CLASS 10 – CBSE | MATHEMATICS

QUADRATIC EQUATIONS

SECTION -A (Multiple Choice Questions)

1. If the difference of roots of the quadratic equation $x^2+kx+12=0$ is 1, the positive value of k is

   (a) – 7 (b) 7 (c) 4 (d) 8

2. 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) $3x^2 + 4\sqrt{3}x + 4 = 0$

3. If the roots of $ax^2 + bx + c = 0$ are equal in magnitude but opposite in sign, then

   (a) a = 0 (b) b = 0 (c) $b \neq 0$ (d) a < b

4. The zeroes of the polynomial $x^2 - 3x - m(m + 3)$ are

   (a) m, m + 3 (b) –m, m + 3 (c) m, – (m + 3) (d) –m, – (m + 3)

5. Let p be a prime number. The quadratic equation having its roots as factors of p is

   (a) $x^2 - px + p = 0$ (b) $x^2 - (p + 1)x + p = 0$ (c) $x^2 + (p + 1)x + p = 0$ (d) $x^2 - px + p + 1 = 0$

6. The least positive value of k for which the quadratic equation $2x^2 + kx - 4 = 0$ has rational roots is

   (a) √2 (b) ±2√2 (c) 2 (d) ±2

7. The equation $x + \frac{1}{x} = 3$ $(x \neq 0)$ is expressed as a quadratic equation in the form $ax^2 + bx + c = 0$. The value of a − b + c is:

   (a) 5 (b) 2 (c) 1 (d) −1

8. If the equation $qx^2 + px - r = 0$ $(q \neq 0)$ has real and equal roots, then which of the following is true?

   (a) $p^2 = qr$ (b) $p^2 = -4qr$ (c) $q^2 = 4pr$ (d) $q^2 = -4pr$

9. If the quadratic equation $9x^2 + 8kx + 16 = 0$ has real and equal roots, then the value of k is:

   (a) 3 (b) 1 (c) −4 (d) $\frac{3}{2}$

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

    (a) four real roots (b) two real roots (c) no real roots (d) one real root

11. The equation $2x^2 + 2(p + 1)x + p = 0$, where p is real, always has roots that are:

(a) Real and equal (b) real & distinct (c) irrational (d) None of these

12. If $x = -1$ is a root of the equation $ax^2 - bx + 3 = 0$, then:

(a) $-a + b - 3 = 0$ (b) $a - b - 3 = 0$ (c) $-a - b + 3 = 0$ (d) $a + b + 3 = 0$

SECTION -B (Long Answer Questions)

13. In a flight of 600km, an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 200 km/hr from its usual speed and the time of the flight increased by 30 min. Find the scheduled duration of the flight.
14. Swati can row her boat at speed of 5km /h in still water . If it takes her 1 hour more to row the boat 5.25 km upstream than to downstream , find the speed of the stream .
15. A pole has to be erected at a point on the boundary of a circular park of diameter 17 m in such a way that the differences of its distances from two diametrically opposite fixed gates A and B on the boundary is 7 metres. Find the distances from the two gates where the pole is to be erected.
16. Find the value of p for which the quadratic equation $(p + 1)x^2 - 6(p + 1)x + 3(p + 9) = 0$, $p \neq 1$ has equal roots. Hence, find the roots of the equation.
17. If roots of equation are equal $(b-c)x^2 + (c-a)x + (a-b) = 0$ are equal , then prove that : $2b = a + c$.
18. Solve: i) $x^2 - 5x - (a^2 + a - 6) = 0$

    ii) $\frac{1}{2a+b+2x} = \frac{1}{2a} + \frac{1}{b} + \frac{1}{2x}$

    iii) $x^2 + 6x - (a^2 + 2a - 8) = 0$

    iv) $\frac{2}{x+1} + \frac{3}{2(x-2)} = \frac{23}{5x}$
19. A motor boat whose speed is 18 km/h in still water takes 1 hr. more to go 24 km upstream than to return downstream to the same spot. Find the speed of stream.
20. Two water taps together can fill a tank in $9\frac{3}{8}$ hours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.
21. A dealer sells a toy for Rs 24 & gains as much percent as the cost price of the toy , find the cost price of the toy.

