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QUADRATIC EQUATIONS

OBJECTIVE SECTION

[BASIC/STANDARD]

I. MULTIPLE CHOICE QUESTIONS

- Which one of the following is not a quadratic equation ?
 (a) $(x + 2)^2 = 2(x + 3)$ (b) $x^2 + 3x = (-1)(1 - 3x)^2$
 (c) $(x + 2)(x - 1) = x^2 - 2x - 3$ (d) $x^3 - x^2 + 2x + 1 = (x + 1)^3$
- Which constant should be added and subtracted to solve the quadratic equation $4x^2 - \sqrt{3}x - 5 = 0$ by the method of completing the square ?
 (a) $\frac{9}{16}$ (b) $\frac{3}{16}$ (c) $\frac{3}{4}$ (d) $\frac{\sqrt{3}}{4}$
- Which of the following is a quadratic equation?
 (a) $x^2 + 2x + 1 = (4 - x)^2 + 3$ (b) $-2x^2 = (5 - x)\left(2x - \frac{2}{5}\right)$
 (c) $(k + 1)x^2 + \frac{3}{2}x = 7$, where $k = -1$ (d) $x^3 - x^2 = (x - 1)^3$
- Which of the following is not a quadratic equation?
 (a) $2(x - 1)^2 = 4x^2 - 2x + 1$ (b) $2x - x^2 = x^2 + 5$
 (c) $(\sqrt{2}x + \sqrt{3})^2 + x^2 = 3x^2 - 5x$ (d) $(x^2 + 2x)^2 = x^4 + 3 + 4x^3$
- Which of the following has 2 as a root ?
 (a) $x^2 - 4x - 5 = 0$ (b) $x^2 + 3x - 12 = 0$
 (c) $2x^2 - 7x + 6 = 0$ (d) $3x^2 - 6x - 2 = 0$
- If $\frac{1}{2}$ is a root of the equation $x^2 + kx - \frac{5}{4}$, then the value of k is:
 (a) 2 (b) -2 (c) $\frac{1}{4}$ (d) $\frac{1}{2}$
- Which of the following equations has the sum of its roots as 3?
 (a) $2x^2 - 3x + 6 = 0$ (b) $-x^2 + 3x - 3 = 0$
 (c) $\sqrt{2}x^2 - \frac{3}{\sqrt{2}}x + 1 = 0$ (d) $3x^2 - 3x + 3 = 0$
- Value of k for which the quadratic equation $2x^2 - kx + k = 0$, has equal roots is:
 (a) 1 (b) 2 (c) 5 (d) 0, 8
- Which constant must be added and subtracted to solve the quadratic equation $9x^2 + \frac{3}{4}x - \sqrt{2} = 0$ by the method of completing the square?

$$(a) \quad \frac{1}{8} \quad (b) \quad \frac{1}{64} \quad (c) \quad \frac{1}{4} \quad (d) \quad \frac{9}{64}$$

10. The quadratic equation $2x^2 - \sqrt{5}x + 1 = 0$ has :

- (a) Two distinct real roots (b) Two equal real roots
(c) No real roots (d) More than 2 real roots

11. Which of the following equations has two distinct real roots ?

- (a) $2x^2 - 3\sqrt{2}x + \frac{9}{4} = 0$ (b) $x^2 + x - 5 = 0$
(c) $x^2 + 3x + 2\sqrt{2} = 0$ (d) $5x^2 - 3x + 1 = 0$

12. Which of the following equations has no real roots?

- (a) $x^2 - 4x + 3\sqrt{2} = 0$ (b) $x^2 + 4x - 3\sqrt{2} = 0$
(c) $x^2 - 4x - 3\sqrt{2} = 0$ (d) $3x^2 + 4\sqrt{3}x + 4 = 0$

13. $(x^2 + 1)^2 - x^2 = 0$ has :

- (a) Four real roots (b) Two real roots
(c) No real roots (d) One real root

14. If 8 is a root of the equation $x^2 - 10x + k = 0$, then the value of k is:

- (a) 2 (b) 8 (c) -8 (d) 16

15. The quadratic equation whose roots are real and equal is:

- (a) $2x^2 - 4x + 3 = 0$ (b) $x^2 - 4x + 4 = 0$
(c) $3x^2 - 5x + 2 = 0$ (d) $x^2 - 2\sqrt{2}x - 6 = 0$

16. If α, β are the roots of the equation $x^2 - 5x + k = 0$, then what is the value of k such that $\alpha - \beta = 1$?

