CBSE Class 10 Mathematics - 01
Solved Sample / Practice Paper - 2025-26
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Time Allowed: 3 hours | Maximum Marks: 80 (Theory)

Language: English | Calculator: Not allowed

General Instructions:

1. All questions are compulsory.
2. The paper contains five sections: A, B, C, D, and E.
3. Section A has 20 multiple-choice questions (MCQs) carrying 1 mark each.
4. Section B has 5 short answer-I (SA-I) type questions carrying 2 marks each.
5. Section C has 6 short answer-II (SA-II) type questions carrying 3 marks each.
6. Section D has 4 long answer (LA) type questions carrying 5 marks each.
7. Section E has 3 case based integrated units of assessment (4 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
8. All questions are compulsory. However, an internal choice in 2 questions of 5 marks, 2 questions of 3 marks and 2 questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.
9. Draw neat figures wherever required. Take π = 22/7 wherever required if not stated.

Section A (20 × 1 = 20 marks)

1. If HCF (306, 657) = 9, then LCM (306, 657) is:
   a) 22338
   b) 22334
   c) 21338
   d) 22330
2. The number of zeroes of the polynomial p(x) whose graph is given below is:
   (A graph is shown where a parabola intersects the x-axis at three distinct points.)
   a) 1
   b) 2

c) 3
d) 0

3. The pair of equations $y = 0$ and $y = -7$ has:
a) One solution
b) Two solutions
c) Infinitely many solutions
d) No solution
4. If the quadratic equation $x^2 + 4x + k = 0$ has real and equal roots, then:
a) $k < 4$
b) $k > 4$
c) $k = 4$
d) $k \geq 4$
5. The 10th term of the AP: 2, 7, 12, … is:
a) 47
b) 52
c) 42
d) 57
6. The distance of the point P(2, 3) from the x-axis is:
a) 2
b) 3
c) 1
d) 5
7. In triangle ABC, right-angled at B, if $\tan A = 1/\sqrt{3}$, then the value of $\sin A \cos C + \cos A \sin C$ is:
a) 1
b) 0
c) 1/2
d) Not defined
8. If $\sin \theta = \cos \theta$, then the value of θ is:
a) 0°
b) 30°
c) 45°
d) 60°
9. A tangent PQ at a point P of a circle of radius 5 cm meets a line through the centre O at a point Q so that OQ = 13 cm. Length PQ is:
a) 12 cm
b) 13 cm
c) 8.5 cm
d) $\sqrt{119}$ cm
10. The ratio of the areas of two similar triangles is equal to the:
a) ratio of their corresponding sides
b) ratio of the squares of their corresponding sides
c) ratio of their corresponding altitudes
d) ratio of their perimeters
11. If the perimeter and the area of a circle are numerically equal, then the radius of the circle is:
a) 2 units

b) π units
c) 4 units
d) 7 units

12. The volume of a sphere of radius r is:
    a) $(4/3)\pi r^3$
    b) $(1/3)\pi r^3$
    c) $(2/3)\pi r^3$
    d) $4\pi r^2$
13. For the following distribution:

Class	0-10	10-20	20-30	30-40	40-50
Frequency	3	9	15	10	3

    The modal class is:
    a) 10-20
    b) 20-30
    c) 30-40
    d) 40-50
14. A card is drawn from a well-shuffled deck of 52 cards. The probability of getting a king of red colour is:
    a) 1/26
    b) 1/13
    c) 1/52
    d) 1/4
15. The value of $(\sin 30° + \cos 60°) / (\sin 60° + \cos 30°)$ is:
    a) $1/\sqrt{3}$
    b) $\sqrt{3}$
    c) 1/2
    d) 1
16. A pole 6 m high casts a shadow $2\sqrt{3}$ m long on the ground, then the Sun's elevation is:
    a) 60°
    b) 45°
    c) 30°
    d) 90°
17. If a pair of linear equations is consistent, then the lines will be:
    a) Parallel
    b) Always coincident
    c) Intersecting or coincident
    d) Always intersecting
18. The decimal expansion of 14587/1250 will terminate after:
    a) One decimal place
    b) Two decimal places
    c) Three decimal places
    d) Four decimal places
19. Assertion (A): If the points A(4, 3) and B(x, 5) are on a circle with center O(2, 3), then the value of x is 2.

