SUBJECT: MATHEMATICS BASIC (241)
SAMPLE QUESTION PAPER
CLASS - X (2026 - 27)

Maximum Marks: 80 **Time Allowed: 3 hours**

General Instructions

Read the following instructions carefully and follow them:

1. This question paper contains 38 questions. All questions are compulsory.
2. This question Paper is divided into 5 Sections A, B, C, D and E.
3. In Section A, Question numbers 1-18 are multiple choice questions (MCQs) and question no.19 and 20 are Assertion- Reason based questions of 1 mark each.
4. In Section B, Question numbers 21-25 are very short answer (VSA) type questions, carrying 02 marks each.
5. In Section C, Question numbers 26-31 are short answer (SA) type questions, carrying 03 marks each.
6. In Section D, Question numbers 32-35 are long answer (LA) type questions, carrying 05 marks each.
7. In Section E, Question numbers 36-38 are case study-based questions carrying 4 marks each with sub parts of the values of 1, 1 and 2 marks each respectively.
8. There is no overall choice. However, an internal choice in 2 questions of Section B, 2 questions of Section C and 2 questions of Section D has been provided. An internal choice has been provided in all 2 marks questions of Section E.
9. Draw neat and clean figures wherever required. Take $\pi = \frac{22}{7}$ wherever required if not stated.
10. Use of calculators is not allowed.

SECTION – A **(20 × 1 = 20)**

This section comprises of 18 multiple choice questions and two assertion and reason type questions of 1 mark each.

Q.No.	Question	Marks
Q1.	If HCF (2520, 6600) = 40 and LCM (2520, 6600) = 252 × k, then the value of k is (A) 165 (B) 1600 (C)1625 (D)1650	**1**
Q2.	If α and β are the Zeroes of the polynomial $2x^2 - 4x - 5$, the value of $(\alpha - \beta)^2$ is (A) 4 (B) 6 (C) 14 (D) 56	**1**
Q3.	For what value of p does the pair of Linear equations $4x + py + 8 = 0$ and $2x + 2y + 2 = 0$ has a unique solution (A) $p = 4$ only (B) $p = 2$ only (C) $p \neq 4$ (D)$p \neq 2$	**1**

*There is no change in the Question Paper Design and Assessment Pattern for Academic Session 2026-27.

Q4.	The sum of the numerator and denominator of a fraction is 11. If the denominator is increased by 1, the fraction becomes $\frac{1}{2}$, then the fraction is (A) $\frac{2}{9}$ (B) $\frac{3}{8}$ (C) $\frac{4}{7}$ (D) $\frac{5}{6}$	**1**
Q5.	If one root of the quadratic equation $ax^2 + bx + c = 0$ is the reciprocal of the other, then (A) $b = c$ (B) $a = b$ (C) $ac = 1$ (D) $a = c$	**1**
Q6.	The first term of AP is p and the common difference is q , then its 10th term is (A) $q + 10p$ (B) $p - 9q$ (C) $p + 9q$ (D) $p + 10$q	**1**
Q7.	Which term of the AP: 21, 42, 63, 84 ... is 210? (A) 9**th** (B) 10**th** (C) 11**th** (D) 12**th**	**1**
Q8.	If the point P (5, 2) divides the line segment joining A(8, 5) and B(4, $\boldsymbol{y}$) in the ratio 3 : 1, then the value of $\boldsymbol{y}$ is (A) 4 (B) 3 (C) 2 (D) 1	**1**
Q9.	A letter from the word INDEPENDENCE is selected at random. What is the probability that the letter selected is a vowel which occurs the maximum number of times in the given word? (A) $\frac{1}{12}$ (B) $\frac{1}{4}$ (C) $\frac{1}{3}$ (D) $\frac{5}{12}$	**1**
Q10.	For the following distribution **Class** | 0-5 | 5-10 | 10-15 | 15-20 | 20-25 **Frequency** | 10 | 15 | 12 | 20 | 9 The lower limit of the median class is (A) 5 (B) 10 (C) 15 (D) 20	**1**
Q11.	The length of a tangent drawn from a point at a distance of 10 cm from the centre of the circle is 8 cm. The radius of the circle is (A) 4 cm (B) 5 cm (C) 6 cm (D) 7 cm	**1**
Q12.	Mean and median of certain data are 32 and 30 respectively. Using empirical formula, the value of mode is (A) 36 (B) 26 (C) 30 (D) 20	**1**
Q13.	A ladder 15 m long reaches a window 12 m above the ground. The distance of the foot of the ladder from the base of the wall is (A) 8 m (B) 9 m (C) 10 m (D) 13 m	**1**

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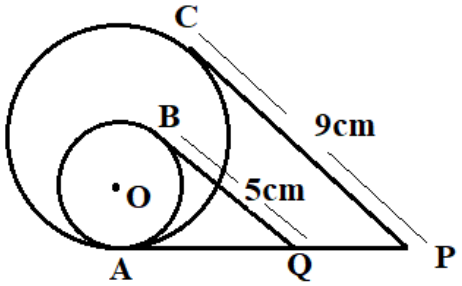
Q14.	The value of $\sin^2 60° - 2\tan^2 45° - \cos^2 30°$ is (A) −2 (B) −1 (C) 1 (D) 2	**1**
Q15.	The perimeter of two similar triangles is 28 cm and 35 cm respectively. If one side of the first triangle is 8cm, then the corresponding side of the second triangle is (A) 10 cm (B) 12cm (C) 14cm (D) 16cm	**1**
Q16.	If in ΔABC and ΔPQR , ∠B = ∠Q, ∠R = ∠C and AB = 2PQ, then the two triangles are (A) Congruent but not similar (B) Similar but not congruent (C)Neither congruent nor similar (D) Congruent as well as similar	**1**
Q17.	If tangents PA and PB from a point P to a circle with centre O and respective point of contacts as A and B, are inclined to each other at angle of 80°, then ∠AOB is equal to (A) 60° (B) 70° (C) 80° (D)100°	**1**
Q18.	Two cubes each of volume $64cm^3$ are joined end to end to form a cuboid. The total surface area of the resulting cuboid is (A) 128 cm^2 (B) 160 cm^2 (C) 176 cm^2 (D) 192 cm^2	**1**
	Assertion-Reason Based Questions **Directions: Questions number 19 and 20 are Assertion and Reason based questions carrying 1 mark each. Two statements are given, one labelled Assertion (A) and the other labelled Reason (R).** **Select the correct answer from the options (A), (B), (C) and (D) as given below:** (A) Both Assertion (A) and Reason (R) are true and (R) is the correct explanation of Assertion (A). (B) Both Assertion (A) and Reason (R) are true but (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.	
Q19.	**ASSERTION (A)**: The probability of getting number 8 on rolling a die is zero (0) **REASON (R)**: The probability of an impossible event is zero (0)	**1**
Q20.	**ASSERTION (A)**: If a line divides any two sides of a triangle in the same ratio, then the line is parallel to the third side. **REASON (R)**: Line drawn from midpoint of one side of triangle parallel to another will bisect the third side.	**1**

	SECTION – B (5 x 2 = 10) **This section comprises of 5 very short answer (VSA) type questions of 2 marks each.**	
Q21(A)	Find the smallest number which when increased by 17 is exactly divisible by both 520 and 468.	**2**
	OR	
Q21(B)	Show that $(25)^n$ will never end with digit zero for any natural number n.	
Q22.	If $3\sin\theta = 4\cos\theta$, find the value of $\sin\theta + \cos^2\theta - 1$; $0° < \theta < 90°$	**2**
Q23.	If one zero of the quadratic polynomial $2x^2 - 3x + p$ is 3, find the value of p. Also, find the other zero.	**2**
Q24.	In the given figure, PA is a common tangent and QB and PC are the tangents from Q and P to the smaller and larger circle respectively. If QB = 5cm and PC = 9cm, then evaluate length of PQ.  	**2**
	For Visually Impaired Candidates Two concentric circles are of radii 5cm and 3cm. Find the length of the chord of the larger circle which touches the smaller circle.	
Q25(A)	Points A (3,1), B (5, 1), C (a, b) and D (4, 3) are vertices of a parallelogram ABCD. Find the values of a and b.	**2**
	OR	
Q25(B)	Find a linear relation between x and y such that P (x, y) is equidistant from the points A (1, 4) and B (–1, 2).	
	SECTION – C (6 x 3 = 18) **This section comprises of 6 short answer (SA) type questions of 3 marks each.**	
Q26.	Given that $\sqrt{5}$ is irrational, prove that $2 + 3\sqrt{5}$ is irrational.	**3**
Q27. (A)	In the given figure, AX, AY and BC are tangents to the circle with P, R and Q respective point of contacts. Prove that AP = $\frac{1}{2}$ (AB + BC + CA)	

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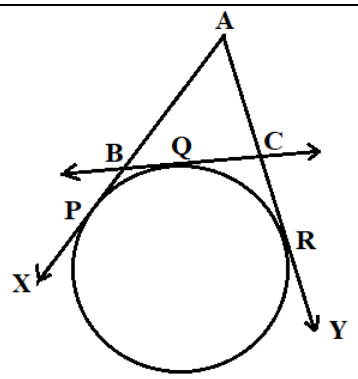
<tr><td></td><td>
</td><td rowspan="3">3</td></tr>
<tr><td></td><td>For Visually Impaired Candidates

Prove that a parallelogram circumscribing a circle is a rhombus.</td></tr>
<tr><td></td><td>OR</td></tr>
<tr><td>Q27. (B)</td><td>Two tangents PA and PB are drawn to a circle with centre O from an external point P. Prove that $\angle APB = 2\angle OAB$</td><td>3</td></tr>
<tr><td>Q28.</td><td>Determine the ratio in which the point (– 6, y) divides the line segment joining the points A (–3, –1) and B (– 8, 9). Also, find the value of y.</td><td>3</td></tr>
<tr><td>Q29.</td><td>Consider Δ ACB, right-angled at C, in which AB = 29 units, BC = 21 units and $\angle ABC = \theta$. Determine the values of
i. $1 + \tan^2\theta$
ii. $\cos^2\theta - \sin^2\theta$</td><td>3</td></tr>
<tr><td>Q30. (A)</td><td>The mean of the following distribution is 48 and sum of all the frequencies is 50. Find the missing frequencies x and y.
<table>
<tr><td>Class</td><td>20 – 30</td><td>30 – 40</td><td>40 – 50</td><td>50 – 60</td><td>60 – 70</td></tr>
<tr><td>Frequency</td><td>8</td><td>6</td><td>x</td><td>11</td><td>y</td></tr>
</table></td><td rowspan="3">3</td></tr>
<tr><td></td><td>OR</td></tr>
<tr><td>Q30. (B)</td><td>The distribution below gives the weight of 50 students of class X. Find the Modal weight of the students.
<table>
<tr><td>Weight (in kg)</td><td>35 – 45</td><td>45 – 55</td><td>55 – 65</td><td>65 – 75</td><td>75 – 85</td></tr>
<tr><td>Number of students</td><td>5</td><td>10</td><td>20</td><td>12</td><td>3</td></tr>
</table></td></tr>
<tr><td>Q31.</td><td>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.</td><td>3</td></tr>
</table>

	SECTION – D (4 x 5 = 20) **This section comprises of 4 long answer (LA) type questions of 5 marks each.**	
Q32.	Prove that if a line is drawn parallel to one side of a triangle intersecting the other two sides in distinct points, then the other two sides are divided in the same ratio.	**5**
Q33. (A)	A train travels a distance of 360 km at a uniform speed. If the speed had been 5 km/h more, then it would have taken 1 hour less to cover the same distance. Find the speed of the train.	**5**
	OR	
Q33. (B)	John and Jivanti together have 45 marbles. Both of them lost 5 marbles each, and the product of the number of marbles they now have is 124. Find the number of marbles they had with them in the beginning.	
Q34.	The largest possible hemisphere is drilled out of a wooden cubical block of side 21cm such that the base of the hemisphere is on one of the faces of the cube. Then, find **i.** the volume of the wood left in the block. **ii.** the total surface area of the remaining solid.	**5**
Q35. (A)	To assist an ambulance, a drone is hovering over an accident site at a constant height on a highway. The angle of depression of the ambulance, approaching the accident site, observed from drone is 30°. Twelve minutes later, the angle of depression of the ambulance is found to be 60°. If the ambulance is moving at a constant speed then, find the total time taken by the ambulance to reach the site of accident.	**5**
	OR	
Q35. (B)	A statue standing on a pedestal, is 1.6 m tall. From a point on the ground, the angles of elevation of the top and bottom of the statue are 60° and 45° respectively. Find the height of the pedestal.	

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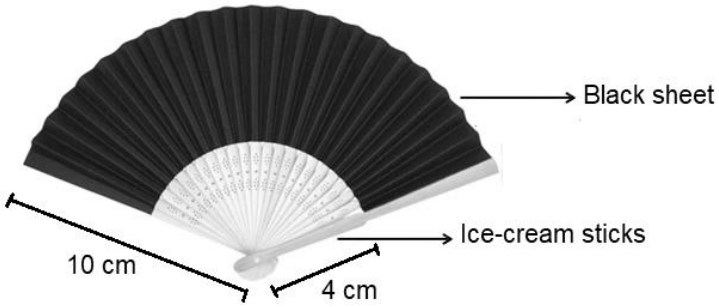
SECTION – E (3 x 4 = 12)

This section comprises of 3 case-study/passage-based questions of 4 marks each with sub parts. The first two case study questions have three sub parts (i), (ii), (iii) of marks 1, 1, 2 respectively.

Q36. An Art and craft teacher prepared a fan which looked like the sector of a circle



using ice-cream sticks and black sheet as shown in the given figure:

(i) The angle subtended at the centre of the sector is 60º. Find the area of one face of the fan. **1**

(ii) With the given sector angle of 60º at the centre, find area of black sheet used in the fan. **1**

(iii)(A) The boundary of the black sheet region on one face is to be covered by a designer tape. What length of tape is required? **2**

OR

(iii)(B) If 29.6 cm of designer tape is required to cover the boundary of the black sheet region on one face of the fan, then evaluate the central angle of the sector.

For Visually Impaired Candidates

A motion sensor (or motion detector) is an electronic device that is designed to detect and measure movement. The motion detector can detect movement over a sector of angle θ = 70° to a distance of 24m.

