SUBJECT: MATHEMATICS STANDARD (041)
SAMPLE QUESTION PAPER
CLASS – X (2026 – 27)

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

General Instructions:

Read the following instructions very carefully and strictly follow them:

(i) This Question paper contains 38 questions. All questions are compulsory.

(ii) This Question paper is divided into five Sections – A, B, C, D and E.

(iii) In Section A, Question number 1 to 18 are Multiple Choice Questions (MCQs) and Question number 19 and 20 are Assertion - Reason based questions of 1 mark each.

(iv) In Section B, Question number 21 to 25 are Very Short Answer (VSA)-type questions, carrying 2 marks each.

(v) In Section C, Question number 26 to 31 are Short Answer (SA)-type questions carrying 3 marks each.

(vi) In Section D, Question number 32 to 35 are Long Answer (LA)-type questions carrying 5 marks each.

(vii) In Section E, Question number 36 to 38 are case study-based questions carrying 4 marks each.

(viii) There is no overall choice. However, an internal choice has been provided in 2 questions in Section B, 2 questions in Section C and 2 questions in Section D. An internal choice has been provided in all the sub parts having 2 marks of questions in section E.

(ix) Draw neat and clean figures wherever required. Take $\pi = \frac{22}{7}$ wherever required, if not stated.

(x) Use of calculators is not allowed.

SECTION – A **(20 x 1 = 20)**

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

Q. No.	Questions	Marks
1.	The greatest number which divides both 134 and 188, leaving remainders 4 and 6 respectively, is: (A) 13 (B) 26 (C) 39 (D) 65	**1**
2.	If $f(x) = px^2 + qx + r$, $p \neq 0$ and $p + r = q$, then one of the zeroes of $f(x)$ is: (A) $\frac{q}{p}$ (B) $\frac{r}{p}$ (C) $-\frac{r}{p}$ (D) $-\frac{q}{p}$	**1**
3.	Tarun correctly solved a pair of linear equations in two variables and found their only point of intersection as (5, – 1). One of the lines was $x – y = 6$. Which of the following could have been the other line? I: $3x – 3y = 18$ II: $2x – 3y = 13$ III: $2x – 3y = 16$ (A) I only (B) II only (C) I and II (D) II and III	**1**
4.	If $(1 – p)$ is a root of the quadratic equation $x^2 + px + 1 – p = 0$, then its roots are: (A) 0, 1 (B) – 1, 1 (C) 0, – 1 (D) – 1, 2	**1**

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5.	The middle term of the A.P.: 10, 7, 4, …, – 62 is: (A) – 26 (B) – 29 (C) – 32 (D) – 35	**1**
6.	The perimeters of two similar triangles are 56 cm and 70 cm respectively. If one side of the first triangle is 14 cm, then the corresponding side of the second triangle (in cm) is: (A) 5 (B) 7.5 (C) 10 (D) 17.5	**1**
7.	The point which lies on the perpendicular bisector of the line segment joining the points A (– 3, – 4) and B (3, 4) is: (A) (0, 0) (B) (0, 3) (C) (3, 0) (D) (0, 4)	**1**
8.	If tan (A + B) = $\sqrt{3}$ and tan (A – B) = $\frac{1}{\sqrt{3}}$, 0° < A + B < 90°, A > B, then the value of A and B respectively are: (A) 60°, 30° (B) 60°, 45° (C) 45°, 15° (D) 60°,15°	**1**
9.	T-shirts marked with numbers 4 to 99 are placed in a box. Gunika is fond of numbers. She randomly takes out a T-shirt from this box. The probability that she gets a T-shirt marked with a number that is either a perfect square or a perfect cube is: (A) $\frac{1}{12}$ (B) $\frac{1}{32}$ (C) $\frac{11}{96}$ (D) $\frac{5}{48}$	**1**
10.	The diameter of a car wheel is 21 cm. The number of complete revolutions it will make in moving 66 km is: (A) 10^4 (B) 10^5 (C) 10^6 (D) 10^7	**1**
11.	Two cubes each of volume 64 cm^3 are joined end to end to form a solid. The surface area of the resultant cuboid is: (A) 192 cm^2 (B) 160 cm^2 (C) 96 cm^2 (D) 80 cm^2	**1**
12.	The mean age of a combined group of men and women is 35 years. If the mean ages of the men and women are 38 years and 30 years respectively, then the percentage of women in the group is: (A) 15 (B) 25.5 (C) 35 (D) 37.5	**1**
13.	Two dice are rolled simultaneously. The probability of getting number less than 4 on each die is: (A) $\frac{1}{4}$ (B) $\frac{1}{9}$ (C) $\frac{1}{36}$ (D) $\frac{1}{6}$	**1**
14.	PM is a median of Δ PQR with vertices P (5, – 6), Q (6, 4) and R (0, 0). The length of PM is: (A) $2\sqrt{17}$ units (B) $2\sqrt{15}$ units (C) $\sqrt{101}$ units (D) 10 units	**1**
15.	The arc of a circle is of length 6π cm and the sector it bound has an area of 24π cm^2. The radius of the circle is: (A) 4 cm (B) 8 cm (C) 16 cm (D) 18 cm	**1**
16.	The mean and median of the data are 35.5 and 32 respectively. The value of mode for this data is: (A) 23 (B) 26 (C) 25 (D) 30	**1**
17.	A flying kite is tied to a point on the ground with the help of a string. The string makes an angle θ with the ground level such that tan θ = $\frac{12}{5}$. If the length of the string is 52 m, then the height of the kite above the ground is: (A) 40 m (B) 45.5 m (C) 48 m (D) 50 m	**1**

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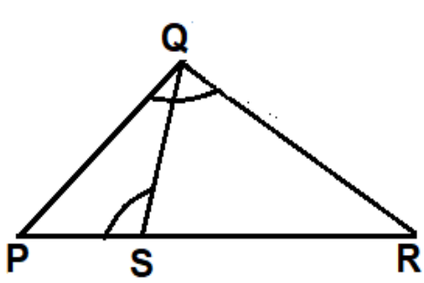
18.	2 cards of diamonds and 4 cards of spades are missing from a pack of 52 cards. A card is drawn at random from this pack. The probability of getting a card of heart is: (A) $\frac{13}{52}$ (B) $\frac{13}{46}$ (C) $\frac{11}{52}$ (D) $\frac{11}{46}$	**1**
	Assertion-Reason Based Questions **Directions: 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 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.	
19.	**Assertion (A)**: If three vertices of a parallelogram taken in order are (–1, –6), (2, –5) and (7, 2), then its fourth vertex is (4,1). **Reason (R)**: Diagonals of a parallelogram bisect each other.	**1**
20.	**Assertion (A)**: If zeroes of the polynomial $(2k-1)x^2 + 4x - 3$ are reciprocal of each other, then $k = -1$. **Reason (R)**: If a = c, then zeroes of the polynomial $ax^2 + bx + c$, $a \neq 0$ are reciprocal of each other.	**1**
	SECTION – B **(5 x 2 = 10)** **This section comprises of 5 Very Short Answer (VSA) type questions of 2 marks each**.	
21(A).	A hall has a length of 9.75 m, breadth of 6.75 m and height of 5.25 m. What is the length of the longest unmarked ruler that can exactly measure the dimensions of the hall?	**2**
	OR	
21(B).	There are three bells placed at different swings in a park, which toll at intervals of 5, 6 and 8 minutes, respectively. They all toll together when the park opens for the visitors at 10:00 a.m.. How many more times do they all toll together till the park is closed at 7:00 p.m.?	
22(A).	ABCD is a trapezium in which AB is parallel to DC and its diagonals intersect each other at the point O. Show that $\frac{AO}{BO} = \frac{CO}{DO}$.	**2**
	OR	
22(B).	In the given figure, if ∠PQR = ∠QSP, PQ = 6 cm and PS = 3 cm, then find the length of PR.  **<u>For visually Impaired Candidates:</u>** In a right-angled triangle ABC, right-angled at B, a perpendicular BD is drawn to the hypotenuse AC. Prove that the triangle BCD is similar to the triangle ACB.	

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23.	If $\tan\theta = \frac{1}{\sqrt{5}}$, then find the value of $\frac{\text{cosec}^2\theta - \sec^2\theta}{\text{cosec}^2\theta + \sec^2\theta}$.	**2**
24.	Find the area of a sector of a circle with diameter 28 cm, If the length of the corresponding arc is 22 cm.	**2**
25.	Two dice are thrown simultaneously. Find the probability that the product of the numbers appearing on them is a prime number.	**2**
	SECTION – C (6 x 3 = 18) **This section comprises of 6 Short Answer (SA) type questions of 3 marks each**.	
26.	Given that $\sqrt{3}$ is irrational number, prove that $(2 + 3\sqrt{3})$ is an irrational number.	**3**
27.	If α and β are the zeroes of the quadratic polynomial $2x^2 - 8x + 5$, then find the value of $(\alpha + \frac{1}{\beta}) \times (\beta + \frac{1}{\alpha})$.	**3**
28(A).	Ridhi drew a polygon with n sides. The smallest exterior angle is 8° and each subsequent exterior angle is 4° more than the previous exterior angle. Find the number of sides of the polygon that Ridhi had drawn.	**3**
	OR	
28(B).	Find the sum of integers between 1 and 400 that are multiples of 4 as well as of 5.	
29.	Prove that the parallelogram circumscribing a circle is a rhombus.	**3**
30.	In what ratio does the x–axis divide the line segment joining the points (– 4, – 6) and (–1, 7)? Also, find the coordinates of the point of division.	**3**
31(A).	During a math class, Ms. Isha wrote the expression given below on the board and asked the students to simplify it. $\frac{\cos\theta}{1-\sin\theta} + \frac{1-\sin\theta}{\cos\theta}$ Jyoti solved it in her note book as follows: $\frac{\cos\theta}{1-\sin\theta} + \frac{1-\sin\theta}{\cos\theta}$ $= \frac{\cos^2\theta + (1-\sin\theta)^2}{(1-\sin\theta)\times\cos\theta}$ **…. (step 1)** $= \frac{\cos^2\theta + \cos^2\theta}{(1-\sin\theta)\times\cos\theta}$ **…. (step 2)** $= \frac{2\cos^2\theta}{(1-\sin\theta)\times\cos\theta}$ **…. (step 3)** $= \frac{2\cos\theta}{(1-\sin\theta)}$ **…. (step 4)** Identify the step in which Jyoti has made error(s), if any. Rectify the same and find the correct answer.	**3**
	OR	
31(B).	If $\frac{1}{\sin x - \cos x} = \frac{\text{cosec}\, x}{\sqrt{2}}$, then prove that $\left(\frac{1}{\sin x + \cos x}\right)^2 = \frac{\sec^2 x}{2}$	

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SECTION – D (4 x 5= 20)

This section comprises of 4 Long Answer (LA) type questions of 5 marks each.

32.	In a rectangular park measuring 50 m × 40 m, the gram panchayat plans to construct a rectangular swimming pool in the middle, surrounded by a uniform-width grass strip throughout the park. Find the dimensions of the swimming pool, if the area of the grassy strip is 1184 m².	**5**
33.	Prove that a line drawn parallel to one side of a triangle to intersect the other two sides in distinct points, divides the other two sides in the same ratio. Using the above theorem solve the following: PQRS is a trapezium with PQ || SR. X and Y are points on non-parallel sides PS and QR respectively such that XY || PQ. Show that $\frac{PX}{XS} = \frac{QY}{YR}$.	**5**
34(A).	A tent is in the shape of a cylinder surmounted by a conical top. If the height and radius of the cylindrical part are 3 m and 14 m respectively, and the total height of the tent is 13.5 m, then find the area of the canvas required for making the tent, keeping a provision of 26 m^2 of canvas for stitching and wastage. Also, find the cost of the canvas to be purchased at the rate of ₹ 250 per m^2.	**5**
	OR	
34(B).	A solid wooden toy is in the form of a hemisphere surmounted by a cone of the same radius. The radius of hemisphere is 3.5 cm and the total wood used in making the toy is $166\frac{5}{6}$ cm^3. Find the height of the conical part. Also, find the cost of painting the hemispherical part of the toy at the rate of ₹ 15 per cm^2.	
35(A).	Manish is standing on level ground and observes a kite flying 200 m away from him at an angle of elevation of 30^0. Mahesh, standing on the roof of a 50 m high building on the opposite side of the kite, observes the same kite at an angle of elevation of 45^0. Find the distance between the kite and Mahesh.	**5**
	OR	
35(B).	The angles of depression of two ships from the top of a lighthouse and on the same side of it are found to be 45^0 and 30^0. If the ships are 200m apart and one ship is exactly behind the other then find the height of lighthouse.	

SECTION – E (3 x 4 = 12)

This section comprises of 3 case-study-based questions of 4 marks each with sub parts. Each case study questions has three sub parts (i), (ii), (iii) of marks 1, 1, 2 respectively.

36.	A student entrepreneur started a company that manufactures sanitizers in two sizes – small and large. The cost of a small bottle of sanitizer is ₹10 and that of a large bottle is ₹15. In June, the company sold 1000 bottles and recorded a total sale of ₹12,750. Seeing the increased demand, the company decided to increase the price of both sanitizer bottles by ₹2 each. In the next month, the company sold 2500 bottles and recorded a total sale of ₹34,250. Based on the above information, answer the following questions:	
	(i) Form a linear equation in two variables representing the sale for June.	**1**
	(ii) Form a linear equation in two variables representing the sale for July.	**1**
	(iii) **(A)** How many sanitizer bottles of each type were actually sold in June?	**2**
	OR	
	(iii) **(B)** How many sanitizer bottles of each type were sold in July?	**2**

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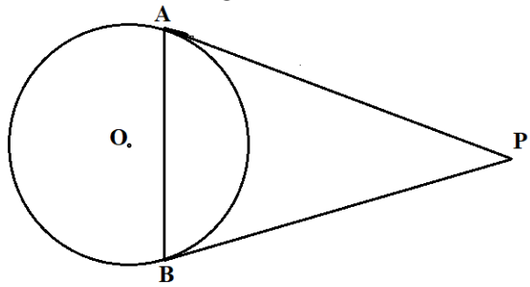
37. In a technology park in Hyderabad, a company installed a circular meditation garden for its employees as shown in the figure.