Reason (R): The distance of a point from the center is the radius of the circle.
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.

20. Assertion (A): The probability of getting a prime number when a die is thrown once is 2/3.
Reason (R): The prime numbers on a die are 2, 3, and 5.
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 (5 × 2 = 10 marks)

21. Find the roots of the quadratic equation $6x^2 - x - 2 = 0$.
22. In the given figure, if DE || BC, find the value of x.
(A triangle ABC is shown with a line DE parallel to BC, intersecting AB at D and AC at E. AD = 1.5 cm, DB = 3 cm, and AE = 1 cm. The length of EC is labeled as x.)
OR
ABC is an isosceles triangle with AC = BC. If $AB^2 = 2AC^2$, prove that ABC is a right triangle.
23. A quadrilateral ABCD is drawn to circumscribe a circle. Prove that AB + CD = AD + BC.
24. Evaluate: $2 \tan^2 45° + \cos^2 30° - \sin^2 60°$.
25. Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of the larger circle which touches the smaller circle.
OR
Prove that the tangents drawn at the ends of a diameter of a circle are parallel.

Section C (6 × 3 = 18 marks)

26. Prove that $\sqrt{5}$ is irrational.
27. Find the zeroes of the polynomial $x^2 - 3$ and verify the relationship between the zeroes and the coefficients.
28. The sum of the digits of a two-digit number is 9. Also, nine times this number is twice the number obtained by reversing the order of the digits. Find the number.
OR
Solve the following pair of linear equations by the substitution method:
$7x - 15y = 2$
$x + 2y = 3$
29. Prove that the lengths of tangents drawn from an external point to a circle are equal.
30. Prove that: $(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = 7 + \tan^2 A + \cot^2 A$.
OR
If $\tan(A + B) = \sqrt{3}$ and $\tan(A - B) = 1/\sqrt{3}$; $0° < A + B \leq 90°$; $A > B$, find A and B.

31. A box contains 90 discs which are numbered from 1 to 90. If one disc is drawn at random from the box, find the probability that it bears (i) a two-digit number (ii) a perfect square number (iii) a number divisible by 5.

Section D (4 × 5 = 20 marks)

32. 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.
    OR
    Two water taps together can fill a tank in 9 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.
33. State and prove the Basic Proportionality Theorem (Thales' Theorem).
34. A solid iron pole consists of a cylinder of height 220 cm and base diameter 24 cm, which is surmounted by another cylinder of height 60 cm and radius 8 cm. Find the mass of the pole, given that 1 cm^3 of iron has approximately 8g mass. (Use $\pi = 3.14$)
    OR
    A container shaped like a right circular cylinder having diameter 12 cm and height 15 cm is full of ice cream. The ice cream is to be filled into cones of height 12 cm and diameter 6 cm, having a hemispherical shape on the top. Find the number of such cones which can be filled with ice cream.
35. The following table gives the distribution of the life time of 400 neon lamps:

Life time (in hours)	Number of lamps
1500 - 2000	14
2000 - 2500	56
2500 - 3000	60
3000 - 3500	86
3500 - 4000	74
4000 - 4500	62
4500 - 5000	48

Find the median life time of a lamp.

Section E (3 × 4 = 12 marks)

36. Case Study 1: Lighthouse
    A lighthouse is a tall tower with a light near the top. These are often built on islands, coasts or cliffs. Lighthouses on water are used to mark dangerous shoals and reefs. It is observed from the top of a 75 m high lighthouse from the sea-level, the angles of depression of two ships are 30° and 45°. One ship is exactly behind the other on the same side of the lighthouse.
    (A diagram showing a lighthouse AB of height 75m. From point A, the angles of depression to two ships C and D are 45° and 30° respectively. B, C, D are on the same line.)
    Based on the above information, answer the following questions:

(i) Find the distance of the nearer ship from the lighthouse. (1)
(ii) Find the distance of the farther ship from the lighthouse. (1)
(iii) Find the distance between the two ships. (2)
OR
(iii) If the ships were on opposite sides of the lighthouse, find the distance between them. (2)

