

CLASS 10 — MATHEMATICS

Chapter: Quadratic Equations

Practice Worksheet | CBSE Pattern

Maximum Marks: 40

Time Allowed: 1 hour 30 minutes

Name: _____

Class/Section: _____ Date: _____

General Instructions:

1. All questions are compulsory.
2. Read each question carefully before answering.
3. Show complete working for questions requiring calculations or proofs.
4. Select only one option for each MCQ.
5. Marks for each question are indicated alongside the question.
6. Write mathematical steps clearly and use appropriate notation.

This paper has 21 questions in five sections: A (Q1–Q10, 1 mark each), B (Q11–Q15, 2 marks each), C (Q16–Q19, 3 marks each), D (Q20, 4 marks) and E (Q21, case study, 4 marks).

Questions marked **Challenging** are higher-order thinking questions.

SECTION A

Multiple Choice Questions — Q1 to Q10 carry 1 mark each.

- Q1.** Which of the following is a quadratic equation? **[1 mark]**
(A) $(x + 2)^2 = x^2 + 3$ (B) $x(x + 1) + 8 = (x + 2)(x - 2)$
(C) $x^3 + 2x = (x + 1)^3$ (D) $2x + 5 = 3(x - 1)$
- Q2.** The roots of the quadratic equation $x^2 - 3x - 10 = 0$ are **[1 mark]**
(A) -5, 2 (B) 5, -2
(C) 10, -1 (D) -10, 1
- Q3.** The discriminant of the quadratic equation $3x^2 - 5x + 2 = 0$ is **[1 mark]**
(A) -1 (B) 0
(C) 49 (D) 1
- Q4.** The quadratic equation $4x^2 - 12x + 9 = 0$ has **[1 mark]**
(A) two distinct real roots (B) two equal real roots
(C) no real roots (D) more than two real roots
- Q5.** If $x = 2$ is a root of the quadratic equation $kx^2 - 5x + 2 = 0$, then the value of k is **[1 mark]**
(A) 1 (B) 3
(C) -2 (D) 2

- Q6.** The values of k for which the quadratic equation $x^2 + kx + 16 = 0$ has two equal roots are [1 mark]
(A) ± 8 (B) ± 4
(C) 8 only (D) 16

- Q7.** Which of the following quadratic equations has no real roots? [1 mark]
(A) $x^2 - 4x + 3\sqrt{2} = 0$ (B) $x^2 + 4x - 3\sqrt{2} = 0$
(C) $2x^2 - 3x - 1 = 0$ (D) $x^2 - 2x + 1 = 0$

- Q8.** If the quadratic equation $(k + 1)x^2 - 2(k - 1)x + 1 = 0$ has two equal roots, then $k =$ [1 mark]
(A) 0 only (B) 3 only
(C) 0 or 3 (D) 1 or 3

In Q9 and Q10, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option.

- Q9.** **Assertion (A):** The quadratic equation $x^2 + 2x + 5 = 0$ has no real roots. [1 mark]

Reason (R): If $b^2 - 4ac < 0$, the quadratic equation $ax^2 + bx + c = 0$ has no real roots.

- (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, but 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.

- Q10.** **Assertion (A):** $(x - 3)^2 = x^2 + 2$ is a quadratic equation. [1 mark]

Reason (R): An equation of the form $ax^2 + bx + c = 0$, where a, b, c are real numbers and $a \neq 0$, is a quadratic equation.

- (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, but 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.

SECTION B

Very Short Answer Questions — Q11 to Q15 carry 2 marks each.

Q11. Find the roots of the quadratic equation $2x^2 + x - 6 = 0$ by factorisation. **[2 marks]**

Q12. Find the roots of the quadratic equation $x^2 - 4x + 1 = 0$ using the quadratic formula. **[2 marks]**

Q13. Find the nature of the roots of the quadratic equation $2x^2 - 2\sqrt{2}x + 1 = 0$. If real roots exist, find them. **[2 marks]**

Q14. Find the value of k for which the quadratic equation $kx(x - 3) + 9 = 0$ has two equal roots. **[2 marks]**

Q15. The product of two consecutive odd positive integers is 255. Form a quadratic equation and find the integers. **[2 marks]**

SECTION C

Short Answer Questions — Q16 to Q19 carry 3 marks each.

- Q16.** Solve for x : $\frac{1}{x+4} - \frac{1}{x-7} = \frac{11}{30}$, $x \neq -4, 7$ **Challenging** [3 marks]

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- Q17.** Is it possible to design a rectangular garden whose perimeter is 60 m and whose area is 250 m^2 ? Justify your answer using the discriminant. [3 marks]

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- Q18.** A bus travels 480 km at a uniform speed. If its speed had been 8 km/h more, it would have taken 2 hours less for the same journey. Find the original speed of the bus. [3 marks]

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- Q19.** If -5 is a root of the quadratic equation $2x^2 + px - 15 = 0$, and the quadratic equation $p(x^2 + x) + k = 0$ has two equal roots, find the value of k . **Challenging** [3 marks]
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SECTION D

Long Answer Question — Q20 carries 4 marks.

Q20. Find the values of p for which the quadratic equation

[4 marks]

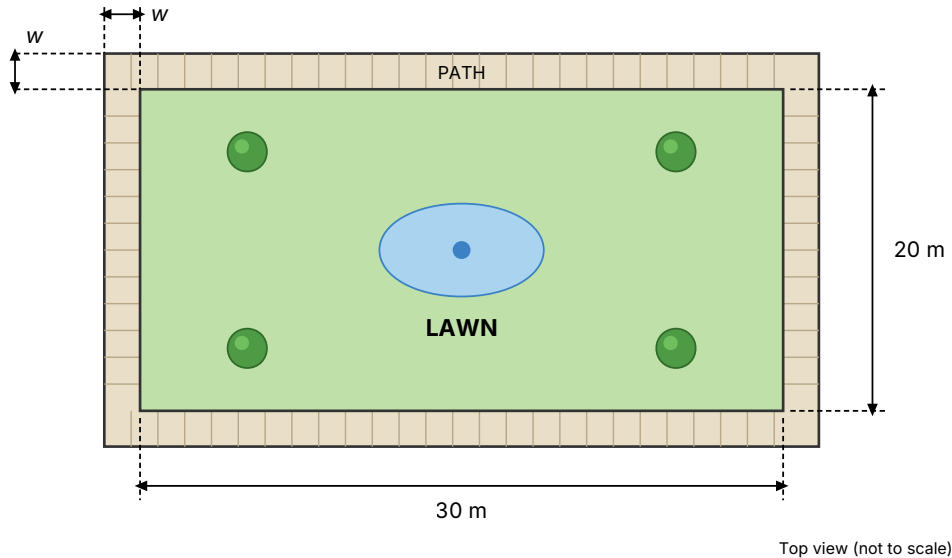
$$(2p + 1)x^2 - (7p + 2)x + (7p - 3) = 0$$

has two equal roots. Also find the equal roots in each case. **Challenging**

SECTION E

Case Study Based Question — Q21 carries 4 marks.

- Q21.** A rectangular lawn measures 30 m by 20 m. A path of uniform width w metres is built all around the outside of the lawn, as shown in the figure. The area of the path alone is 216 m^2 . **[4 marks]**



Based on the above information, answer the following questions:

- (i) Write the length and breadth of the outer rectangle (lawn together with the path) in terms of w . **[1 mark]**
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- (ii) Using the area of the path, form a quadratic equation in w and write it in the standard form. **[1 mark]**
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- (iii) Solve the equation to find the width of the path. Hence find the perimeter of the outer boundary of the path. **[2 marks]**

— End of Question Paper —