QUADRATIC EQUATIONS

SECTION A: (1 MARK)

1. Find the value of $\sqrt{6+\sqrt{6+\sqrt{6+\cdots}}}$ (CBSE BOARD 2016)   (-2,3)

2. A polygon of **n** sides has $\frac{n(n-3)}{2}$ diagonals. How many sides has a polygon with 54 diagonals?   (12)

3. Find the roots of the equation $ax^2 + a = a^2x + x$ $(a,\frac{1}{a})$

SECTION B: (2 MARKS)

4. Solve for x : $\sqrt{3x^2 + x + 5} = x - 3$ (CBSE BOARD 2012) $(-4,\frac{1}{2})$

5. Find the value of **p** for which $x^2 + 5px + 16 = 0$ has no real roots. $(\frac{-8}{5} < p < \frac{8}{5})$

6. One day, I asked the son of my close friend about his age. The child replied in a different way. He said, "One year ago, my dad was 8 times as old as me and now his age is equal to square of my age." Represent this situation in the form of a quadratic equation.   (CBSE BOARD 2007) $(x^2-8x+7=0)$

7. Find the value of p for which the quadratic equation $4x^2 – 3px + 9 = 0$ has real roots.   ($p \geq 4$ or $p \leq -4$)

8. If y =1 is a common root of the equations $ay^2 + ay + 3 = 0$ and $y^2 + y + b = 0$, find ab.   (CBSE BOARD 2012)   (3)

SECTION C: (3 MARKS)

9. Solve for x : $2^{2x + 3} = 65(2^x – 2) + 122$ (CBSE BOARD 2012)   (-3,3)

10. Solve for x : $x^2 + 5x – (a^2 + a – 6) = 0$.   [-(a+3),(a-2)]

11. Solve for x: $9x^2 – 9(a + b)x + (2a^2 + 5ab + 2b^2) = 0$. $[\frac{2a+b}{3},\frac{a+2b}{3}]$

12. Solve for x: $\frac{a}{x-b} + \frac{b}{x-a} = 2$, $x\neq a,b$.   (CBSE BOARD 2004)   [(a+b),$\frac{(a+b)}{2}$]

13. Solve for x : $\frac{1}{a+b+c} = \frac{1}{a}+\frac{1}{b}+\frac{1}{x}$ (x$\neq$ 0 ,$b \neq 0, x \neq 0$)   (CBSE BOARD 2005)   (-a , -b)

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14. Solve for x: $\sqrt{\frac{x}{1-x}} + \sqrt{\frac{1-x}{x}} = 2\frac{1}{6}$ (x ≠ 0,1)   (CBSE BOARD 2000) $(\frac{9}{13}, \frac{4}{13})$

SECTION D: (4 MARKS)

15. The numerator of a fraction is 1 less than the denominator. If 3 is added to each of the numerator and denominator, the fraction is increased by 3/28. Find the fraction.   (3/4)
(CBSE BOARD 2016)

16. The sum of the squares of two consecutive multiples of 7 is 637. Find the multiples.   (14,21)
(CBSE BOARD 2016)

17. The total cost of a certain length of a piece of cloth is ₹200. If the piece was 5m longer and each meter 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 meter?   (20m,₹10)
(CBSE BOARD 2012)

18. If the roots of the quadratic equation $x^2 + 2px + mn = 0$ are real and equal, show that the roots of the quadratic equation $x^2 - 2(m + n)x + (m^2 + n^2 + 2p^2) = 0$ are also equal.
(CBSE BOARD 2008)

19. A tank can be filled by one pipe in x minutes and emptied by another pipe in (x + 5) minutes. Both the pipes when opened together can fill the empty tank in 16.8 minutes. Find x.   (7 hours)
(EXEMPLAR PROBLEM)

20. Solve for x: $5^{x+1} + 5^{2-x} = 126$ (2,-1)

21. If the roots of the equation $(a - b) x^2 + (b - c) x + (c - a) = 0$ are equal, prove that 2a = b + c.   (EXEMPLAR PROBLEM)

22. Solve for x : $\frac{2x}{x-3} + \frac{1}{2x+3} + \frac{3x+9}{(x-3)(2x+3)} = 0; x \neq 3, -\frac{3}{2}$ (-1)

23. Students of class X collected ₹18000. They wanted to divide it equally among a certain number of students residing in slum area. When they started distributing the amount, 20 more students from the nearby slums also joined. Now each student get ₹240 less.   (30)
(a) Find the number of students living in the slum.
(b) Which value is depicted by the students?   (CBSE BOARD 2013)

24. Out of a number of saras birds , one fourth of the number are moving about in lots, 1/9 th coupled with ¼ th as well as 7 times the square root of the number move on a hill, 56 birds in vakula trees. What is the total number of birds? (CBSE BOARD 2004)   (576)

25. At t minutes past 2 p.m. the time needed by the minutes hand of a clock to show 3 p.m. was found to be 3 minutes less than t2/4 minutes. Find t.   (14)
(EXEMPLAR PROBLEM))