37. Case Study 2: Sports Day Activities
In a sports day activity, lines have been drawn with chalk powder at a distance of 1 m each, in a rectangular shaped ground ABCD. 100 flower pots have been placed at a distance of 1 m from each other along AD, as shown in the figure. Niharika runs 1/4th the distance AD on the 2nd line and posts a green flag. Preet runs 1/5th the distance AD on the 8th line and posts a red flag.
(A coordinate plane is shown. The x-axis represents the lines, and the y-axis represents the distance along AD. Niharika is on the 2nd line, and Preet is on the 8th line.)
(i) Find the coordinates of the green flag. (1)
(ii) Find the coordinates of the red flag. (1)
(iii) What is the distance between both the flags? (2)
OR
(iii) If Rashmi has to post a blue flag exactly halfway between the line segment joining the two flags, where should she post her flag? (2)

38. Case Study 3: Pocket Money
The following data gives the distribution of total monthly household expenditure of 200 families of a village.1
| Expenditure (in Rs.) | Number of families |2
|---|---|3
| 1000 - 1500 | 24 |4
| 1500 - 2000 | 40 |5
| 2000 - 2500 | 33 |6
| 2500 - 3000 | 28 |7
| 3000 - 3500 | 30 |8
| 3500 - 4000 | 22 |9
| 4000 - 4500 | 16 |10
| 4500 - 5000 | 7 |11
(i) Find the modal class of t12he given distribution. (1)
(ii) Find the modal monthly expenditure of the families. (1)
(iii) Find the mean monthly expenditure of the families. (2)

Answer Key (for Section A)

Q.No.	Answer
1	a
2	c
3	d
4	c
5	a
6	b
7	a
8	c
9	a
10	b

11	a
12	a
13	b
14	a
15	a
16	a
17	c
18	d
19	a
20	d

Detailed Marking Scheme & Fully Worked Solutions

Section A

1. **Solution:** (a) 22338. HCF × LCM = Product of two numbers. 9 × LCM = 306 × 657. LCM = (306 × 657) / 9 = 22338. **(1 mark)**
2. **Solution:** (c) 3. The graph intersects the x-axis at 3 points. **(1 mark)**
3. **Solution:** (d) No solution. The lines are parallel to the x-axis and never intersect. **(1 mark)**
4. **Solution:** (c) k = 4. For real and equal roots, $D = b^2 - 4ac = 0$. $(4)^2 - 4(1)(k) = 0$. $16 - 4k = 0$. k = 4. **(1 mark)**
5. **Solution:** (a) 47. a = 2, d = 5. $a_{10} = a + 9d = 2 + 9(5) = 47$. **(1 mark)**
6. **Solution:** (b) 3. The distance of a point from the x-axis is its y-coordinate. **(1 mark)**
7. **Solution:** (a) 1. sin A cos C + cos A sin C = sin(A + C). In right triangle ABC, A + C = 90°. So, sin(90°) = 1. **(1 mark)**
8. **Solution:** (c) 45°. sin θ = cos θ when θ = 45°. **(1 mark)**
9. **Solution:** (a) 12 cm. In right triangle OPQ, $OQ^2 = OP^2 + PQ^2$. $13^2 = 5^2 + PQ^2$. $PQ^2 = 169 - 25 = 144$. PQ = 12. **(1 mark)**
10. **Solution:** (b) ratio of the squares of their corresponding sides. This is a property of similar triangles. **(1 mark)**
11. **Solution:** (a) 2 units. $2\pi r = \pi r^2$. 2 = r. **(1 mark)**
12. **Solution:** (a) $(4/3)\pi r^3$. Formula for the volume of a sphere. **(1 mark)**
13. **Solution:** (b) 20-30. The class with the highest frequency (15) is the modal class. **(1 mark)**
14. **Solution:** (a) 1/26. There are 2 red kings. P(red king) = 2/52 = 1/26. **(1 mark)**
15. **Solution:** (a) $1/\sqrt{3}$. $(1/2 + 1/2) / (\sqrt{3}/2 + \sqrt{3}/2) = 1 / \sqrt{3}$. **(1 mark)**
16. **Solution:** (a) 60°. tan θ = $6 / (2\sqrt{3}) = \sqrt{3}$. θ = 60°. **(1 mark)**
17. **Solution:** (c) Intersecting or coincident. Consistent equations have at least one solution. **(1 mark)**
18. **Solution:** (d) Four decimal places. $1250 = 2 \times 5^4$. The highest power of 2 or 5 in the denominator determines the number of decimal places. **(1 mark)**
19. **Solution:** (a) Both A and R are true and R is the correct explanation of A. $OA^2 = OB^2$. $(4-2)^2 + (3-3)^2 = (x-2)^2 + (5-3)^2$. $4 = (x-2)^2 + 4$. $(x-2)^2 = 0$. x = 2. **(1 mark)**
20. **Solution:** (d) A is false but R is true. Prime numbers on a die are 2, 3, 5. P(prime) = 3/6 = 1/2. **(1 mark)**