(i) Derive a relation between length of arc(*l*) and the area of the sector(*A*) enclosed by it? **1**

(ii) How much area is monitored by motion detector? **1**

(iii)(A) To increase the area to be monitored by 50% with same range of distance covered, what should be the angle? **2**

OR

(iii)(B) For θ = 91°**,** what range of distance is required for the detector to monitor 30% more area?

Q37.	Delhi's pollution is a severe, often seasonal issue caused by a combination of factors like high vehicular and industrial emissions, dust from construction, and crop burning in surrounding states. In a school, students of classes I to XII thought of planting trees in and around the school to reduce air pollution.  It was decided that the number of trees that each section of each class will plant be three more than the double of the class in which they are studying, e.g., a section of class IV will plant 11 trees. If in the given school, there are two sections of each class, then answer the following questions: **(i)** If number of trees planted by students class-wise follow arithmetic progression, then find the common difference. **(ii)** What is the number of trees planted by students of class VI? **(iii) (A)** What is the total number of trees planted by the students of given school? **OR** **(iii) (B)** Identify the class that planted 34 trees.	**1** **1** **2**
Q38.	A labourer prints 400 T-shirts in a day. The supervisor checked the T-shirts and found that 312 prints were good, 54 prints were with minor defects and rest of the prints were of major defects.  Harish, a customer will buy a T-shirt only if it is good but a trader will buy, if it has no major defect. If a random T-shirt is picked, then **(i)** find the probability that Harish will buy a T-shirt. **(ii)** find the probability that a trader will buy the T-shirt. **(iii) (A)** find the probability that the T-shirt is not good. **OR** **(iii) (B)** find the probability that neither Harish nor trader buy the T-shirt.	**1** **1** **2**

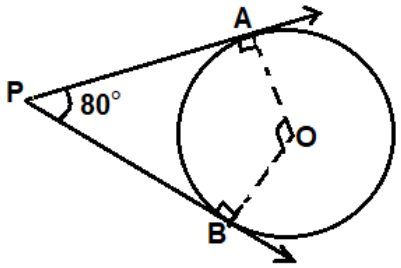
MATHEMATICS BASIC (241)
MARKING SCHEME
CLASS - X (2026 - 27)
SECTION: A

[Solution of MCQs of 1 Mark each, no part marks]

Q. No.	ANS	HINTS/SOLUTION	Marks
1.	**D**	HCF × LCM = Product of two numbers 40 × 252 × k = 2520 × 6600 **(D) 1650**	**1**
2.	**C**	$\alpha + \beta = 2; \alpha\beta = -\frac{5}{2}$ $(\alpha-\beta)^2 = (\alpha+\beta)^2 - 4\alpha\beta = 2^2 - 4\left(-\frac{5}{2}\right) = 14$ **(C) 14**	**1**
3.	**C**	For unique solution $\frac{a_1}{a_2} \neq \frac{b_1}{b_2} \Rightarrow \frac{4}{2} \neq \frac{p}{2} \Rightarrow p \neq 4$ **(C) $p \neq 4$**	**1**
4.	**C**	Let numerator be x and denominator be y Given, x + y = 11 $\frac{x}{(y+1)} = \frac{1}{2}$ Solving these equations, we get x = 4, y = 7; ∴ Fraction = $\frac{4}{7}$ **(C) $\frac{4}{7}$**	**1**
5.	**D**	Let the roots be α and $\frac{1}{\alpha}$ Product of roots $\alpha \times \frac{1}{\alpha} = \frac{c}{a} \Rightarrow 1 = \frac{c}{a} \Rightarrow a = c$ **(D) $a = c$**	**1**
6.	**C**	$a_{10} = a + (10-1)d = p + 9q$ **(C) $p + 9q$**	**1**
7.	**B**	$210 = 21 + (n-1)21 \Rightarrow n = 10$ **(B) 10th**	**1**

8.	**D**	Using Section formula, $\frac{3y+5}{3+1}=2 \Rightarrow \frac{3y+5}{4}=2 \Rightarrow y=1$ **(D) 1**	**1**
9.	**C**	INDEPENDENCE; Total number of letters = 12 Number of times 'I' occurs = 1; Number of times 'E' occurs = 4 P(most occurring vowel 'E') = $\frac{4}{12}=\frac{1}{3}$ **(C) $\frac{1}{3}$**	**1**
10.	**B**	$\frac{N}{2}=\frac{66}{2}$ = 33, which lies in the interval 10-15 Median class → 10 – 15 ⇒ Median Class is 10-15 Lower limit of median class =10 **(B) 10**	**1**
11.	**C**	(Distance of point from the centre)^2 = (Length of tangent)^2+(radius)^2 (10)^2 = (8)^2 +(radius)^2 ⇒ $r=\sqrt{100-64} \Rightarrow r=6$ **(C) 6 cm**	**1**
12.	**B**	Mode = 3Median – 2Mean ⇒ Mode= 3×30 - 2×32 ⇒ Mode = 26 **(B) 26**	**1**
13.	**B**	(Hypotenuse)^2 =(Base)^2 + (Perpendicular)^2 ⇒ (15)^2 = (Base)^2 +(12)^2 ⇒ Base = 9 m **(B) 9m**	**1**
14.	**A**	$\sin^2 60°-2\tan^2 45°-\cos^2 30° = \left(\frac{\sqrt{3}}{2}\right)^2 - 2(1)^2 - \left(\frac{\sqrt{3}}{2}\right)^2 = -2$ **(A) -2**	**1**
15.	**A**	$\frac{\text{Perimeter of First Triangle}}{\text{Perimeter of second Triangle}} = \frac{\text{Side of first Triangle}}{\text{Side of second Triangle}}$ $\Rightarrow \frac{28}{35} = \frac{8}{\text{Side of second Triangle}} \Rightarrow$ side of second triangle $= 10$cm **(A) 10cm**	**1**

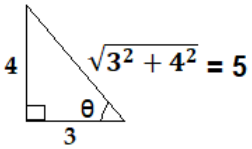
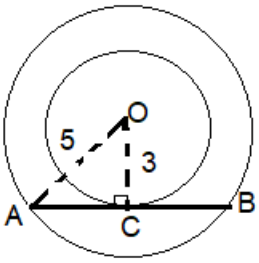
Class	Frequency	Cumulative frequency
0 – 5	10	10
5 – 10	15	25
10 – 15	12	37
15 – 20	20	57
20 – 25	9	66

16.	**B**	In ΔABC and ΔPQR , ∠B = ∠Q ; ∠R = ∠C ; $\frac{AB}{PQ} = \frac{2}{1}$ ∴ ΔABC ~ΔPQR Hence , the triangles are similar but not congruent because AB≠PQ **(B) Similar but not congruent**	**1**
17.	**D**	∠APB = 80° Join OA and OB ∠OAP = ∠OBP = 90° (Radius through the point of contact is perpendicular to tangent) In Quadrilateral AOBP, ∠APB + ∠OAP + ∠AOB + ∠OBP = 360° ⇒ 80°+ 90°+ ∠AOB + 90° = 360° ⇒ ∠AOB = 100° **(D) 100°** 	**1**
18.	**B**	Volume of cube, a^3 = 64 ⇒ a = 4 cm On joining two cubes of side = 4 cm, we get a cuboid whose Length (l) = 8 cm, Breadth (b) = 4 cm, Height (h) = 4 cm Surface area of resulting cuboid = $2(lb + bh + h\,l)$ $= 2(8 \times 4 + 4 \times 4 + 4 \times 8)$ =160 cm^2 **(B) $160cm^2$**	**1**
19.	**A**	P(getting 8 on rolling a die) = $\frac{0}{8}$ This is an impossible event as the numbers on the faces of a die are 1,2,3,4,5 and 6 **(A)Both Assertion (A)and Reason (R)are true and Reason (R)is the correct explanation of Assertion (A)**	**1**
20.	**B**	**(B)Both Assertion (A)and Reason (R)are true and Reason (R)is not the correct explanation of Assertion (A)**	**1**

Section –B

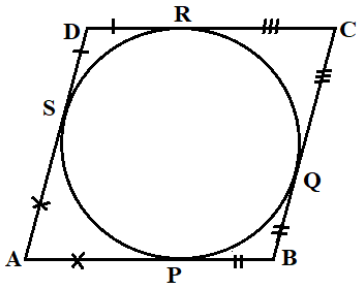
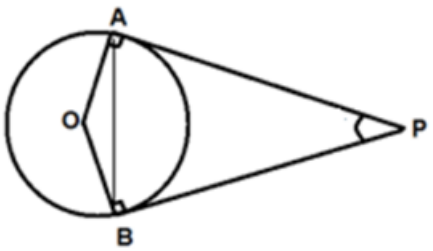
[This section comprises of solution of very short answer type questions (VSA) of 2 marks each]

21(A).	520 = 2^3 x 5 x 13; 468 = 2^2 x 3^2 x 13 LCM = 2^3 x 3^2 x 5 x 13 = 4680 ∴ The required number is (4680 – 17). i.e., **4663**	**1** **½** **½**

	OR	
21(B).	$(25)^n = (5^2)^n = 5^{2n}$ So, prime factorization of $(25)^n$ contains only 5 and this factorization is unique. Now, for $(25)^n$ to end with digit 0, there must be pair of 2 and 5 in its prime factorization. But 2 is not a factor of $(25)^n$. Hence, $(25)^n$ can never end with digit zero for any natural number.	½ ½ ½ ½
22.	$\frac{\sin\theta}{\cos\theta} = \frac{4}{3} \Rightarrow \tan\theta = \frac{4}{3}$  $\therefore \sin\theta + \cos^2\theta - 1 = \frac{4}{5} + \frac{9}{25} - 1 = \frac{4}{25}$	½+½ 1
23.	Since, 3 is a zero of $p(x) = 2x^2 - 3x + p \Rightarrow$ p(3) = 0 $\Rightarrow 2(3)^2 - 3(3) + p = 0$ $\Rightarrow \quad p = -9$ Let another zero be β, $3 + \beta = \frac{-(-3)}{2}$ (sum of zeroes) $\Rightarrow \quad \beta = -\frac{3}{2}$	½ ½ ½ ½
24.	BQ = QA = 5 cm CP = PA = 9 cm (Lengths of tangents from an external point to a circle are equal) PQ = AP – AQ = 9cm – 5cm = 4cm	½+½ 1
	For visually Impaired students only Join OC, OA ∠ACO = 90° (Radius through the point of contact is perpendicular to tangent) In rt ΔACO, AC = $\sqrt{OA^2 - OC^2}$ = 4cm ∴ AB = 2(AC) (perpendicular from centre bisects the chord) = 2×4 cm = 8 cm  	½ ½ ½ ½
25(A).	Since, diagonals of parallelogram bisect each other ∴ Midpoint of AC = midpoint of BD $\Rightarrow \left(\frac{3+a}{2}, \frac{1+b}{2}\right) = \left(\frac{5+4}{2}, \frac{1+3}{2}\right)$ $\Rightarrow \frac{3+a}{2} = \frac{9}{2}$ and $\frac{1+b}{2} = \frac{4}{2}$ $\Rightarrow a = 6;\ b = 3$	½ 1 ½
	OR	
25(B).	PA = PB $\Rightarrow \sqrt{(x-1)^2 + (y-4)^2} = \sqrt{(x+1)^2 + (y-2)^2}$ $\Rightarrow x^2 - 2x + 1 + y^2 - 8y + 16 = x^2 + 2x + 1 + y^2 - 4y + 4$ $\Rightarrow 4x + 4y = 12$ $\Rightarrow x + y = 3$	½ 1 ½

Section –C

[This section comprises of solution short answer type questions (SA) of 3 marks each]

26.	Let $2+3\sqrt{5}$ be a rational. Then $2+3\sqrt{5} = \frac{p}{q}$, where p and q are integers and q ≠0 $\sqrt{5} = \frac{p-2q}{3q}$ Since p,q are integers, so $\frac{p-2q}{3q}$ will be rational number. But $\sqrt{5}$ is irrational Since, rational is not equal to irrational This is a contradiction Hence, our assumption is incorrect. Therefore, $2+3\sqrt{5}$ is irrational.	½ 1 ½ ½ ½
27(A).	AB+BC+CA= AB+BQ+CQ+AC = AB+BP+CR+AC (BQ = BP and CQ = CR, lengths of tangents from an external point to a circle are equal) = AP + AR = 2AP (AP = AR) Hence, AP = $\frac{1}{2}$ (AB + BC + CA)	1 ½ 1 ½
	For visually Impaired students only Parallelogram $ABCD$ circumscribes a circle as shown in figure.  Lengths of tangents drawn to a circle from an external point are equal. So, $AP = AS, PB = BQ,$ $CR = CQ, DR = DS$ On adding the above equations, $(AP + PB) + (CR + RD) = (AS + DS) + (CQ + QB)$ $\Rightarrow AB + CD = AD + BC$ $\Rightarrow 2AB = 2BC$ (Opposite sides of parallelogram are equal) Thus, $AB = BC$ Since, $ABCD$ is a parallelogram with pair of adjacent sides equal. Hence, $ABCD$ is a rhombus.	1 ½ ½ ½ ½
	OR	
27(B).	In ΔAPB, ∠APB+∠BAP+∠ABP=180° ∠APB+2∠BAP=180° (∠BAP=∠ABP) _____(i) ∠OAB+∠BAP=90° ⇒ ∠BAP= 90°– ∠OAB _____(ii) (tangent is perpendicular to the radius at the point of contact) 	½ (for correct figure) ½ ½

Substituting ∠BAP in (i),we get

∠APB + 2(90°– ∠OAB) = 180° **1**

Hence, ∠APB = 2∠OAB **½**

28. $A(-3,-1)$; $B(-8,9)$ are given points

Let the ratio in which AB is divided be $k:1$ **½**

Coordinates of the required point are $\left(\frac{-8k-3}{k+1}, \frac{9k-1}{k+1}\right)$ **½**

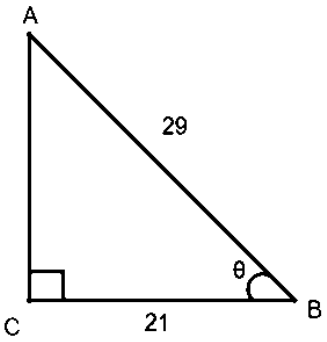
Hence, $\frac{-8k-3}{k+1} = -6 \Rightarrow k = \frac{3}{2}$, i.e., Required ratio is 3:2 **1**

$\therefore y = \frac{9\left(\frac{3}{2}\right)-1}{\left(\frac{3}{2}\right)+1} \Rightarrow y = 5$ **1**

29. $\text{AC} = \sqrt{(\text{AB})^2 - (\text{BC})^2} = \sqrt{29^2 - 21^2}$

$= \sqrt{400} = 20$ units **½**

$\sin\theta = \frac{\text{AC}}{\text{AB}} = \frac{20}{29}$, $\cos\theta = \frac{\text{BC}}{\text{AB}} = \frac{21}{29}$ **½**



(i) $1 + \tan^2\theta = 1 + \left(\frac{20}{21}\right)^2 = \frac{841}{441}$ **1**

(ii) $\cos^2\theta - \sin^2\theta = \left(\frac{21}{29}\right)^2 - \left(\frac{20}{29}\right)^2 = \frac{41}{841}$ **1**

30(A).

