# UNIQUE STUDY POINT

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**PRACTICE PAPER 01 - CHAPTER 04 QUADRATIC EQUATIONS (2025-26)**

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**SUBJECT:** MATHEMATICS **MAX. MARKS:** 40

**CLASS:** X **DURATION:** 1½ hrs

Website: uniquestudyonline.com

**General Instructions:**

1. All questions are compulsory.
2. This question paper contains 20 questions divided into five Sections A, B, C, D and E.
3. Section A: 10 MCQs of 1 mark each. Section B: 4 questions of 2 marks each. Section C: 3 questions of 3 marks each. Section D: 1 question of 5 marks. Section E: 2 Case Studies of 4 marks each.
4. There is no overall choice.
5. Use of Calculators is not permitted.

## SECTION – A (Questions 1 to 10 carry 1 mark each)

**1.** Which of the following equations has the sum of roots equal to 5?

(a) $x^2 - 5x + 6 = 0$

(b) $x^2 + 5x - 6 = 0$

(c) $2x^2 - 10x + 3 = 0$

(d) $x^2 - 10x + 9 = 0$

**2.** The product of roots of equation $3x^2 - 6x + 9 = 0$ is:

(a) 2

(b) 3

(c) -3

(d) 9

**3.** If one root of equation $x^2 - 7x + k = 0$ is 3, then the value of k is:

(a) 10

(b) 12

(c) 15

(d) 21

**4.** A quadratic equation whose roots are 2 and -3 is:

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

(b) $x^2 - x - 6 = 0$

(c) $x^2 + x + 6 = 0$

(d) $x^2 - 5x - 6 = 0$

**5.** If $\alpha$ and $\beta$ are roots of $x^2 - 3x + 2 = 0$, then the value of $\alpha + \beta + \alpha\beta$ is:

(a) 5

(b) 4

(c) 3

(d) 6

**6.** The roots of equation $2x^2 - 5x + 3 = 0$ are:

(a) 1, 3/2

(b) 2, 3

(c) 1, 2

(d) 3/2, 2

**7.** If roots of a quadratic equation are equal, then discriminant is:

(a) Greater than zero

(b) Less than zero

(c) Equal to zero

(d) Cannot be determined

**8.** The equation $x^2 + 4x + 5 = 0$ has:

(a) Two distinct real roots

(b) Two equal real roots

(c) No real roots

(d) More than two real roots

**9.** Assertion (A): The equation $2x^2 - 3x + 1 = 0$ can be solved by factorization method.

Reason (R): Every quadratic equation can be solved by factorization.

(a) Both A and R are true and R is the correct explanation of A

(b) Both A and R are true but R is not the correct explanation of A

(c) A is true but R is false

(d) A is false but R is true

**10.** Assertion (A): If the sum of roots is 6 and product is 8, the quadratic equation is $x^2 - 6x + 8 = 0$.

Reason (R): A quadratic equation is given by $x^2$ - (sum of roots)x + (product of roots) = 0.

(a) Both A and R are true and R is the correct explanation of A

(b) Both A and R are true but R is not the correct explanation of A

(c) A is true but R is false

(d) A is false but R is true

## SECTION – B (Questions 11 to 14 carry 2 marks each)

**11.** Find the sum and product of roots of the quadratic equation $5x^2 - 7x + 2 = 0$ without solving it.

**12.** Form a quadratic equation whose roots are 4 and -5.

**13.** Check whether the equation $x^2 - 6x + 9 = 0$ has equal roots. Justify your answer.

**14.** If $\alpha$ and $\beta$ are roots of equation $2x^2 - 5x + 3 = 0$, find the value of $\alpha^2 + \beta^2$.

## SECTION – C (Questions 15 to 17 carry 3 marks each)

**15.** Solve the quadratic equation by factorization method: $6x^2 - 13x + 6 = 0$

**16.** Find the discriminant of the quadratic equation $3x^2 - 4x + 2 = 0$ and hence determine the nature of its roots.

**17.** If $\alpha$ and $\beta$ are the roots of the equation $x^2 - 5x + 6 = 0$, form a quadratic equation whose roots are $\alpha^2$ and $\beta^2$.

## SECTION – D (Question 18 carries 5 marks)

**18.** The sum of the ages of a father and his son is 45 years. Five years ago, the product of their ages (in years) was 124. Determine their present ages.

## SECTION – E (Questions 19 to 20 carry 4 marks each)

**19.** A school has a rectangular playground with length 20 m more than its breadth. The area of the playground is 2400 $m^2$. The school management wants to fence the playground with barbed wire.

**(a)** Form a quadratic equation to represent this situation.

**(b)** Find the breadth of the playground.

**(c)** Find the length of barbed wire needed to fence the playground.

**20.** In a cricket match, a batsman hits a ball which follows a parabolic path. The height h (in meters) of the ball at time t seconds is given by the equation $h = -5t^2 + 20t + 1$.

