CBSE

QUADRATIC EQUATIONS WS 2

Class 10 - Mathematics

Section A

1. A two-digit number is such that the product of the digits is 20. When 9 is added to the number then the digits interchange their places. The number is **[1]**

a) 45 b) 54

c) 55 d) 50

2. The roots of a quadratic equation are 5 and -2. Then, the equation is **[1]**

a) $x^2 - 3x + 10 = 0$ b) $x^2 - 3x - 10 = 0$

c) $x^2 + 3x + 10 = 0$ d) $x^2 + 3x - 10 = 0$

3. The sum of two numbers is 8 and the sum of their reciprocals is $\frac{8}{15}$.Find the numbers. **[1]**

a) 7, 1 b) 2, 6

c) 5, 3 d) 4, 4

4. If p and q are the roots of the equation $x^2 + px + q = 0$, then **[1]**

a) p = 1, q = - 2 b) p = - 2, q = l

c) b = 0, 9 = 1 d) p = - 2, q = 0

5. The least positive value of k, for which the quadratic equation $2x^2 + kx - 4 = 0$ has rational roots, is **[1]**

a) ± 2 b) $\pm 2\sqrt{2}$

c) 2 d) $\sqrt{2}$

6. The roots of the equation $x^2 + 3x - 10 = 0$ are: **[1]**

a) -2, 5 b) 2, -5

c) 2, 5 d) -2, -5

7. If x = 1 is a common root of the equations $ax^2 + ax + 3 = 0$ and $x^2 + x + b = 0$, then ab = **[1]**

a) 6 b) 3

c) -3 d) 3.5

8. If the roots of the equation $ax^2 + bx + c = 0$ are equal then c = ? **[1]**

a) $\frac{b}{2a}$ b) $\frac{b^2}{4a}$

c) $\frac{-b^2}{4a}$ d) $\frac{-b}{2a}$

9. The number of quadratic equations having real roots and which do not change by squaring their roots is **[1]**

a) 3 b) 1

c) 4 | d) 2

10. The roots of the quadratic equation $9a^2b^2x^2 - 16abcdx - 25c^2d^2 = 0$ are **[1]**

a) $\frac{25cd}{9ab}$ and $\frac{cd}{ab}$
b) $\frac{-25cd}{9ab}$ and $\frac{-cd}{ab}$
c) $\frac{-25cd}{9ab}$ and $\frac{cd}{ab}$
d) $\frac{25cd}{9ab}$ and $\frac{-cd}{ab}$

11. Roots of the quadratic equation $x^2 + x - (a + 1)(a + 2) = 0$ are ________. **[1]**

a) -(a + 1), (a + 2)
b) (a + 1), (a + 2)
c) (a + 1), -(a + 2)
d) -(a + 1), -(a + 2)

12. The discriminant of the quadratic equation $4x^2 - 6x + 3 = 0$ is: **[1]**

a) 12
b) -12
c) $2\sqrt{3}$
d) 84

13. **Assertion (A):** The value of k = 2, if one root of the quadratic equation $6x^2 - x - k = 0$ is $\frac{2}{3}$ **[1]**

Reason (R): The quadratic equation $ax^2 + bx + c = 0$, $a \leq 0$ has two roots.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

14. **Assertion (A):** $(2x - 1)^2 - 4x^2 + 5 = 0$ is not a quadratic equation. **[1]**

