

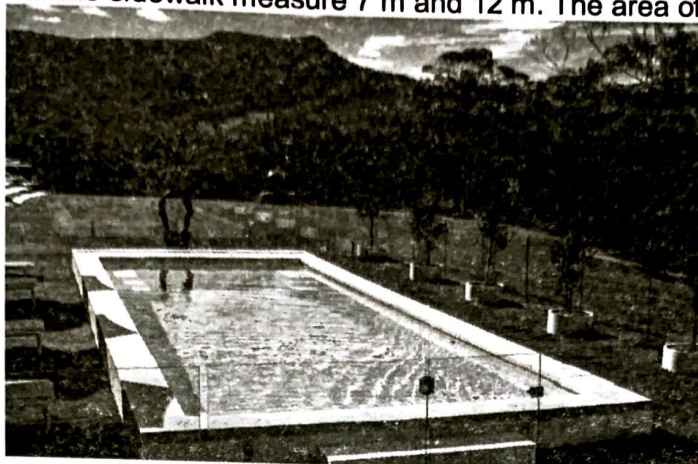
QUADRATIC EQUATIONS

1. Show that $x = -3$ is a solution of $x^2 + 6x + 9 = 0$ (CBSE 2007-08, 1 mark)
2. The sum of the squares of two consecutive odd numbers is 394. Find the numbers. (CBSE 2008-09, 6 marks)
3. If α and β are zeroes of the quadratic polynomial $x^2 - 6x + a$; find the value of 'a' if $3\alpha + 2\beta = 20$. (CBSE 2009-10, 3 marks)
4. The common root of the equation $x^2 - 7x + 10 = 0$ and $x^2 - 10x + 16 = 0$ is (CBSE 2011-12, 1 mark)
 (A) -2 (B) 2 (C) 3 (D) 5
5. For what value of k does the equation $x^2 + 2x + k^2 + 1 = 0$ has real and equal roots? (CBSE 2011-12, 2 marks)
6. Find the roots of the following quadratic equation using quadratic formula:
 $abx^2 + (b^2 - ac)x - bc = 0$ (CBSE 2011-12, 3 marks)
7. Solve the following quadratic equation for x: $4\sqrt{3}x^2 + 5x - 2\sqrt{3} = 0$ (CBSE 2012-13, 2 marks)
8. For what value of k, are the roots of the quadratic equation $kx(x - 2) + 6 = 0$ equal? (CBSE 2012-13, 3 marks)
9. If $x = -\frac{1}{2}$, is a solution of the quadratic equation $3x^2 + 2kx - 3 = 0$, find the value of k. (CBSE 2014-15, 1 marks)
10. Solve the following quadratic equation for x:
 $4x^2 - 4a^2x + (a^4 - b^4) = 0$. (CBSE 2014-15, 2 marks)
11. Solve the following quadratic equation for x:
 $9x^2 - 6b^2x - (a^4 - b^4) = 0$ (CBSE 2014-15, 2 marks)
12. Find that non zero value of k, for which the quadratic equation $kx^2 + 1 - 2(k - 1)x + x^2 = 0$ has equal roots. Hence find the roots of the equation. (CBSE 2014-15, 3 marks)
13. Find that 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. (CBSE 2014-15, 3 marks)
14. Solve the following quadratic equation for x: $x^2 + \left(\frac{a}{a+b} + \frac{a+b}{a}\right)x + 1 = 0$ (CBSE 2014-15, 3 marks)