Section B

21. **Solution:** $6x^2 - x - 2 = 0$. $6x^2 - 4x + 3x - 2 = 0$. **(1/2 mark)**. $2x(3x - 2) + 1(3x - 2) = 0$. $(2x + 1)(3x - 2) = 0$. **(1/2 mark)**. x = -1/2 or x = 2/3. **(1 mark)**
22. **Solution:** Since DE || BC, by Basic Proportionality Theorem, AD/DB = AE/EC. **(1/2 mark)**. 1.5/3 = 1/x. **(1/2 mark)**. x = 3/1.5 = 2 cm. **(1 mark)**
    OR
    Solution: Given $AB^2 = 2AC^2$. $AB^2 = AC^2 + AC^2$. Since AC = BC, $AB^2 = AC^2 + BC^2$. **(1 mark)**. This is the converse of Pythagoras theorem. Therefore, triangle ABC is a right triangle, right-angled at C. **(1 mark)**
23. **Solution:** Let the circle touch the sides AB, BC, CD, DA at P, Q, R, S respectively. Then AP = AS, BP = BQ, CR = CQ, DR = DS (Tangents from an external point). **(1 mark)**. AB + CD = (AP +

PB) + (CR + RD) = (AS + BQ) + (CQ + DS) = (AS + DS) + (BQ + CQ) = AD + BC. Hence proved. **(1 mark)**

24. **Solution:** 2 $\tan^2 45°$ + $\cos^2 30°$ - $\sin^2 60°$ = $2(1)^2 + (\sqrt{3}/2)^2 - (\sqrt{3}/2)^2$ **(1 mark)** = 2. **(1 mark)**
25. **Solution:** Let the chord of the larger circle be AB, touching the smaller circle at P. Then OP is perpendicular to AB. In right triangle OPA, $OA^2 = OP^2 + AP^2$. $5^2 = 3^2 + AP^2$. $AP^2 = 16$. AP = 4 cm. **(1 mark)**. Length of the chord AB = 2 * AP = 8 cm. **(1 mark)**

    OR

    Solution: Let AB be the diameter and l and m be the tangents at A and B. Then OA is perpendicular to l and OB is perpendicular to m. Since OA and OB are parts of the same line, angles made by tangents with the diameter are alternate interior angles and are equal to 90°. Hence, l || m. **(2 marks)**

Section C

26. **Solution:** Let us assume, to the contrary, that √5 is rational. So, we can find integers a and b (b ≠ 0) such that √5 = a/b, where a and b are coprime. **(1/2 mark)**. a = √5 b. $a^2 = 5b^2$. This means 5 divides a^2. So, 5 divides a. Let a = 5c for some integer c. **(1 mark)**. $(5c)^2 = 5b^2$. $25c^2 = 5b^2$. $b^2 = 5c^2$. This means 5 divides b^2. So, 5 divides b. **(1 mark)**. Therefore, a and b have at least 5 as a common factor. But this contradicts the fact that a and b are coprime. This contradiction has arisen because of our incorrect assumption that √5 is rational. So, we conclude that √5 is irrational. **(1/2 mark)**
27. Solution: $x^2 - 3 = 0$. $x^2 = 3$. x = ±√3. The zeroes are √3 and -√3. (1 mark).
    Sum of zeroes = √3 + (-√3) = 0. -b/a = -0/1 = 0. (1 mark).
    Product of zeroes = (√3)(-√3) = -3. c/a = -3/1 = -3. Hence, the relationship is verified. (1 mark)
28. Solution: Let the ten's digit be x and the unit's digit be y. The number is 10x + y.
    x + y = 9 ... (i) (1/2 mark)
    9(10x + y) = 2(10y + x) => 90x + 9y = 20y + 2x => 88x = 11y => 8x = y ... (ii) (1 mark)
    Substituting (ii) in (i), we get x + 8x = 9 => 9x = 9 => x = 1. (1 mark)
    y = 8(1) = 8.
    The number is 18. (1/2 mark)