Class interval	**f_i**	**x_i (mid-value)**	**$u_i = \frac{x_i - 45}{h}$**	**$f_i u_i$**
20-30	8	25	- 2	- 16
30-40	6	35	-1	- 6
40-50	**x**	45	0	0
50-60	11	55	1	11
60-70	**y**	65	2	2y
Total	25+ x+ y			2y - 11

1

Assumed mean(A) = 45, Width of the interval (h) = 10 **½**

25 + x + y = 50 ⇒x + y = 25……(1) **½**

$\text{Mean} = 45 + \left(\frac{2y - 11}{50}\right) \times 10 \Rightarrow 48 = 45 + \left(\frac{2y - 11}{5}\right)$ **½**

⇒ y = 13

∴ from (1), x = 12 **½**

OR

30(B).

Weight (in kg)	No. of students	
35 – 45	5	
45 – 55	10	f_0
55 – 65	20	f_1
65 – 75	12	f_2
75 – 85	3	

Modal class ⇨ **55 – 65**

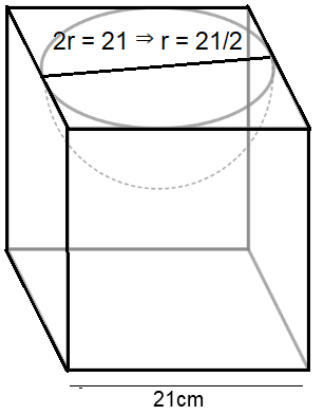
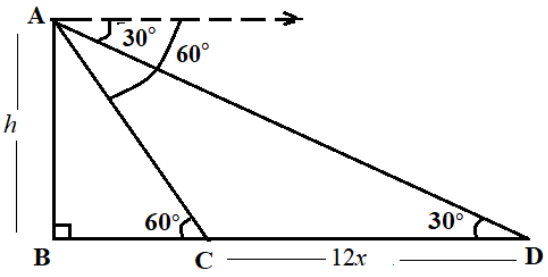
1

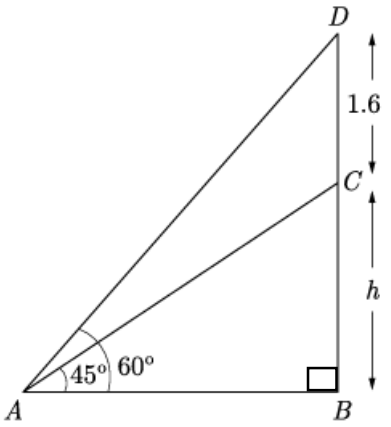
	∴ Modal class = 55 – 65, l = 55, h = 10	½
	Mode = $l + \left(\frac{f_1-f_0}{2f_1-f_0-f_2}\right)h = 55 + \left(\frac{20-10}{2(20)-10-12}\right)10 = 60.555\ldots$	1
	Hence, modal weight of students is 60.56 kg (approx.)	½
31.	Let the ten's place digit be x Let the unit's place digit be y Number = $10x + y$ Reversed Number = $10y + x$ ATQ	½
	$x + y = 9$ —----------(1)	½
	$9(10x + y) = 2(10y + x)$ ----------(2)	½
	Solving (1) and (2), we get	
	$x = 1, y = 8$	1
	Required Number = 18	½

Section –D

[This section comprises of solution of long answer type questions (LA) of 5 marks each]

32.	Correct figure, Given, To prove and Construction	4x½ = **2**
	Correct proof of theorem	**3**
33(A).	Let the speed of the train be x km/h Then the increased speed of the train be $(x + 5)$ km/h	½
	ATQ, $\frac{360}{x} - \frac{360}{x+5} = 1$	1
	On simplifying, we get	
	$x^2 + 5x - 1800 = 0$	1
	$x = \frac{-5 \pm \sqrt{5^2+4(1800)}}{2}$	1
	$x = 40, -45$	1
	Hence, $x = 40$	½
	∴ Speed of the train= 40 km/h	
	OR	
33(B).	Let the number of marbles John had in the beginning be x Then the number of marbles Jivanti had in the beginning $= 45 - x$ ATQ	½
	$(x - 5)(40 - x) = 124$	1
	$x^2 - 45x + 324 = 0$	½
	$x = \frac{45 \pm \sqrt{45^2-4(324)}}{2}$	1
	$x = 36, 9$	1

	Case 1 Number of marbles John had in the beginning $= x = 36$ Then, number of marbles Jivanti had in the beginning $= 45 - x = 9$ *Case 2* Number of marbles John had in the beginning $= x = 9$ Then, number of marbles Jivanti had in the beginning $= 45 - x = 36$	½ ½
34.	Side of cube (a) = 21 cm Radius of hemi-sphere (r) = $\frac{21}{2}$ cm i) Volume of solid = $V_{Cube} - V_{Hemi\text{-}sphere}$ $= a^3 - \frac{2}{3}\pi r^3$ $= 21^3 - \frac{2}{3} \times \frac{22}{7} \times \frac{21\times21\times21}{2\times2\times2}$ $= 6835.5\ cm^3$ ii) Surface area of wooden block $= 6a^2 - \pi r^2 + 2\pi r^2$ $= 6a^2 + \pi r^2 = 6(21)^2 + \frac{22}{7} \times \left(\frac{21}{2}\right)^2$ $= 2992.5\ cm^2$ 	½ ½ 1 ½ ½+1 1
35(A).	Let height of drone (AB) be h m Let speed of ambulance be x m/min CD = 12 x m In rt ΔABC, $\tan60° = \frac{AB}{BC} \Rightarrow BC = \frac{h}{\sqrt{3}}$ In rt ΔABD, $\tan30° = \frac{AB}{BD} \Rightarrow BD = h\sqrt{3}$ $\Rightarrow \frac{h}{\sqrt{3}} + 12x = h\sqrt{3} \Rightarrow h = 6\sqrt{3}x$ ∴ BC = 6 x time taken from C to B is $\frac{6x}{x}$ = 6 minutes ∴ Total time taken = (6+12) minutes = 18 minutes 	1 for correct figure 1 1 1 ½ ½
	OR	

35(B).	Let height of the pedestal (BC) be h m CD = height of statue = 1.6 m  In rt ΔABC, $\tan 45° = \frac{BC}{AB} \Rightarrow 1 = \frac{h}{AB}$ $\Rightarrow$ AB = h --------(i) In rt ΔABD, $\tan 60° = \frac{BD}{AB} \Rightarrow \sqrt{3} = \frac{h+1.6}{AB}$ $\Rightarrow AB = \frac{h+1.6}{\sqrt{3}}$ -------(ii) Equating (i) and (ii), we get $h = \frac{h+1.6}{\sqrt{3}}$ $(\sqrt{3}-1)\,h = 1.6$ $h = \frac{1.6}{\sqrt{3}-1} = 0.8(\sqrt{3}+1)$ ∴ height of the pedestel is $0.8(\sqrt{3}+1)$ m	**1 for correct figure** **1** **1** **½** **1** **½**

Section –E

[This section comprises solution of 3 case- study/passage-based questions of 4 marks]

36.	Central angle, $\Theta = 60°$, r = 4cm, R = 10cm (i) Required area of one face of the fan = $\frac{\theta}{360}\pi R^2 = \frac{60}{360} \times \frac{22}{7} \times 10^2$ = 52.38 cm^2 (ii) Required area of black sheet = $\frac{\theta}{360}\pi(R^2 - r^2)$ $= \frac{60}{360} \times \frac{22}{7}(10^2 - 4^2)$ = 44 cm^2 (iii) (A) boundary length of black sheet region on one face of the fan = 2(10 – 4) + $\frac{60}{360} \times 2 \times \frac{22}{7}(10+4)$ =12 + $\frac{44}{3} = \frac{80}{3}$ cm **OR** (iii) (B) 2(10 – 4) + $\frac{\theta}{360} \times 2 \times \frac{22}{7}(10+4)$ = 29.6 $\frac{\theta}{360} \times 88$ = 17.6 $\theta = \frac{17.6 \times 360}{88}$ = 72°	½+½ ½+½ **1** **1** **½** **1** **½**

	For visually Impaired students only Radius, i.e., range of distance covered, r = 24 m; Central angle, θ = 70° (i) $\frac{A}{l} = \frac{\frac{\theta}{360}\pi r^2}{\frac{\theta}{360}\times 2\pi r} \Rightarrow A = \frac{1}{2}\, lr$ (ii) Area monitored = $\frac{\theta}{360}\pi r^2$ $= \frac{70}{360} \times \frac{22}{7} \times 24^2$ = 352 m² (iii) (A) $\frac{\theta}{360}\pi(24)^2 = \frac{150}{100} \times 352$ $\theta = \frac{3}{2} \times \frac{7\times 360}{22\times 24^2} \times 352$ θ = 105° **OR** (iii) (B) $\frac{91}{360}\pi r^2 = \frac{130}{100} \times 352$ $r^2 = \frac{13}{10} \times \frac{7\times 360}{22\times 91} \times 352 = 36 \times 16$ r = 24 m	½+½ ½+½ ½ 1 ½ ½ 1 ½
37.	Number of trees planted by class I = 2{2(**1**) +3} = 10 Number of trees planted by class II = 2{2(**2**) +3} = 14 Number of trees planted by class III = 2{2(**3**) +3} = 18 ……so on Hence, it follows AP: 10, 14, 18, 22, …. (i) Common difference = 14 – 10 = 4 (ii) Number of trees planted by class VI = 2{2(**6**) +3} = 30 (iii) (A) Total number of trees planted = $S_n = \frac{n}{2}\{2a + (n-1)d\}$ $= \frac{12}{2}\{2(10) + (12-1)4\}$ $= 6 \times 64 = 384$ **OR** (iii) (B) Let class that planted 34 trees be n. $2\{2(n) + 3\} = 34$ $2(n) + 3 = 17$ $n = 7$	1 1 1 1 1 ½ ½

38.	Total number T-shirts printed = 400 Number of T-shirts with good print = 312 Number of T-shirts with minor print defect = 54	
	(i) P(Harish buys T-shirt) = $\frac{312}{400}$ or $\frac{39}{50}$	**1**
	(ii) P(Trader buys T-shirt) = $\frac{312+54}{400} = \frac{366}{400}$ or $\frac{183}{200}$	**1**
	(iii) (A) P(T-shirt is not good) = 1 – P(T-shirt is good) = 1 – $\frac{312}{400} = \frac{88}{400}$ or $\frac{11}{50}$ **OR** (iii) (B)P(neither Harish nor Trader buys T-shirt) = $\frac{400-54-312}{400} = \frac{34}{400}$ or $\frac{17}{200}$	**1+1** **1+1**

MATHEMATICS (BASIC) – Code No. 241
SAMPLE QUESTION PAPER
CLASS - X (2025 - 26)

Maximum marks:80 **Time :3 hour**

General Instructions

Read the following instructions carefully and follow them:

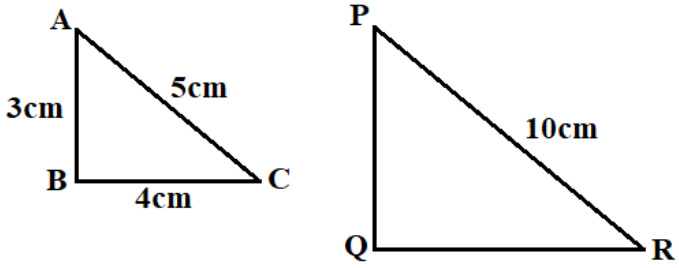
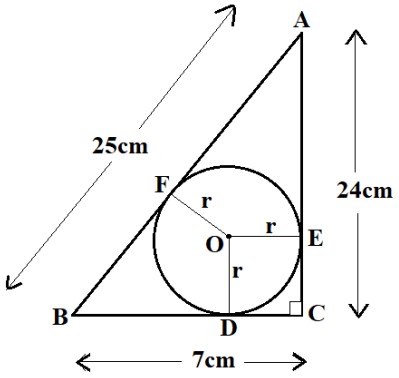
1. This question paper contains 38 questions. All Questions are compulsory.
2. This Question Paper is divided into 5 Sections A, B, C, D and E.
3. In Section A, Question numbers 1-18 are multiple choice questions (MCQs) and question no.19 and 20 are Assertion- Reason based questions of 1 mark each.
4. In Section B, Question numbers 21-25 are very short answer (VSA) type questions, carrying 02 marks each.
5. In Section C, Question numbers 26-31 are short answer (SA) type questions, carrying 03 marks each.
6. In Section D, Question numbers 32-35 are long answer (LA) type questions, carrying 05 marks each.
7. In Section E, Question numbers 36-38 are case study-based questions carrying 4 marks each with sub parts of the values of 1, 1 and 2 marks each respectively.
8. There is no overall choice. However, an internal choice in 2 questions of Section B, 2 questions of Section C and 2 questions of Section D has been provided. An internal choice has been provided in all the 2 marks questions of Section E.
9. Draw neat and clean figures wherever required. Take $\boldsymbol{\pi} = \frac{22}{7}$ wherever required if not stated.
10. Use of calculators is not allowed.

