



General Instructions:

1. This Question Paper has 5 sections A to E.
2. SECTION-A has 20 Multiple Choice Questions carrying 1 mark each.
3. SECTION-B has 5 Short Answer-I (SA-I) type questions carrying 2 marks each.
4. SECTION-C has 6 Short Answer-II (SA-II) type questions carrying 3 marks each.
5. SECTION-D has 4 Long Answer (LA) type questions carrying 5 marks each.
6. SECTION-E has 3 source-based/case-based/passage-based integrated units of assessment (4 marks each) with sub-parts of values 1, 1, and 2 marks respectively.
7. All questions are compulsory. However, an internal choice in 2 questions of 2 marks, 2 questions of 3 marks, and 2 questions of 5 marks has been provided. An internal choice has been provided in the 2 marks question of Section E.
8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

FIRST TERM EXAMINATION (2026-27)

CLASS X

SUBJECT: MATHEMATICS(041)

Time allowed: 3 Hours

Set-1

Maximum Marks: 80

SECTION-A

(1 × 20 = 20 Marks)

1. The pair of equations $x + 2y + 5 = 0$ and $-3x - 6y + 1 = 0$ has:
 - a) a unique solution
 - b) exactly two solutions
 - c) infinitely many solutions
 - d) no solution
2. If $a = 2^2 \times 3^3 \times 5^4$ and $b = 2^3 \times 3^2 \times 5$, then HCF(a, b) is:
 - a) 90
 - b) 180
 - c) 360
 - d) 540
3. The distance of the point P(-6, 8) from the origin is:
 - a) 8
 - b) $2\sqrt{7}$
 - c) 10
 - d) 6
4. If $\frac{x}{5} - \frac{5}{x} = 0$, then the roots of the equation are:
 - a) ± 25
 - b) ± 5
 - c) 5 only
 - d) 0
5. Zeroes of the polynomial $p(x) = x^2 - 2\sqrt{3}x - 9$ are:
 - a) $3\sqrt{3}, -\sqrt{3}$
 - b) $2\sqrt{3}, -\sqrt{3}$
 - c) $-3\sqrt{3}, \sqrt{3}$
 - d) $3\sqrt{3}, \sqrt{3}$
6. The product of two irrational number is:
 - a) Always a rational number.
 - b) Always an irrational number.
 - c) Can be either a rational or an irrational number.
 - d) Always a terminating decimal.
7. If two tangents inclined at an angle of 60° are drawn to a circle of radius 3 cm, then the length of each tangent is equal to:
 - a) $\frac{3}{2}\sqrt{3}$ cm
 - b) 6 cm
 - c) $3\sqrt{3}$ cm
 - d) 3 cm
8. If α and β are the zeroes of the polynomial $p(x) = x^2 - px + q$, then the value of $(\alpha^2 + \beta^2)$ is equal to:
 - a) $p^2 - 2q$
 - b) $p^2 + 2q$
 - c) $q^2 - 2p$
 - d) $p^2 - q$

20. ASSERTION: The roots of the quadratic equation $x^2 - 8x + 16 = 0$ are real and equal.

REASON: A quadratic equation $ax^2 + bx + c = 0$ has real and equal roots if its discriminant $D = b^2 - 4ac = 0$.

(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

(2 × 5 = 10 Marks)

21. Evaluate: $\frac{5\cos^2 60^\circ + 4\sec^2 30^\circ - \tan^2 45^\circ}{\sin^2 30^\circ + \cos^2 30^\circ}$.

OR

✓ If $\sin(A - B) = \frac{1}{2}$ and $\cos(A + B) = \frac{1}{2}$, where $0^\circ < A + B \leq 90^\circ$ and $A > B$, find the values of A and B.

✓ 22. If one zero of the quadratic polynomial $f(x) = 4x^2 - 8kx - 9$ is equal in magnitude but opposite in sign to the other, find the value of k.

✓ 23. Two electronic alarm beacons at a research facility beep at regular intervals of 48 seconds and 72 seconds, respectively. If both beacons beep together at exactly 8:00 AM, determine the total number of times they will beep simultaneously between 8:00 AM and 8:30 AM (excluding the initial beep at 8:00 AM). 12

✓ 24. For what value of k will the following system of linear equations have infinitely many solutions?

$$2x + 3y = 7$$

$$(k+1)x + (2k-1)y = 4k+1$$

25. A quadrilateral ABCD is drawn to circumscribe a circle. Prove that $AB + CD = AD + BC$.

Or

From an external point P, two tangents PA and PB are drawn to a circle with centre O. If $\angle APB = 70^\circ$, find:
i) $\angle AOB$ ii) $\angle OAB$

SECTION-C

(3 × 6 = 18 Marks)

26. A taxi service in a city charges a fixed initial fee plus a specific rate per kilometer traveled. For a journey of 12 km, a person pays 154, and for a journey of 20 km, the person pays 250. Determine the fixed charge and the charge per kilometer.

Or

✓ Five years ago, a father's age was four times the age of his son. Five years from now, the father's age will be three times the age of his son. Find their present ages. 25, 45

✓ 27. Prove that $7 - 3\sqrt{2}$ is an irrational number, given that $\sqrt{2}$ is already known to be an irrational number.