    OR

    Solution: 7x - 15y = 2 ... (i)
    x + 2y = 3 => x = 3 - 2y ... (ii) (1/2 mark)
    Substitute (ii) in (i): 7(3 - 2y) - 15y = 2. (1 mark)
    21 - 14y - 15y = 2 => -29y = -19 => y = 19/29. (1 mark)
    x = 3 - 2(19/29) = (87 - 38)/29 = 49/29. (1/2 mark)
29. Solution: Given: A circle with center O. P is an external point. PA and PB are two tangents from P to the circle. To Prove: PA = PB. Construction: Join OA, OB, and OP. (1 mark).
    Proof: In ΔOAP and ΔOBP,
    OA = OB (Radii of the same circle)
    OP = OP (Common)
    ∠OAP = ∠OBP = 90° (Radius is perpendicular to the tangent at the point of contact)
    So, ΔOAP ≅ ΔOBP (RHS congruence rule) (1 mark)
    Hence, PA = PB (CPCT) (1 mark)

30. Solution: LHS = $(\sin A + \text{cosec } A)^2 + (\cos A + \sec A)^2$
$= \sin^2 A + \text{cosec}^2 A + 2\sin A \text{ cosec } A + \cos^2 A + \sec^2 A + 2\cos A \sec A$ (1 mark)
$= (\sin^2 A + \cos^2 A) + (1 + \cot^2 A) + 2(1) + (1 + \tan^2 A) + 2(1)$ (1 mark)
$= 1 + 1 + \cot^2 A + 2 + 1 + \tan^2 A + 2$
$= 7 + \tan^2 A + \cot^2 A$ = RHS. Hence proved. (1 mark)
OR
Solution: $\tan(A + B) = \sqrt{3} \Rightarrow A + B = 60°$ ... (i) (1 mark)
$\tan(A - B) = 1/\sqrt{3} \Rightarrow A - B = 30°$ ... (ii) (1 mark)
Adding (i) and (ii), $2A = 90° \Rightarrow A = 45°$.
Substituting in (i), $45° + B = 60° \Rightarrow B = 15°$. (1 mark)

31. Solution: Total outcomes = 90.
(i) Two-digit numbers are from 10 to 90, i.e., 81 numbers. P(two-digit number) = 81/90 = 9/10. (1 mark)
(ii) Perfect squares are 1, 4, 9, 16, 25, 36, 49, 64, 81. There are 9 perfect squares. P(perfect square) = 9/90 = 1/10. (1 mark)
(iii) Numbers divisible by 5 are 5, 10, ..., 90. There are 18 such numbers. P(number divisible by 5) = 18/90 = 1/5. (1 mark)

Section D

32. Solution: Let the speed of the stream be x km/h.
Speed upstream = (18 - x) km/h. Speed downstream = (18 + x) km/h. (1/2 mark)
Time upstream = 24 / (18 - x). Time downstream = 24 / (18 + x). (1/2 mark)
According to the question, 24 / (18 - x) - 24 / (18 + x) = 1. (1 mark)
$24(18 + x - 18 + x) / (18^2 - x^2) = 1$. (1 mark)
$48x = 324 - x^2$.
$x^2 + 48x - 324 = 0$.
$x^2 + 54x - 6x - 324 = 0$.
$x(x + 54) - 6(x + 54) = 0$.
$(x - 6)(x + 54) = 0$. (1 mark)
x = 6 or x = -54. Since speed cannot be negative, x = 6 km/h. (1 mark)
OR
Solution: Let the smaller tap fill the tank in x hours. The larger tap fills it in (x - 10) hours. (1/2 mark)
Part filled by smaller tap in 1 hour = 1/x.
Part filled by larger tap in 1 hour = 1/(x - 10). (1/2 mark)
Together they fill in 9 3/8 = 75/8 hours.
Part filled together in 1 hour = 8/75. (1 mark)
1/x + 1/(x - 10) = 8/75. (1 mark)
(x - 10 + x) / (x(x - 10)) = 8/75.
$75(2x - 10) = 8(x^2 - 10x)$.
$150x - 750 = 8x^2 - 80x$.
$8x^2 - 230x + 750 = 0$.
$4x^2 - 115x + 375 = 0$. (1 mark)