Arjun, a designer, stood at a point P outside the garden and drew two tangents PA and PB to the circular boundary. The radius of the garden is 9 m, and the distance of point P from the centre O is 18 m. For preparing safety guidelines, Arjun needed the lengths of the tangents. During a demonstration to interns, he asked them to compute the angle formed between the two tangents using the properties of circle.

Based on the above information, answer the following questions:

(i) What is the measure of ∠OAP? **1**

(ii) Calculate the length of the tangent PA. **1**

(iii) **(A)** Calculate the measure of ∠AOB. **2**

OR

(iii) **(B)** In the above design, if PA and PB were inclined at 60°, then what would be their length? **2**

38. A school conducted a weekly test for Class X students, before the commencement of the pre-board examination and recorded their scores (out of 50). To analyse performance patterns, the academic coordinator grouped the marks into intervals. The grouped frequency distribution is as below:

Marks Obtained	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Number of students	3	6	12	15	14

The academic coordinator computed the central tendencies to judge overall learning level, the most common performance range and to understand consistency across the batch for planning the remedial sessions.

Based on the above information, answer the following questions:

(i) Identify the class with the most common performance range. **1**

(ii) Find the class interval containing the median. **1**

(iii) **(A)** What is the average performance of the students? **2**

OR

(iii) **(B)** Find the mode of the data. **2**

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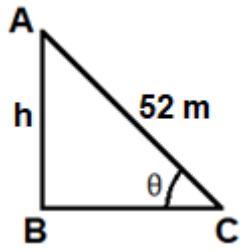
MATHEMATICS STANDARD – Code No. (041)

MARKING SCHEME

CLASS X (2026 - 27)

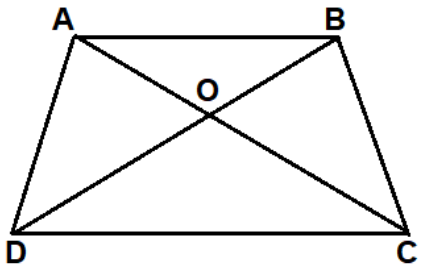
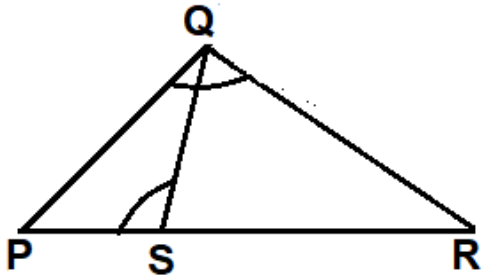
SECTION: A (Solution of MCQs of 1 Mark each, no part marks)

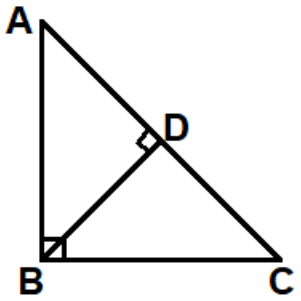
Q. No.	Ans.	Hints/Solution	Marks
1.	**(B)** 26	134 – 4 = 130 and 188 – 6 = 182 HCF (130, 182) = 26	**1**
2.	**(C)** $-\frac{r}{p}$	Substituting q = p + r in f(x) $f(x) = px^2 + (p + r)x + r$ $= (x + 1)(px + r)$ Zeroes are – 1 or $-\frac{r}{p}$.	**1**
3.	**(B)** II only	(5, – 1) is a solution of I: 3x – 3y = 18 also. But this will make the system of equations as consistent and dependent. Only II: 2x – 3y = 13 fulfills the given condition of having only one point of intersection.	**1**
4.	**(C)** 0, – 1	As (1 – p) is a root of the quadratic equation $x^2 + px + 1 – p = 0$, $\therefore (1 – p)^2 + p(1 – p) + 1 – p = 0$, $\Rightarrow p = 1$ Now quadratic equation will be: $x^2 + x = 0$ $x(x+1) = 0$ So the roots are 0, -1	**1**
5.	**(A)** – 26	– 62 = 10 + (n – 1) (– 3) ⇒ n = 25. Thus $\frac{25+1}{2}$ = 13th term is the middle term. $\therefore a_{13} = 10 + 12 (– 3) = – 26$	**1**
6.	**(D)** 17.5	Ratio of perimeters of similar triangles = ratio of their corresponding sides $\therefore \frac{56}{70} = \frac{14}{\text{corresponding side}}$ corresponding side = 17.5	**1**
7.	**(A)** (0, 0)	Mid-point of AB will lie on the perpendicular bisector of the line segment joining the points A (– 3, – 4) and B (3, 4). $\therefore$ Coordinates of mid-point of A and B are $\left(\frac{-3+3}{2}, \frac{-4+4}{2}\right)$ = (0, 0)	**1**
8.	**(C)** 45°, 15°	$\tan (A + B) = \sqrt{3}$ $\Rightarrow (A + B) = 60°$ …. (i) $\tan (A – B) = \frac{1}{\sqrt{3}}$ $\Rightarrow (A – B) = 30°$ …. (ii) Solving equation (i) and (ii), we get A = 45° and B = 15°.	**1**
9.	**(D)** $\frac{5}{48}$	Total outcomes = 96 Perfect square numbers – 4, 9, 16, 25, 36, 49, 64, 81 perfect cubes are 8, 27, 64, common number is 64 Number of favourable outcomes = 10 P(either a perfect square or a perfect cube) = $\frac{10}{96} = \frac{5}{48}$	**1**

10.	**(B)** 10^5	Total revolutions = $\frac{66 \times 10^5 \times 7}{22 \times 21} = 10^5$	**1**
11.	**(B)** 160 cm^2	Side of cube = 4 cm Dimensions of resulting cuboid: length = 8 cm, breadth = 4 cm, height = 4 cm. Total surface area = 2 (8 × 4 + 4 × 4 + 8 × 4) = 160 cm^2	**1**
12.	**(D)** 37.5	Let number of men be x and number of women be y $\frac{38x + 30y}{x + y} = 35$ ⇒ 38x + 30y = 35x + 35y ⇒ 3x = 5y $\therefore \frac{x}{y} = \frac{5}{3}$ % age of women = $\frac{3}{8} \times 100 = 37.5$	**1**
13.	**(A)** $\frac{1}{4}$	Total outcomes = 36 Favourable outcomes = (1, 1), (1, 2), (1, 3), (2, 1), (2, 2), (2, 3), (3, 1), (3, 2), (3, 3) P (E) = $\frac{9}{36} = \frac{1}{4}$	**1**
14.	**(A)** 2 $\sqrt{17}$ units	Coordinates of midpoint of QR i.e. M are $\left(\frac{6+0}{2}, \frac{4+0}{2}\right) = (3,2)$ Median PM $= \sqrt{(5-3)^2 + (-6-2)^2} = \sqrt{68} = 2\sqrt{17}$ units	**1**
15.	**(B)** 8 cm	A = $\frac{1}{2} l \times r$ ⇒ $24\pi = \frac{1}{2} \times 6\pi \times r$ ⇒ r = 8 cm.	**1**
16.	**(C)** 25	Mode = 3 Median – 2 Mean = 3 (32) – 2 (35.5) = 25	**1**
17.	**(C)** 48 m	tan θ = $\frac{12}{5}$ $\therefore$ sin θ = $\frac{12}{13}$ ⇒ $\frac{h}{52} = \frac{12}{13}$ ⇒ h = 48 m 	**1**
18.	**(B)** $\frac{13}{46}$	Total remaining cards = 52 – (2 + 4) = 46 P(a heart card) = $\frac{13}{46}$	**1**
19.	**(A)**	Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is the correct explanation of **Assertion (A).**	**1**
20.	**(A)**	Both **Assertion (A)** and **Reason (R)** are true and **Reason (R)** is 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]

Q. No.	HINTS/SOLUTION	Marks
21. (A)	Length = 9.75 m = 975 cm Breadth = 6.75 m = 675 cm Height = 5.25 m = 525 cm Length of longest unmarked ruler = HCF (975, 675, 525) $975 = 3 \times 5^2 \times 13$ $675 = 3^3 \times 5^2$ $525 = 3 \times 5^2 \times 7$ $\therefore$ HCF (975, 675, 525) $= 3 \times 5^2 = 75$ Hence, the length of longest unmarked ruler is 75 cm or 0.75 m	½ 1 ½
	OR	
21. (B)	LCM of 5, 6 and 8 is 120 i.e., all the bells toll together after an interval of 120 minutes or 2 hours. Thus, all the bells will again toll together at 12:00 noon, 2:00 pm, 4:00 pm and 6 p.m. i.e., 4 times So, the bells will toll together 4 more times, till the park is closed at 7:00 p.m.	1 1
22. (A)	 In Δ AOB and Δ COD ∠ OAB = ∠ OCD ∠ OBA = ∠ ODC (Alternate interior angles) $\therefore$ Δ AOB ~ Δ COD (AA criterion) $\Rightarrow \frac{AO}{CO} = \frac{BO}{DO}$ or $\frac{AO}{BO} = \frac{CO}{DO}$	 1 ½ ½
	OR	
22. (B)	 In Δ PRQ and Δ PQS ∠ PQR = ∠ QSP (Given) ∠ QPR = ∠ QPS (Common) $\therefore$ Δ PRQ ~ Δ PQS (AA criterion)	 1

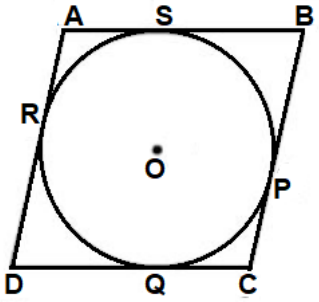
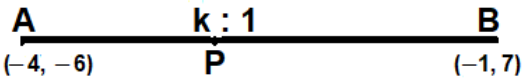
	$\Rightarrow \frac{PQ}{PS} = \frac{PR}{PQ} \Rightarrow \frac{6}{3} = \frac{PR}{6}$ $\therefore$ PR = 12 cm **For visually Impaired Candidates:**  In triangle BCD and triangle ACB Angle BDC = Angle ABC (each 90 degree) Angle BCD = Angle ACB (common) $\therefore$ Triangle BCD is similar to Triangle ACB (AA criterion)	½ ½ ½ ½ 1
23.	$\tan\theta = \frac{1}{\sqrt{5}} \Rightarrow \cot\theta = \sqrt{5}$ $\sec^2\theta = 1 + \tan^2\theta = 1 + \left(\frac{1}{\sqrt{5}}\right)^2 = \frac{6}{5}$ and $\text{cosec}^2\theta = 1 + \cot^2\theta = 1 + \left(\sqrt{5}\right)^2 = 6$ $\therefore \frac{\text{cosec}^2\theta - \sec^2\theta}{\text{cosec}^2\theta + \sec^2\theta} = \frac{6 - \frac{6}{5}}{6 + \frac{6}{5}} = \frac{2}{3}$	 ½ ½ 1
24.	Radius = $\frac{28}{2}$ = 14 cm Area of sector = $\frac{1}{2} \times l \times r$ $= \frac{1}{2} \times 22 \times 14$ = 154 cm^2	½ 1 ½
25.	Total number of outcomes = 36 Favourable outcomes = 6 {(1,2), (1,3), (1,5), (2,1), (3,1), (5,1)} P (Prime Product) = $\frac{6}{36} = \frac{1}{6}$	½ ½ 1

Section – C

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

Q. No.	HINTS/SOLUTION	Marks
26.	Let us assume that $2 + 3\sqrt{3}$ be rational number. Then $2 + 3\sqrt{3} = \frac{a}{b}$, where 'a' and 'b' are integers & b ≠ 0 $\Rightarrow \sqrt{3} = \frac{a - 2b}{3b}$	 1

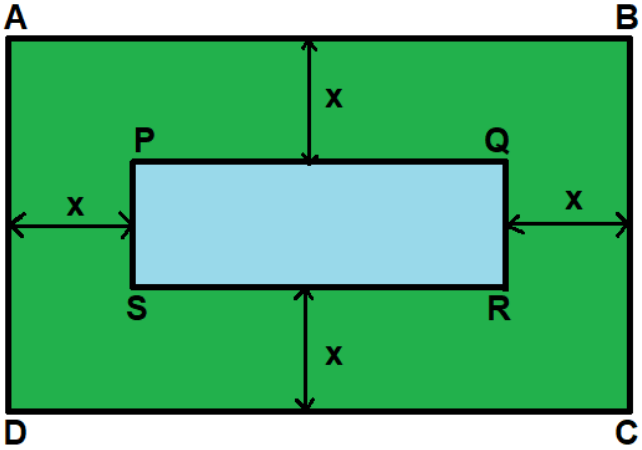
	Since 'a' and 'b' are integers. $\therefore \frac{a-2b}{3b}$ is rational number. So, $\sqrt{3}$ is rational number which contradicts the given fact that $\sqrt{3}$ is irrational number. Hence, our assumption is wrong. Therefore $2 + 3\sqrt{3}$ is irrational number.	**1** **1**
27.	$\alpha + \beta = 4$ and $\alpha\beta = \frac{5}{2}$ $(\alpha + \frac{1}{\beta}) \times (\beta + \frac{1}{\alpha}) = (\frac{\alpha\beta+1}{\beta}) \times (\frac{\alpha\beta+1}{\alpha}) = \frac{(\alpha\beta+1)^2}{\alpha\beta}$ $= \frac{\left(\frac{5}{2}+1\right)^2}{\frac{5}{2}}$ $= \frac{49}{10}$	**1** **½** **1** **½**
28. (A)	Number of the sides of the given polygon is 'n'. The exterior angles of the given polygon are in A.P. Here a = 8 and d = 4 As sum of all the exterior angles of a polygon is 360° $\therefore S_n = 360$ $\Rightarrow \frac{n}{2}[2 \times 8 + (n-1) \times 4] = 360$ $\Rightarrow n^2 + 3n - 180 = 0$ $\Rightarrow (n + 15)(n - 12) = 0$ $\therefore n = -15$ or 12 Angle is always positive. $\therefore n = 12$ So, the number of sides in the given polygon is 12.	 **1** **1** **½** **½**
	OR	
28. (B)	Required A.P. is 20, 40, 60, …, 380 Here a = 20 and d = 20 Let $a_n = 380$ $\Rightarrow 20 + (n-1) \times 20 = 380$ $\Rightarrow n = 19$ $\therefore S_{19} = \frac{19}{2}[20 + 380]$ $= 3800$	**1** **½** **½** **½** **½**