15. If $x = \frac{2}{3}$ and $x = -3$ are roots of the quadratic equation $ax^2 + 7x + b = 0$, find the value of a and b .
(CBSE 2015-16, 2 marks)
16. Find the roots of the quadratic equation $\sqrt{2}x^2 + 7x + 5\sqrt{2} = 0$.
(CBSE 2016-17, 2 marks)
17. Find the value of k for which the equation $x^2 + k(2x + k - 1) + 2 = 0$ has real and equal roots.
(CBSE 2016-17, 2 marks)
18. If the equation $(1 + m^2)x^2 + 2mcx + c^2 - a^2 = 0$ has equal roots then show that $c^2 = a^2(1 + m^2)$.
(CBSE 2016-17, 3 marks)
19. If $x = 3$ is one root of the quadratic equation $x^2 - 2kx - 6 = 0$, then find the value of k .
(CBSE 2017-18, 1 mark)
20. For what values of k , the roots of the equation $x^2 + 4x + k = 0$ are real?
OR
Find the value of k for which the roots of the equation $3x^2 - 10x + k = 0$ are reciprocal of each other.
(CBSE 2018-19, 1 mark)
21. The quadratic polynomial, the sum of whose zeroes is -5 and their product is 6 , is
(CBSE 2019-20, 1 mark)
- (A) $x^2 + 5x + 6$ (B) $x^2 - 5x + 6$
(C) $x^2 - 5x - 6$ (D) $-x^2 + 5x + 6$
22. Find the quadratic polynomial whose zeroes are reciprocal of the zeroes of the polynomial $f(x) = ax^2 + bx + c$, $a \neq 0$, $c \neq 0$.
(CBSE 2019-20, 3 marks)
23. In a flight of 600 km, an aircraft was slowed due to bad weather. Its average speed for the trip was reduced to 200 km/hr and time of flight increased by 30 minutes. Find the original duration of flight.
(CBSE 2019-20, 3 marks)
24. (a) Find the value of m for which the quadratic equation $(m - 1)x^2 + 2(m - 1)x + 1 = 0$ has two real and equal roots.
(CBSE 2020-21, Term - II, 2 mark)
- (b) Solve the following quadratic equation for x :
 $\sqrt{3}x^2 + 10x + 7\sqrt{3} = 0$
(CBSE 2020-21, Term - II, 2 mark)
25. The product of Rehan's age (in years) 5 years ago and his age 7 years from now, is one more than twice his present age. Find his present age.
(CBSE 2020-21, Term - II, 2 mark)
26. (a) Find the nature of the roots of the quadratic equation $x^2 - 5x + 9 = 0$.
OR
(b) Write a quadratic equation with roots -3 and 5 .
(CBSE 2020-21, Term - II, 2 mark)
27. Solve the quadratic equation $2x^2 - 5x - 1 = 0$ for x .
(CBSE 2020-21, Term - II, 2 mark)

28. Find the nature of the roots of the quadratic equations: $4x^2 - 5x - 1 = 0$
(CBSE 2020-21, Term – II, 2 mark)
29. (a) For what value of p , does the quadratic equation $px^2 + 2x + p = 0$ have real and equal roots?
OR
(b) Solve the quadratic equation for x : $6 - x - x^2 = 0$ (CBSE 2020-21, Term – II, 2 mark)
30. Find the value of 'k' so that the quadratic equation $3x^2 - 5x - 2k = 0$ has real and equal roots.
(CBSE 2021-22 TERM-II, 2 mark)
31. Solve the quadratic equation: $x^2 + 2\sqrt{2}x - 6 = 0$ for x , (CBSE 2021-22 TERM-II, 2 mark)
32. (a) Solve the quadratic equation for x :
 $x^2 - 2ax - (4b^2 - a^2) = 0$
(b) If the quadratic equation
 $(1 + a^2)x^2 + 2abx + (b^2 - c^2) = 0$
has equal and real roots, then prove that:
 $b^2 = c^2(1 + a^2)$ (CBSE 2021-22, TERM-II, 2 mark)
33. (a) If the sum of the roots of the quadratic equation $ky^2 - 11y + (k - 23) = 0$ is $\frac{13}{21}$ more than the product of the roots, then find the value of k .
OR
(b) If $x = -2$ is the common solution of quadratic equations $ax^2 + x - 3a = 0$ and $x^2 + bx + b = 0$, then find the value of a^2b . (CBSE 2021-22, TERM-II, 2 mark)
34. (a) Find the value of 'p' for which the quadratic equation $p(x - 4)(x - 2) + (x - 1)^2 = 0$ has real and equal roots.
OR
(b) Had Aarush scored 8 more marks in a Mathematics test, out of 35 marks, 7 times these marks would have been 4 less than square of his actual marks. How many marks did he get in the test? (CBSE 2021-22, TERM-II, 3 mark)
35. (a) If $x = 3$ is one root of the quadratic equation $2x^2 + px + 30 = 0$, find the value of p and the other root of the quadratic equation.
OR
(b) The length of a rectangular park is 5 metres more than twice its breadth. If the area of the park is 250 sq m, find the length and breadth of the park. (CBSE 2021-22 TERM-II, 3 mark)
36. (a) 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.
OR
(b) The difference of the squares of two numbers is 180. The square of the smaller number is 8 times the greater number. Find the two numbers. (CBSE 2021-22 TERM-II, 4 mark)