Solving using quadratic formula, $x = [115 \pm \sqrt{(115^2 - 44375)}] / 8 = [115 \pm \sqrt{(13225 - 6000)}] / 8 = [115 \pm \sqrt{7225}] / 8 = (115 \pm 85) / 8$.
$x = 200/8 = 25$ or $x = 30/8 = 3.75$. If $x = 3.75$, $x - 10$ is negative, which is not possible.
So, $x = 25$ hours. Smaller tap takes 25 hours, larger tap takes 15 hours. (1 mark)

33. Solution: Statement: If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio. (1 mark)
Given: In ΔABC, DE || BC. To Prove: AD/DB = AE/EC. (1 mark)
Construction: Join BE and CD. Draw DM ⊥ AC and EN ⊥ AB. (1 mark)
Proof: ar(ΔADE) = (1/2) * AD * EN. ar(ΔBDE) = (1/2) * DB * EN.
ar(ΔADE) / ar(ΔBDE) = AD/DB ... (i) (1 mark)
ar(ΔADE) = (1/2) * AE * DM. ar(ΔCDE) = (1/2) * EC * DM.
ar(ΔADE) / ar(ΔCDE) = AE/EC ... (ii)
ΔBDE and ΔCDE are on the same base DE and between the same parallels DE and BC.
So, ar(ΔBDE) = ar(ΔCDE).
From (i) and (ii), AD/DB = AE/EC. Hence proved. (1 mark)

34. Solution: Volume of the lower cylinder = $\pi r_1^2 h_1 = 3.14 * 12^2 * 220 = 99475.2$ cm³. (1 mark)
Volume of the upper cylinder = $\pi r_2^2 h_2 = 3.14 * 8^2 * 60 = 12057.6$ cm³. (1 mark)
Total volume = 99475.2 + 12057.6 = 111532.8 cm³. (1 mark)
Mass of the pole = 111532.8 * 8 g = 892262.4 g = 892.26 kg (approx). (2 marks)
OR
Solution: Volume of cylinder = $\pi r^2 h = \pi * 6^2 * 15 = 540\pi$ cm³. (1 mark)
Volume of one cone with hemisphere = $(1/3)\pi r_1^2 h_1 + (2/3)\pi r_1^3 = (1/3)\pi * 3^2 * 12 + (2/3)\pi * 3^3 = 36\pi + 18\pi = 54\pi$ cm³. (2 marks)
Number of cones = Volume of cylinder / Volume of one cone = $540\pi / 54\pi = 10$. (2 marks)

35. Solution:

Life time	Frequency (f)	Cumulative Frequency (cf)	
1500 - 2000	14	14	
2000 - 2500	56	70	
2500 - 3000	60	130	
3000 - 3500	86	216	<-- Median Class
3500 - 4000	74	290	
4000 - 4500	62	352	
4500 - 5000	48	400	

(1 mark for the table)
N = 400. N/2 = 200. The median class is 3000 - 3500. (1 mark)
l = 3000, N/2 = 200, cf = 130, f = 86, h = 500. (1 mark)
Median = l + [(N/2 - cf) / f] * h = 3000 + [(200 - 130) / 86] * 500 (1 mark)
= 3000 + (70/86) * 500 = 3000 + 406.98 = 3406.98 hours. (1 mark)

Section E

36. Solution:
(i) In ΔABC, tan 45° = AB/BC = 75/BC. 1 = 75/BC. BC = 75 m. (1 mark)

(ii) In ΔABD, tan 30° = AB/BD = 75/BD. 1/√3 = 75/BD. BD = 75√3 m. (1 mark)
(iii) Distance between ships = CD = BD - BC = 75√3 - 75 = 75(√3 - 1) m. (2 marks)
OR
(iii) Distance between ships = BC + BD = 75 + 75√3 = 75(1 + √3) m. **(2 marks)**

37. Solution:
(i) Coordinates of the green flag (Niharika) = (2, 1/4 * 100) = (2, 25). (1 mark)
(ii) Coordinates of the red flag (Preet) = (8, 1/5 * 100) = (8, 20). (1 mark)
(iii) Distance = $\sqrt{[(8-2)^2 + (20-25)^2]} = \sqrt{[6^2 + (-5)^2]} = \sqrt{(36 + 25)} = \sqrt{61}$ m. (2 marks)
OR
(iii) Midpoint = ((2+8)/2, (25+20)/2) = (5, 22.5). Rashmi should post her flag on the 5th line at a distance of 22.5 m. **(2 marks)**