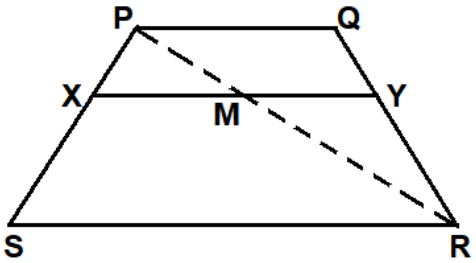
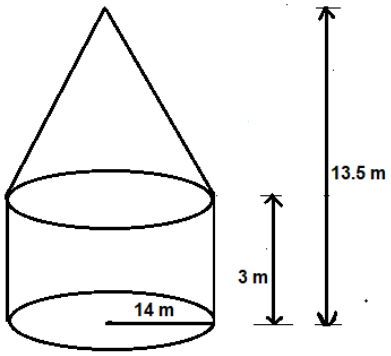
29.	 Given, ABCD is a parallelogram circumscribing a circle. AS = AR --- (i) BS = BP --- (ii) CQ = CP --- (iii) DQ = DR --- (iv) (Length of tangents drawn from an external point to a circle are equal) Adding (i), (ii), (iii) and (iv), we get AS + BS + CQ + DQ = AR + BP + CP + DR ⇒ AB + CD = AD + BC ⇒ 2 AB = 2 AD ⇒ AB = AD Since adjacent sides of parallelogram ABCD are equal. Therefore, ABCD is a rhombus.	**1** **1** **1**
30.	 Let x-axis divides the line segment joining the points A (– 4, – 6) and B (–1, 7) at P (x, 0) in the ratio k:1. Coordinates of P are $\left[\frac{k(-1)+1(-4)}{k+1}, \frac{k(7)+1(-6)}{k+1}\right]$ or $\left[\frac{-k-4}{k+1}, \frac{7k-6}{k+1}\right]$ Since point P lies on x – axis $\therefore \frac{7k-6}{k+1} = 0 \Rightarrow k = \frac{6}{7}$ So, point P divides AB in the ratio 6:7 Coordinates of P, are $(\frac{-34}{13}, 0)$.	**1** **½** **½** **1**
31. (A)	Jyoti made error in step 2. The correct solution is as under: $\frac{\cos\theta}{1-\sin\theta} + \frac{1-\sin\theta}{\cos\theta}$ $= \frac{\cos^2\theta+(1-\sin\theta)^2}{(1-\sin\theta)\times\cos\theta}$ $= \frac{\cos^2\theta+1+\sin^2\theta-2\sin\theta}{(1-\sin\theta)\times\cos\theta}$ $= \frac{2-2\sin\theta}{(1-\sin\theta)\times\cos\theta}$	**1** **1** **½**

	$= \frac{2 \times (1 - \sin\theta)}{(1 - \sin\theta) \times \cos\theta}$ $= \frac{2}{\cos\theta} = 2 \sec\theta$	½
	OR	
31. (B)	Given: $\frac{1}{\sin x - \cos x} = \frac{\text{cosec } x}{\sqrt{2}}$ $\Rightarrow \sin x - \cos x = \sqrt{2} \sin x$ Squaring both sides, we get $2 \sin x \cos x = 1 - 2 \sin^2 x$ --- (i) Now, LHS = $\left(\frac{1}{\sin x + \cos x}\right)^2 = \frac{1}{1 + 2 \sin x \cos x}$ $= \frac{1}{1 + (1 - 2sin^2 x)} = \frac{1}{2cos^2 x}$ $= \frac{\sec^2 x}{2}$ = RHS	½ **1** ½ ½ ½

Section –D

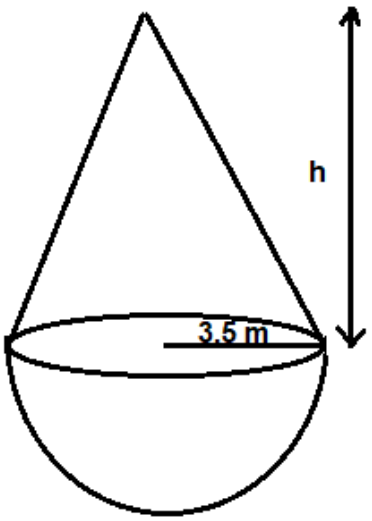
[This section comprises of solution of long answer type questions (LA) of 5 marks each]

Q. No.	HINTS/SOLUTION	Marks
32.	 ABCD is the rectangular park and PQRS is the swimming pool. Let 'x' be the uniform width of the grass strip. Then, length of the swimming pool, PQ = (50 – 2x) m and breadth of the swimming pool, QR = (40 – 2x) m Area of rectangular park – Area of swimming pool = Area of grass strip. $50 \times 40 - (50 - 2x)(40 - 2x) = 1184$ $\Rightarrow x^2 - 45x + 296 = 0$ $\Rightarrow (x - 8)(x - 37) = 0$ $\Rightarrow x = 8, 37$ Rejecting x = 37, as length and breadth cannot be negative integers.	½ **1** **1** ½

	$\therefore x = 8$	**1**
	Thus, length of the swimming pool = (50 – 2x) = 50 – 16 = 34 m.	½
	and breadth of the swimming pool = (40 – 2x) = 40 – 16 = 24 m	½
33.	Correct figure, given, to prove, construction	**1**
	Correct proof 	**2**
	Join PR intersecting XY at M.	½
	In Δ PSR, XM ‖ SR	
	$\therefore \frac{PX}{XS} = \frac{PM}{MR}$ --- (i)	½
	In Δ PQR, MY ‖ PQ	
	$\therefore \frac{QY}{YR} = \frac{PM}{MR}$ --- (ii)	½
	From (i) and (ii), we get	
	$\frac{PX}{XS} = \frac{QY}{YR}$	½
34. (A)		
	Height of Conical part = 13.5 – 3 = 10.5 m	½
	Slant height (l) = $\sqrt{(14)^2 + (10.5)^2}$ = 17.5 m	**1**
	CSA of Conical part = $\pi rl = \frac{22}{7} \times 14 \times 17.5 = 770$ m^2	**1**
	CSA of Cylindrical part = $2\pi rh = 2 \times \frac{22}{7} \times 14 \times 3 = 264$ m^2	**1**
	Total area of canvas required = CSA of conical part + CSA of cylindrical part + Wastage	
	= 770 + 264 + 26 = 1060 m^2	½
	Cost of canvas to be purchased @ ₹ 250 / m^2 = 250 × 1060 = ₹ 265000	**1**
	OR	

34. (B)

Let 'h' cm be the height of conical part.



Volume of wood in the toy = Volume of conical part + Volume of hemispherical part

$$166\frac{5}{6} = \frac{1}{3} \times \pi \times r^2 \times h + \frac{2}{3} \times \pi \times r^3$$

$$\Rightarrow \frac{1001}{6} = \frac{1}{3} \times \frac{22}{7} \times (3.5)^2 \times h + \frac{2}{3} \times \frac{22}{7} \times (3.5)^3$$ — **2**

$\Rightarrow$ h = 6 cm — **1**

CSA of hemispherical part = $2 \times \pi \times r^2$

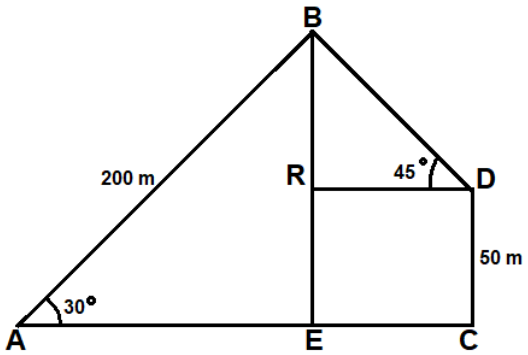
$= 2 \times \frac{22}{7} \times (3.5)^2$

$= 77\ cm^2$ — **1**

Cost of painting hemispherical part @ ₹ 15 / cm^2 = 15 × 77

= ₹ 1155 — **1**

35. (A)



Correct figure — **1**

Let Manish is standing at point 'A' and Mahesh is standing at point 'D'.

Distance of kite from Manish = 200 m

In rt. angled Δ AEB

$\frac{BE}{200} = \sin 30° = \frac{1}{2}$ — **1**

$\Rightarrow$ BE = 100 m — **½**

BR = BE – RE = BE – DC = 100 – 50 = 50 m — **1**

In rt. angled Δ BRD

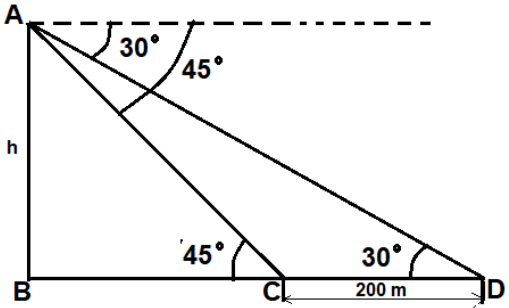
$\frac{50}{BD} = \sin 45° = \frac{1}{\sqrt{2}}$ — **1**

$\Rightarrow$ BD = $50\sqrt{2}$ m — **½**

∴ Distance of kite from Mahesh is $50\sqrt{2}$ m

OR

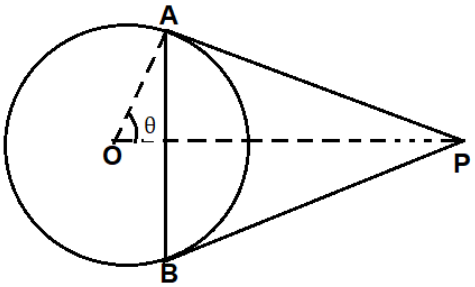
35. (B)



	Correct figure Let the height of the lighthouse be 'h' m. In rt. angled Δ ABC $\frac{h}{BC}$ = tan 45° = 1 ⇒ BC = h --- (i) In rt. angled Δ ABD $\frac{h}{h+200} = \tan 30° = \frac{1}{\sqrt{3}}$ ⇒ h = $\frac{200}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1}$ ⇒ h = 100 $(\sqrt{3}+1)$ ∴ height of the lighthouse is 100 $(\sqrt{3}+1)$ m.	**1** **1** **½** **1** **½** **1**

Section –E

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

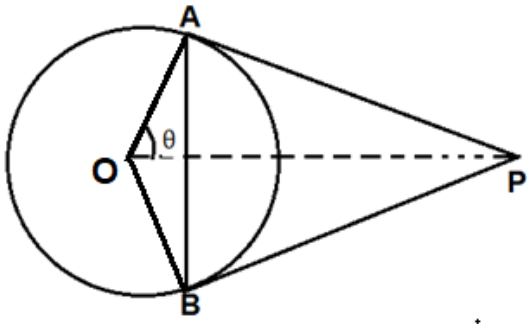
Q. No.	HINTS/SOLUTION	Marks
36.	Let the number of small bottles and large bottles be 'x' and 'y' respectively.	
	(i) 10x + 15y = 12750 or 2x + 3y = 2550	**1**
	(ii) 12x + 17y = 34250	**1**
	(iii) **(A)** According to the question, x + y = 1000 --- (i) 10x + 15y = 12750 --- (ii)	**1**
	Solving (i) and (ii), we get x = 450 & y = 550	**1**
	Number of small and large bottles sold are 450 and 550 respectively.	
	OR	
	(iii) **(B)** According to the question, x + y = 2500 --- (i) 12x + 17y = 34250 --- (ii)	**1**
	Solving (i) and (ii), we get x = 1650 & y = 850	**1**
	Number of small and large bottles sold are 1650 and 850 respectively.	
37.	 (i) ∠OAP = 90° (Radius is perpendicular to tangent at the point of contact)	**1**

(ii) In right angled Δ OAP, $OP^2 = OA^2 + AP^2$

$\Rightarrow (18)^2 = (9)^2 + AP^2$ ½

$\Rightarrow AP = \sqrt{243} = 9\sqrt{3}$ m ½

(iii) **(A)**



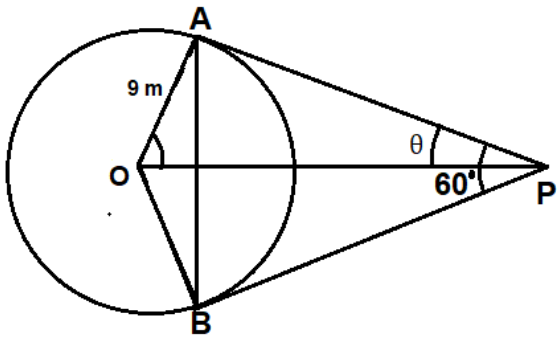
In right angled Δ OAP, $\cos\theta = \frac{9}{18} = \frac{1}{2} = \cos 60°$ **1**

$\Rightarrow \theta = 60°$ ½

$\therefore \angle AOB = 2\theta = 120°$ ½

OR

(iii) **(B)**



If tangent inclined at 60°, then $\angle OPA = \frac{1}{2} \times 60° = 30°$ ½

In right angled Δ OPA, $\frac{9}{AP} = \tan 30° = \frac{1}{\sqrt{3}}$ **1**

$\Rightarrow AP = 9\sqrt{3}$ m ½

38. (i) 30 – 40 **1**

(ii)

Marks	Number of students (*f*)	*cf*
0 – 10	3	3
10 – 20	6	9
20 – 30	12	21
30 – 40	15	36
40 – 50	14	50

Since $\frac{N}{2} = 25$. ∴ Median class is 30 – 40. **1**

(iii) **(A)**

C.I.	f_i	x_i	$f_i x_i$
0 – 10	3	5	15
10 – 20	6	15	90
20 – 30	12	25	300
30 – 40	15	35	525
40 – 50	14	45	630
Total	50		1560

Correct Table **1**

Average performance i.e. mean = $\frac{1560}{50}$ = 31.2 **1**

OR

(iii) **(B)** Here, modal class is 30 – 40, f_0 = 12, f_1 = 15, f_2 = 14 **½**

Mode = $30 + \left(\frac{15 - 12}{2 \times 15 - 12 - 14}\right) \times 10$ **1**

= 37.5 **½**

MATHEMATICS STANDARD – Code No.041
SAMPLE QUESTION PAPER
CLASS – X (2025-26)

Maximum Marks: 80 **Time: 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 questions 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 $\pi = \frac{22}{7}$ wherever required if not stated.
10. Use of calculators is not allowed.

