KIRAN TUTORIALS **Seat No.** | | | | | | | |

Std 10 (English) **Mathematics Part - I** **Date 01-10-20**

Time 1HRS **CHAPTER :2 SOLUTION** **Marks 20**

Q.1 **Multiple Choice Questions** **2**

1 Which of the following equation has 2 as a root?

a. $x^2 - 4x + 5 = 0$ b. $x^2 + 3x - 12 = 0$

c. $2x^2 - 7x + 6 = 0$ d. $3x^2 - 6x - 2 = 0$

Ans Option c.

2 The root of the quadratic equation $x^2 - 3x - 4 = 0$ are.

a. - 4 , 1 b. 4, - 1 c. 4 , 1 d. - 4 , - 1

Ans Option b.

Q.2 **Attempt the following (Activity)** **2**

1 If one root of the quadratic equation $5m^2 + 2m + k = 0$ is $\frac{-7}{5}$ then find the value of k by completing the following activity.

$\frac{-7}{5}$ is the root of equation $5m^2 + 2m + k = 0$

$\therefore$ $\frac{-7}{5}$ is satisfies the given equation.

Substituting $m = \frac{-7}{5}$ in given equation.

$\therefore$ $5 \times$ _____ $+ 2 \times$ _____ $+ k = 0$

$\therefore$ _____ + _____ $+ k = 0$

$\therefore$ $7 + k = 0$

$\therefore$ $k =$ _____

Ans 1) $\left(\frac{-7}{5}\right)^2$ 2) $\frac{-7}{5}$ 3) $\frac{49}{5}$ 4) $\frac{-14}{5}$ 5) -7

Q.3 **Answer the following (Any One)** **2**

1 Solve : $7y = -3y^2 - 4$

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

$\therefore$ $3y(y + 1) + 4(y + 1) = 0$

$\therefore$ $(3y + 4)(y + 1) = 0$

$\therefore$ $y = -1$ or $y = -\frac{4}{3}$

2 From the quadratic equation form the roots given below.

$\frac{1}{2}, -\frac{1}{2}$

Ans Let $\alpha = \frac{1}{2}$ and $\beta = -\frac{1}{2}$.

Then $\alpha + \beta = \frac{1}{2} + \left(-\frac{1}{2}\right) = \frac{1}{2} - \frac{1}{2} = 0$ and $\alpha\beta = \frac{1}{2} \times \left(-\frac{1}{2}\right) = \frac{-1}{4}$

The required quadratic equation is

$x^2 - (\alpha + \beta)x + \alpha\beta = 0$

i.e. $x^2 - (0)\,x + \left(-\frac{1}{4}\right) = 0$

i.e. $x^2 - \frac{1}{4} = 0$

Ans.: $x^2 - \frac{1}{4} = 0$ or $4x^2 - 1 = 0$ is the required quadratic equation.

Q.4 Answer the following (Non textual) **8**

1

Solve the following quadratic equations: $12\left(x^2 + \frac{1}{x^2}\right) - 56\left(x + \frac{1}{x}\right) + 89 = 0.$

Ans

$12\left(x^2 + \frac{1}{x^2}\right) - 56\left(x + \frac{1}{x}\right) + 89 = 0.$

$\therefore \quad 12\left[\left(x + \frac{1}{x}\right)^2 - 2\right] - 56\left(x + \frac{1}{x}\right) + 89 = 0$

$\therefore \quad 12\left(x + \frac{1}{x}\right)^2 - 24 - 56\left(x + \frac{1}{x}\right) + 89 = 0$

$\therefore \quad 12\left(x + \frac{1}{x}\right)^2 - 56\left(x + \frac{1}{x}\right) + 65 = 0$

Substituting m for $x + \frac{1}{x}$, we get,

$\therefore \quad 12m^2 - 56m + 65 = 0$

$\therefore \quad 12m^2 - 30m - 26m + 65 = 0$

$\therefore \quad 6m(2m - 5) - 13(2m - 5) = 0$

$\therefore \quad (2m - 5)(6m - 13) = 0$

$\therefore \quad 2m - 5 = 0 \quad \text{or} \quad 6m - 13 = 0$

$\therefore \quad 2m = 5 \quad \text{or} \quad 6m = 13$

$\therefore \quad m = \frac{5}{2} \quad \text{or} \quad m = \frac{13}{6}$

Substituting $x + \frac{1}{x}$ for m, we get,

$x + \frac{1}{x} = \frac{5}{2}$ or ... (1)

$x + \frac{1}{x} = \frac{13}{6}$ ... (2)

Multiplying equation (1) by by 2x,

$2x^2 + 2 = 5x$

$\therefore \quad 2x^2 - 5x + 2 = 0$

$\therefore \quad 2x^2 - 4x - x + 2 = 0$

$\therefore \quad 2x(x - 2) - 1(x - 2) = 0$

$\therefore \quad (x - 2)(2x - 1) = 0$

$\therefore \quad x - 2 = 0 \text{ or } 2x - 1 = 0$

$\therefore \quad x = 2 \text{ or } x = \frac{1}{2}$

Multiplying equation (2) by 6x,

$\therefore \quad 6x^2 + 6 = 13x$

$\therefore \quad 6x^2 - 13x + 6 = 0$

$\therefore \quad 6x^2 - 9x - 4x + 6 = 0$

$\therefore \quad 3x(2x - 3) - 2(2x - 3) = 0$

$\therefore$ $(2x - 3)(3x - 2) = 0$

$\therefore$ $2x - 3 = 0$ or $3x - 2 = 0$

$\therefore$ $2x = 3$ or $3x = 2$

$\therefore$ $x = \frac{3}{2}$ or $x = \frac{2}{3}$

2, $\frac{1}{2}, \frac{3}{2}, \frac{2}{3}$ are the roots of the given equation.