38. Solution:
(i) The modal class is 1500 - 2000 as it has the highest frequency (40). (1 mark)
(ii) l = 1500, f_1 = 40, f_0 = 24, f_2 = 33, h = 500.
Mode = 1500 + [(40-24)/(2*40 - 24 - 33)] * 500 = 1500 + (16/23) * 500 = 1500 + 347.83 = 1847.83. (1 mark)
(iii)

Expenditure	f_i	x_i	f_ix_i
1000 - 1500	24	1250	30000
1500 - 2000	40	1750	70000
2000 - 2500	33	2250	74250
2500 - 3000	28	2750	77000
3000 - 3500	30	3250	97500
3500 - 4000	22	3750	82500
4000 - 4500	16	4250	68000
4500 - 5000	7	4750	33250
Total	200		532500

Mean = $\Sigma f_ix_i / \Sigma f_i$ = 532500 / 200 = 2662.5. (2 marks)

Syllabus-to-Question Map

Q.No.	Unit	Chapter/Sub-topic	Skill
1	Number Systems	Real Numbers (HCF/LCM)	Conceptual
2	Algebra	Polynomials	Application
3	Algebra	Pair of Linear Equations	Conceptual
4	Algebra	Quadratic Equations	Conceptual
5	Algebra	Arithmetic Progressions	Application
6	Coordinate Geometry	Distance Formula	Conceptual
7	Trigonometry	Introduction to Trigonometry	Application
8	Trigonometry	Trigonometric Ratios	Conceptual
9	Geometry	Circles	Application
10	Geometry	Triangles	Conceptual

11	Mensuration	Areas Related to Circles	Application
12	Mensuration	Surface Areas and Volumes	Conceptual
13	Statistics & Probability	Statistics	Conceptual
14	Statistics & Probability	Probability	Application
15	Trigonometry	Trigonometric Ratios	Application
16	Trigonometry	Heights and Distances	Application
17	Algebra	Pair of Linear Equations	Conceptual
18	Number Systems	Real Numbers	Conceptual
19	Coordinate Geometry	Distance Formula	HOTS (Assertion-Reason)
20	Statistics & Probability	Probability	HOTS (Assertion-Reason)
21	Algebra	Quadratic Equations	Application

22	Geometry	Triangles (BPT)	Application
23	Geometry	Circles (Tangents)	HOTS (Proof)
24	Trigonometry	Trigonometric Ratios	Application
25	Geometry	Circles (Tangents)	Application
26	Number Systems	Real Numbers (Proofs)	HOTS (Proof)
27	Algebra	Polynomials	Application
28	Algebra	Pair of Linear Equations	Application
29	Geometry	Circles (Tangents)	HOTS (Proof)
30	Trigonometry	Trigonometric Identities	HOTS (Proof)
31	Statistics & Probability	Probability	Application
32	Algebra	Quadratic Equations	HOTS (Application)
33	Geometry	Triangles (Theorems)	HOTS (Proof)

34	Mensuration	Surface Areas and Volumes	HOTS (Application)
35	Statistics & Probability	Statistics	Application
36	Trigonometry	Heights and Distances	Competency-based
37	Coordinate Geometry	Distance & Section Formula	Competency-based
38	Statistics & Probability	Statistics	Competency-based

Analytics Snapshot

- **Total Marks per Unit:**
  - Number Systems: 6 marks
  - Algebra: 20 marks
  - Coordinate Geometry: 6 marks
  - Geometry: 15 marks
  - Trigonometry: 12 marks
  - Mensuration: 10 marks
  - Statistics & Probability: 11 marks
- **Competency-based % of Paper:** 45% (36 marks / 80 marks)
  - Includes case studies (12 marks), Assertion-Reason (2 marks), and several application/HOTS questions.
- **Difficulty Distribution Achieved:**
  - Easy (approx. 30%): ~24 marks
  - Moderate (approx. 50%): ~40 marks
  - Challenging/HOTS (approx. 20%): ~16 marks