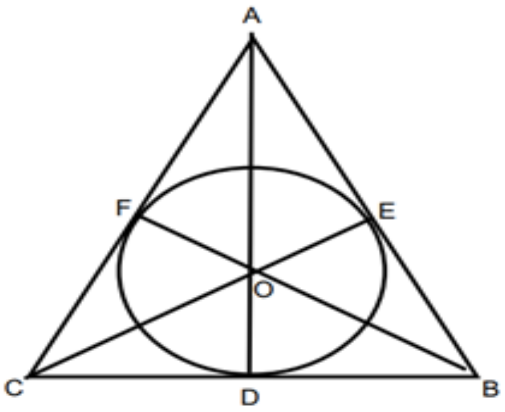
(Section A)
Section A consists of 20 questions of 1 mark each.

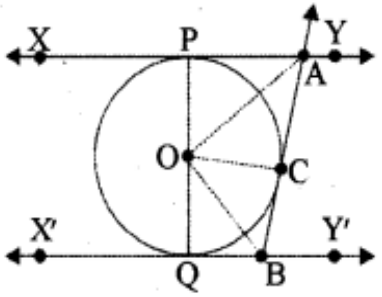
Q.No.	Questions	Marks
1.	If $a = 2^2 \times 3^x$, $b = 2^2 \times 3 \times 5$, $c = 2^2 \times 3 \times 7$ and LCM $(a, b, c) = 3780$, then x is equal to (A) 1 (B) 2 (C) 3 (D) 0	**1**
2.	The shortest distance (in units) of the point (2,3) from y-axis is (A) 2 (B) 3 (C) 5 (D) 1	**1**
3.	If the lines given by 3*x* +2k*y* =2 and 2*x*+5*y* +1=0 are not parallel, then k has to be (A) $\frac{15}{4}$ (B) $\neq\frac{15}{4}$ (C) any rational number (D) any rational number having 4 as denominator	**1**

4.	A quadrilateral ABCD is drawn to circumscribe a circle. If BC=7cm, CD=4cm and AD=3cm, then the length of AB is (A) 3cm (B) 4cm (C) 6cm (D) 7cm	**1**
5.	If $sec\theta + tan\theta = x$,then $sec\theta - tan\theta$ will be (A) x (B) x^2 (C) $\frac{2}{x}$ (D) $\frac{1}{x}$	**1**
6.	Which one of the following is not a quadratic equation? (A) $(x+2)^2 = 2(x+3)$ (B) $x^2 + 3x = (-1)(1-3x)^2$ (C) $x^3 - x^2 + 2x + 1 = (x+1)^3$ (D) $(x+2)(x+1) = x^2 + 2x + 3$	**1**
7.	Given below is the picture of the Olympic rings made by taking five congruent circles of radius 1cm each, intersecting in such a way that the chord formed by joining the point of intersection of two circles is also of length 1cm.Total area of all the dotted regions (assuming the thickness of the rings to be negligible) is  (A) $4[\frac{\pi}{12} - \frac{\sqrt{3}}{4}]$ cm^2 (B) $[\frac{\pi}{6} - \frac{\sqrt{3}}{4}]$ cm^2 (C) $4[\frac{\pi}{6} - \frac{\sqrt{3}}{4}]$ cm^2 (D) $8[\frac{\pi}{6} - \frac{\sqrt{3}}{4}]$ cm^2 **For Visually Impaired candidates** The area of the circle that can be inscribed in a square of 6 cm is (A) 36πcm^2 (B) 18πcm^2 (C) 12πcm^2 (D) 9πcm^2	**1**
8.	A pair of dice is tossed. The probability of not getting the sum eight is (A) $\frac{5}{36}$ (B) $\frac{31}{36}$ (C) $\frac{5}{18}$ (D) $\frac{5}{9}$	**1**
9.	If $2\sin 5x = \sqrt{3}$,$0^\circ \leq x \leq 90^o$, then x is equal to (A) 10° (B) 12° (C) 20° (D) 50°	**1**
10.	The sum of two numbers is 1215 and their HCF is 81, then the possible pairs of such numbers are (A) 2 (B) 3 (C) 4 (D) 5	**1**

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

11.	If the area of the base of a right circular cone is 51cm^2 and it's volume is 85cm^2, then the height of the cone is given as (A) $\frac{5}{6}$ cm (B) $\frac{5}{3}$cm (C) $\frac{5}{2}$cm (D) 5cm	**1**
12.	If zeroes of the quadratic polynomial ax^2 + bx +c (a, c ≠0) are equal, then (A) c and b must have opposite signs (B) c and a must have opposite signs (C) c and b must have same signs (D) c and a must have same signs	**1**
13.	The area (in cm^2) of a sector of a circle of radius 21cm cut off by an arc of length 22cm is (A) 441 (B) 321 (C) 231 (D) 221	**1**
14.	If ∆ABC ~∆DEF, AB=6cm, DE=9cm, EF=6cm and FD=12cm, then the perimeter of ∆ABC is (A) 28cm (B) 28.5cm (C) 18cm (D) 23cm	**1**
15.	If the probability of the letter chosen at random from the letters of the word "Mathematics" to be a vowel is $\frac{2}{2x+1}$, then x is equal to (A) $\frac{4}{11}$ (B) $\frac{9}{4}$ (C) $\frac{11}{4}$ (D) $\frac{4}{9}$	**1**
16.	The points A(9,0), B(9, -6) ,C(-9,0) and D(-9,6) are the vertices of a (A) Square (B) Rectangle (C) Parallelogram (D) Trapezium	**1**
17.	The median of a set of 9 distinct observation is 20.5. If each of the observations of a set is increased by 2,then the median of a new set (A) is increased by 2 (B) is decreased by 2 (C) is two times the original number (D) Remains same as that of original observations	**1**
18.	The length of a tangent drawn to a circle of radius 9 cm from a point at a distance of 41cm from the centre of the circle is (A) 40cm (B) 9cm (C) 41cm (D) 50cm	**1**
	DIRECTIONS: 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 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 number 5^n cannot end with the digit 0, where n is a natural number **Reason (R):** A number ends with 0, if its prime factorization contains both 2 and 5	**1**
20.	**Assertion (A):** If cosA + $\cos^2$A=1, then $\sin^2$A + $\sin^4$A =1 **Reason (R):** $\sin^2$A + $\cos^2$A =1	**1**
	(Section – B) **Section B consists of 5 questions of 2 marks each.**	
21.(A) **(B)**	The A.P 8, 10, 12,……. has 60 terms. Find the sum of last 10 terms. **OR** Find the middle term of A.P 6,13, 20, ……., 230	**2**
22.	If $sin(A+B) = 1$ and $cos(A-B) = \frac{\sqrt{3}}{2}$,$0° < A, B < 90°$, find the measure of angles A and B.	**2**
23.	If AP and DQ are medians of triangles ABC and DEF respectively, where $\Delta ABC \sim \Delta DEF$, then prove that $\frac{AB}{DE} = \frac{AP}{DQ}$	**2**
24. **(A)** **(B)**	A horse, a cow and a goat are tied, each by ropes of length 14m, at the corners A, B and C respectively, of a grassy triangular field ABC with sides of lengths 35m, 40m and 50 m. Find the area of grass field that can be grazed by them. **OR** Find the area of the major segment (in terms of π) of a circle of radius 5cm, formed by a chord subtending an angle of 90˚ at the centre.	**2**
25.	A ΔABC is drawn to circumscribe a circle of radius 4 cm such that the segments BD and DC are of lengths 10 cm and 8 cm respectively. Find the lengths of the sides AB and AC, if it is given that ar(ΔABC) = 90cm^2  **For Visually Impaired candidates:** A circle is inscribed in a right-angled triangle ABC, right angled at B. If BC=7cm and AB=24cm, find the radius of the circle	**2**

	(Section – C) **Section C consists of 6 questions of 3 marks each.**	
26.	In Figure, XY and X′Y′ are two parallel tangents to a circle with centre O and another tangent AB with point of contact C intersecting XY at A and X′Y′ at B. Prove that ∠ AOB = 90°  **For Visually Impaired candidates:** Two tangents PA and PB are drawn to a circle with centre O from an external point P. Prove that ∠APB= 2(∠OAB)	**3**
27.	In a workshop, the number of teachers of English, Hindi and Science are 36, 60 and 84 respectively. Find the minimum number of rooms required, if in each room the same number of teachers are to be seated and all of them being of the same subject.	**3**
28.	Find the zeroes of the quadratic polynomial $2x^2 - (1 + 2\sqrt{2})\,x + \sqrt{2}$ and verify the relationship between the zeroes and coefficents of the polynomial.	**3**
29.	If $sin\theta + cos\theta = \sqrt{3}$,then prove that $tan\theta + cot\theta = 1$ **OR** Prove that $\frac{cosA - sinA + 1}{cosA + sinA - 1}$ =cosecA + cotA	**3**
30.	On a particular day, Vidhi and Unnati couldn't decide on who would get to drive the car. They had one coin each and flipped their coin exactly three times. The following was agreed upon: 1. If Vidhi gets two heads in a row, she would drive the car 2. If Unnati gets a head immediately followed by a tail, she would drive the car. Who has greater probability to drive the car that day? Justify your answer.	**3**
31.(A)	The monthly income of Aryan and Babban are in the ratio 3:4 and their monthly expenditures are in ratio 5:7. If each saves ₹ 15,000 per month, find their monthly incomes. **OR**	**3**
(B)	Solve the following system of equations graphically: $2x + y = 6$, $2x - y - 2 = 0$. Find the area of the triangle so formed by two lines and x -axis. **For Visually Impaired candidates**: Five years hence, fathers age will be three times the age of son. Five years ago, father was seven times as old as his son. Find their present ages.	

(Section – D)
Section D consists of 4 questions of 5 marks each

32. A train travels at a certain average speed for a distance of 63km and then travels at a distance of 72km at an average speed of 6km/hr more than its original speed. If it takes 3 hours to complete the total journey, what is the original average speed? **5**

33. Prove that 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 sameratio. **5**

Hence in ΔPQR, prove that a line ℓ intersects the sides PQ and PR of a ΔPQR at L and M respectively such that LM II QR. If PL = 5.7cm, PQ=15.2cm and MR=5.5cm, then find the length of PM (in cm)

34.(A) From a solid right circular cone, whose height is 6cm and radius of base is 12cm, a right circular cylindrical cavity of height 3cm and radius 4cm is hollowed out such that bases of cone and cylinder form concentric circles. Find the surface area of the remaining solid in terms of π. **5**

OR

(B) An empty cone of radius 3cm and height 12cm is filled with ice-cream such that the lower part of the cone which is $(\frac{1}{6})^{th}$ of the volume of the cone is unfilled (empty) but a hemisphere is formed on the top. Find the volume of the ice-cream.

35.(A) If the mode of the following distribution is 55, then find the value of x. Hence, find the mean. **5**

Class Interval	$0-15$	$15-30$	$30-45$	$45-60$	$60-75$	$75-90$
Frequency	10	7	x	15	10	12

OR

(B) A survey regarding heights (in cm) of 51 girls of class X of a school was conducted and the following data was obtained:

Heights (in cm)	Number of girls
less than 140	04
less than 145	11
less than 150	29
less than 155	40
less than 160	46
less than 165	51

Find the median height of girls. If mode of the above distribution is 148.05, find the mean using empirical formula.

(Section – E)
Section E consists of 3 case study-based questions of 4 marks each.

36. In a class, the teacher asks every student to write an example of A.P. Two boys Aryan and Roshan writes the progression as $-5, -2, 1, 4, \ldots\ldots$ and 187, 184, 181, …. respectively. Now the teacher asks his various students the following questions on progression.