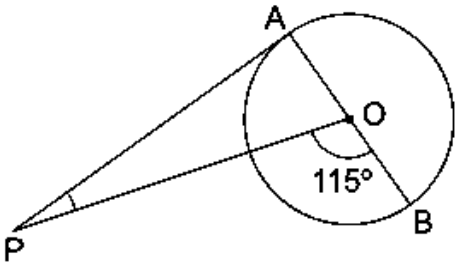
SECTION – A
(Multiple Choice Questions)
Each MCQ of 1mark, has four options with only one correct option, choose the correct option

Q. No.	Question	Marks
Q1.	The exponent of 3 in the prime factorization of 2025 is A) 1 B) 2 C) 3 D) 4	1
Q2.	If $2024\boldsymbol{x} + 2025\boldsymbol{y} = 1$; $2025\boldsymbol{x} + 2024\boldsymbol{y} = -1$, then $\boldsymbol{x} - \boldsymbol{y} =$ A) 0 B) – 2 C) 2 D) – 1	1

***Please note that the assessment scheme of the Academic Session 2024-25 will continue in the current session i.e. 2025-26**

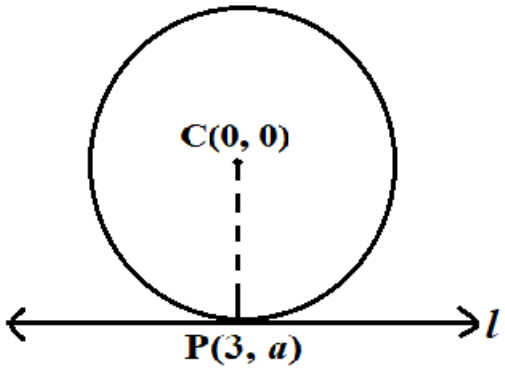
Q3.	The number of polynomials having -2 and 5 as its zeroes is A) one B) two C) three D) Infinitely many	1
Q4.	Which of the following is **not** a quadratic equation? A) $(x+2)^2 = 2(x+3)$ B) $x^2 + 3x = (-1)(1-3x^2)$ C) $(x+2)(x-1) = x^2 - 2x - 3$ D) $x^3 - x^2 + 2x + 1 = (x+1)^3$	1
Q5.	The value of x for which $2x$, $(x + 10)$ and $(3x + 2)$ are the three consecutive terms of an AP is A) 6 B) -6 C) -2 D) 2	1
Q6.	If $1 + 2 + 3 + 4 + \cdots + 50 = 25\mathbf{k}$, then **k** = A) 50 B) 51 C) 49 D) 26	1
Q7.	The distance between the points (cos30°, sin30°) and (cos60°, – sin 60°) is A) 0 unit B) $\sqrt{3}$ units C) 1 unit D) $\sqrt{2}$ units	1
Q8.	The co-ordinates of the point which is mirror image of the point $(-3, 5)$ about x-axis are A) (3, 5) B) (3, −5) C) $(-3, -5)$ D) $(-3, 5)$	1
Q9.	If in ΔABC and ΔDEF, $\frac{AB}{EF} = \frac{AC}{DE}$ then they will be similar when A) $\angle A = \angle D$ B) $\angle A = \angle E$ C) $\angle C = \angle F$ D) $\angle B = \angle E$	1

Q10.	If $\Delta ABC \sim \Delta PQR$, then perimeter of the triangle PQR (in cm) is A) 12 B) 24 C) 18 D) 20  **For visually Impaired students only** If $\Delta ABC \sim \Delta PQR$, where AB = 3cm, BC = 4cm, AC = 5cm and PR = 10cm, then perimeter of the triangle PQR (in cm) is A) 12 B) 24 C) 18 D) 20	1
Q11.	In the figure given below, radius **r** of the circle which touches the sides of the triangle is A) 3 cm B) 6 cm C) 7 cm D) 4 cm  ***For visually Impaired students only*** From a point P, which is at a distance of 26cm from the centre O of a circle with radius 10 cm, the pair of tangents PQ and PR to the circle are drawn. Then the area of the quadrilateral PQOR (in cm^2) is A) 220 B) 240 C) 260 D) 280	1
Q12.	Which one of the following is **not** equal to Unity? A) $\sin^2\boldsymbol{x} + \cos^2\boldsymbol{x}$ B) $\cot^2\boldsymbol{x} - \operatorname{cosec}^2\boldsymbol{x}$ C) $\sec^2\boldsymbol{x} - \tan^2\boldsymbol{x}$ D) $\tan\boldsymbol{x}.\cot\boldsymbol{x}$	1

Q13.	Consider the following frequency distribution | Class	0 – 5	5 – 10	10 – 15	15 – 20	20 – 25
---	---	---	---	---	---
Frequency	11	12	13	9	11 | The upper limit of median class is A) 10 B) 13 C) 15 D) 20	1
Q14.	Let empirical relationship between the three measures of central tendency be **a**(Median) = Mode + **b**(Mean), then (2**b** + 3**a**) = A) 11 B) 12 C) 13 D) 14	1
Q15.	From an external point Q, the length of tangent to a circle is 12 cm and the distance of Q from the centre of circle is 13 cm. The radius of circle (in cm) is A) 10 B) 5 C) 12 D) 7	1
Q16.	In the given figure, PA is a tangent from an external point P to a circle with centre O and diameter AB. If ∠POB=115°, then measure of ∠APO is A) 25° B) 30° C) 20° D) 65°  ***For visually Impaired students only*** At one end A of a diameter AB of a circle with radius 13 cm, tangent XAY is drawn to the circle. The length of the chord CD parallel to XY and at a distance 18 cm from A is A) 24 cm B) 25 cm C) 26 cm D) 18 cm	1

Q17.	The circumferences of two circles are in the ratio 3 : 4. The ratio of their areas is A) 3 : 4 B) 4 : 3 C) 9 : 16 D) 16 : 9	1
Q18.	An event is most unlikely to happen. Its probability is A) 0.0001 B) 0.001 C) 0.01 D) 0.1	1
	Each of the following questions contains two statements i.e., ASSERTION and REASON, and has following four choices. Only one of which is the correct answer.	
Q19.	**ASSERTION (A)**: Line joining the midpoints of two sides of triangle is parallel to the third side. **REASON (R)**: If a line divides two sides of a triangle in the same ratio then it is parallel to the third side. 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.	1
Q20.	**ASSERTION (A)**: Two coins are tossed simultaneously. Possible outcomes are two heads, one head and one tail, two tails. Hence, the probability of getting two heads is $\frac{1}{3}$. **REASON (R)**: Probabilities of 'equally likely' outcomes of an experiment are always equal. 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.	1

SECTION – B
(Very Short Answers)
This section comprises of VSA of 2 marks each

Q21.	**(A)** Show that the number $2 \times 5 \times 7 \times 11 + 11 \times 13$ is a composite number. **OR** **(B)** Find the smallest number which is divisible by both 306 and 657.	2
Q22.	Find the radius of the circle with centre at origin, if line l given by $x + y = 5$ is tangent to the circle at point P.  ***For visually Impaired students only*** Find the radius of the circle whose end points of a diameter are (0, 0) and (6, 8).	2
Q23.	If the zeroes of the quadratic polynomial $x^2 + (a + 1)x + b$ are 2 and – 3, then find the values of a and b.	2
Q24.	Find the nature of roots of the quadratic equation $x^2 + 4x - 3\sqrt{2} = 0$.	2
Q25.	**(A)** Evaluate : $2 \sin 30° \tan 60° - 3 \cos^2 60° \sec^2 30°$ **OR** **(B)** If $\sin x = \frac{7}{25}$, where x is an acute angle, then find the value of $\sin x . \cos x (\tan x + \cot x)$.	2

***Please note that the assessment scheme of the Academic Session 2024-25 will continue in the current session i.e. 2025-26**

SECTION – C
(Short Answers)

This section comprises of SA type questions of 3 marks each

Q26. Show that $\sqrt{2} - \sqrt{5}$ is an irrational number. **3**

Q27. **(A)** The frequency distribution table of agriculture holdings in a village is given below: **3**

Area of land (in hectares)	1 – 3	3 – 5	5 – 7	7 – 9	9 – 11	11 – 13
No. of families	20	45	80	55	40	12

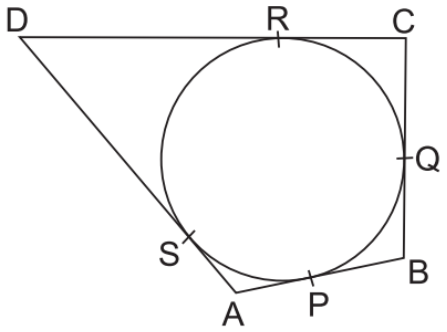
Find the modal agriculture holdings of the village.

OR

(B) If the mean of the following distribution is 54, find the value of *p.*

Class Interval	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100
Frequency	7	*p*	10	9	13

Q28. A quadrilateral ABCD is drawn to circumscribe a circle, as shown in the given figure. Show that $\frac{AB + CD}{AD + BC} = 1$ **3**

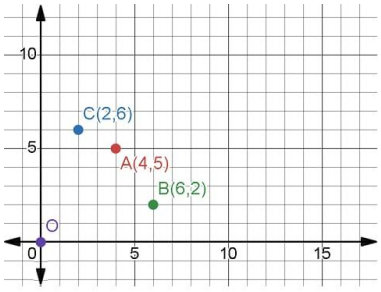


For visually Impaired students only

Show that parallelogram circumscribing a circle is a rhombus.

***Please note that the assessment scheme of the Academic Session 2024-25 will continue in the current session i.e. 2025-26**

Q29.	**(A)** On a particular day, 50000 people attended a Cricket Test Match between India and Australia in Sydney Cricket Ground. Let $\boldsymbol{x}$ be the number of adults attended the cricket match and $\boldsymbol{y}$ be the number of children attended the cricket match. Cost of an adult ticket was ₹1000 while cost of a child ticket was ₹200. On that day Revenue earned by selling all 50,000 tickets, was ₹4,20,00,000. Find how many adults and how many children attended the cricket match? **OR** **(B)** Solve for $\boldsymbol{x}$ and $\boldsymbol{y}$, **graphically**: $2\boldsymbol{x} + \boldsymbol{y} = 6;\ \boldsymbol{x} + \boldsymbol{y} = 5$ **For visually Impaired students only** **(A)** On a particular day, 50000 people attended a Cricket Test Match between India and Australia in Sydney Cricket Ground. Let $\boldsymbol{x}$ be the number of adults attended the cricket match and $\boldsymbol{y}$ be the number of children attended the cricket match. Cost of an adult ticket was ₹1000 while cost of a child ticket was ₹200. On that day Revenue earned by selling all 50,000 tickets, was ₹4,20,00,000. Find how many adults and how many children attended the cricket match. **OR** **(B)** A 2-digit number is 6 times the sum of its digits. The number formed by reversing the digits is 9 less than the given number. Find the number.	3
Q30.	Prove that : $(\sin\boldsymbol{x} - \cos\boldsymbol{x} + 1).(\sec\boldsymbol{x} - \tan\boldsymbol{x}) = (\sin\boldsymbol{x} + \cos\boldsymbol{x} - 1)$	3
Q31.	The sum of first $\boldsymbol{n}$ terms of an AP is $5\boldsymbol{n}^2 - \boldsymbol{n}$. Find the $\boldsymbol{n}^{\text{th}}$ term of the AP.	3
	SECTION – D **(Long Answers)** *This section comprises of LA type questions of 5 marks each*	
Q32.	Prove that a line drawn parallel to one side of a triangle intersecting other two sides in distinct points, divides the other two sides in the same ratio.	5
Q33.	**(A)** The numerator of a fraction is 3 less than its denominator. If 2 is added to both of its numerator and denominator then the sum of the new fraction and original fraction is $\frac{29}{20}$. Find the original fraction. **OR** **(B)** A train covers a distance of 300 km at a uniform speed. If the speed of the train is increased by 5 km/hr, it takes 2 hours less in the journey. Find the original speed of the train.	5

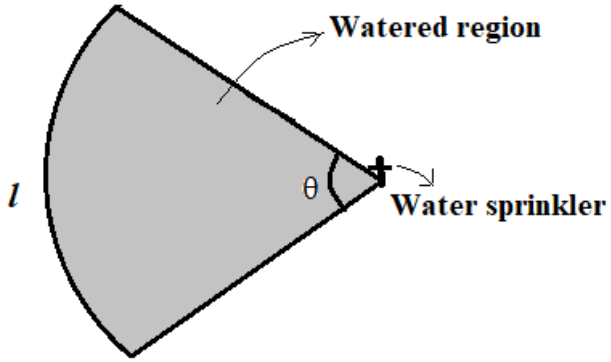
Q34.	**(A)** The angle of elevation of the top of a chimney from the foot of a tower is 60° and the angle of depression of the foot of the chimney from the top of the tower is 30°. If the height of the tower is 40 meters, find the height of the chimney. Also, find the length of the wire tied from the top of the chimney to the top of tower. **OR** **(B)** The angles of depression of the top and bottom of a 50m high building from the top of a tower are 45° and 60° respectively. Find the height of the tower and the horizontal distance between the tower and the building. (*Use* $\sqrt{3}$ *= 1.73*)	5
Q35.	A solid toy is in the form of a hemisphere surmounted by a right circular cone of height 2cm and diameter of base 4cm. If a right circular cylinder circumscribes the toy, find the difference of the volumes of the cylinder and the toy. [*Use π = 3.14*]	5
	SECTION - E **(Case-study Based Questions)** *This section comprises of 3 case-study based questions of 4 marks each with three sub-parts.*	
Q36.	Carpooling is the sharing of car journeys so that more than one person travels in a car, and prevents the need for others to have to drive to a location themselves. By having more people using one vehicle, carpooling reduces each person's travel costs such as: fuel costs, tolls, and the stress of driving. Carpooling is also a more environmentally friendly and sustainable way to travel as sharing journeys reduces air pollution, carbon emissions, traffic congestion on the roads, and the need for parking spaces.   Three friends Amar, Bhavin and Chetanya live in societies represented by the points A(4,5), B(6,2) and C(2,6) respectively. They all work in offices located in a same building represented by the point O(0,0). Since they all go to same building every day, they decided to do carpooling to save money on petrol. Based on the above information, answer the following questions. i) What is the distance between B and C? ii) If Bhavin and Chetanya planned to meet at a club situated at the mid-point of the line joining the points B and C, find the coordinates of this point. iii) **(A)** Which society is farthest from the office? Also find its distance from the office. **OR** **(B)** Out of B and C which society is nearer to A? Also find their distances.	1 1 2

***Please note that the assessment scheme of the Academic Session 2024-25 will continue in the current session i.e. 2025-26**

Q37. A water sprinkler is a device used to irrigate agricultural crops, lawns, landscapes, golf courses, and other areas. Water sprinklers can be used for residential, industrial, and agricultural usage.