22. At present Asha's age (in years) is 2 more than the square of her daughter Nisha's age. When Nisha grows to her mother's present age, Asha's age would be one year less than 10 times the present age of Nisha. Find the present ages of both Asha and Nisha.
23. At t minutes past 2 pm, the time needed by the minutes hand of a clock to show 3 pm was found to be 3 minutes less than $\frac{t^2}{4}$ minutes. Find t.
24. Does there exist a quadratic equation whose coefficients are rational but both of its roots are irrational? Justify your answer.
25. If $x = -2$ is a root of the equation $3x^2 + 7x + p = 0$, find the values of k so that the roots of the equation $x^2 + k(4x + k - 1) + p = 0$ are equal.
26. A train travels at a certain average speed for a distance of 63 km and then travels a distance of 72 km at an average speed of 6 km/h more than its original speed. If it takes 3 hours to complete the total journey, what is its original
27. If – 4 is a root of the equation $x^2 + px - 4 = 0$ & quadratic equation $x^2 + px + k = 0$ has equal roots , find the value of k.
28. Prove that $x^2(a^2 + b^2) + 2x(ac + bd) + (c^2 + d^2) = 0$ has no roots .
29. If difference of two numbers is 3 & difference of their reciprocals is $\frac{3}{28}$. Find the numbers.
30. The total cost of a certain length of a piece of cloth is Rs 200. If the piece was 5 m longer and each metre of cloth costs 2 less, the cost of the piece would have remained unchanged. How long is the piece and what is its original rate per metre ?
31. For what value of k , the expression $(4- k) x^2 + (2k +4)x +(8k +1)$ is a perfect square. Hence , Write the expression .
32. An aeroplane 30 minutes later than its scheduled time & in order to reach its destination 1500 km away in time , it has to increase its speed by 250 km/h from its usual speed , determine its usual speed .
33. Two water taps together can fill a tank in $9\frac{3}{8}$ hours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.
34. In a flight of 2800 km, an aircraft was slowed down due to bad weather. Its average speed is reduced by 100 km/h and time increased by 30 minutes. Find the original duration of the flight.
35. Find the value of k for which the equation $x^2 + k(2x + k - 1) + 2 = 0$ has real and equal roots.
36. If roots of $x^2(a^2 + b^2) + 2x(ac + bd) + (c^2 + d^2) = 0$ are equal then prove that : ad= bc .

37. Some students arranged a picnic. The budget for food was Rs 240.Because four students of the group failed to go, the cost of food to each student got increased by Rs 5. How many students went for the picnic?

38. Three consecutive positive integers are such that the sum of the square of the first and the product of other two is 46, find the integers.

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Quadratic Equations - Answer Key

SECTION - A (Multiple Choice Questions)

1. (b)
2. (a)
3. (b)
4. (b)
5. (b)
6. (c)
7. (a)
8. (b)
9. (a)
10. (c)
11. (b)
12. (d)

SECTION B

13. 1 hour
14. 2 km/h
15. 15 m, 8 m
16. p = 3; roots = 3, 3
17. 2b = a + c
18. (i) x = a + 3, 2− a (ii) x = −a, $-\frac{b}{2}$. (iii) x = −(a + 4), a −2 (iv) x = 4, $-\frac{23}{11}$.
19. 6 km/h
20. Smaller tap = 25 hours; Larger tap = 15 hours
21. Rs 20
22. Nisha's Age = 5 years; Asha's Age = 27 years
23. t = 14 minutes
24. Yes

25. p = 2; k = $\frac{2}{3}$ or −1

26. 42 km/h

27. k = $\frac{9}{4}$.

29. 7, 4 (or −4, −7)

30. length = 20 m; rate = Rs 10/m

31. $(2x+1)^2$ for k = 0 ; $(x+5)^2$ for k = 3.

32. 750 km/h

33. smaller tap = 25 hours; larger tap = 15 hours

34. 3.5 hours

35. k = 2

37. 12 students

38. 4,5,6