Help the students to find answers for the following:

i. Find the sum of the common difference of two progressions. **1**

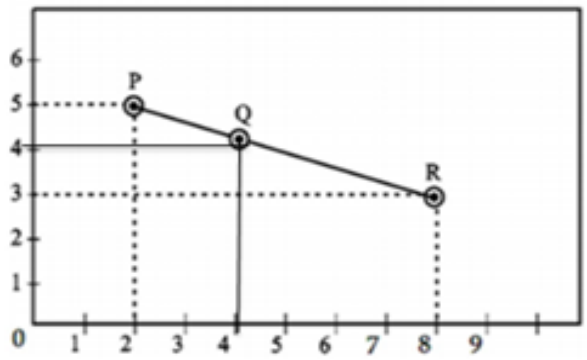
ii. Find the 34th term of progression written by Roshan. **1**

iii. (A) Find the sum of first 10 terms of the progression written by Aryan. **2**

OR

(B) Which term of the progressions will have the same value? **2**

37. A group of class X students goes to picnic during winter holidays. The position of three friends Aman, Kirti and Chahat are shown by the points P, Q and R



(i) Find the distance between P and R. **1**

(ii) Is Q, the midpoint of PR? Justify by finding midpoint of PR. **1**

(iii) (A) Find the point on x-axis which is equidistant from P and Q. **2**

OR

(B) Let S be a point which divides the line joining PQ in ratio 2:3. Find the coordinates of S. **2**

For Visually Impaired Candidates:

A group of class X students goes to picnic during winter holidays. Aman, Kirti and Chahat are three friends. The position of three friends Aman, Kirti and Chahat are shown by the points P, Q and R.
The co-ordinates of P (2,5), Q (4,4) and R (8,3) are given.

(i) Find the distance between P and R. **1**

(ii) Is Q the midpoint of PR? Justify by finding midpoint of PR. **1**

(iii) (A) Find the point on x-axis which is equidistant from P and Q. **2**

OR

(B) Let S be a point which divides the line joining PQ in ratio 2:3. Find the coordinates of S. **2**

38.	India gate (formerly known as All India war memorial) is located near Karthavya path. (formerly Rajpath) at New Delhi. It stands as a memorial to 74187 soldiers of Indian Army, who gave their life in the first world war. This 42m tall structure was designed by Sir Edwin Lutyens in the style of Roman triumphal arches. A student Shreya of height 1 m visited India Gate as a part of her study tour. 	
	i. What is the angle of elevation from Shreya's eye to the top of India Gate, if she is standing at a distance of 41m away from the India Gate?	**1**
	ii. If Shreya observes the angle of elevation from her eye to the top of India Gate to be 60°, then how far is the she standing from the base of the India Gate?	**1**
	iii. (A) If the angle of elevation from Shreya's eye changes from 45° to 30°, when she moves some distance back from the original position. Find the distance she moves back.	**2**
	OR	
	(B) If Shreya moves to a point which is at a distance of $\frac{41}{\sqrt{3}}$m **from** the India Gate, then find the angle of elevation made by her eye to the top of India Gate.	**2**

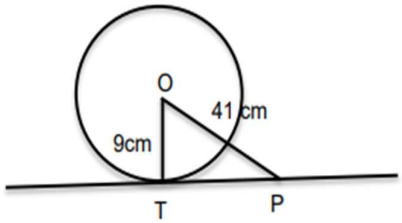
***Please note that the assessment scheme of the Academic Session 2024-25 will continue in the current session i.e. 2025-26**

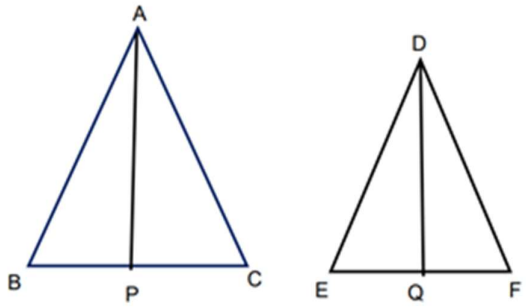
MATHEMATICS STANDARD – Code No.041
MARKING SCHEME
CLASS – X (2025-26)

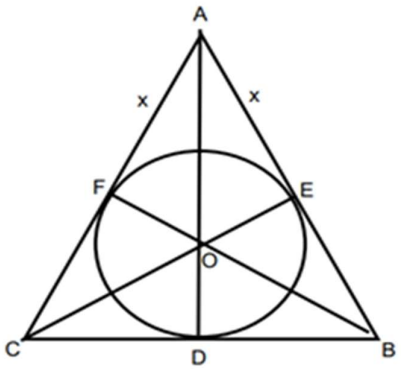
Maximum Marks: 80 **Time: 3 hours**

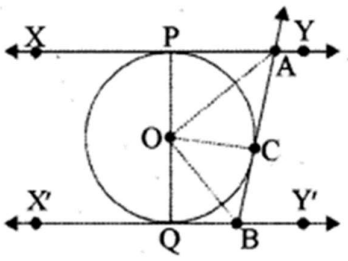
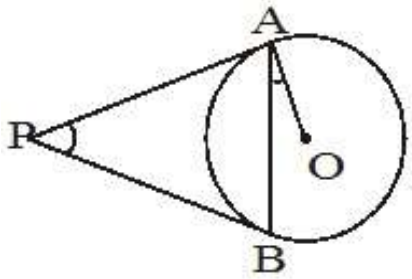
Q.No.	Section A	Marks
1.	(C) 3 LCM$(a, b, c) = 2^2 \times 3^x \times 5 \times 7 = 3780$ $140 \times 3^x = 3780$ $3^x = 27 = 3^3$ $x = 3$	**1**
2.	(A) 2 As shortest distance from (2, 3) to y-axis is the x coordinate, i.e., 2.	**1**
3.	(B) k$\neq\frac{15}{4}$ $\frac{3}{2}\neq\frac{2k}{5}$, hence k$\neq\frac{15}{4}$	**1**
4.	(C) 6cm AB+CD=AD+BC AB+4=3+7 AB=6cm	**1**
5.	(D) $\frac{1}{x}$ $\frac{1}{sec\theta+tan\theta} = \frac{(sec\theta-tan\theta)}{(sec\theta+tan\theta)(sec\theta-tan\theta)} = \frac{(sec\theta-tan\theta)}{1}$ = secϴ-tanϴ	**1**
6.	(D) $(x+2)(x+1) = x^2+2x+3$, so, $x^2+3x+2 = x^2+2x+3$ gives $x-1=0$ It's not a quadratic equation.	**1**
7.	D) 8[$\frac{\pi}{6}$ - $\frac{\sqrt{3}}{4}$] cm^2  Required Area=8 × area of one segment (with r = 1cm and $\theta = 60^\circ$) =8x ($\frac{60^\circ}{360^\circ}$ x π x $1^2 - \frac{\sqrt{3}}{4}$ x 1^2) = 8[$\frac{\pi}{6} - \frac{\sqrt{3}}{4}$] cm^2	**1**

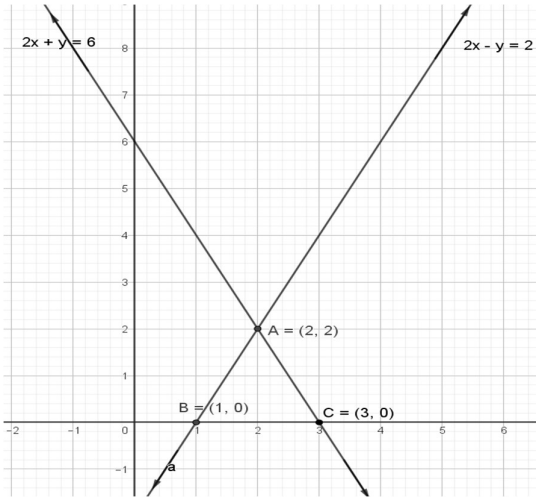
	For Visually Impaired candidates: (D) 9πcm^2 area of circle=$\pi(3^2)$ $=9\,\pi$ cm^2	
8.	(B) $\frac{31}{36}$ Probability of getting sum 8 is $\frac{5}{36}$ Probability of not getting sum 8 is $\frac{31}{36}$	**1**
9.	(B) $12°$ $\sin 5x = \frac{\sqrt{3}}{2}$ So, $5x = 60°$ And hence $x = 12°$	**1**
10.	(C) 4 Since HCF=81, the numbers can be $81x$ and $81y$ $81x + 81y = 1215$ $x + y = 15$ which gives four pairs as (1,14), (2,13), (4,11), (7,8)	**1**
11.	(D) 5cm $\pi r^2 = 51$ $V=\frac{1}{3} \times \pi r^2 \times h$ $85 = \frac{1}{3} \times 51 \times h$ $h= \frac{85}{17} = 5cm$	**1**
12.	(D) As for equal roots to the corresponding equation, $b^2 = 4ac$ Hence $ac = \frac{b^2}{4}$ And hence $ac > 0 \Rightarrow$ c and a must have same signs	**1**
13.	(C) 231 Area of sector $= \frac{1}{2} \times l \times r$ $= \frac{1}{2} \times 22 \times 21 = 231$cm^2	**1**

14.	(C) 18cm $\Delta ABC \sim \Delta DEF$ $\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF} = \frac{Perimeter\ of\ \Delta ABC}{Perimeter\ of\ \Delta DEF}$ $\frac{6}{9} = \frac{Perimeter\ of\ \Delta ABC}{27}$ Perimeter of Δ ABC= 18cm	**1**
15.	(B) $\frac{9}{4}$ Probability of getting vowels in the word Mathematics is $\frac{4}{11}$, So, $\frac{2}{2x+1} = \frac{4}{11}$ $\Rightarrow x = \frac{9}{4}$	**1**
16.	(C) Parallelogram By visualising the figure by plotting points in co-ordinate plane it can be concluded it is a Parallelogram.	**1**
17.	(A) median is increased by 2	**1**
18.	(A) 40cm  Since, tangent is perpendicular to the radius at the point of contact In ΔOPT, right angled at T $OP^2=OT^2+TP^2$ $41^2=9^2+TP^2$ TP^2= 1681-81=1600 TP=40cm	**1**
19.	(A) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)	**1**
20.	(A) $\cos A+\cos^2 A=1$ ---------(i) gives $\cos A= \sin^2 A$------(ii) (using $\sin^2 A+ \cos^2 A=1$) Substituting value of cos A from (ii) in (i) $\sin^2 A +\sin^4 A=1$ $\therefore$ Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)	**1**

	(Section – B)	
21. **(A)**	n =60, a =8 and d=2 t_{60}= 8 + 59(2) =126 t_{51}= 108 Hence t_{51} + t_{52}+……..+ t_{60}= $\frac{10}{2}$(108 +126) =1170	½ ½ 1
	OR	
(B)	230 = 6 + (n -1)7 gives n=33 ∴ Middle Term = t_{17}= 6 + (16)(7) = 118	1 1
22.	A+B = 90° and A – B= 30° A=60° and B =30°	1 1
23.	 △ABC~△DEF ⇒$\frac{AB}{DE}$ =$\frac{BC}{EF}$ $\frac{AB}{DE}$ =$\frac{2B}{2EQ}$ (AP and DQ are the medians) $\frac{AB}{DE}$ =$\frac{BP}{EQ}$ In △ABP and △DEQ $\frac{AB}{DE}$ =$\frac{BP}{EQ}$ ∠B=∠E (△ABC~△DEF) ⇒△ABP ~△DEQ Hence, $\frac{AB}{DE}$ = $\frac{AP}{DQ}$	½ ½ ½ ½
24.(A)	area of grass field that can be grazed by them =$\frac{\theta_1}{360°} \times \pi r^2 + \frac{\theta_2}{360°} \times \pi r^2 + \frac{\theta_3}{360°} x \pi r^2$ =$\frac{\pi r^2}{360°}$ (θ_1 + θ_2 + θ_3) =$\frac{\pi r^2}{360°} \times 180°$ = $\frac{22}{7} \times \frac{14\ X\ 14}{2}$ =308 m^2	1 1

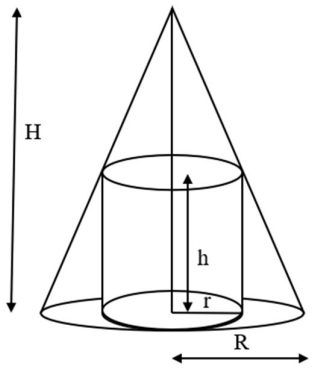
	OR	
(B)	Area of minor segment= Area of sector − area of triangle $=\frac{90°}{360°}\pi\ r^2-\frac{1}{2}\times r^2$ $=(\frac{25}{4}\pi-\frac{25}{2})\ cm^2$ Area of major segment = Area of circle – Area of minor segment $=\pi\ 5^2-(\frac{25}{4}\pi-\frac{25}{2})$ $=25\pi-\frac{25}{4}\pi+\frac{25}{2}$ $=(\frac{75}{4}\pi+\frac{25}{2})\ cm^2$	**1** **1**
25.	 Let r be the radius of the inscribed circle BD=BE=10cm CD=CF=8cm Let AF=AE= x ar(△ABC) =ar(△AOC) + ar(△BOC) + ar(△AOB) $=\frac{1}{2}\times$ r x AC + $\frac{1}{2}\times$ r × BC +$\frac{1}{2}\times$ r × AB 90 = $\frac{1}{2}\times 4\ (x+8+18+x+10)$ x = 4.5cm ∴ AB=4.5+10=14.5cm AC=4.5+8=12.5cm **For Visually Impaired candidates:** $AC^2=AB^2+BC^2=24^2+7^2=625$ AC=25cm Area of ∆ABC=$\frac{1}{2}\times 7\times 24=84cm^2$ -----(i) Let r=radius of circle Also, Area of ∆ABC=$\frac{1}{2}$ (24r+25r+7r) $=\frac{1}{2}\times 56$ r -------(ii) From (i) and (ii), we get r=3cm	½ ½ ½ ½ ½ ½