. A water sprinkler is set to shoot a stream of water a distance of 21 m and rotate through an angle which is equal to complementary angle of 10°.



i) What is the area of sector in terms of arc length? 1

ii) What is the area of the watered region (in terms of $\boldsymbol{\pi}$)? 1

iii) **(A)** If the radius(***r***) changes to 28m, find the angle θ so that the area of the watered region remains the same. 2

OR

(B) If the radius(***r***) is increased from 21m to 28m and the angle remains the same, what is the increase in the area of the watered region?

***Please note that the assessment scheme of the Academic Session 2024-25 will continue in the current session i.e. 2025-26**

Q38. One of four main blood types can be found in a human body. They are known as A, B, AB and O. Each blood type can be further classified as either a Rhesus positive (+) or Rhesus negative (−).For example, a possible combination is blood type O and Rhesus negative which is written as O^-

The data below shows the distribution of the blood types and Rhesus types of given blood type for a **Blood Donation Center** recorded (in percentages) for the year 2023.

BLOOD GROUP	RHESUS FACTOR	NUMBER OF PERSONS (in %)
O	O^-	x
	O^+	30
A	A^-	8
	A^+	24
B	B^-	6
	B^+	18
AB	AB^-	1
	AB^+	3



i) Find the value of x. 1

ii) Find the probability that a randomly selected person has a Rhesus negative blood type. 1

iii) **(A)** What is the probability that the person selected from the record is Rhesus positive but neither blood type A nor B? 2

OR

(B) People with blood type AB positive (AB^+) are known as the universal recipient and with blood type O negative (O^-) are known as universal donor. Find the probability of a selected person to be neither universal recipient nor universal donor.

***Please note that the assessment scheme of the Academic Session 2024-25 will continue in the current session i.e. 2025-26**

MATHEMATICS BASIC – Code No. 241
MARKING SCHEME
CLASS - X (2025 - 26)

SECTION - A		
Q. No.	**Answer**	**Marks**
1.	**Answer – D** As, $2025 = 3^4 \times 5^4$ So, the exponent of 3 in the prime factorization of 2025 is **4**	**1**
2.	**Answer – B** On subtracting first equation from second equation, we get $2025\boldsymbol{x} + 2024\boldsymbol{y} - 2024\boldsymbol{x} - 2025\boldsymbol{y} = -1 - 1 \implies (\boldsymbol{x} - \boldsymbol{y}) = \boldsymbol{-2}$	**1**
3.	**Answer – D** As, $f(x) = \mathrm{k}(\mathrm{x}+2)(\mathrm{x}-5) \implies f(x) = \mathrm{k}(x^2 - 3\mathrm{x} - 10), \mathrm{k} \neq 0$ Since k can be any real number. So, there are Infinitely many such polynomials.	**1**
4.	**Answer – C** On simplification, given equations reduce to $(A)\ x^2 + 2x - 2 = 0$ (**Quadratic Equation**) $(B)\ 2\boldsymbol{x}^2 - 3x - 1 = 0$ (**Quadratic Equation**) (C) $3x + 1 = 0$ (***NOT a* Quadratic Equation**) (D) $4\boldsymbol{x}^2 + \boldsymbol{x} = 0$ (**Quadratic Equation**)	**1**
5.	**Answer – A** As, $2(\boldsymbol{x} + 10) = (3\boldsymbol{x} + 2) + 2x \implies x = 6$	**1**
6.	**Answer – B** As, $\frac{50(51)}{2} = 25k \implies k = 51$	**1**
7.	**Answer – D** Distance between the given points = $\sqrt{(\frac{1}{2} - \frac{\sqrt{3}}{2})^2 + (\frac{1}{2} + \frac{\sqrt{3}}{2})^2} = \sqrt{2}$	**1**
8.	**Answer – C** We know that, for the coordinates of a mirror image of a point in *x*-axis, abscissa remains the same and ordinate will be of opposite sign of the ordinate of given point. So, the Mirror image of the point (−3, 5) about x-axis is (−3, −5).	**1**
9.	**Answer – B** As, $\Delta\mathrm{ABC} \sim \Delta\mathrm{EFD} \implies \angle\mathrm{A} = \angle\mathrm{E}$	**1**

10.	**Answer – B** As, $\Delta ABC \sim \Delta PQR \Longrightarrow \frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR} = \frac{1}{2} \Longrightarrow PQ = 6\text{ cm}, QR = 8\text{ cm}$ Perimeter of the triangle PQR (in cm) = 6 + 8 +10 = 24	**1**
	Question given for Visually impaired candidates **Answer – B** The solution is same as above.	**1**
11.	**Answer – A** From the figure, AE = 24 – r = AF. So, BF = 1 + r = 7 – r $\Longrightarrow$ r = 3 cm	**1**
	Question given for Visually Impaired candidates **Answer – B** As, PQ = PR = 24 cm So, Area of Quadrilateral PQOR (in cm^2) = $2 \times \frac{1}{2} \times 24 \times 10 = 240$	**1**
12.	**Answer – B** As, $\cot^2\mathbf{x} - \text{cosec}^2\mathbf{x} = -\mathbf{1}$, so it is **NOT** equal to Unity	**1**
13.	**Answer – C** As, Median class is 10-15. So, its upper limit is 15.	**1**
14.	**Answer – C** Since, 3 Median = Mode + 2 Mean. So, **a = 3 & b = 2.** Thus, (2***b*** + 3***a***) = 4 + 9 = 13	**1**
15.	**Answer – B** Radius (in cm) = $\sqrt{13^2 - 12^2} = 5$	**1**
16.	**Answer – A** As, ∠PAO= 90°. So, ∠APO = 115° − 90° = 25°	**1**
	Question given for Visually Impaired candidates **Answer – A** As, the chord is at a distance of 18 cm (more than the radius). So, the chord will be at a distance of 5 cm on the opposite side of the centre. Thus, length of the chord CD will be $2\sqrt{13^2 - 5^2} = 24\ cm$	**1**
17.	**Answer – C** As, $r_1 : r_2 = 3 : 4$. So, the ratio of their areas = $r_1^2 : r_2^2 = 9 : 16$	**1**
18.	**Answer – A** Since, the event is most unlikely to happen. Therefore, its probability is 0.0001	**1**
19.	**Answer – A** As**,** Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).	**1**

20.	**Answer – D** Since events given in Assertion are not equally likely, so probability of getting two heads is not $\frac{1}{3}$. Thus, Assertion (A) is false but reason (R) is true.	**1**
Section –B **[This section comprises of solution of very short answer type questions (VSA) of 2 marks each]**		
21 (A).	It can be observed that, $2 \times 5 \times 7 \times 11 + 11 \times 13 = 11 \times (70 + 13)$ = 11 x 83 which is the product of two factors other than 1. Therefore, it is a composite number. **OR**	**1** **1**
21 (B).	The smallest number which is divisible by any two numbers is their LCM. So, Number which is divisible by both 306 and 657 = LCM (306, 657) Since, 306 = $2^1 \times 3^2 \times 17^1$ and 657 = $3^2 \times 73$ LCM (306, 657) = $2^1 \times 3^2 \times 17^1 \times 73 = 22338$	**½** **1** **½**
22.	As, P(3, a) lies on the line L, so 3 + a = 5 $\Longrightarrow a = 2$ Now, the radius of the circle = CP = $\sqrt{3^2 + 2^2} = \sqrt{13}\, units$ **<u>Question given for Visually Impaired candidates</u>** Diameter of the circle = Distance between (0,0) and (6,8) = $\sqrt{6^2 + 8^2} = 10$ Radius of the circle = ½ (Diameter of the circle) = 5 units	**1** **1** **1½** **½**
23.	Sum of the zeroes = 2 – 3 = $-(\boldsymbol{a} + 1) \Longrightarrow a = 0$ Product of the zeroes = – 6 = $b \Longrightarrow b = -6$ Hence, $a = 0$ & $b = -6$	**1** **1**
24.	Discriminant, D = 16 + $12\sqrt{2}$ > 0 As, Discriminant is positive. So, Roots are real and distinct.	**1** **1**
25 (A).	$2\sin 30°\tan 60° - 3\cos^2 60°\sec^2 30° = 2\left(\frac{1}{2}\right)\left(\sqrt{3}\right) - 3\left(\frac{1}{2}\right)^2\left(\frac{2}{\sqrt{3}}\right)^2$ $= \sqrt{3} - 1$ **OR**	**1½** **½**
25 (B).	As, $\sin x.\cos x(\tan x + \cot x) = \sin x.\cos x\left(\frac{\sin x}{\cos x} + \frac{\cos x}{\sin x}\right)$. $= \sin x.\cos x\left(\frac{1}{\cos x.\sin x}\right)$ = 1 (Constant) Since, the value of sinx. cosx (tanx + cotx) is constant, so its equal 1 for all angles.	**½** **1½**

Section –C

[This section comprises of solution short answer type questions (SA) of 3 marks each]

26.

To prove that $(\sqrt{2}-\sqrt{5})$ is an irrational number, we will use the contradiction Method.

Let, if possible, $\sqrt{2}-\sqrt{5}=x$, where x is any rational number (Clearly $x \neq 0$)

so, $\sqrt{2}=x+\sqrt{5} \Rightarrow 2=\left(x+\sqrt{5}\right)^2$ **1**

$\Rightarrow 2=x^2+5+2\sqrt{5}x$

$\Rightarrow -x^2-3=2\sqrt{5}x$

$\Rightarrow \frac{-x^2-3}{2x}=\sqrt{5}$ ……(1) **1**

(Note: $\sqrt{5}$ is an irrational number, as the square root of any prime number is Always an irrational number)

In equation (1), LHS is a rational number while RHS is an irrational number but an irrational number cannot be equal to a rational number.
So, our assumption is wrong.

Thus, $(\sqrt{2}-\sqrt{5})$ is an irrational number. **1**

27 (A).

Area of land (in hectares)	No. of families	
1 – 3	20	
3 – 5	45	f_0
5 – 7 (Modal class)	80	f_1
7 – 9	55	f_2
9 – 11	40	
11 – 13	12	

1

∴ Modal class = 5 – 7 , l = 5, h = 2

Mode = $l + \left(\frac{f_1-f_0}{2f_1-f_0-f_2}\right)h = 5 + \left(\frac{80-45}{2(80)-45-55}\right) 2 = 6.166…..$ **2**

Hence, modal agriculture holdings of the village is 6.17 hectare (approx.)

OR

27 (B).

Class interval	f_i	x_i (Mid-value)	$d_i = \frac{x_i - 30}{h}$	$f_i d_i$
0-20	7	10	-1	-7
20-40	p	30	0	0
40-60	10	50	1	10
60-80	9	70	2	18
80-100	13	90	3	39
Total	**39 + p**			**60**

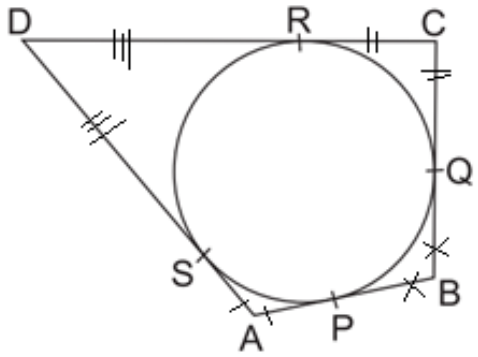
2

Assumed mean(A) = 30, Width of the interval (h) = 20

$\text{Mean} = 30 + \frac{60}{39+\text{p}} \times 20 = 54 \Longrightarrow 50 = 39 + \text{p} \Longrightarrow \text{p} = 11$

1

28.



Tangents drawn to a circle from an external point are equal.

