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 × Equation 2) - (2 × 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 $(x - \propto)(x - \beta) = 0$ and then equation is solved to get $x = \propto$ or $x = \beta$.

Q3. Solve quadratic equation

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

Solution:

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

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

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

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

$\Rightarrow x + 3 = 0$ or $x - 5 = 0$

$\Rightarrow x = -3$ or $x = 5$

2) Sridharachrya's method

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

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

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

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

Solution:

X1= $\frac{-b+\sqrt{b^2-4ac}}{2a}$ = 5

X2= $\frac{-b-\sqrt{b^2-4ac}}{2a}$ = -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

⇒ x = +25 or -25 (we will consider two values of x because of x^2) y =

$\sqrt{625}$

⇒ y = 25 (The square root is used to refer to only the positive square root i.e. $\{\sqrt{x^2}=|x|\}$.)

∴ x ≤ 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

$m = \sqrt{324}$

⇒ m = 18

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

⇒ $n^2 - 18n + 2n - 36 = 0$

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

$\Rightarrow$ (n – 18) (n + 2) = 0

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

Hence, m ≥ 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= $\sqrt[3]{15625}$

$\mathbf{y^2 = 625}$

Solution:

$X= \sqrt[3]{15625} = 25$
Y= 625
Y= (+25, -25)
Y ≤ X