- (a) 1 (b) 3 (c) 4 (d) 6

17. The roots of the equation $x^2 - 3x - m(m + 3) = 0$, where m is a constant, are :

- (a) $m, m + 3$ (b) $-m, m + 3$ (c) $m, -(m + 3)$ (d) $-m, -(m + 3)$

18. The roots of the equation $x^2 + 3x - (m + 2)(m + 5) = 0$, where m is a constant, are :

- (a) $(m + 2), (m + 5)$ (b) $(m + 2), -(m + 5)$
(c) $-(m + 2), (m + 5)$ (d) $-(m + 2), -(m + 5)$

19. The roots of the equation $x^2 + x - p(p + 1) = 0$, where p is a constant, are :

- (a) $p, p + 1$ (b) $-p, p + 1$ (c) $p, -(p + 1)$ (d) $-p, -(p + 1)$

20. If one root of the equation $5x^2 - 13x + k = 0$, is reciprocal of the other, then $k =$

- (a) 0 (b) 5 (c) 6 (d) $\frac{1}{6}$

21. If one root of the equation $2x^2 - 10x + p = 0$ is 2, then the value of p is :

- (a) -3 (b) -6 (c) 9 (d) 12

22. The root of the quadratic equation $2x^2 - x - 6 = 0$ are :

- (a) $-2, \frac{3}{2}$ (b) $2, -\frac{3}{2}$ (c) $-2, -\frac{3}{2}$ (d) $2, \frac{3}{2}$

23. The roots of the quadratic equation $x^2 + 5x - (\alpha + 1)(\alpha + 6) = 0$, where α is a constant are :

- (a) $\alpha + 1, \alpha + 6$ (b) $(\alpha + 1), -(\alpha + 6)$
 (c) $-(\alpha + 1), (\alpha + 6)$ (d) $-(\alpha + 1), -(\alpha + 6)$

24. Roots of the quadratic equation $3x^2 - 5x + 2 = 0$, are :

- (a) $1, \frac{3}{2}$ (b) $\frac{2}{3}, 1$ (c) $\frac{1}{3}, 5$ (d) $\frac{-3}{2}, 1$

25. Roots of the quadratic equation $3x^2 - 2\sqrt{6}x + 2 = 0$ are

- (a) $\sqrt{\frac{2}{3}}, \sqrt{\frac{2}{3}}$ (b) $-\sqrt{\frac{2}{3}}, \sqrt{\frac{2}{3}}$ (c) $-\sqrt{\frac{2}{3}}, -\sqrt{\frac{2}{3}}$ (d) $-\sqrt{\frac{2}{3}}, \sqrt{\frac{3}{2}}$

26. If $\frac{16}{x} - 1 = \frac{15}{x+1}$, where $x \neq 0, -1$, then $x =$

- (a) ± 2 (b) ± 3 (c) ± 4 (d) ± 6

27. If $\frac{3}{x+1} - \frac{1}{2} = \frac{2}{3x-1}$, where $x \neq -1, \frac{1}{3}$, then $x =$

- (a) $1, 2$ (b) $1, 3$ (c) $2, 3$ (d) $3, 5$

28. If $\frac{4}{x} - 3 = \frac{5}{2x+5}$, where $x \neq 0, \frac{-3}{2}$, then $x =$

- (a) $1, 2$ (b) $-1, -2$ (c) $1, -2$ (d) $2, -3$

29. If $\frac{14}{x+3} - 1 = \frac{5}{x+1}$, where $x \neq -3, -1$, then $x =$

- (a) $1, 3$ (b) $1, 2$ (c) $1, 5$ (d) $1, 4$

30. If the sum of a number and its reciprocal is $\frac{10}{3}$, then, the number is :

- (a) $\frac{2}{3}$ (b) 3 (c) 4 (d) 10

31. If the sum of the squares of two consecutive natural numbers is 421, then the numbers are:

- (a) 14 and -15 (b) 14 and 15 (c) 13 and 15 (d) -13 and -15

32. If $\frac{1}{x-1} - \frac{1}{x+5} = \frac{6}{7}$ (where $x \neq 1, -5$), then $x =$

- (a) 2 and -6 (b) 3 and 5 (c) 5 and 4 (d) 2 and 6

33. If $\frac{1}{x-2} + \frac{2}{x-1} = \frac{6}{x}$ (where $x \neq 0, 1, 2$), then $x =$

- (a) $3, \frac{2}{3}$ (b) $5, \frac{7}{3}$ (c) $3, \frac{4}{3}$ (d) $7, \frac{5}{3}$