So, AP = AS, PB = BQ,
CR = CQ, DR = DS

1½

On adding the above equations,

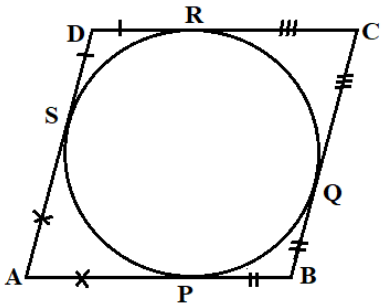
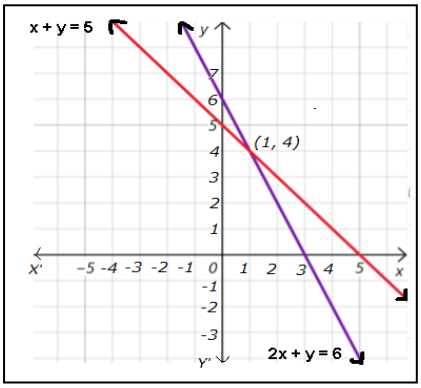
$(\text{AP} + \text{PB}) + (\text{CR} + \text{RD}) = (\text{AS} + \text{BQ}) + (\text{CQ} + \text{DS})$

1

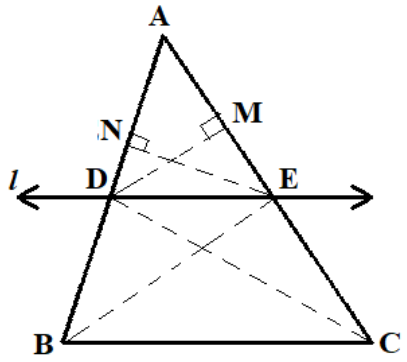
$\Longrightarrow \text{AB} + \text{CD} = \text{AD} + \text{BC}$

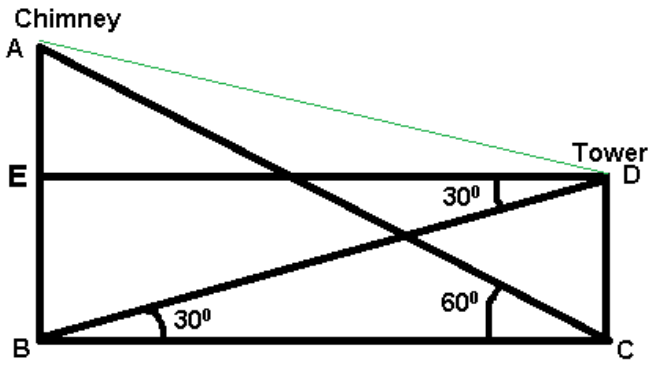
$\Longrightarrow \frac{\text{AB} + \text{CD}}{\text{AD} + \text{BC}} = 1$

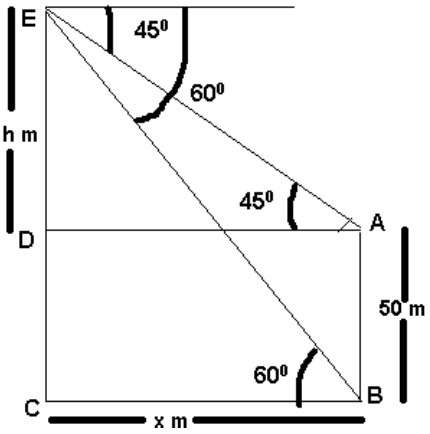
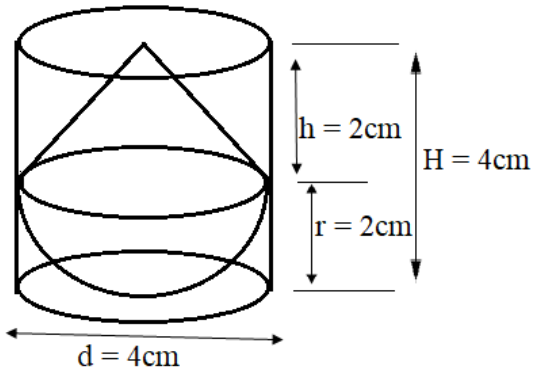
½

	Question given for Visually Impaired candidates Parallelogram ABCD circumscribes a circle as shown in figure. Tangents drawn to a circle from an external point are equal So, AP = AS, PB = BQ, CR = CQ, DR = DS  On adding the above equations, $(AP + PB) + (CR + RD) = (AS + BQ) + (CQ + DS)$ $\Rightarrow AB + CD = AD + BC$ $\Rightarrow 2AB = 2BC$ (Opposite sides of parallelogram are equal) Thus, AB = BC Since, in Parallelogram ABCD a pair of adjacent sides are equal. Hence, ABCD is a rhombus.	**1½** **1** **½**
29 (A).	According to the question, 1000x + 200y = 42000000 ⇒ 5x + y = 210000 …… (1) x + y = 50000 ……(2) (1) – (2) ⇒ 4x = 160000 ⇒ x = 40000 Substituting value of x in (2), y = 10000 ∴ Number of adults attended the match is 40000 and number of children attended is 10000 **OR**	**1** **½** **1** **½**
29 (B).	$2x + y = 6$ 	x	2	3	0
---	---	---	---
y	2	0	6 | $x + y = 5$ | x	2	5	0
---	---	---	---
y	3	0	5	 Hence solution is x = 1, y = 4  	**2** For graph **1**

	<u>Question given for Visually Impaired candidates</u> **29(A)** Solution and marks distribution is same as above **OR**	
	29(B) Let unit place digit be x & tens place digit be y ∴ original number = 10y+x Reversed number = 10x+y Given, $10y + x = 6(x + y)$ $\Rightarrow 5x - 4y = 0$ ……(1) And $(10y + x) - (10x + y) = 9$ $\Rightarrow -9x + 9y = 9$ $\Rightarrow x - y = -1$ ……(2) On solving (1) and (2) , we get x = 4, y= 5 ∴ The number is 54	**1** **1** **1**
30.	LHS = $(\sin x - \cos x + 1).(\sec x - \tan x)$ $= (\sin x - \cos x + 1).\left(\frac{1-\sin x}{\cos x}\right)$ $= (1 + \sin x)\left(\frac{1-\sin x}{\cos x}\right) - \cos x\left(\frac{1-\sin x}{\cos x}\right)$ $= \left(\frac{1-\sin^2 x}{\cos x}\right) - (1 - \sin x)$ $= \frac{\cos^2 x}{\cos x} - 1 + \sin x = \sin x + \cos x - 1$ = RHS	**1** **1** **1**
31.	As, $S_n = 5n^2 - n$ Now, nth Term is given by $a_n = S_n - S_{n-1}$ $a_n = [5n^2 - n] - [5(n-1)^2 - (n-1)]$ $a_n = 5[n^2 - (n-1)^2] - [n - (n-1)]$ $a_n = 5[2n-1] - [1]$ $a_n = 10n - 6$	**½** **1** **1½**
Section –D **[This section comprises of solution of long answer type questions (LA) of 5 marks each]**		
32.	Given: In ΔABC, a line *l* drawn parallel to side BC intersects AB and AC at D and E respectively. To prove: $\frac{AD}{DB} = \frac{AE}{EC}$ Construction: Draw perpendicular from D and E to AC and AB i.e., DM⊥AC and EN⊥AB. Join DC and BE.	**½** **½** **½**

	 Proof: $\frac{ar(\Delta ADE)}{ar(\Delta BDE)} = \frac{\frac{1}{2}(AD)(EN)}{\frac{1}{2}(BD)(EN)} = \frac{AD}{DB}$ .....(1) $\frac{ar(\Delta ADE)}{ar(\Delta CED)} = \frac{\frac{1}{2}(AE)(DM)}{\frac{1}{2}(EC)(DM)} = \frac{AE}{EC}$ ..... (2) Also, $ar(\Delta BDE) = ar(\Delta CED)$ .....(3) (Triangles on same base and between same parallel are equal in area) From (1), (2) & (3), we get $\frac{ar(\Delta ADE)}{ar(\Delta BDE)} = \frac{ar(\Delta ADE)}{ar(\Delta CED)}$ $\Rightarrow \frac{AD}{DB} = \frac{AE}{EC}$ (Hence proved)	½ (for correct figure) 1 ½ ½ 1
33 (A)	Let the denominator of the required fraction be x Then, its numerator = $x - 3$ So, the original fraction is $\frac{x-3}{x}$ Given, $\frac{(x-3)+2}{x+2} + \frac{(x-3)}{x} = \frac{29}{20}$ $\frac{(x-1)}{x+2} + \frac{(x-3)}{x} = \frac{29}{20}$ $\frac{(x-1)x + (x-3)(x+2)}{(x+2)x} = \frac{29}{20}$ $\frac{x^2 - x + x^2 - x - 6}{x^2 + 2x} = \frac{29}{20}$ $20(2x^2 - 2x - 6) = 29(x^2 + 2x)$ $11x^2 - 98x - 120 = 0$ $11x^2 - 110x + 12x - 120 = 0$ $11x(x-10) + 12(x-10) = 0$ $(11x + 12)(x - 10) = 0$ $x = 10$ or $x = -\frac{12}{11}$ (not possible as it is not an integer) $\therefore x = 10$ Hence, the required fraction is $\frac{7}{10}$ **OR**	1 1 1½ 1 ½

33 (B)	Let the original speed of the train be x km/hr Distance travelled be 300km $\therefore$ Original time (t_o) = $\frac{300}{x}$ hr New speed of the train = (x+5) km/hr $\therefore$ New time (t_n) = $\frac{300}{x+5}$ hr Given, $t_o - t_n = 2$ $\frac{300}{x} - \frac{300}{x+5} = 2$ $\frac{300(x+5) - 300(x)}{x(x+5)} = 2$ $\frac{1500}{x^2+5x} = 2$ $x^2 + 5x - 750 = 0$ $x^2 + 30x - 25x - 750 = 0$ $x(x+30) - 25(x+30) = 0$ $(x-25)(x+30) = 0$ $x = 25$ or $x = -30$(not possible as speed cannot be negative) $\therefore x = 25$ Hence, the original speed of the train is 25km/hr	½ ½ **1** **1½** **1** ½
34 (A)	Let BA be the Chimney and CD be the tower.  **40m** In $\Delta CBD, tan30° = \frac{40}{BC} \Longrightarrow BC = 40\sqrt{3}\, m$ In $\Delta ABC, tan60° = \frac{AB}{40\sqrt{3}} \Longrightarrow AB = 120\, m$ AE = (120 – 40) m = 80m, ED = BC = $40\sqrt{3}$m Now, $AD = \sqrt{AE^2 + ED^2} = \sqrt{6400 + 4800} = 40\sqrt{7}\, m$ Thus, length of wire tied from the top of the chimney to the top of tower is $40\sqrt{7}\, m$. **OR**	**1 (for correct figure)** **1½** **1½** **1**

34 (B)	Let EC be the tower and AB be the building.  In $\Delta EDA, tan45° = \frac{h}{x} \Longrightarrow h = x$ In $\Delta EBC, tan60° = \frac{EC}{BC} \Longrightarrow h + 50 = \sqrt{3}h \Longrightarrow h = \frac{50}{\sqrt{3}-1} = 25(\sqrt{3}+1)m$ Thus, $h = 68.25\, m = x$ (Horizontal distance between the tower and building) Now, height of the tower =68.25 + 50 = 118.25 m	**1 (for correct figure)** **1½** **1½** **½** **½**
35.	Volume of toy = $Vol_{Hemi\text{-}sphere} + Vol_{Cone}$  $= \frac{2}{3}\pi r^3 + \frac{1}{3}\pi r^2 h = \frac{1}{3}\pi r^2(2r+h) = 25.12\ cm^3$ Volume of circumscribing cylinder = $\pi r^2 H = 50.24\ cm^3$ Now, difference in the volumes of circumscribing cylinder and the toy = Vol. of cylinder – Vol. of toy = (50.24 – 25.12) cm^3 = 25.12 cm^3 Hence, difference in the volumes of circumscribing cylinder and the toy is 25.12cm^3.	**1** **(for correct figure)** **2** **1** **1**

Section –E

[This section comprises solution of 3 case- study based questions of 4 marks each with three sub parts of 1, 1 and 2 marks each respectively]

36.	(i) Distance between B and C = $4\sqrt{2}\ units$	**1**
	(ii) Mid-point of the line joining the points B and C = (4, 4)	**1**
	(iii) **(A)** As, OA = $\sqrt{41}\ units$, OB = $\sqrt{40}\ units$, OC = $\sqrt{40}\ units$	**1½**
	So, society A is the farthest from the office.	**½**
	OR	
	(iii) **(B)** As, AB = $\sqrt{13}\ units$, AC = $\sqrt{5}\ units$	**1½**
	So, Society C is nearer to society A.	**½**
37.	(i) Area of sector = $\frac{(\text{Arc length} \times \text{radius})}{2}$	**1**
	(ii) Area of sector = $\frac{80}{360}\pi \times 441 = 98\pi\ m^2$	**1**
	(iii) **(A)** $\frac{80}{360}\pi \times 441 = \frac{\theta}{360}\pi \times 28^2$	**1**
	$\theta = 45°$	**1**
	OR	
	(iii) **(B)** Increase in the area of the lawn watered $= \frac{80}{360}\pi \times (784 - 441)$	**1**
	$= 239.56\ \text{m}^2$	**1**
38.	(i) x = 100 – (30 – 32 – 24 – 4) = 10	**1**
	(ii) P(selected person to have Rhesus negative blood type) = $\frac{10+8+6+1}{100}$ $= \frac{25}{100}$ or $\frac{1}{4}$	**1**
	(iii) **(A)** P(person is Rhesus positive but neither A nor B type blood)= $\frac{30+3}{100}$ $= \frac{33}{100}$	**1+1**
	OR	
	(iii) **(B)** P(person is neither universal recipient nor universal donor) $= 1 - \frac{(3+10)}{100}$	**1½**
	$= 1 - \frac{13}{100}$	**½**
	$= \frac{87}{100}$	

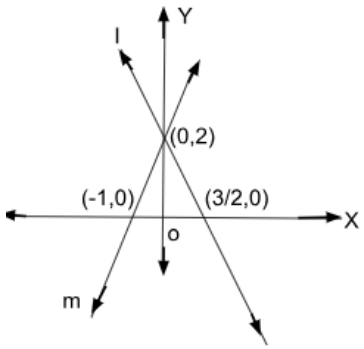
SAMPLE QUESTION PAPER
Class X Session 2024-25
MATHEMATICS BASIC (Code No.241)

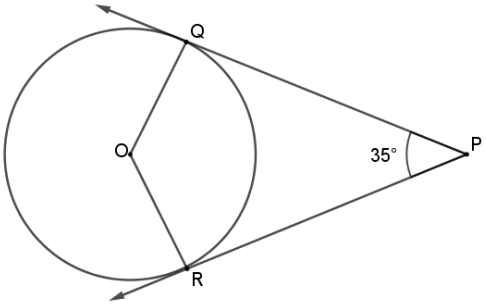
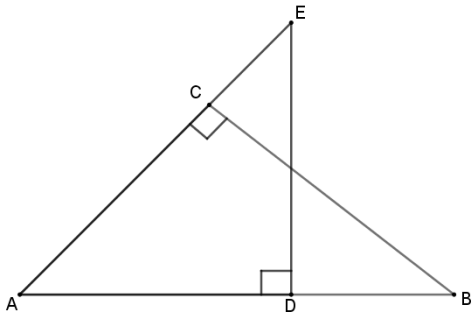
TIME: 3 hours **MAX.MARKS: 80**

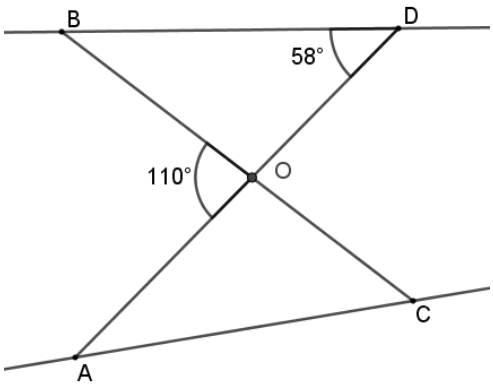
General Instructions:

Read the following instructions carefully and follow them:

1. This question paper contains 38 questions.
2. This Question Paper is divided into 5 Sections A, B, C, D and E.
3. In Section A, Questions no. 1-18 are multiple choice questions (MCQs) and questions no. 19 and 20 are Assertion- Reason based questions of 1 mark each.
4. In Section B, Questions no. 21-25 are very short answer (VSA) type questions, carrying 02 marks each.
5. In Section C, Questions no. 26-31 are short answer (SA) type questions, carrying 03 marks each.
6. In Section D, Questions no. 32-35 are long answer (LA) type questions, carrying 05 marks each.
7. In Section E, Questions no. 36-38 are case study based questions carrying 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 section B, 2 Questions of section C and 2 Questions of section D has been provided. And internal choice has been provided in all the 2 marks questions of Section E.
9. Draw neat and clean figures wherever required.
10. Take π =22/7 wherever required if not stated.
11. Use of calculators is not allowed.

