2.Quadratic Equations

Choose the correct alternative answer for each of the following sub questions and write the correct alphabet.

1) Which of the following is a quadratic equation?

   A) $X^3+5X^2+X+3=0$ B) $4X^2-3X-5=0$ C) $X+5=0$ D) $4X^5 = 0$

2) Which of the following is not a quadratic equation?

   A) $2X^2-X+3=0$ B) $4X^2-3X=0$ C) $X^3-5X +3 =0$ D) $4X^2 = 0$

3) If the root of the given quadratic equation are real and equal then find the value of 'k'
   $X^2 + 2X + k = 0$.

   A) 1   B) -1   C) 2   D) -2

4) What is the value of discriminant for the quadratic equation $X^2 – 2X - 3 = 0$?

   A) -16   B) 16   C) 8   D) 4

5) Which of the following quadratic equation has roots -3 and -5 ?
   A) $X^2-8X+15=0$ B) $X^2-8X-15=0$ C) $X^2+8X+15=0$ D) $X^2+8X15=0$

6) If one of the roots of quadratic equation $X^2 – kX + 27 = 0$ is 3 then find the value of 'k'.
   A) 10   B) 12   C) -12   D) 16

7) Degree of quadratic equation is always ---------------.
   A) 1   B) 2   C) 3   D) 4

1) Write the given quadratic equation in standard form and also write the values of a, b and c .

   $4y^2 – 3y = -7$

2) Write the roots of following quadratic equation.

$$(p-5)(p+3) = 0$$

3) If $a = 1$, $b = 4$, $c = -5$ then find the value of $b^2 - 4ac$.

4) If $b^2 - 4ac > 0$ and $b^2 - 4ac < 0$ then write the nature of roots of the quadratic equation for each given case.

5) Write the given quadratic equation in standard form.

$$m(m-6) = 9$$

Q 2 A) Activity based questions for 2 marks each:

1) Complete the following activity to solve the given quadratic equation by factorization method. Activity: $X^2 + 8x - 20 = 0$

$X^2 + (....) - 2x - 20 = 0$

$X(x+10) - (....)(x+10) = 0$

$(x + 10)(.......) = 0$

$X = ...$ or $x = 2$

2) Complete the following activity to find the value of discriminant for quadratic equation $4x^2 - 5x + 3 = 0$. Activity: $4x^2 - 5x + 3 = 0$ $a = 4$, $b = ...$, $c = 3$

$b^2 - 4ac = (-5)^2 - (....) \times 4 \times 3$

$= (....) - 48$

$b^2 - 4ac = ...$

3) If one of the root of quadratic equation $X^2 + kx + 54 = 0$ is -6 then complete the following activity to find the value of 'k'.

Activity: one of the roots of the quadratic equation $X^2 + kx + 54 = 0$ is -6

Therefore let's take x =.......

$(-6)^2 + k(-6) + 54 = 0$

$(......) -6k + 54 = 0$

$-6k + ... = 0$ $k = ...$

4) To decide whether 1 is a root of quadratic equation $X^2 + 4x - 5 = 0$ or not complete the following activity.

Activity: when $x = (....)$ L.H.S.

$= 1^2 + 4(......) - 5$

$= 1 + 4 - 5$

$$= (\dots.) - 5$$

$$= \dots\dots$$

$$= \text{R.H.S.}$$

Therefore x = 1 is a root of quadratic equation $X^2 + 4x - 5 = 0$.

Solve the following quadratic equation by factorization method.

$$3p^2 + 8p + 5 = 0$$

1) If one of the roots of quadratic equation $X^2 - kx - 15 = 0$ is -3 then find the value of 'k'.

2) If the Roots of a quadratic equation are 4 and -5 then form the quadratic equation.

3) If roots of a quadratic equation $3y^2 + ky + 12 = 0$ are real and equal then find the value of 'k'.

4) Roots of a quadratic equation are 5 and -4 then form the quadratic equation.

1) Complete the following activity to solve the given quadratic equation by formula method. $2x^2 + 13x + 15 = 0$

Activity : $2x^2 + 13x + 15 = 0$
$$a = (\dots..) , b = 13, c = 15$$
$$b^2 - 4ac = (13)^2 - 4 \times 2 \times (\dots\dots)$$
$$= 169 - 120$$
$$b^2 - 4ac = 49$$

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

$$x = \frac{-(\dots\dots) \pm \sqrt{49}}{4}$$

$$x = \frac{-13 \pm (\dots.)}{4}$$

$$x = \frac{6}{4} \quad or \quad x = \frac{-20}{4}$$

$$X = (\dots.) \quad or \quad X = (\dots.)$$

2) Complete the following activity to solve the given word problem. Sum of squares of two consecutive even natural numbers is 244 then find those numbers.

Activity: let the first even natural number be X,

Therefore its consecutive even natural number will be = (.....)

By the given condition,

$X^2 + (x+2)^2 = 244$

$X^2 + X^2 + 4x + 4 - (....) = 0$

$2x^2 + 4x - 240 = 0$

$X^2 + 2x - 120 = 0$

$X^2 + (........) - (........) - 120 = 0$

$X(x+12) - (.....)(x+12) = 0$

$(x+12)(x-10) = 0$

$X = (......) / X = 10$

But natural number cannot be negative x = -12 is not possible.

Therefore first even natural number is x = 10.

Second even consecutive natural number = x+ 2= 10+ 2= 12.

Q 3 B) Examples for 3 marks each:

1) If the roots of the given quadratic equations are real and equal then find the value of 'k'.

$kx(x-2) + 6 = 0$

2) Mukund has Rs. 50 more than Sagar. If the product of the amount they have is 15,000 then find the amount each has.

3) Solve the following quadratic equation.

$\sqrt{3}\, x^2 + \sqrt{2}\, x - 2\sqrt{3} = 0$

4) Solve the following quadratic equations by formula method.

a) $5m^2 - 4m - 2 = 0$

b) $Y^2 + \frac{1}{3} y = 2$

5) Form a quadratic equation if the roots of the quadratic equation are $2 + \sqrt{7}$ and $2 - \sqrt{7}$.

1) Present age of mother of Manish is 1 year more than 5 times the present age of Manish. Four years before If the product of their ages was 22 then find the present age of Manish and his mother.

2) In an orchard there are total 200 trees. If the number of trees in each column is more by 10 than the number of trees in each row then find the number of trees in each row.

3) If the roots of the given quadratic equation are real and equal then find the value of 'm'.

   $(m-12) x^2 + 2 (m-12) x + 2 = 0$

4) Solve the following quadratic equation.

   $$\frac{1}{4-P} - \frac{1}{2+P} = \frac{1}{4}$$

5) Sum of the roots of the quadratic equation is 5 and sum of their cubes is 35 then find the quadratic equation.

Q 5) Examples of 3 marks each:

1) Form a quadratic equation such that one of its roots is 5. Form a quadratic equation for it and write. (For the formation of word problem you can use quantities like age, rupees or natural numbers.) (sample solution for the above example is given below students can take another number to form another example)

   Solution: We need one of the solutions of quadratic equation as 5. Then we can take another root as any number like positive or negative number or zero. Here I am taking another root of quadratic equation as 2.
   Then we can form a word problem as below,
   Smita is younger than her sister Mita by 3 years (5-2= 3). If the product of their ages is (5 x 2 = 10). Then find their present ages. (to form a word problem 1 mark)

   Let the age of Mita be x,

   Therefore age of Smita = x-3 (1 mark for this)
   By the given condition,
   X(x-3) = 10
   $X^2 - 3x - 10 = 0$ (to form a quadratic equation 1 mark)