34. The sum of two numbers is 16 and sum of their reciprocals is $\frac{1}{3}$. The number are:

- (a) 13 and 3 (b) 4 and 12 (c) 11 and 5 (d) 10 and 6

35. Two numbers differ by 4 and their product is 192. The numbers are:

(a) 12 and 16 (b) 10 and 6 (c) 20 and 24 (d) 18 and 14

36. Sum of two numbers is 27 and their product is 182. The numbers are:

(a) 13 and 14 (b) 15 and 12 (c) 20 and 7 (d) 22 and 5

37. The roots of the quadratic equation $2x^2 + ax - a^2 = 0$ are :

(a) $-a, \frac{a}{2}$ (b) $a, -\frac{a}{2}$ (c) $a, \frac{a}{2}$ (d) None of these

38. The values of for k which the quadratic equation $9x^2 - 3kx + k = 0$ has equal roots is :

(a) 4 (b) 0 (c) 0 or 4 (d) 1 or 4

39. The values of p for which the quadratic equation $4x^2 + px + 3 = 0$ has equal roots is :

(a) $\pm 4\sqrt{3}$ (b) $\pm 3\sqrt{2}$ (c) $\pm 3\sqrt{3}$ (d) $\pm 5\sqrt{3}$

40. Roots of the quadratic equation $\sqrt{3}x^2 - 2\sqrt{2}x - 2\sqrt{3} = 0$ are :

(a) $\frac{-\sqrt{2}}{\sqrt{3}}, \sqrt{6}$ (b) $\frac{\sqrt{3}}{\sqrt{2}}, \sqrt{6}$ (c) $\frac{\sqrt{2}}{\sqrt{3}}, -\sqrt{6}$ (d) $\frac{\sqrt{3}}{\sqrt{2}}, -\sqrt{6}$

41. A natural number, when increased by 12, equals 160 times its reciprocal. The number is:

(a) 8 (b) 6 (c) 4 (d) 2

42. Roots of the equation $\sqrt{(3x^2 - 2)} = 2x - 1$ are :

(a) 3, 1 (b) 4, 1 (c) 3, 2 (d) 2, 3

43. Roots of the quadratic equation $\frac{1}{3}x^2 - \sqrt{11}x + 1 = 0$ are :

(a) $\frac{3\sqrt{11} \pm \sqrt{87}}{2}$ (b) $\frac{3\sqrt{7} \pm \sqrt{87}}{2}$ (c) $\frac{5\sqrt{11} \pm \sqrt{7}}{2}$ (d) $\frac{7\sqrt{87} \pm \sqrt{11}}{2}$

44. Roots of the quadratic equation $4x^2 - 4px + (p^2 - q^2) = 0$ are :

(a) $\frac{p \pm q}{2}$ (b) $\frac{p \pm q}{3}$ (c) $\frac{q \pm p}{5}$ (d) $\frac{p \pm q}{8}$

45. Roots of the quadratic equation $(2x - 3)^2 = 16$ are :

(a) $\frac{7}{2}, \frac{-1}{2}$ (b) $\frac{5}{2}, \frac{-3}{2}$ (c) $\frac{7}{2}, \frac{3}{2}$ (d) $\frac{11}{2}, \frac{7}{2}$

46. If the sum and product of two numbers are 24 and 128 respectively, then numbers are:

(a) 16 and 8 (b) 18 and 6 (c) 22 and 2 (d) 14 and 10

47. The value of p for which one root of the quadratic equation $px^2 - 14x + 8 = 0$ is 6 times the other is :

(a) 5 (b) 3 (c) -3 (d) 2

48. If $x = 1$ is a common root of the equations $ax^2 + ax + 3 = 0$ and $x^2 + x + b = 0$, then the value of $a \div b =$