2 Solve the following quadratic equations: $(y^2 - 6y)^2 - 4(y^2 - 6y + 3) - 20 = 0$.

Ans $(y^2 - 6y)^2 - 4(y^2 - 6y + 3) - 20 = 0$.

Substituting m for $y^2 - 6y$, we get,

$m^2 - 4(m + 3) - 20 = 0$

$\therefore$ $m^2 - 4m - 12 - 20 = 0$

$\therefore$ $m^2 - 4m - 32 = 0$

$\therefore$ $m^2 - 8m + 4m - 32 = 0$

$\therefore$ $m(m - 8) + 4(m - 8) = 0$

$\therefore$ $(m - 8)(m + 4) = 0$

$\therefore$ $m - 8 = 0$ or $m + 4 = 0$

Substituting $y^2 - 6y$ for m, we get,

$y^2 - 6y - 8 = 0$ or ... (1)

$y^2 - 6y + 4 = 0$ ... (2)

From (1),

$y^2 - 6y - 8 = 0$

Here, $a = 1, b = -6, c = -8$

$\therefore$ $b^2 - 4ac = (-6)^2 - 4(1)(-8)$

$= 36 + 32 = 68 = 4 \times 17$

$\therefore$ $\sqrt{b^2 - 4ac} = \sqrt{4 \times 17} = 2\sqrt{17}$

Now, $y = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-(-6) \pm 2\sqrt{17}}{2(1)}$

$= \frac{6 \pm 2\sqrt{17}}{2} = 3 \pm \sqrt{17}$

From (2),

$y^2 - 6y + 4 = 0$

Here, $a = 1, b = -6, c = 4$

$\therefore$ $b^2 - 4ac = (-6)^2 - 4(1)(4)$

$= 36 - 16 = 20 = 4 \times 5$

$\therefore$ $\sqrt{b^2 - 4ac} = 2\sqrt{5}$

Now, $y = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{-(-6) \pm 2\sqrt{5}}{2(1)}$

$= \frac{6 \pm 2\sqrt{5}}{2} = \frac{2(3 \pm \sqrt{5})}{2} = 3 \pm \sqrt{5}$

$3 \pm \sqrt{17}, 3 \pm \sqrt{5}$ are the roots of the given equation.

Q.5 Answer the following **3**

1 If 460 is divided by a natural number then quotient is 6 more than 5 times the divisor and remainder is 1 then find quotient and divisor.

Ans Let the divisor be x.

$\therefore$ The quotient = $5x + 6$

$\therefore$ Here dividend = 460 and remainder = 1

Dividend = Divisor $\times$ quotient + Remainder

$\therefore$ $460 = x \times (5x + 6) + 1$

$\therefore$ $460 = 5x^2 + 6x + 1$

$\therefore$ $5x^2 + 6x + 1 - 460 = 0$

$\therefore$ $5x^2 + 6x - 459 = 0$

$\therefore$ $5x^2 - 45x + 51x - 459 = 0$

$\therefore$ $5x(x - 9) + 51(x - 9) = 0$

$\therefore$ $(x - 9)(5x + 51) = 0$

$\therefore$ $x - 9 = 0$ or $5x + 51 = 0$

$\therefore$ $x = 9$ or $x = \frac{-51}{5}$

$\therefore$ $x \neq \frac{-51}{5}$ as natural number can not be negative.

$\therefore$ $x = 9$ is the divisor and

Quotient = $5x + 6$

$= 5 \times 9 + 6$

$= 51$

$\therefore$ The divisor is 9 and the quotient is 51.

Q.6 Creative questions **3**

1 Construct a word problem on quadratic equation (age related problem) so that one answer will be 12. Solve the problem you have constructed.

Ans **Construction**: Six year before, the age of mother was equal to the square of her son's age. Three year hence, her age will be thrice the age of her son then.

Find the present ages of the mother and son.

solution:

Suppose, the age of the son six years before was x

$\therefore$ Mother's age six years before was x^2

$\therefore$ The present age of the son is $(x + 6)$ and present age of the mother is $(x^2 + 6)$

Three years hence, son's age will be $(x + 9)$ and mother's age will be $(x^2 + 9)$

by given condition,

$x^2 + 9 = 3(x + 9)$

$\therefore$ $x^2 - 3x + 9 - 27 = 0$

$\therefore$ $x^2 - 3x - 18 = 0$

$\therefore$ $(x - 6)(x + 3) = 0$

$\therefore$ $x = 6$ or $x = -3$

But age cannot be negative $\therefore$ $x \neq -3$

$\therefore$ Son's present age = $x + 6 = 6 + 6 = 12$ years

Mother's present age = $x^2 + 6 = 36 + 6 = 42$ years