37. **Case Study-1:** In the picture given below, one can see a rectangular in-ground swimming pool installed by a family in their backyard. There is a concrete sidewalk around the pool of width x m. The outside edges of the sidewalk measure 7 m and 12 m. The area of the pool is 36 sq. m.



- (a) Based on the information given above, form a quadratic equation in terms of x .
(b) Find the width of the sidewalk around the pool. **(CBSE 2021-22, TERM-II, 4 mark)**

38. 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. **(CBSE 2020-21, Term – II, 4 mark)**

Case Study 1

The tradition of pottery making in India is very old. In fact, it is older than Indus Valley Civilization. The shaping and baking of clay articles has continued through the ages. The picture of a potter is shown below:



A potter makes a certain number of pottery articles in a day. It was observed on a particular day the cost of production of each article (in Rs.) was one more than twice the number of articles produced on that day. The total cost of production on that day was Rs. 210.

39. (a) Taking number of articles produced on that day as x , form a quadratic equation in x .
(b) Find the number of articles produced and the cost of each article. **(CBSE 2020-21, Term – II, 4 mark)**
40. If the quadratic equation $ax^2 + bx + c = 0$ has two real and equal roots, then 'c' is equal to **(CBSE 2022-23, 1 mark)**

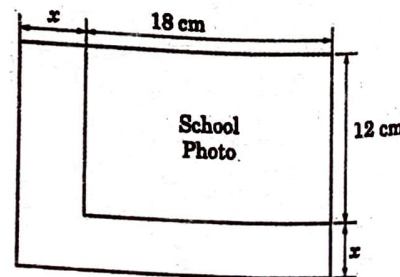
(A) $\frac{-b}{2a}$
(C) $\frac{-b^2}{4a}$

(B) $\frac{b}{2a}$
(D) $\frac{b^2}{4a}$

41. The least positive value of k , for which the quadratic equation $2x^2 + kx - 4 = 0$ has rational roots, is _____.
 (A) $\pm 2\sqrt{2}$ (B) 2
 (C) ± 2 (D) $\sqrt{2}$
 (CBSE 2022-23, 1 mark)
42. The roots of the equation $x^2 + 3x - 10 = 0$ are:
 (A) 2, -5 (B) -2, 5
 (C) 2, 5 (D) -2, -5
 (CBSE 2022-23, 1 mark)
43. If the quadratic equation $9x^2 + bx + \frac{1}{4} = 0$ has equal roots, then the value of b is :
 (A) 0 (B) -3 only
 (C) 3 only (D) ± 3
 (CBSE 2022-23, 1 mark)

Direction (44): In the question number 5, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**. Choose the correct option out of the following:

- (A) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).
 (B) Both Assertion (A) and Reason (R) are true and Reason (R) is not the correct explanation of Assertion (A).
 (C) Assertion (A) is true but Reason (R) is false.
 (D) Assertion (A) is false but Reason (R) is true.
44. **Assertion (A):** If $5 + \sqrt{7}$ is a root of a quadratic equation with rational coefficients, then its other root is $5 - \sqrt{7}$.
Reason (R): Surd roots of quadratic equation with rational coefficients occur in conjugate pairs.
 (CBSE 2022-23, 1 mark)
45. Find the sum and product of the roots of the quadratic equation $2x^2 - 9x + 4 = 0$
 (CBSE 2022-23, 2 marks)
46. Find the discriminant of the quadratic equation $4x^2 - 5 = 0$ and hence comment on the nature of roots of the equation.
 (CBSE 2022-23, 2 marks)
47. The sum of two numbers is 15. If the sum of their reciprocals is $\frac{3}{10}$, find the two numbers.
 (CBSE 2022-23, 3 marks)
48. If α and β are roots of the quadratic equation $x^2 - 7x + 10 = 0$, find the quadratic equation whose roots are α^2 and β^2 .
 (CBSE 2022-23, 3 marks)
49. Find the value of 'p' for which the quadratic equation $px(x - 2) + 6 = 0$ has two equal real roots.
 (CBSE 2022-23, 3 marks)
50. While designing the school year book, a teacher asked the student that the length and width of a particular photo is increased by x units each to double the area of the photo. The original photo is 18 cm long and 12 cm wide.
 Based on the above questions:
 (I) Write an algebraic equation depicting the above information. **1 mark**
 (II) Write the corresponding quadratic equation in standard form. **1 mark**
 (III) What should be the new dimensions of the enlarged photo? **2 marks**



OR

Can any rational value of x make the new area equal to 220 cm^2 ? (CBSE 2022-23, 4 marks)

51. If the roots of equation $ax^2 + bx + c = 0$, $a \neq 0$ are real and equal, then which of the following relation is true? **(CBSE 2023-24, 1 Mark)**
- (A) $a = \frac{b^2}{c}$ (B) $b^2 = ac$
- (C) $ac = \frac{b^2}{4}$ (D) $c = \frac{b^2}{a}$
52. The quadratic equation $x^2 + x + 1 = 0$ has _____ roots. **(CBSE 2023-24, 1 Mark)**
- (A) real and equal (B) irrational
- (C) real and distinct (D) non-real
53. If the discriminant of the quadratic equation $3x^2 - 2x + c = 0$ is 16, then the value of c is: **(CBSE 2023-24, 1 Mark)**
- (A) 1 (B) 0
- (C) -1 (D) $\sqrt{2}$
54. The ratio of the sum and product of the roots of the quadratic equation $5x^2 - 6x + 21 = 0$ is: **(CBSE 2023-24, 1 Mark)**
- (A) 5 : 21 (B) 2 : 7
- (C) 21 : 5 (D) 7 : 2
55. In a 2-digit number, the digit at the unit's place is 5 less than the digit at the ten's place. The product of the digits is 36. Find the number. **(CBSE 2023-24, 3 Marks)**
56. (a) Find the value of 'k' for which the quadratic equation $(k + 1)x^2 - 6(k + 1)x + 3(k + 9) = 0$, $k \neq 1$ has real and equal roots. **(CBSE 2023-24, 5 Marks)**
- OR**
- (b) The age of a man is twice the square of the age of his son. Eight year hence, the age of the man will be 4 years more than three times the age of his son. Find their present ages.
57. (a) A train travels a distance of 90 km at a constant speed. Had the speed been 15 km/h more, it would have taken 30 minutes less for the journey. Find the original speed of the train. **(CBSE 2023-24, 5 Marks)**
- OR**
- (b) Find the value of 'c' for which the quadratic equation $(c + 1)x^2 - 6(c + 1)x + 3(c + 9) = 0$; $c \neq -1$ has real and equal roots.