(a) $\frac{3}{4}$ (b) $\frac{4}{3}$ (c) $\frac{-3}{4}$ (d) $\frac{-4}{3}$

49. If $x - 4 = \frac{12}{x}$, then the values of x are :

(a) $-2, -6$ (b) $6, 2$ (c) $6, -2$ (d) $-6, 2$

50. Roots of the equation $(x - 1)^2 - 5(x - 1) - 6 = 0$ are:

(a) $(7, 0)$ (b) $(6, 0)$ (c) $(7, 6)$ (d) $(6, -7)$

II. FILL IN THE BLANKS

- If two number differ by 2 and their product is 360, the numbers are _____ and _____.
- The roots of the equation $2x^2 - x + \frac{1}{8} = 0$ are _____.
- The roots of the equation $100x^2 - 20x + 1 = 0$ are _____.
- The roots of the equation $a^2b^2x^2 + b^2x - a^2x - 1 = 0$ are _____.
- If 12 is divided into two parts such that their product is 32. Then two parts are _____ and _____.
- The attitude of a right triangle is 7 cm less than its base. If the hypotenuse is 13 cm, then sum of other two sides is _____.
- The two consecutive odd natural numbers, the sum of whose squares is 202 _____.
- If -4 is a root of the quadratic equation $x^2 + px - 4 = 0$ and the quadratic equation $x^2 + px + k = 0$ has equal roots, then the value of $k =$ _____.
- If the equation $(1 + m^2)x^2 + 2mcx + (c^2 - a^2) = 0$, then, $a^2(1 + m^2) =$ _____.
- If I had walked 1 km per hour faster, I would have taken 10 minutes less to walk 2 km. The rate of my walking is _____.
- The value(s) of p for which the quadratic equation $4x^2 - 3px + 9 = 0$ has real root is _____.
- The sides of a right angled triangle are $x - 1$, x and $x + 1$. Then sides are _____ and _____.
- The roots of the quadratic equation $x^2 + 3x - m(m + 3) = 0$ where m is a constant are _____ and _____.
- A natural number is greater than twice its square root by 3. The number is _____.
- If the root of the equation $m^2x^2 + 2x(mc - 2a) + c^2 = 0$ are equal, then $c =$ _____.

III. VERY SHORT ANSWER QUESTIONS

- Write the standard form of a quadratic equation.
- If $x = \alpha$ is a solution of the quadratic equation $Ax^2 + Bx + C = 0$, then $A\alpha^2 + B\alpha + C = 0$. Is it true?
- Find the roots of the quadratic equation $(x + 2)^2 = 0$.
- What is the discriminant of a quadratic equation $ax^2 + bx + c = 0$?
- Write the discriminant of $2x^2 - 7 = 0$.
- Write the condition for the quadratic equation $ax^2 + bx + c = 0$, to have real roots.
- State the condition for the quadratic equation $ax^2 + bx + c = 0$ to have equal real roots.
- State the condition for the quadratic equation $ax^2 + bx + c = 0$ to have no real roots.
- State Shreedharacharya Formula.

10. Find the nature of the roots of the quadratic equation $2x^2 - 4x + 3 = 0$. [CBSE 2019]
 11. For what values of k , the roots of the equation $x^2 + 4x + k = 0$ are real? [CBSE 2019]
 12. If $x = 3$ is one root of the quadratic equation, $x^2 - 2kx - 6 = 0$, then find the value of k . [CBSE 2018]

ANSWERS

I. Multiple Choice Questions :

1. (c) 2. (b) 3. (d) 4. (c) 5. (c) 6. (a) 7. (b) 8. (d) 9. (b) 10. (c)
 11. (b) 12. (a) 13. (c) 14. (d) 15. (b) 16. (d) 17. (b) 18. (b) 19. (c) 20. (b)
 21. (d) 22. (b) 23. (b) 24. (b) 25. (a) 26. (c) 27. (b) 28. (c) 29. (d) 30. (b)
 31. (b) 32. (a) 33. (c) 34. (b) 35. (a) 36. (a) 37. (a) 38. (c) 39. (a) 40. (a)
 41. (a) 42. (a) 43. (a) 44. (a) 45. (a) 46. (a) 47. (b) 48. (a) 49. (c) 50. (a)

II. Fill in the Blanks :

1. -20, -18, 18, 20 2. $\frac{1}{4}, \frac{1}{4}$ 3. $\frac{1}{10}, \frac{1}{10}$
 4. $\frac{1}{b^2}, -\frac{1}{a^2}$ 5. 4, 8
 6. 17 cm 7. 9, 11 8. $\frac{9}{4}$ 9. c^2 10.
 3 km/hr
 11. $p \geq 4$ or $p \leq -4$ 12. 3, 4, 5 13. $m, -m + 3$
 14. 9 15. $\frac{a}{m}$

III. Very Short Answer Questions :

1. $ax^2 + bx + c = 0, a \neq 0$ 2. yes 3. $x = -2, -2$ 4. $D = b^2 - 4ac$
 5. 56 6. $b^2 - 4ac \geq 0$ 7. $b^2 - 4ac = 0$
 8. $b^2 - 4ac < 0$
 10. imaginary 11. $k \leq 4$ 12. $\frac{1}{2}$