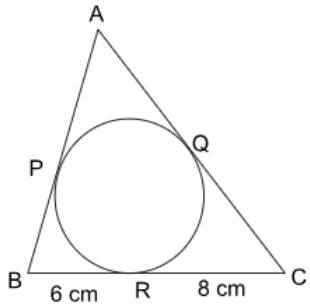
	Section A	
	Section A consists of 20 questions of 1 mark each.	
1.	HCF OF $(3^3 \times 5^2 \times 2), (3^2 \times 5^3 \times 2^2)\ and\ (3^4 \times 5 \times 2^3)$ is (A) 450 (B) 90 (C) 180 (D) 630	**1**
2.	The system of linear equations represented by the lines l and m is  (A) consistent with unique solution (B) inconsistent (C) consistent with three solutions (D) consistent with many solutions	**1**
3.	The value of k for which the quadratic equation $kx^2 - 5x + 1 = 0$ does not have a real solution, is (A) 0 (B) $\frac{25}{4}$ (C) $\frac{4}{25}$ (D) 7	**1**

4.	The distance between the points (a, b) and $(-a, -b)$ is (A)$\sqrt{a^2+b^2}$ (B) a^2+b^2 (C) $2\sqrt{a^2+b^2}$ (D) $4\sqrt{a^2+b^2}$	**1**
5.	In the given figure, PQ and PR are tangents to a circle centred at O. If $\angle QPR=35°$ then $\angle QOR$ is equal to  (A) $70°$ (B) $90°$ (C) $135°$ (D) $145°$	**1**
6.	If $\triangle ABC \sim \triangle PQR$ such that 3AB = 2PQ and BC=10 cm, then length QR is equal to (A) 10 cm (B) 15 cm (C) $\frac{20}{3}$ cm (D) 30 cm	**1**
7.	If 3 $\cot A$ =4, where $0° < A < 90°$, then $\sec A$ is equal to (A) $\frac{5}{4}$ (B) $\frac{4}{3}$ (C) $\frac{5}{3}$ (D) $\frac{3}{4}$	**1**
8.	In the given figure, ΔBAC is similar to  (A) ΔAED (B) ΔEAD (C) ΔACB (D) ΔBCA	**1**
9.	If H.C.F(420,189) = 21 then L.C.M(420,189) is (A) 420 (B) 1890 (C) 3780 (D) 3680	**1**
10.	The 4th term from the end of the A.P $-8, -5, -2, \ldots, 49$ is (A) 37 (B) 40 (C) 1 (D) 43	**1**
11.	In the given figure, if $\triangle OCA \sim \triangle OBD$ then $\angle OAC$ is equal to	**1**



(A) $58°$ (B) $55°$ (C) $128°$ (D) $52°$

12. If perimeter of given triangle is 38 cm, then length AP is equal to **1**



(A)19 cm (B) 5 cm (C) 10 cm (D)8 cm

13. $\frac{1-tan^2 30°}{1+tan^2 30°}$ is equal to **1**

(A) $\cos 60°$ (B) $\sin 60°$ (C) 1 (D) $tan^2 60°$

14. The total surface area of solid hemisphere of radius r is **1**

(A) πr^2 (B) $2\pi r^2$ (C) $3\pi r^2$ (D) $4\pi r^2$

15. Which of the following cannot be the probability of an event? **1**

(A) 0.4 (B) 4% (C) 0.04% (D) 4

16. The roots of quadratic equation $3x^2 - 4\sqrt{3}x + 4 = 0$ are **1**

(A) not real (B) real and equal

(C) rational and distinct (D) irrational and distinct

17. The following distribution shows the marks distribution of 80 students. **1**

Marks	Below 10	Below 20	Below 30	Below 40	Below 50	Below 60
No. of students	2	12	28	56	76	80

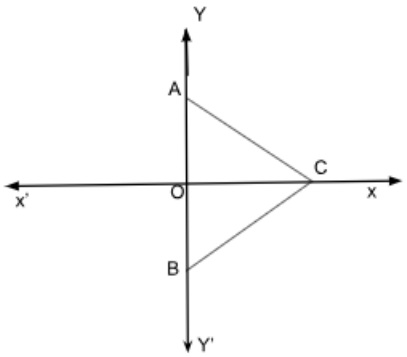
The median class is

(A) 20-30 (B) 40-50 (C) 30-40 (D) 10-20

18. A quadratic polynomial whose zeroes are $\frac{2}{5}$ and $\frac{-1}{5}$ is **1**

(A) $25x^2 + 5x - 2$ (B) $5x^2 - 2x + 1$

(C) $5x^2 + 2x - 1$ (D) $25x^2 - 5x - 2$

	DIRECTION: In the question number 19 and 20, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**. Choose the correct option 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.	
19.	Assertion(A): The sequence $-1, -1-1, \ldots, -1$ is an AP. Reason(R): In an AP, $a_n - a_{n-1}$ is constant where $n \geq 2$ and $n \in N$	**1**
20.	Assertion(A): $(2+\sqrt{3})\sqrt{3}$ is an irrational number. Reason(R): Product of two irrational numbers is always irrational.	**1**
	Section B	
	Section B consists of 5 questions of 2 marks each.	
21 (A).	$P(x, y)$ is a point equidistant from the points $A(4,3)$ and $B(3,4)$. Prove that $x - y = 0$.	**2**
	OR	
21 (B).	In the given figure, ΔABC is an equilateral triangle. Coordinates of vertices A and B are $(0,3)$ and $(0,-3)$ respectively. Find the coordinates of points C.  	
22.	In two concentric circles, a chord of length 8 cm of the larger circle touches the smaller circle. If the radius of the larger circle is 5 cm, then find the radius of the smaller circle.	**2**
23 (A).	The sum of the first 12 terms of an A.P. is 900. If its first term is 20 then find the common difference and 12th term.	**2**
	OR	
23 (B).	The sum of first n terms of an A.P. is represented by $S_n = 6n - n^2$. Find the common difference.	
24.	If $sin(A-B) = \frac{1}{2}\ and\ cos(A+B) = \frac{1}{2}, 0° < A+B < 90°\ and\ A > B$, then find the values of A and B.	**2**

25. Calculate mode of the following distribution: **2**

Class	5-10	10-15	15-20	20-25	25-30	30-35
Frequency	5	6	15	10	5	4

Section C

Section C consists of 6 questions of 3 marks each.

26. Prove that $\sqrt{5}$ is an irrational number. **3**

27 (A). Find the ratio in which the y-axis divides the line segment joining the points $(4,-5)$ and $(-1,2)$. Also find the point of intersection. **3**

OR

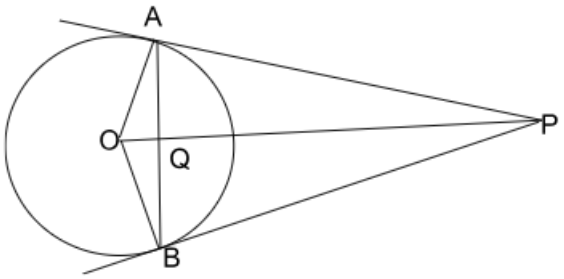
27 (B). Line $4x + y = 4$ divides the line segment joining the points $(-2,-1)$ and $(3,5)$ in a certain ratio. Find the ratio.

28. Prove that: $(cosecA - sinA)(secA - cosA) = \frac{1}{\tan A + \cot A}$. **3**

29. Find the mean using the step deviation method. **3**

Class	0-10	10-20	20-30	30-40	40-50
Frequency	6	10	15	9	10

30. (A) In the given figure, PA and PB are tangents to a circle centred at O. Prove that (i) OP bisects $\angle APB$ (ii) OP is the right bisector of AB. **3**

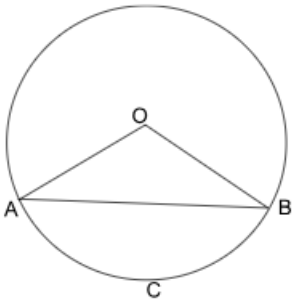


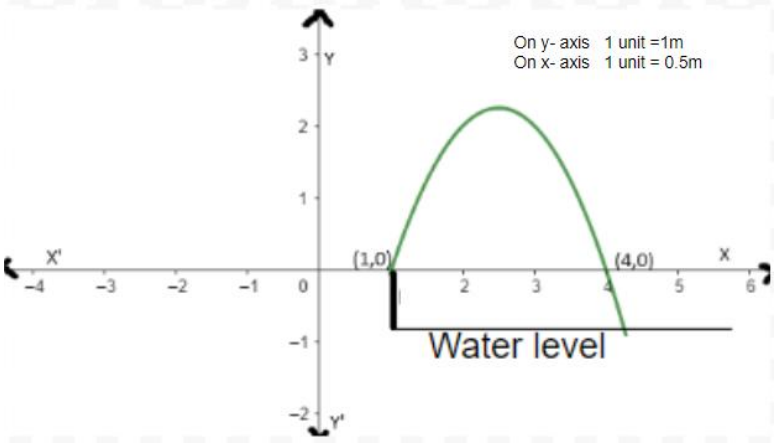
OR

30 (B). Prove that the lengths of tangents drawn from an external point to a circle are equal. **3**

31. The sum of a two-digit number and the number obtained by reversing the order of its digits is 99. If ten's digit is 3 more than the unit's digit, then find the number. **3**

Section -D

	Section D consists of 4 questions of 5 marks each	
32 (A).	Amita buys some books for ₹1920. If she had bought 4 more books for the same amount each book would cost her ₹ 24 less. How many books did she buy? What was the initial price of one book?	**5**
	OR	
32 (B).	A train travels at a certain average speed for a distance of 132 km and then travels a distance of 140 km at an average speed of 4 km/h more than the initial speed. If it takes 4 hours to complete the whole journey, what was the initial average speed? Determine the time taken by train to cover the distances separately.	**5**
33.	If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then prove that the other two sides are divided in the same ratio.	**5**
34.	The perimeter of sector OACB of the circle centred at O and of radius 24, is 73.12 cm.  (i) Find the central angle $\angle AOB$. (ii) Find the area of the minor segment ACB. (Use $\pi = 3.14\ and\ \sqrt{3} = 1.73$)	**5**
35 (A).	From the top of a 9 m high building, the angle of elevation of the top of a cable tower is $60°$ and angle of depression of its foot is $45°$. Determine the height of the tower and distance between building and tower. (Use $\sqrt{3} = 1.732$)	**5**
	OR	
35 (B).	As observed from the top of a 75 m high lighthouse from the sea level, the angles of depression of two ships are $30°$ and $45°$. If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships (Use $\sqrt{3} = 1.732$)	**5**
	Section E	
36.	A group of students conducted a survey to find out about the preferred mode of transportation to school among their classmates. They surveyed 200 students from their school. The results of the survey are as follows: 120 students preferred to walk to school. 25% of the students preferred to use bicycles. 10% of the students preferred to take the bus.	

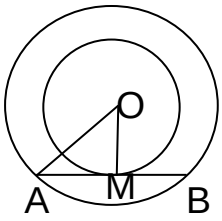
	Remaining students preferred to be dropped off by car. Based on the above information, answer the following questions:	
(i)	What is the probability that a randomly selected student does not prefer to walk to school?	**1**
(ii)	Find the probability of a randomly selected student who prefers to walk or use a bicycle.	**1**
(iii)(A)	One day 50% of walking students decided to come by bicycle. What is the probability that a randomly selected student comes to school using a bicycle on that day? **OR**	**2**
(B)	What is the probability that a randomly selected student prefers to be dropped off by car?	**2**
37.	Radha, an aspiring landscape designer, is tasked with creating a visually captivating pool design that incorporates a unique arrangement of fountains. The challenge entails arranging the fountains in such a way that when water is thrown upwards, it forms the shape of a parabola. The graph of one such parabola is given below.   The height of each fountain rod above water level is 10 cm. The equation of the downward-facing parabola representing the water fountain is given by $p(x) = -x^2 + 5x - 4$. Based on the above information, answer the following questions:	
(i)	Find the zeroes of the polynomial p(x) from the graph.	**1**
(ii)	Find the value of x at which water attains maximum height.	**1**