Reason (R): x = 0, 3 are the roots of the equation $2x^2 - 6x = 0$

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

15. Solve: $3x^2 - 2x - 1 = 0$ **[1]**

16. If one root of the quadratic equation $2x^2 + 2x + k = 0$ is 1/3, then find the value of k. **[1]**

17. Solve: $15x^2 - 28 = x$ **[1]**

18. Solve for x: **[1]**

$\sqrt{3}x^2 + 14x - 5\sqrt{3} = 0$

19. Solve: $3x^2 - 243 = 0$ **[1]**

20. Show that x = - 2 is a solution of $3x^2 + 13x + 14 = 0$. **[1]**

21. For the quadratic equation $2x^2 - 5x - 3 = 0$, show that x = 4 is not its solution. **[1]**

22. Find the roots of the quadratic equation $\sqrt{3}x^2 - 2x - \sqrt{3} = 0$ **[1]**

23. Solve the following problem: $x^2 - 55x + 750 = 0$ **[1]**

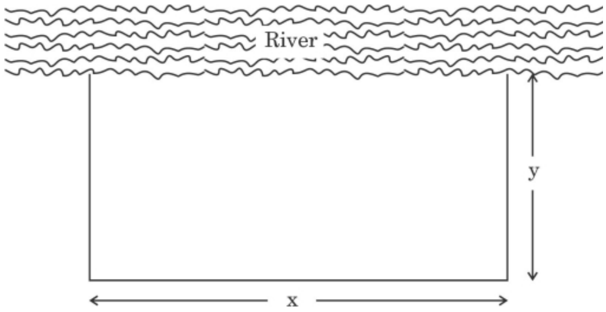
24. Find the value of k for which the given quadratic equation has real and distinct roots: $5x^2 - kx + 1 = 0$ **[1]**

25. Solve: (2x - 3)(3x + 1) = 0 **[1]**

Section B

Question No. 26 to 27 are based on the given text. Read the text carefully and answer the questions: **[2]**

Ramesh, a farmer, wishes to fence off his rectangular field of given area 1500 m^2. The length of the field lies along a straight river. A wire of length 110 m is required for the fencing assuming that along the river, no fencing is needed for the field.



26. Write the perimeter and the area of the rectangular field in terms of **x** and **y**.

27. What are the dimensions of the rectangular field?

28. Determine the positive value of p for which the equations $x^2 + 2px + 64 = 0$ and $x^2 - 8x + 2p = 0$ will both have real roots. **[2]**

29. If the sum of n successive odd natural numbers starting from 3 is 48, find the value of n. **[2]**

30. If the sum of first n even natural numbers is 420, find the value of n. **[2]**

31. Find the value of p, for which one root of the quadratic equation $px^2 - 14x + 8 = 0$ is 6 times the other. **[2]**

32. Find the whole number which when decreased by 20 is equal to 69 times the reciprocal of the number. **[2]**

33. Find the numerical difference of the roots of the equation : $x^2 - 7x - 18 = 0$. **[2]**

34. Solve for x: $\frac{2x}{x-3} + \frac{1}{2x+3} + \frac{3x+9}{(x-3)(2x+3)} = 0$. **[2]**

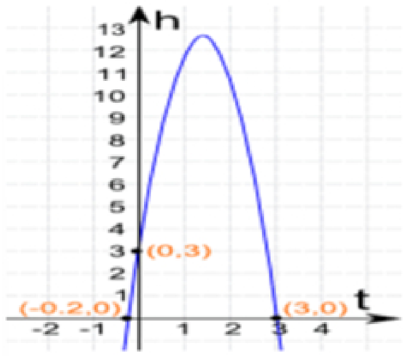
35. Find k so that the quadratic equation $(k + 1)x^2 + 2(k + 1)x + 1 = 0$ has equal roots. **[2]**

36. The sum of a natural number and its square is 156. Find the number. **[2]**

Section C

Question No. 37 to 40 are based on the given text. Read the text carefully and answer the questions: **[4]**

Michael throws a ball with a speed of 14 m/s which follows the curve = $-5t^2 + 14t + 3$ where **h** represents height in meters and time **t** in seconds.



37. Find the possible values of **t** when the ball touches the ground.

38. Find the maximum height attained by the ball.

39. What is the vertical component of velocity at h_{max}?

40. Find the position of ball at t = 18.

41. **State True or False:** **[4]**

(a) For k > 0, the quadratic equation $2x^2 + 6x - k = 0$ will definitely have real roots. **[1]**

(b) The roots of the quadratic equation $x^2 + 4x + 5 = 0$ are 4, 1. **[1]**

(c) If the coefficient of x^2 and the constant term have the same sign and if the coefficient of x term is zero, then the quadratic equation has no real roots. **[1]**

(d) If the roots of the quadratic equation are rational, the coefficient of the term x will also be rational. **[1]**

Section D

42. Solve for y: **[5]**

$\frac{y+3}{y-2}-\frac{1-y}{y}=\frac{17}{4}; y\neq 0\cdot 2$

43. The length of the sides forming right angle of a right triangle are 5x cm and (3x -1)cm. If the area of the triangle is 60 cm^2. Find its hypotenuse. **[5]**

44. Solve for x: **[5]**

$\frac{1}{(x-1)(x-2)}+\frac{1}{(x-2)(x-3)}=\frac{2}{3}\ ; x\neq 1,2,3$

45. The difference of the squares of two numbers is 45. The square of the smaller number is 4 times the larger number. Determine the numbers. **[5]**

