$Y \leq X$$