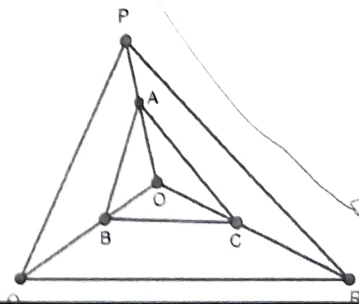
28. A landscape architect designs a rectangular garden plot where the length and width (in meters) are given by the zeroes α and β of the quadratic polynomial $f(x) = 2x^2 - 7x + 5$.

Due to a redesign, a new pathway needs to be constructed with dimensions $(2\alpha + \beta)$ and $(\alpha + 2\beta)$. Without explicitly calculating the individual values of α and β , find a quadratic polynomial whose zeroes are the dimensions of this new pathway, and calculate the product of these new dimensions.

Or

29. Find a quadratic polynomial whose zeroes are $\alpha = 3 + \sqrt{5}$ and $\beta = 3 - \sqrt{5}$. After finding the polynomial, verify the relationship between the zeroes and the coefficients.

29. In the given figure A, B and C are points on OP, OQ and OR respectively such that $AB \parallel PQ$ and $AC \parallel PR$. Show that $BC \parallel QR$.



30. If $\tan^2 A = 1 + 2 \tan^2 B$, then find the value of $\frac{\cos^2 A}{\cos^2 B}$

31. Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.

$$\angle = 180^\circ$$

SECTION-D

(4 × 5 = 20 Marks)

32. The median of the following data is 50. Find the values of p and q , if the sum of all frequencies is 90.

Class Interval	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80	80 – 90
Frequency	5	15	p	20	q	8	2

Or

The following table shows the distribution of heights of 60 students in a class. Calculate the mean and mode of the given distribution.

Height (in cm)	135 – 140	140 – 145	145 – 150	150 – 155	155 – 160	160 – 165
Number of Students	4	9	18	16	8	5

148.4
149.5

33. From the top of a 7 m high building, the angle of elevation of the top of a cable tower is 60° and the angle of depression of its foot is 45° .

(i) Determine the height of the cable tower. $14\sqrt{3}$

(ii) Calculate the distance between the building and the cable tower. 7

34. State and prove the Basic Proportionality Theorem (Thales Theorem). In triangle ABC, D and E are points on the sides AB and AC respectively such that $DE \parallel BC$. If $AD = 2\text{cm}$, $DB = 3\text{cm}$, and $AE = 1.6\text{cm}$, find the length of EC. 2.4cm

35. 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.

OR

A motor boat whose speed is 18 km/h in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream. 6 km/h

SECTION-E

(4 × 3 = 12 Marks)

36. Case study 1: To celebrate World Environment Day, a school organized a tree plantation drive in a municipal park. Students planted saplings along a straight boundary wall in a specific pattern. The first student planted 4 saplings. Each subsequent student planted 3 more saplings than the previous student (e.g., the second student planted 7, the third planted 10, and so on). A total of 15 students participated in this drive sequentially.

i) Write the sequence formed by the number of saplings planted by the students and identify the common difference d.

ii) Find the exact number of saplings planted by the 10th student. 31

iii) Find the total number of saplings planted by all 15 students combined. 420

Or

Which student in the sequence planted exactly 40 saplings?



$$a = 4$$

$$d = 3$$

$$a_n = 15$$

37. Case study 2: On Sports Day, three flagship events are marked on the school field, which has been mapped using a Cartesian coordinate grid (where 1 unit = 1 meter).

Event A (100m Sprint Finish Line): Located at $A(-2, 3)$

Event B (Long Jump Pit): Located at $B(4, 11)$

Event C (Medical First-Aid Tent): Positioned along the straight line connecting A and B such that it divides the segment AB internally in the ratio 1 : 2 (closer to A).



i) Calculate the direct linear distance between Event A and Event B. 10

ii) Find the coordinates of the midpoint of the line segment joining A and B. $1, 7$

iii) Find the exact coordinates of the Medical First-Aid Tent (C). $0, 17/3$

Or

If an Information Desk (D) is placed at $(x, 0)$ on the X-axis such that it is equidistant from Event A $(-2, 3)$ and a banner pole at $E(2, 3)$, find the value of x .

38. Case study 3: In a probability workshop, a complete standard deck of 52 playing cards is placed on a table. The deck is divided into 4 suits (Spades, Clubs, Hearts, Diamonds), each containing 13 cards (Ace, 2 through 10, and 3 Face Cards (Jack, Queen, King)).

i) A single card is drawn at random from the full deck. What is the probability that the card is either a Red card OR a King?

ii) What is the probability of drawing a card that is neither a Spade nor a Face Card?

iii) All the black face cards and red Aces are removed from the deck. A card is then drawn at random from the remaining cards. Find the probability that the drawn card is:

(a) A face card.

(b) A red card.

Or

In the original full deck of 52 cards, two cards—the King of Spades and the Queen of Hearts—are lost. If one card is drawn at random from the remaining 50 cards, find the probability that it is a Honor card (defined strictly as an Ace, King, Queen, or Jack).