**(a)** At what time will the ball reach maximum height?

**(b)** What is the maximum height reached by the ball?

**(c)** After how many seconds will the ball hit the ground?

# DETAILED ANSWER KEY

## SECTION A - ANSWERS

**1. Answer: (a) $x^2 - 5x + 6 = 0$**

**Solution:** Sum of roots = -b/a = -(-5)/1 = 5 ✓

**2. Answer: (b) 3**

**Solution:** Product of roots = c/a = 9/3 = 3

**3. Answer: (b) 12**

**Solution:** $x^2 - 7x + k = 0$, one root = 3
$3^2 - 7(3) + k = 0 \rightarrow 9 - 21 + k = 0 \rightarrow k = 12$

**4. Answer: (a) $x^2 + x - 6 = 0$**

**Solution:** Sum = 2 + (-3) = -1, Product = 2 × (-3) = -6
Equation: $x^2 - (\text{sum})x + (\text{product}) = 0 \rightarrow x^2 - (-1)x + (-6) = 0 \rightarrow x^2 + x - 6 = 0$

**5. Answer: (a) 5**

**Solution:** $x^2 - 3x + 2 = 0 \rightarrow \alpha + \beta = 3, \alpha\beta = 2$
$\alpha + \beta + \alpha\beta = 3 + 2 = 5$

**6. Answer: (a) 1, 3/2**

**Solution:** $2x^2 - 5x + 3 = 0$
$(2x - 3)(x - 1) = 0 \rightarrow x = 3/2$ or $x = 1$

**7. Answer: (c) Equal to zero**

**Solution:** For equal roots, discriminant $D = b^2 - 4ac = 0$

**8. Answer: (c) No real roots**

**Solution:** $D = b^2 - 4ac = 16 - 4(1)(5) = 16 - 20 = -4 < 0$
Discriminant is negative, so no real roots

**9. Answer: (c) A is true but R is false**

**Solution:** $2x^2 - 3x + 1 = (2x - 1)(x - 1) = 0$ can be factorized ✓
But not EVERY quadratic can be factorized (e.g., $x^2 + x + 1 = 0$)

**10. Answer: (a) Both A and R are true and R is the correct explanation of A**

**Solution:** Sum = 6, Product = 8
$x^2 - 6x + 8 = 0$ ✓ (Both A and R correct, R explains A)

## SECTION B - ANSWERS

**11. Solution:**

$5x^2 - 7x + 2 = 0$
Sum of roots = -b/a = -(-7)/5 = 7/5
Product of roots = c/a = 2/5
**Answer: Sum = 7/5, Product = 2/5**

**12. Solution:**

Roots are 4 and -5
Sum = 4 + (-5) = -1
Product = 4 × (-5) = -20
Equation: $x^2$ - (sum)x + (product) = 0
**Answer: $x^2 + x - 20 = 0$**

**13. Solution:**

$x^2 - 6x + 9 = 0$
$D = b^2 - 4ac = 36 - 4(1)(9) = 36 - 36 = 0$
Since D = 0, the equation has equal roots.
**Answer: Yes, it has equal roots (both roots = 3)**

**14. Solution:**

$2x^2 - 5x + 3 = 0$
$\alpha + \beta = 5/2, \alpha\beta = 3/2$
$\alpha^2 + \beta^2 = (\alpha + \beta)^2 - 2\alpha\beta = (5/2)^2 - 2(3/2) = 25/4 - 3 = 25/4 - 12/4$
**Answer: $\alpha^2 + \beta^2 = 13/4$**

## SECTION C - ANSWERS

**15. Solution:**

$6x^2 - 13x + 6 = 0$
$6x^2 - 9x - 4x + 6 = 0$
$3x(2x - 3) - 2(2x - 3) = 0$
$(3x - 2)(2x - 3) = 0$
**Answer: x = 2/3 or x = 3/2**

**16. Solution:**

$3x^2 - 4x + 2 = 0$
$D = b^2 - 4ac = (-4)^2 - 4(3)(2) = 16 - 24 = -8$
Since D < 0, the roots are not real (imaginary/complex).
**Answer: Discriminant = -8, Nature: No real roots**

**17. Solution:**

$x^2 - 5x + 6 = 0 \rightarrow$ Roots: $\alpha = 2, \beta = 3$
$\alpha^2 = 4, \beta^2 = 9$
New equation with roots 4 and 9:
Sum = 4 + 9 = 13, Product = 4 × 9 = 36
**Answer: $x^2 - 13x + 36 = 0$**

## SECTION D - ANSWER

**18. Solution:**

Let son's present age = x years, father's present age = (45 - x) years
Five years ago: Son = (x - 5), Father = (40 - x)
Product: (x - 5)(40 - x) = 124
$40x - x^2 - 200 + 5x = 124$
$-x^2 + 45x - 200 = 124$
$x^2 - 45x + 324 = 0$
$x^2 - 36x - 9x + 324 = 0$
x(x - 36) - 9(x - 36) = 0
(x - 9)(x - 36) = 0
x = 9 or x = 36
If son = 36, father = 9 (not possible)
**Answer: Son's age = 9 years, Father's age = 36 years**

## SECTION E - ANSWERS

**19. Solution:**

Let breadth = x m, then length = (x + 20) m
**(a)** Area = length × breadth
x(x + 20) = 2400
**Equation: $x^2 + 20x - 2400 = 0$**

**(b)** $x^2 + 20x - 2400 = 0$
(x + 60)(x - 40) = 0
x = 40 (taking positive value)
**Breadth = 40 m**

**(c)** Length = 60 m, Breadth = 40 m
Perimeter = 2(60 + 40) = 200 m
**Length of barbed wire = 200 m**

**20. Solution:**

Height $h = -5t^2 + 20t + 1$
**(a)** For maximum height, $t = -b/2a = -20/(2\times(-5)) = 20/10 = 2$
**Time = 2 seconds**

**(b)** $h(2) = -5(4) + 20(2) + 1 = -20 + 40 + 1 = 21$
**Maximum height = 21 meters**

**(c)** When ball hits ground, h = 0
$-5t^2 + 20t + 1 = 0$
$5t^2 - 20t - 1 = 0$
Using quadratic formula: $t = [20 \pm \sqrt{(400 + 20)}]/10 = [20 \pm \sqrt{420}]/10$
$t \approx 4.05$ seconds (taking positive value)
**Time ≈ 4.05 seconds**

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