	(Section – C)	
26.	 In ∆APO and ∆ACO AP=AC (Tangents from External Point) AO=AO (common) OP=OC (radii) ∆APO ≅ ∆ACO ∠POQ=180˚ (PQ is the diameter) ∠POA+∠COA+∠QOB+∠COB=180˚ 2∠COA+2∠COB=180˚ ∠ AOB = 90° **For Visually Impaired candidates:**  PA=PB (Tangents from external point to a circle) ∠PAB=∠PBA= x (angles opposite to equal sides) In ∆PAB, ∠PAB+∠PBA+∠APB=180° $x + x$ +∠APB=180° ∠APB=180°−2 x ------(i) Also, ∠PAB+∠OAB=90° (radius is perpendicular to the tangent at the point of contact) x +∠OAB=90° x =90°−∠OAB --------(ii) Substituting (ii) in (i), we get ∠APB=180°-2(90°− ∠OAB) ∠APB=2∠OAB	**1** **1** **1** **½** **1** **1** **½**
27.	HCF (36,60,84) =12 Required number of rooms= $\frac{36}{12}+\frac{60}{12}+\frac{84}{12}$ =3+5+7 =15	**1 ½** **1** **½**
28.	$2x^2-(1+2\sqrt{2})x+\sqrt{2}$ $= 2x^2-x-2\sqrt{2}x+\sqrt{2}$ $= (2x-1)(x-\sqrt{2})$ Hence the zeroes are $\frac{1}{2}$ and $\sqrt{2}$. Now $\frac{-b}{a} = \frac{2\sqrt{2}+1}{2} = \sqrt{2}+\frac{1}{2}$ and $\frac{c}{a} = \frac{\sqrt{2}}{2} = \frac{1}{2}\times\sqrt{2}$	**1** **1** **1**

29.	$sin\theta + cos\theta = \sqrt{3}$ gives $(sin\theta + cos\theta)^2 = 3.$ Hence $1 + 2sin\theta cos\theta = 3$ So $2sin\theta cos\theta = 2$ $\Rightarrow sin\theta\ cos\theta = 1$ $\therefore tan\ \theta + cot\theta = \frac{1}{sin\theta cos\theta}$ =1 **OR** $\frac{cosA-sinA+}{cosA+sinA-} = \frac{(cosA-sinA+\ )(cosA+sinA+1)}{(cosA+sinA-1)(cosA+sinA+\ )}$ $= \frac{cos^2A+2cosA+1-sin^2A}{2sinAcosA}$ $= \frac{2cosA(1+cosA)}{2sinAcosA} = \frac{1+cosA}{sinA} = cosecA + cotA$	**1** **1** **1** **1** **1** **1**
30.	P(Vidhi drives the car) = $\frac{3}{8}$ as favourable outcomes are HHT,THH,HHH P(Unnati drives the car) = $\frac{4}{8}$ as favourable outcomes are THT,THH,HTH,TTH As $\frac{4}{8} > \frac{3}{8}$ Unnati has greater probability to drive the car	**1** **1** **1**
31.	Let the income of Aryan and Babban be $3x$ and $4x$ respectively And let their expenditure be $5y$ and $7y$ respectively. Since each saves ₹ 15,000, we get $3x - 5y = 15000$ $4x - 7y = 15000$ Hence $x = 30000$ Their income thus become ₹90,000 and ₹1,20,000 respectively. **OR**  	**1** **1** **1** **2 for correct Graph**

	Hence, the solution is $x = 2, y = 2$ Area= 2 sq. units **For Visually Impaired candidates** Let the present age of father be x and son be y So, $(x + 5) = 3(y + 5) \Rightarrow x - 3y = 10$ $x - 5 = 7(y - 5) \Rightarrow x - 7y = -30$ So, $x = 40, y = 10$. Hence the present ages of father and son are 40 years and 10 years Respectively	½ ½ 1 1 1
	Section D	
32.	Let the original speed of train be x km/hr Distance =63km, time(t_1) =$\frac{63}{x}$ hrs Faster speed = (x +6) km/hr time (t_2)=$\frac{72}{x+6}$ hrs Now $t_1 + t_2 = 3$ hrs So $\frac{63}{x} + \frac{72}{x+6} = 3$ $63(x + 6) + 72x = 3(x + 6)x$ $135x + 378 = 3x^2 + 18x$ $3x^2 - 117x - 378 = 0$ $x^2 - 39x - 126 = 0$ $x^2 - 42x + 3x - 126 = 0$ gives $(x + 3)(x - 42) = 0$ As x can't be negative, so $x = 42$ km/hr The original speed of train=42 km/hr	 1 1 1 1 1
33.	Correct given, figure and construction Correct Proof since LM is parallel to QR Let PM= x $\frac{PL}{PQ} = \frac{PM}{PR}$ $\frac{5.7}{15.2} = \frac{x}{x+5.5}$ x =PM=3.3cm	2 2 ½ ½

34. (A)



Slant height of the cone $L = \sqrt{R^2 + H^2} = \sqrt{12^2 + 6^2}$
$= 3\sqrt{20}\ cm$ ½

Curved Surface area of cone$= \pi RL = \pi \times 12 \times 3\sqrt{20}$
$= (36\sqrt{20})\ \pi\ cm^2$ 1

Area of base circle of cone (= area of outer circle – area of inner circle + top circular area of cylinder)
$= \pi R^2 = \pi \times (12)^2$
$= 144\pi\ cm^2$ 1

Curved Surface area of cylinder$= 2\pi rh = 2\pi \times 4 \times 3$
$= 24\ \pi\ cm^2$ 1

Surface area of the remaining solid= Curved surface of cone
+ area of base circle of cone
+ curved surface area of cylinder 1
$= \left(36\sqrt{20}\right)\pi + 144\pi + 24\pi$
$= \left(168 + 36\sqrt{20}\right)\pi\ cm^2$ ½

OR

(B) Volume of cone=$\frac{1}{3}\pi r^2 h = \frac{1}{3}\pi \times 3 \times 3 \times 12 = 36\pi cm^3$

Volume of ice-cream in the cone=$\frac{5}{6} \times 36\pi cm^3 = 30\pi\ cm^3$ 2

Volume of ice-cream in the hemispherical part= $\frac{2}{3}\pi r^3 = \frac{2}{3}\pi \times 3 \times 3 \times 3 = 18\pi\ cm^3$ 1+½

Total volume of the ice-cream = $(30\pi + 18\pi) = 48\ \pi = 150.86 cm^3$ (approx.) 1+½

35. (A) Mode of the frequency distribution = 55

Modal class is 45-60. Lower limit is 45 Class Interval (h) =15 ½

Now, Mode = $l + \left(\frac{f_1 - f_0}{2f_0 - f_1 - f_2}\right) \times h$

$55 = 45 + \frac{15 - x}{30 - x -} \times 5$ 1

So, $x = 5$ 1

CI	f_i	x_i	$f_i x_i$
0-15	10	7.5	75
15-30	7	22.5	157.5
30-45	5	37.5	187.5
45-60	15	52.5	787.5
60-75	10	67.5	675
75-90	12	82.5	990
	59		2872.5

1 ½

Mean= $\bar{x} = \frac{2872.5}{59} = 48.68$ 1

OR

(B)

Height (in cm)	Number of girls	Class Interval	frequency
less than 140	04	135-140	4
less than 145	11	140-145	7
less than 150	29	145-150	18
less than 155	40	150-155	11
less than 160	46	155-160	6
less than 165	51	160-165	5

1

Median = l +($\frac{\frac{N}{2}-Cf}{f}$) x h **1**

=145 + ($\frac{\frac{51}{2}-11}{18}$)×5 **1**

=149.03

Median height = 149.03cm **1**

3×Median= Mode +2× Mean **1**

3×149.03=148.05+2× Mean

Mean=149.52

Section E

36.

(i) Common difference of first progression= 3

Common difference of first progression= -3

Sum of common difference=0. **1**

(ii) t_{34} = 187 +(34-1) (-3)

So, t_{34} =88 **1**

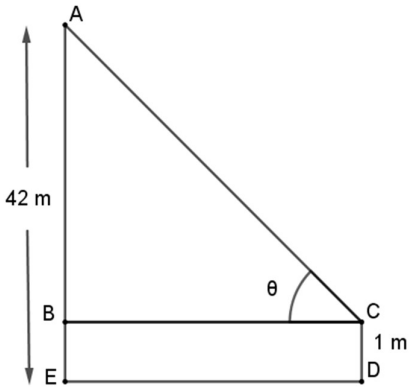
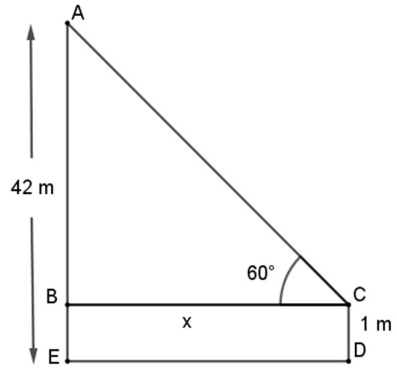
(iii) (A) Sum $= \frac{10}{2}[2(-5) + (10-1)(3)]$ **1**

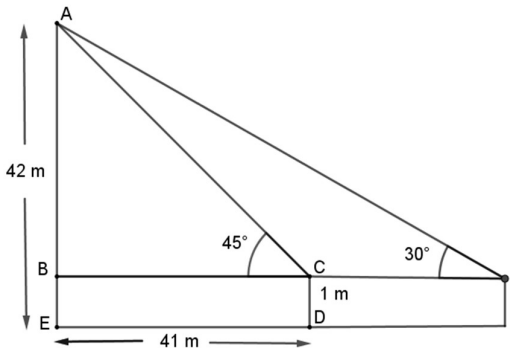
$= 85$ **1**

OR

(B) -5 +(n-1)3 = 187 +(n-1) (-3) **1**

n = 33 **1**

37.	(i) PR= $\sqrt{(8-2)^2+(3-5)^2}$ = $2\sqrt{10}$	**1**
	(ii) Co-ordinates of Q (4,4). The mid-point of PR is (5,4) ∴Q is not the mid-point of PR	½ ½
	(iii) (A) Let the point be $(x,0)$ So, $\sqrt{(2-x)^2+25}$ = $\sqrt{(4-x)^2+16}$ Hence $x = \frac{3}{4}$.Therefore the point is $(\frac{3}{4},0)$. **OR** (B) The coordinates of S will be $\left(\frac{2\times4+3\times2}{2+3},\frac{2\times4+3\times5}{2+3}\right)$ $= \left(\frac{14}{5},\frac{23}{5}\right)$	**1** **1** **1** **1**
38.	 (i) Distance from India gate = 41m, Height of monument = 42m, Shreya's height =1m So, $\tan\theta$=$\frac{41}{41}$ =1 Angle of elevation $= \theta = 45^o$.	½ ½
	 (ii) Angle of elevation =60° Perpendicular = 41m Let the distance from the India Gate be x m Hence tan 60°= $\frac{41}{x}$ $\Rightarrow x = \frac{41}{\sqrt{3}}$ ∴ Shreya is standing at a distance of $\frac{41\sqrt{3}}{3}$ m	½ ½



(iii) (A)

Distance from the India Gate $= 41$ m

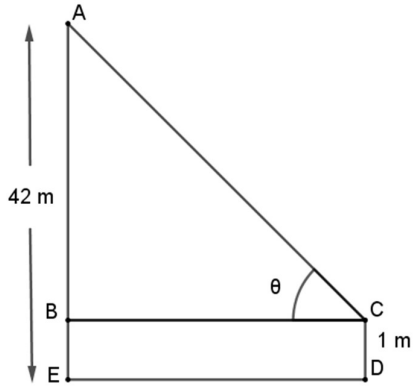
Let the distance moved back be x m

Then, $\tan 30^o = \frac{41}{41+x}$ **1**

$x = (41\sqrt{3} - 41)$ m $= 41(\sqrt{3}\text{-}1)$ m **1**

∴ The distance moved back = $41(\sqrt{3}\text{-}1)$ m

OR



(B) Let the angle of elevation of be θ

Now, $\tan\theta = \frac{41}{\frac{41}{\sqrt{3}}} = \sqrt{3}$ **1**

This gives $\theta = 60^o$ **1**

SAMPLE QUESTION PAPER
Class X Session 2024-25
MATHEMATICS STANDARD (Code No.041)

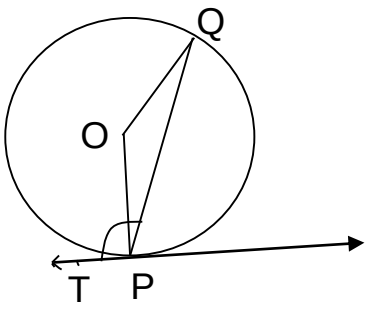
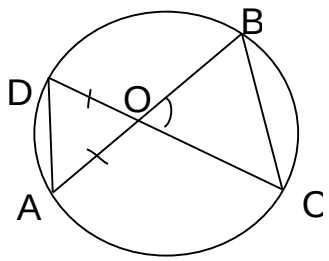
TIME: 3 hours MAX.MARKS: 80

General Instructions:

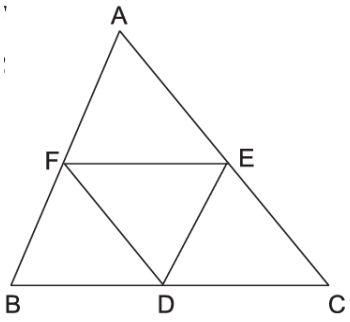
Read the following instructions carefully and follow them:

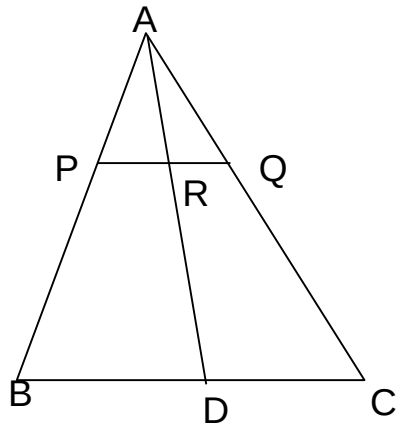
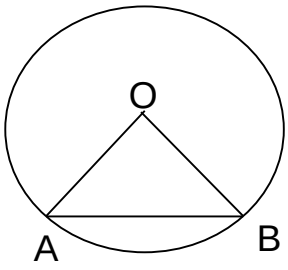
1. This question paper contains 38 questions.
2. This Question Paper is divided into 5 Sections A, B, C, D and E.
3. In Section A, Questions no. 1-18 are multiple choice questions (MCQs) and questions no. 19 and 20 are Assertion- Reason based questions of 1 mark each.
4. In Section B, Questions no. 21-25 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 Question 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.
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.	The graph of a quadratic polynomial p(x) passes through the points (-6,0), (0, -30), (4,-20) and (6,0). The zeroes of the polynomial are A) - 6,0 B) 4, 6 C) - 30,-20 D) - 6,6	1
2.	The value of k for which the system of equations 3x-ky= 7 and 6x+ 10y =3 is inconsistent, is A) -10 B) -5 C) 5 D) 7	1
3.	Which of the following statements is **not** true? A) A number of secants can be drawn at any point on the circle. B) Only one tangent can be drawn at any point on a circle. C) A chord is a line segment joining two points on the circle D) From a point inside a circle only two tangents can be drawn.	1
4.	If nth term of an A.P. is 7n-4 then the common difference of the A.P. is A) 7 B) 7n C) - 4 D) 4	1

5.	The radius of the base of a right circular cone and the radius of a sphere are each 5 cm in length. If the volume of the cone is equal to the volume of the sphere then the height of the cone is A) 5 cm B) 20 cm C) 10 cm D) 4 cm	1
6.	If $\tan\theta = \frac{5}{2}$ then $\frac{4\sin\theta + \cos\theta}{4\sin\theta - \cos\theta}$ is equal to A) $\frac{11}{9}$ B) $\frac{3}{2}$ C) $\frac{9}{11}$ D) 4	1
7.	In the given figure, a tangent has been drawn at a point P on the circle centred at O.  If $\angle$ TPQ= 110° then $\angle$POQ is equal to A) 110° B) 70° C) 140° D)55°	1
8.	A quadratic polynomial having zeroes - $\sqrt{\frac{5}{2}}$ and $\sqrt{\frac{5}{2}}$ is A) $x^2 - 5\sqrt{2}$ x +1 B) $8x^2$ - 20 C) $15x^2$- 6 D) x^2 - $2\sqrt{5}$ x -1	1
9.	Consider the frequency distribution of 45 observations. <table><tr><td>Class</td><td>0-10</td><td>10-20</td><td>20-30</td><td>30-40</td><td>40-50</td></tr><tr><td>Frequency</td><td>5</td><td>9</td><td>15</td><td>10</td><td>6</td></tr></table> The upper limit of median class is A) 20 B) 10 C) 30 D) 40	1
10.	O is the point of intersection of two chords AB and CD of a circle.  If $\angle BOC = 80^O$ and OA = OD then ΔODA and ΔOBC are A) equilateral and similar B) isosceles and similar C) isosceles but not similar D) not similar	1

11.	The roots of the quadratic equation x^2+x-1 = 0 are A) Irrational and distinct B) not real C) rational and distinct D) real and equal	1
12.	If $\theta = 30^o$ then the value of 3tanθ is A)1 B) $\frac{1}{\sqrt{3}}$ C) $\frac{3}{\sqrt{3}}$ (D) not defined	1
13.	The volume of a solid hemisphere is $\frac{396}{7}\ cm^3$.The total surface area of the solid hemisphere (in sq.cm) is A) $\frac{396}{7}$ B) $\frac{594}{7}$ C) $\frac{549}{7}$ D) $\frac{604}{7}$	1
14.	In a bag containing 24 balls, 4 are blue, 11 are green and the rest are white. One ball is drawn at random. The probability that drawn ball is white in colour is $A)\frac{1}{6}$ B) $\frac{3}{8}$ C) $\frac{11}{24}$ D) $\frac{5}{8}$	1
15.	The point on the x- axis nearest to the point (-4,-5) is A) (0, 0) B) (-4, 0) C) (-5, 0) D) ($\sqrt{41}$, 0)	1
16.	Which of the following gives the middle most observation of the data? A) Median B) Mean C) Range D) Mode	1
17.	A point on the x-axis divides the line segment joining the points A(2, -3) and B(5, 6) in the ratio 1:2. The point is A) (4, 0) B) $(\frac{7}{2}, \frac{3}{2})$ C) (3, 0) D) (0,3)	1
18.	A card is drawn from a well shuffled deck of playing cards. The probability of getting red face card is $A)\ \frac{3}{13}$ B) $\frac{1}{2}$ C) $\frac{3}{52}$ D) $\frac{3}{26}$	1
	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): HCF of any two consecutive even natural numbers is always 2. Reason (R): Even natural numbers are divisible by 2.	1
20.	Assertion (A): If the radius of sector of a circle is reduced to its half and angle is doubled then the perimeter of the sector remains the same.	1

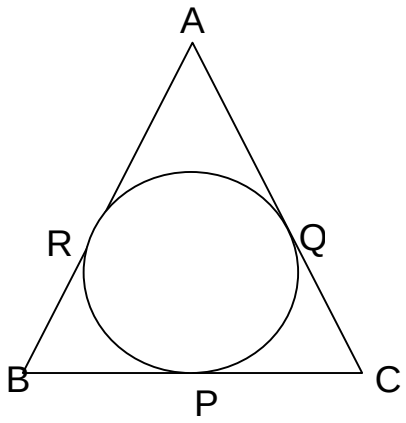
	Reason (R): The length of the arc subtending angle θ at the centre of a circle of radius r = $\frac{\Pi r\theta}{180}$.	
	Section B	
	Section B consists of 5 questions of 2 marks each.	
21.	(A)Find the H.C.F and L.C.M of 480 and 720 using the Prime factorisation method. **OR** (A) The H.C.F of 85 and 238 is expressible in the form 85m -238. Find the value of m.	2
22.	(A) Two dice are rolled together bearing numbers 4, 6, 7, 9, 11, 12. Find the probability that the product of numbers obtained is an odd number **OR** (B) How many positive three digit integers have the hundredths digit 8 and unit's digit 5? Find the probability of selecting one such number out of all three digit numbers.	2
23.	Evaluate: $\frac{2sin^2 60^o - tan^2 30^o}{sec^2 45^o}$	2
24.	Find the point(s) on the x-axis which is at a distance of $\sqrt{41}$ units from the point (8, -5).	2
25.	Show that the points A(-5,6), B(3, 0) and C(9, 8) are the vertices of an isosceles triangle.	2
	Section C	
	Section C consists of 6 questions of 3 marks each.	
26.	(A) In ΔABC, D, E and F are midpoints of BC,CA and AB respectively. Prove that $\triangle FBD \sim \triangle$ DEF and $\triangle$ DEF $\sim \triangle$ ABC  **OR** (B) In ΔABC, P and Q are points on AB and AC respectively such that PQ is parallel to BC.	3

	Prove that the median AD drawn from A on BC bisects PQ.  	
27.	The sum of two numbers is 18 and the sum of their reciprocals is 9/40. Find the numbers.	3
28.	If α and β are zeroes of a polynomial $6x^2$ -5x+1 then form a quadratic polynomial whose zeroes are α^2 and β^2.	3
29.	If cosθ + sinθ = 1 , then prove that cosθ - sinθ = ±1	3
30.	(A) The minute hand of a wall clock is 18 cm long. Find the area of the face of the clock described by the minute hand in 35 minutes. **OR** (B) AB is a chord of a circle centred at O such that ∠AOB=60˚. If OA = 14 cm then find the area of the minor segment. (take $\sqrt{3}$ =1.73)  	3
31.	Prove that $\sqrt{3}$ is an irrational number.	3
	Section D	
	Section D consists of 4 questions of 5 marks each	
32.	(A) Solve the following system of linear equations graphically: x+2y = 3, 2x-3y+8 = 0 **OR** (B) Places A and B are 180 km apart on a highway. One car starts from A and another from B at the same time. If the car travels in the same direction at	5

different speeds, they meet in 9 hours. If they travel towards each other with the same speeds as before, they meet in an hour. What are the speeds of the two cars?

33. Prove that the lengths of tangents drawn from an external point to a circle are equal. 5

Using above result, find the length BC of ΔABC. Given that, a circle is inscribed in ΔABC touching the sides AB, BC and CA at R, P and Q respectively and AB= 10 cm, AQ= 7cm ,CQ= 5cm.



34. A boy whose eye level is 1.35 m from the ground, spots a balloon moving with the wind in a horizontal line at some height from the ground. The angle of elevation of the balloon from the eyes of the boy at an instant is 60°. After 12 seconds, the angle of elevation reduces to 30°. If the speed of the wind is 3m/s then find the height of the balloon from the ground. (Use $\sqrt{3}$= 1.73) 5

35. Find the mean and median of the following data: 5

Class	85-90	90-95	95-100	100-105	105-110	110-115
frequency	15	22	20	18	20	25

OR

The monthly expenditure on milk in 200 families of a Housing Society is given below

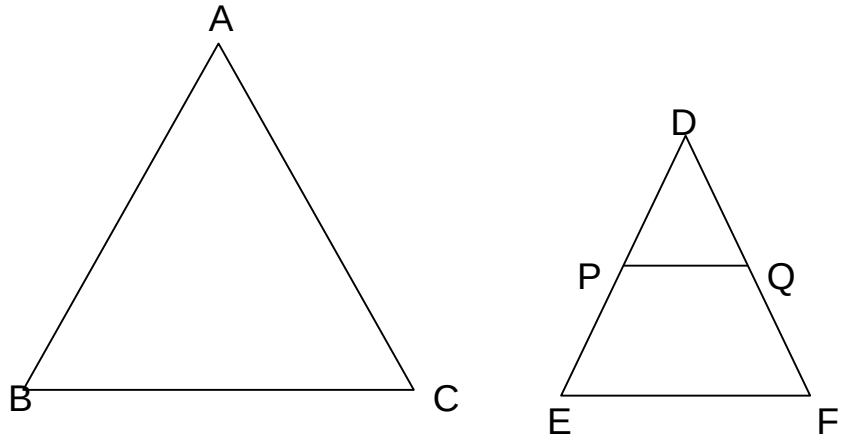
Monthly Expenditure (in Rs.)	1000-1500	1500-2000	2000-2500	2500-3000	3000-3500	3500-4000	4000-4500	4500-5000
Number of families	24	40	33	x	30	22	16	7

Find the value of x and also find the mean expenditure

Section E

Section E consists of 3 case study based questions of 4 marks each.

36. Ms. Sheela visited a store near her house and found that the glass jars are arranged one above the other in a specific pattern.

	On the top layer there are 3 jars. In the next layer there are 6 jars. In the 3rd layer from the top there are 9 jars and so on till the 8th layer. On the basis of the above situation answer the following questions. (i) Write an A.P whose terms represent the number of jars in different layers starting from top . Also, find the common difference. (ii) Is it possible to arrange 34 jars in a layer if this pattern is continued? Justify your answer. (iii) (A) If there are 'n' number of rows in a layer then find the expression for finding the total number of jars in terms of n. Hence find S_8 . **OR** (iii) (B) The shopkeeper added 3 jars in each layer. How many jars are there in the 5th layer from the top? .	1 1 2 2
37.	  Triangle is a very popular shape used in interior designing. The picture given above shows a cabinet designed by a famous interior designer. Here the largest triangle is represented by △ ABC and smallest one with shelf is represented by △ DEF. PQ is parallel to EF. (i) Show that △ DPQ ~ △ DEF.	1

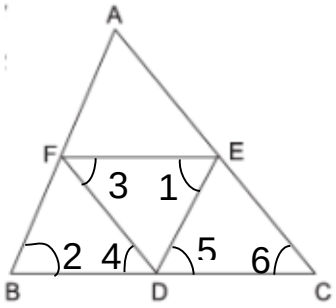
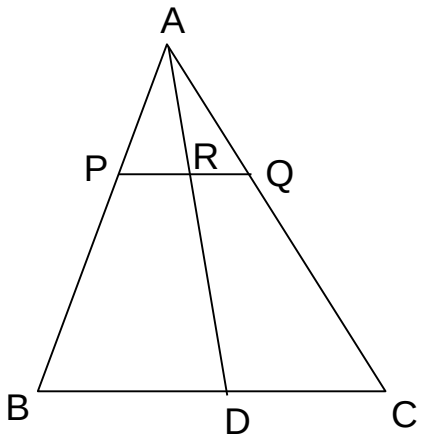
	(ii) If DP= 50 cm and PE = 70 cm then find $\frac{PQ}{EF}$.	1
	(iii) (A) If 2AB = 5DE and △ ABC ~ △ DEF then show that $\frac{perimeter\ of\ \triangle ABC}{perimeter\ of\ \triangle DEF}$ is constant. **OR** (iii) (B) If AM and DN are medians of triangles ABC and DEF respectively then prove that △ ABM ~ △ DEN.	2 2
38.	Metallic silos are used by farmers for storing grains. Farmer Girdhar has decided to build a new metallic silo to store his harvested grains. It is in the shape of a cylinder mounted by a cone. Dimensions of the conical part of a silo is as follows: Radius of base = 1.5 m Height = 2 m Dimensions of the cylindrical part of a silo is as follows: Radius = 1.5 m Height = 7 m On the basis of the above information answer the following questions. (i) Calculate the slant height of the conical part of one silo. (ii) Find the curved surface area of the conical part of one silo. (iii)(A) Find the cost of metal sheet used to make the curved cylindrical part of 1 silo at the rate of ₹2000 per m^2. **OR** (iii) (B) Find the total capacity of one silo to store grains.	1 1 2 2

Marking Scheme
Class X Session 2024-25
MATHEMATICS STANDARD (Code No.041)