46. A rectangular field is 20 m long and 14 m wide. There is a path of equal width all around it, having an area of 111 sq m. Find the width of the path. **[5]**

47. The difference of two numbers is 5 and the difference of their reciprocals is $\frac{1}{10}$. Find the numbers. **[5]**

48. The area of right angled triangle is 480 cm^2 . If the base of triangle is 8 cm more than twice the height (altitude) of the triangle, then find the sides of the triangle. **[5]**

49. The product of two consecutive positive integers is 306. Find the integers. **[5]**

50. The sum of squares of two consecutive multiples of 7 is 637. Find the multiples. **[5]**

51. If the difference between the radii of the smaller circle and the larger circle is 7 cm and the difference between the areas of the two circles is 1078 sq. cm. Find the radius of the smaller circle. **[5]**

52. A rectangular park is to be designed whose breadth is 3 m less than its length. Its area is to be 4 square metres more than the area of a park that has already been made in the shape of an isosceles triangle with its base as the breadth of the rectangular park and of altitude 12 m. Find the length and breadth of the park. **[5]**

53. Solve for x **[5]**

$\frac{1}{a+b+x}=\frac{1}{a}+\frac{1}{b}+\frac{1}{x}$ where $a+b+x\neq 0$ and $a,b\ \ x\neq 0$

54. The hypotenuse of a right triangle is $3\sqrt{10}$cm. If the smaller leg is tripled and the longer leg doubled, new hypotenuse will be $9\sqrt{5}$cm. How long are the legs of the triangle? **[5]**

55. Solve: $\frac{1}{x-2}+\frac{2}{x-1}=\frac{6}{x}; x\neq 0,1,2$ **[5]**

56. Determine whether the given quadratic equation have real roots and if so, find the roots **[5]**

$\sqrt{3}x^2+10x-8\sqrt{3}=0$

57. The length of the hypotenuse of a right-angled triangle exceeds the length of the base by 2 cm and exceeds twice the length of the altitude by 1 cm. Find the length of each side of the triangle. **[5]**

58. Solve for x: $\left(\frac{2x}{x-5}\right)^2+5\left(\frac{2x}{x-5}\right)-24=0, x\neq 5$ **[5]**

59. The sum of the ages of a boy and his sister (in years) is 25 and product of their ages is 150. Find their present ages. **[5]**

60. Two pipes together can fill a tank in $\frac{15}{8}$ hours. The pipe with larger diameter takes 2 hours less than the pipe with smaller diameter to fill the tank separately. Find the time in which each pipe can fill the tank separately. **[5]**

61. The perimeter of a rectangular field is 82 m and its area is 400 square metre. Find the length and breadth of the rectangle. **[5]**

62. Solve for x: $\frac{1}{a+b+x}=\frac{1}{a}+\frac{1}{b}+\frac{1}{x}$; a $\neq$ b $\neq$ 0, x $\neq$ 0, x $\neq$ -(a + b) **[5]**

63. The sum of two numbers is 34. If 3 is subtracted from one number and 2 is added to another, the product of these two numbers becomes 260. Find the numbers. **[5]**

64. Sum of the areas of two squares is 544 m^2. If the difference of their perimeters is 32 m, find the sides of the two squares. **[5]**

65. The sum of ages of a father and his son is 45 years. Five years ago, the product of their ages (in years) was 124. Determine their present ages. **[5]**

66. A 2-digit number is such that the product of its digits is 24. If 18 is subtracted from the number, the digits interchange their places. Find the number. **[5]**

67. The length of the hypotenuse of a right triangle exceeds the length of its base by 2 cm and exceeds twice the length of altitude by 1 cm. Find the length of each side of the triangle. **[5]**

68. Solve the quadratic equation by factorization: **[5]**
$\frac{2}{x+1} + \frac{3}{2(x-2)} = \frac{23}{5x}; x \neq 0, -1, 2$

69. The sum of two numbers is 45. If 5 is subtracted from each of them, the product of these numbers becomes 124. Find the numbers. **[5]**

70. Solve the quadratic equation by factorization: **[5]**
$\frac{3}{x+1} - \frac{1}{2} = \frac{2}{3x-1}, x \neq -1, \frac{1}{3}$

71. The diagonal of a rectangular field is 60 m more than the shorter side. If the longer side is 80 m more than the shorter side, find the length of the sides of the field. **[5]**

72. Solve: $\frac{x-1}{2x+1} + \frac{2x+1}{x-1} = 2, x \neq -\frac{1}{2}, 1$ **[5]**