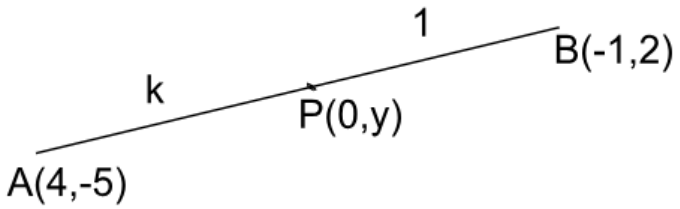
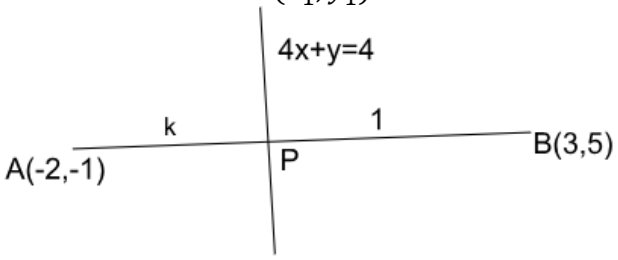
(iii)(A)	If h is the maximum height attained by the water stream from the water level of the pool, then find the value of h.	**2**
	OR	
(B)	At what point(s) on x- axis, the height of water above x- axis is 2 m?	**2**
38.	Rinku was very happy to receive a fancy jumbo pencil from his best friend Rohan on his birthday. Pencil is a basic writing tool, when sharpened its shape is a combination of cylinder & cone as given in the picture. Cylindrical pencil with conical head is a common shape worldwide since ages. Commonly pencils are made up of wood & plastic but we should promote pencils made up of eco-friendly material (many options available in the market these days) to save environment.  The dimensions of Rinku's pencil are given as follows: Length of cylindrical portion is 21cm. Diameter of the base is 1 cm and height of the conical portion is 1.2 cm Based on the above information, answer the following questions:	
(i)	Find the slant height of the sharpened part.	**1**
(ii)	Find curved surface area of sharpened part (in terms of π).	**1**
(iii)(A)	Find the total surface area of the pencil (in terms of π).	**2**
	OR	
(B)	The pencil's total height decreases by 8.2 cm after sharpening it many times, what is the volume of the cylindrical part of the shortened pencil (in terms of π)?	**2**

Marking Scheme
Class X Session 2024-25
MATHEMATICS BASIC (Code No.241)

TIME: 3 hours **MAX.MARKS: 80**

Q. No.	Section A	Marks
1.	B) 90	**1**
2.	A) consistent with unique solution	**1**
3.	D) 7	**1**
4.	C) 2 $\sqrt{a^2 + b^2}$	**1**
5.	D) $145°$	**1**
6.	B) 15 cm	**1**
7.	A) $\frac{5}{4}$	**1**
8.	B) ΔEAD	**1**
9.	C) 3780	**1**
10.	B) 40	**1**
11.	D) $52°$	**1**
12.	B) 5 cm	**1**
13.	A) cos $60°$	**1**
14.	(C) $3\pi r^2$	**1**
15.	D) 4	**1**
16.	B) real and equal	**1**
17.	C) 30 - 40	**1**
18.	D) $25x^2 - 5x - 2$	**1**
19.	A) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)	**1**
20.	C) Assertion (A) is true but reason (R) is false.	**1**
	Section B	

21 (A).	$PA^2 = PB^2$ $\Rightarrow (x-4)^2 + (y-3)^2 = (x-3)^2 + (y-4)^2$ $\Rightarrow x = y \quad or \quad x - y = 0$	**1** **1**
	OR	
21 (B).	AB = 6 cm = AC OC = $\sqrt{36-9}$ = $3\sqrt{3}$ cm Point C is ($3\sqrt{3}$, 0)	**½** **1** **½**
22.	Correct figure  AM = 4 cm OM = $\sqrt{OA^2 - AM^2}$ = $\sqrt{5^2 - 4^2}$ = 3 cm	**½** **½** **1**
23 (A).	$\frac{12}{2}[2 \times 20 + 11d]$=900 $\Rightarrow d = 10$ Also $a_{12} = 20 + 11 \times 10 = 130$	**½** **1** **½**
	OR	
23 (B).	Putting $n = 1,\ S_1 = a = 6 - 1^2 = 5 \ldots\ldots\ldots\ldots (i)$ Putting $n = 2,\ S_2 = 2a + d = 6 \times 2 - 2^2 = 8 \ldots\ldots\ldots\ldots (ii)$ Solving (i) & (ii) $d = -2$	**½** **1** **½**
24.	$sin(A-B) = \frac{1}{2} \Rightarrow A - B = 30°$ ……..(i) $cos(A+B) = \frac{1}{2} \Rightarrow A + B = 60°$ ……..(ii) Solving (i) & (ii) to get $A = 45°, B = 15°$	**½** **½** **½+½**
25.	<table><tr><td>Class</td><td>5-10</td><td>10-15</td><td>15-20</td><td>20-25</td><td>25-30</td><td>30-35</td></tr><tr><td>Frequency</td><td>5</td><td>6</td><td>15</td><td>10</td><td>5</td><td>4</td></tr></table> Modal class is 15-20. $Mode = 15 + 5 \times (\frac{15-6}{2 \times 15 - 6 - 10})$ $= 18.21$(approx.)	**½** **1** **½**
	Section-C	

26.	Let $\sqrt{5}$ be a rational number. $\therefore \sqrt{5} = \frac{p}{q}$, where q≠0 and p & q are coprime. $5q^2 = p^2 \Longrightarrow p^2$ is divisible by 5 $\Longrightarrow$ p is divisible by 5----- (i) $\Longrightarrow$ p = 3a, where 'a' is a postive integer $25a^2 = 5q^2 \Longrightarrow q^2 = 5a^2 \Longrightarrow q^2$ is divisible by 5 $\Longrightarrow$ q is divisible by 5 ----- (ii) (i) and (ii) leads to contradiction as 'p' and 'q' are coprime. $\therefore \sqrt{5}$ is an irrational number.	½ **1** **1** ½
27(A).	Let the required point on the y axis be P(0,y).  Let AP : PB be k : 1 Therefore, $\frac{-k+4}{k+1} = 0$ ⇒k=4 Therefore, required ratio is 4:1 & $y = \frac{8-5}{5} = \frac{3}{5}$ Hence point of intersection is $(0,\frac{3}{5})$.	½ **1** ½ ½ ½
	OR	
27 (B).	Let the line $4x + y = 4$ intersects AB at $P(x_1, y_1)$ such that AP: PB=k:1  $x_1=\frac{3k-2}{k+1}$ and $y_1=\frac{5k-1}{k+1}$ (x_1, y_1) lies on $4x + y = 4$ Therefore, $4(\frac{3k-2}{k+1})+(\frac{5k-1}{k+1})=4$ $\Rightarrow k=1$ Required ratio is 1:1	**1** ½ **1** ½

28.

LHS= $(\frac{1}{sinA} - sinA)(\frac{1}{cosA} - cosA)$ — ½

$=\frac{1-sin^2A}{sinA} \times \frac{1-cos^2A}{cosA}$ — 1

$=\frac{cos^2A}{sinA} \times \frac{sin^2A}{cosA}$

$=cosA\ sinA$ — ½

RHS = $\frac{cosA\ sinA}{sin^2A+cos^2A}$

$=cosA\ sinA$ = LHS — 1

29.

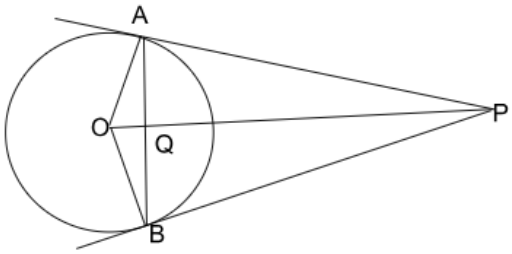
Class	x	frequency(f)	$u = \frac{x-25}{10}$	fu
0-10	5	6	-2	-12
10-20	15	10	-1	-10
20-30	25	15	0	0
30-40	35	9	1	9
40-50	45	10	2	20
		$\sum f$ =50		$\sum fu = 7$

Correct table $1\frac{1}{2}$

$Mean = 25 + 10 \times (\frac{7}{50})$ — 1

= 26.4 — ½

30 (A).



(i) $\Delta OAP \cong \Delta OBP$

$\angle APO = \angle BPO$

Or OP bisects $\angle P$ — 1

(ii)$\Delta AQP \cong \Delta BQP$

⇒AQ=QB and $\angle AQP = \angle BQP$ — 1

AB is a straight line

therefore $\angle AQP = \angle BQP = 90°$ — 1

Hence OP is right bisector of AB

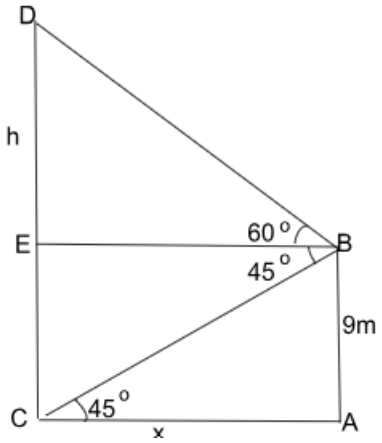
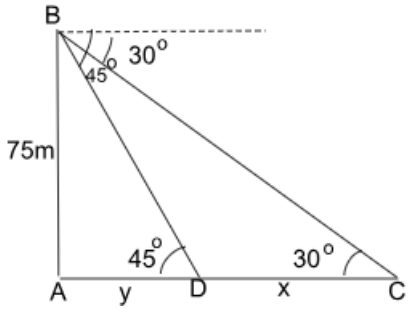
OR

30 (B).

Correct Given, to prove, figure and construction — 1

Correct proof — 2

31.	Let the two-digit number be $10x + y$ Therefore $(10x + y) + (10y + x) = 99$ $\Rightarrow x + y = 9$ …….(i) Also, $x = 3 + y$……..(ii) Solving (i) & (ii) to get $y = 3, x = 6$ Therefore, required number is 63	½ ½ ½ ½ ½ ½
	Section D	
32 (A).	Let the number of books purchased be x Therefore, cost price of 1 book = $\frac{1920}{x}$ Therefore $\frac{1920}{x} - \frac{1920}{x+4} = 24$ $\Rightarrow 1920 \times 4 = 24x(x + 4)$ or $x^2 + 4x - 320 = 0$ $\Rightarrow (x + 20)(x - 16) = 0$ $\Rightarrow x = 16, x \neq -20$ Number of books bought=16 Price of each book =$\frac{1920}{16} = ₹120$	**1** **1** **1** **1** **1**
	OR	
32 (B).	Let the initial average speed of the train be x km/hr. Therefore $\frac{132}{x} + \frac{140}{x+4} = 4$ $\Rightarrow 4x^2 - 256x - 528 = 0$ or $x^2 - 64x - 132 = 0$ $\Rightarrow (x - 66)(x + 2) = 0$ $\Rightarrow x = 66,\ x \neq -2$ Initial average speed of train= 66 km/hr Time taken to cover the distances separately=$\frac{132}{66}$ & $\frac{140}{70}$ i.e. 2 hours each	**1** **1** **1** **1** **1**
33.	Correct Given, to prove, Construction and figure Correct Proof	$\frac{1}{2} \times$ **4=2** **3**
34.	(i) Perimeter of sector = $2r + \frac{2\pi r\theta}{360} = 73.12$ $\Rightarrow 2(24) + \frac{2\times3.14\times24\times\theta}{360} = 73.12$ $\Rightarrow \theta = 60^\circ$ (ii)Area of minor segment = $\left(\frac{3.14\times24\times24\times60}{360} - \frac{1.73}{4} \times 24 \times 24\right) cm^2$ $= (301.44 - 249.12)\ cm^2$ $= 52.32\ cm^2$	**1** **1** **2** **1**

35 (A).	 Let AB be the building and CD be the tower. Here $tan60° = \sqrt{3} = \frac{h}{x}$ $\Rightarrow h = x\sqrt{3}$…….(i) $tan45° = \frac{9}{x} = 1$ $\Rightarrow\ x = 9$ m……(ii) (Distance between tower and building) Solving (i) & (ii) to get $h = 9 \times 1.732 = 15.588m$ Therefore, the height of the tower $= h + 9 = 24.588\ m.$	**1 mark for correct figure** **1** **½** **1** **½** **½** **½**
	OR	
35 (B).	 Let AB be the light house and C & D be positions of ships. $tan30°=\frac{1}{\sqrt{3}} = \frac{75}{x+y}$ $\Rightarrow x + y = 75\sqrt{3}$……..(i) $tan45°=1=\frac{75}{y}$ $\Rightarrow\ y\ =\ 75$……(ii) Solving (i) & (ii) to get $x = 75(\sqrt{3} - 1)$ $\Rightarrow x = 75 \times 0.732$ $=\ 54.9\ m$ Distance between the ships is $54.9\ m$	**1 mark for correct figure** **1** **½** **1** **½** **1**
	Section E	
36.	(i) Number of students who do not prefer to walk = $200 - 120\ =\ 80$ P (selected student doesn't prefer to walk) = $\frac{80}{200}$ or $\frac{2}{5}$	**½** **½**

	(ii) Total number of students who prefer to walk or use bicycle = 120 + 50 = 170 P (selected student prefers to walk or use bicycle) = $\frac{170}{200}$ or $\frac{17}{20}$ (iii) (A) 50% of walking students who used bicycle = 60 Number of students who already use bicycle = 50 P (selected student uses bicycle) = $\frac{110}{200}$ or $\frac{11}{20}$ **OR** (B) Number of students who preferred to be dropped by car $= 200 - (120 + 50 + 20)$ = 10 students P (selected student is dropped by car) = $\frac{10}{200}$ or $\frac{1}{20}$	½ ½ ½ ½ 1 1 1
37.	(i) 1 and 4 (ii) $x = 5/2$ (iii) (A) At $x = 5/2, p(x) = 2.25$ Therefore, $h = 0.10 + 2.25 = 2.35m$ **OR** (B) $-x^2 + 5x - 4 = 2$ $x^2 - 5x + 6 = 0$ $(x-2)(x-3) = 0$ $\Rightarrow x = 2 \; and \; x = 3$ Therefore, required points are $(2,0)$ and $(3,0)$	1 1 1 1 ½ ½ ½ ½
38.	(i) $l^2 = (1.2)^2 + (0.5)^2$ $= 1.44 + 0.25$ $\Rightarrow l = \sqrt{1.69} = 1.3cm$ (ii) Curved surface area of sharpened part $= \pi \times 0.5 \times 1.3$ $= (0.65\,\pi)\; cm^2$ (iii) (A) Total surface area of pencil = CSA of cylinder + CSA of cone + area of base circle $= \pi \times 0.5 \times 0.5 \times 21 + 0.65\,\pi + \pi \times (0.5)^2$ $= (5.25 + 0.65 + 0.25)\pi$ $= (6.15\,\pi)\; cm^2$ **OR** (B) Length of cylindrical part of shortened pencil $= (21 - 8.2)\; cm = 12.8\; cm$ So, volume of cylindrical part of shortened pencil $= \pi \times 0.5 \times 0.5 \times 12.8$ $= (3.2\,\pi)\; cm^3$	½ ½ ½ ½ ½ 1 ½ ½ 1 ½