TIME: 3 hours MAX.MARKS: 80

Q.No.	Section A	Marks
1.	D) -6,6	1
2.	B) -5	1
3.	D) From a point inside a circle only two tangents can be drawn.	1
4.	A) 7	1
5.	B) 20 cm	1
6.	A) $\frac{11}{9}$	1
7.	C) 140°	1
8.	B) $8x^2$- 20	1
9.	C) 30	1
10.	B) isosceles and similar	1
11.	A) Irrational and distinct	1
12.	C) $\frac{3}{\sqrt{3}}$	1
13.	B) $\frac{594}{7}$	1
14.	B) $\frac{3}{8}$	1
15.	B) (-4, 0)	1
16.	A) median	1
17.	C) (3,0)	1
18.	D) $\frac{3}{26}$	1
19.	B)	1
20.	D)	1

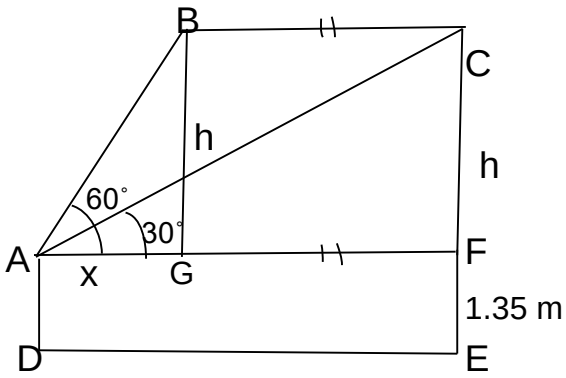
	Section B	
21. (A)	480 = 2^5 x 3 x 5 720 = 2^4 x 3^2 x 5 LCM (480,720) = 2^5 x 3^2x 5 = 1440 HCF (480, 720) = 2^4 x 3x 5 = 240 OR	½ ½ ½ ½
(B)	85 = 5x17, 238 = 2x7x17 HCF(85, 238) = 17 17 = 85xm -238 m = 3	 1 1
22.(A)	Total number of possible outcomes = 6x6=36 For a product to be odd, both the numbers should be odd. Favourable outcomes are (7,7) (7,9) (7,11) (9,7) (9,9) (9, 11) (11,7) (11,9) (11,11) no. of favourable outcomes = 9 P (product is odd) = $\frac{9}{36}$ or $\frac{1}{4}$ OR	½ 1 ½
(B)	Total number of three-digit numbers = 900. Numbers with hundredth digit 8 & and unit's digit 5 are 805,815, 825,....,895 Number of favourable outcomes = 10 P(selecting one such number) = $\frac{10}{900}$ or $\frac{1}{90}$	½ 1 ½
23.	$\frac{2\ (\frac{\sqrt{3}}{2})^2\ -(\frac{1}{\sqrt{3}})^2}{(\sqrt{2})^2}$ $= \frac{7}{12}$	1 ½ ½
24	Let the required point be (x,0) $\sqrt{(8-x)^2\ +\ 25} = \sqrt{41}$ => $(8-x)^2$ = 16 => 8 - x = ±4 => x = 4 , 12 Two points on the x-axis are (4,0) & (12,0).	½ ½ 1

25.	AB = $\sqrt{(3+5)^2 + (0-6)^2}$ = 10 BC = $\sqrt{(9-3)^2 + (8-0)^2}$ = 10 AC = $\sqrt{(9+5)^2 + (8-6)^2}$ = $10\sqrt{2}$ Since AB = BC, therefore Δ ABC is isosceles	½ ½ ½ ½
	Section C	
26.(A)	 Since D, E, F are the mid points of BC, CA, AB respectively Therefore, EF||BC, DF||AC, DE||AB BDEF is a parallelogram $\angle$ 1= $\angle$ 2 & $\angle$ 3 = $\angle$ 4 Δ FBD ~ Δ DEF Also, DCEF is a parallelogram $\angle$ 3= $\angle$ 6 & $\angle$ 1 = $\angle$ 2 (proved above) Δ DEF ~ Δ ABC	1 1 1
	OR	
(B)	 Since PQ//BC therefore Δ APR ~ Δ ABD => $\frac{AP}{AB} = \frac{PR}{BD}$ …….. (i)	1

	Δ AQR ~ Δ ACD => $\frac{AQ}{AC} = \frac{RQ}{DC}$ …….. (ii) Now, $\frac{AP}{AB} = \frac{AQ}{AC}$ …….(iii) Using (i), (ii) & (iii), $\frac{PR}{BD} = \frac{RQ}{DC}$ But, BD = DC => PR = RQ or AD bisects PQ	1 1
27.	Let the numbers be x and 18-x. $\frac{1}{x} + \frac{1}{18-x} = \frac{9}{40}$ => 18×40 = 9x(18-x) => x^2 -18 x + 80=0 => (x-10)(x-8) =0 => x=10, 8. => 18-x =8, 10 Hence two numbers are 8 and 10.	½ 1 1 ½
28.	From given polynomial $\alpha + \beta = \frac{5}{6}$, $\alpha\beta = \frac{1}{6}$ $\alpha^2 + \beta^2 = (\frac{5}{6})^2 - 2 \times \frac{1}{6} = \frac{13}{36}$ And $\alpha^2 \beta^2 = (\frac{1}{6})^2 = \frac{1}{36}$ $x^2 - \frac{13}{36}x + \frac{1}{36}$ ⇨ Required polynomial is $36x^2 - 13x + 1$	1 1 ½ ½
29.	$(cos\theta + sin\theta)^2 + (cos\theta - sin\theta)^2 = 2\,(cos^2\theta + sin^2\theta) = 2$ => $(1)^2 + (cos\theta - sin\theta)^2 = 2$ => $(cos\theta - sin\theta)^2 = 1$ => $cos\theta - sin\theta = \pm 1$	1 ½ 1 ½
30.(A)	Angle described by minute hand in 5 min = 30°. length of minute hand =18 cm = r. Area swept by minute hand in 35 minutes =($\frac{22}{7}$x18x18×$\frac{30}{360}$) x 7 = 594 cm^2. OR	2 1
(B)	Area of minor segment = Ar. Sector OAB- Ar. Δ OAB =$\frac{60}{360}$x $\frac{22}{7}$ × 14x14 - $\frac{\sqrt{3}}{4}$ x 14x14 = 17.89 cm^2	2 1

31.	Let √3 be a rational number. ∴ √3 = $\frac{p}{q}$, where q≠0 and let p & q be co-prime. $3q^2 = p^2 \Longrightarrow p^2$ is divisible by 3 ⟹ p is divisible by 3 ----- (i) ⟹ p = 3a, where 'a' is some integer $9a^2 = 3q^2 \Longrightarrow q^2 = 3a^2 \Longrightarrow q^2$ is divisible by 3 ⟹ q is divisible by 3----- (ii) (i) and (ii) leads to contradiction as 'p' and 'q' are co-prime.	½ 1 1 ½
	Section D	
32.(A)	x+2y=3, 2x-3y+8=0 Correct graph of each equation Solution x=-1 and y=2	2+2 = 4 1
	OR	
(B)	Let car I starts from A with speed x km/hr and car II Starts from B with speed y km/hr (x>y) Case I- when cars are moving in the same direction. Distance covered by car I in 9 hours = 9x. Distance covered by car II in 9 hours = 9y Therefore 9 (x-y) = 180 => x-y= 20 ……. (i) case II- when cars are moving in opposite directions. Distance covered by Car I in 1 hour = x Distance covered by Car II in 1 hour = y Therefore x + y=180 …….. (ii) Solving (i) and (ii) we get, x=100 km/hr, y=80 km/hr.	2 2 1
33.	Correct given, to prove, construction, figure Correct proof AR = AQ = 7cm BP = BR = AB-AR = 3cm CP =CQ = 5cm BC = BP+PC = 3+5 = 8 cm	1 2 ½ ½ ½ ½

34.



Let A be the eye level & B, C are positions of balloon
Distance covered by balloon in 12 sec = 3x12 = 36 m
BC = GF = 36 m

Correct figure 1mark

1

tan 60^0 = $\sqrt{3}$ = $\frac{h}{x}$
=> h = $x\sqrt{3}$ …….. (i)

1

tan 30^0 = $\frac{1}{\sqrt{3}}$ = $\frac{h}{x+36}$
=> h = $\frac{x+36}{\sqrt{3}}$ …….. (ii)

1

Solving (i) and (ii) h= $18\sqrt{3}$ = 31.14 m
Height of balloon from ground = 1.35 + 31.14 = 32.49 m

1

35.

Correct table 2marks

Class	x	f	u=$\frac{x-102.5}{5}$	fu	cf
85-90	87.5	15	-3	-45	15
90-95	92.5	22	-2	-44	37
95-100	97.5	20	-1	-20	57
100-105	102.5	18	0	0	75
105-110	107.5	20	1	20	95
110-115	112.5	25	2	50	120
		Σf = 120		Σfu = -39	

Mean = $\bar{x}$ = 102.5 - 5 x $\frac{39}{120}$
= 100.875

1
½

Median class is 100-105

½

Median = 100 + $\frac{5}{18}$ (60-57) = 100.83

1

OR

Monthly Expenditure	f_i	x_i	f_ix_i
1000-1500	24	1250	30,000
1500-2000	40	1750	70,000
2000-2500	33	2250	74,250
2500-3000	**X=28**	**2750**	**77,000**
3000-3500	30	3250	97,500
3500-4000	22	3750	82,500
4000-4500	16	4250	68,000
4500-5000	7	4750	33,250

Correct table 2marks

172+x=200 — 1

X=28 — 1

Mean= $\frac{532500}{200}$

= 2662.5 — 1

Section E

36.(i) First term a = 3, A.P is 3, 6, 9, 12…..,24 — ½

common difference d = 6-3 = 3 — ½

(ii) 34 = 3+ (n-1)3

=> n = 34/3 = $11\frac{1}{3}$ which is not a positive integer. — ½

Therefore, it is not possible to have 34 jars in a layer if the given pattern is continued. — ½

(iii)(A) $S_n = \frac{n}{2}$ [2x3 + (n-1) 3] — ½

$= \frac{n}{2}$ [6 + 3n-3] — 1

$= \frac{n}{2}$ [3+3n]

$= 3\frac{n}{2}$ [1+n]

$s_8 = 3 \times \frac{8}{2}$ (1+8) — ½

= 108

OR

(iii) (B) A.P will be 6, 9, 12, ….. — ½

a= 6, d=3

t_5 = 6 + (5-1)3 — 1

= 6 + 12

= 18 — ½

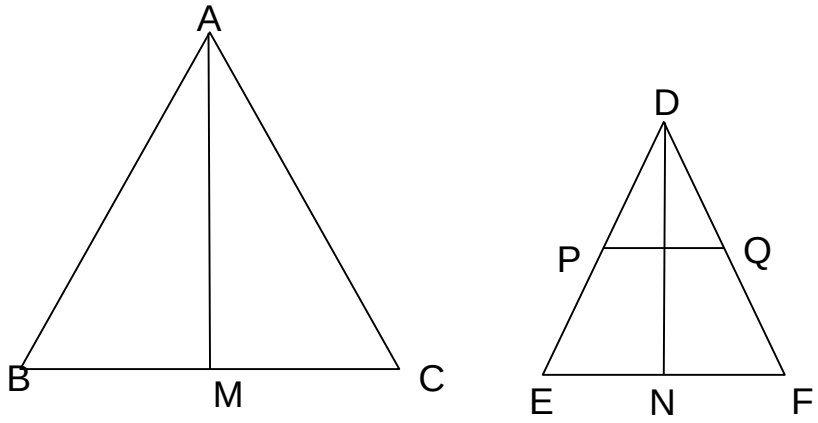
37. (i) ∠DPQ = ∠DEF

∠PDQ =∠EDF

Therefore Δ DPQ ~ Δ DEF — 1

(ii) DE = 50 + 70 = 120 cm — ½

$\frac{DP}{DE} = \frac{PQ}{EF}$

	Therefore $\frac{PQ}{EF} = \frac{50}{120}$ or $\frac{5}{12}$	½
(iii) (A)	$\frac{AB}{DE} = \frac{5}{2} = \frac{BC}{EF} = \frac{AC}{DF}$ $\Rightarrow AB = \frac{5}{2} DE$	1
	$\frac{perimeter\ of\ \triangle ABC}{perimeter\ of\ \triangle DEF} = \frac{\frac{5}{2}(DE + EF + FD)}{DE + EF + FD} = \frac{5}{2}$ (Constant)	1
	OR	
(iii)(B)		Correct fig. ½ mark
	$\frac{AB}{DE} = \frac{BC}{EF} = \frac{BC/2}{EF/2} = \frac{BM}{EN}$	1
	Also ∠B =∠E	
	Therefore △ ABM ~ △ DEN.	½
38. (i)	$l = \sqrt{r^2 + h^2}$ $= \sqrt{(1.5)^2 + (2)^2}$ $= \sqrt{2.25 + 4}$ $= \sqrt{6.25}$ = 2.5 m	½ ½
(ii)	CSA of cone = Πrl = $\frac{22}{7}$ x 1.5 x 2.5 = 11.78 m^2	½ ½
(iii) (A)	CSA of cylinder = 2Π rh = 2 x $\frac{22}{7}$ x 1.5 x 7 = 66 m^2 Cost of metal sheet used = 66 x 2000 = ₹1,32,000	1 1
	OR	
(iii) (B)	Volume of cylinder = $\Pi\ r^2$ h = $\frac{22}{7}$ x $(1.5)^2$ x 7 = 49.5 m^3	½

	Volume of cone = $\frac{1}{3}\Pi r^2$ h $=\frac{1}{3}$ x $\frac{22}{7}$ x $(1.5)^2$ x 2 = 4.71 m^3 Total capacity = 49.5 + 4.71 = 54.21 m^3	1 ½