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.

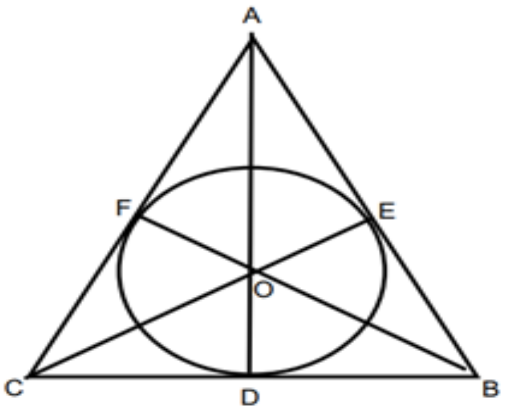
(Section A)
Section A consists of 20 questions of 1 mark each.

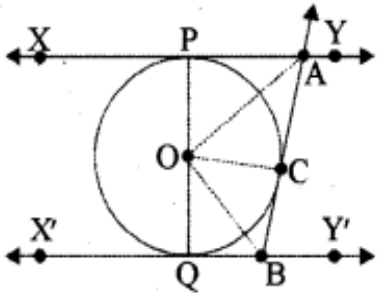
Q.No.	Questions	Marks
1.	If $a = 2^2 \times 3^x$, $b = 2^2 \times 3 \times 5$, $c = 2^2 \times 3 \times 7$ and LCM $(a, b, c) = 3780$, then x is equal to (A) 1 (B) 2 (C) 3 (D) 0	**1**
2.	The shortest distance (in units) of the point (2,3) from y-axis is (A) 2 (B) 3 (C) 5 (D) 1	**1**
3.	If the lines given 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^o (B) 12^o (C) 20^o (D) 50^o	**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**

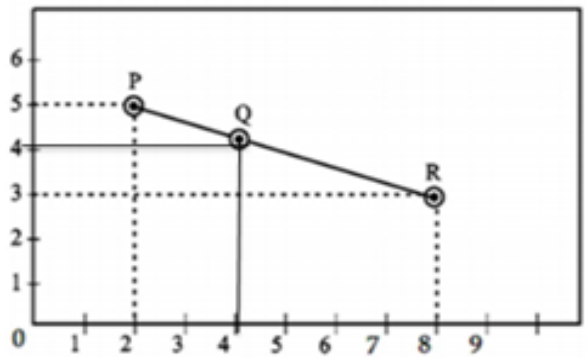
ii. Find the 34^{th} term of progression written by Roshan. **1**

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^{o}, 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**

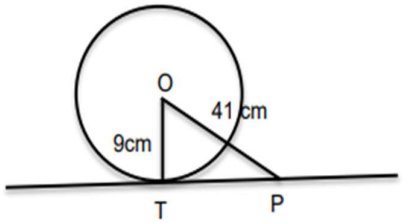
***Please note that the assessment scheme of the Academic Session 2024-25 will continue in the current session i.e. 2025-26**

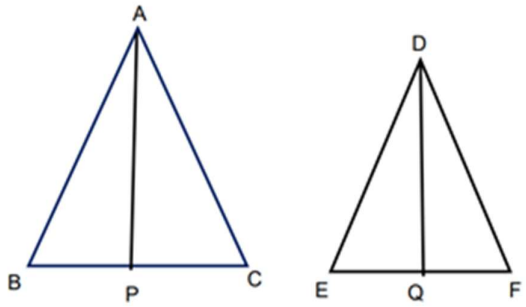
MATHEMATICS STANDARD – Code No.041
MARKING SCHEME
CLASS – X (2025-26)

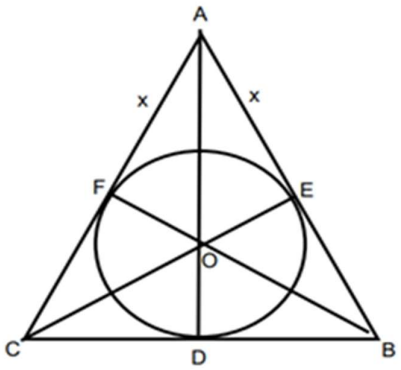
Maximum Marks: 80 **Time: 3 hours**

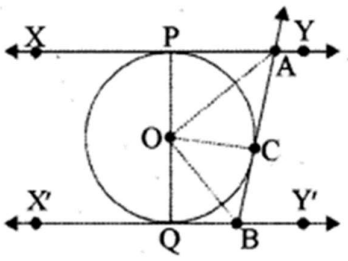
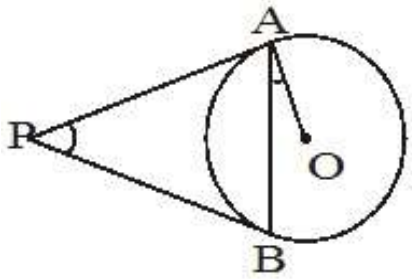
Q.No.	Section A	Marks
1.	(C) 3 LCM$(a, b, c) = 2^2 \times 3^x \times 5 \times 7 = 3780$ $140 \times 3^x = 3780$ $3^x = 27 = 3^3$ $x = 3$	**1**
2.	(A) 2 As shortest distance from (2, 3) to y-axis is the x coordinate, i.e., 2.	**1**
3.	(B) k$\neq\frac{15}{4}$ $\frac{3}{2}\neq\frac{2k}{5}$, hence k$\neq\frac{15}{4}$	**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**

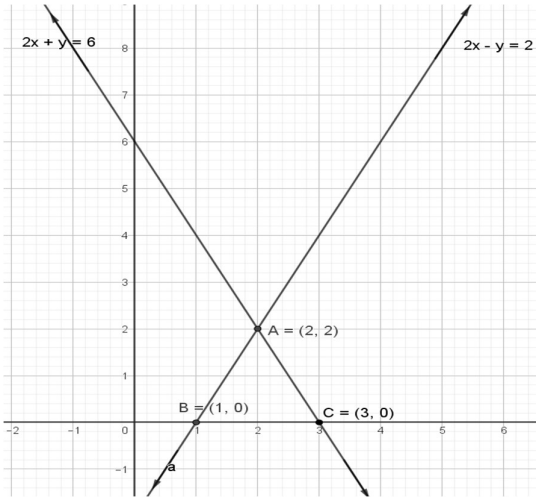
	For Visually Impaired candidates: (D) 9πcm^2 area of circle=$\pi(3^2)$ $=9\,\pi$ cm^2	
8.	(B) $\frac{31}{36}$ Probability of getting sum 8 is $\frac{5}{36}$ Probability of not getting sum 8 is $\frac{31}{36}$	**1**
9.	(B) $12°$ $\sin 5x = \frac{\sqrt{3}}{2}$ So, $5x = 60°$ And hence $x = 12°$	**1**
10.	(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

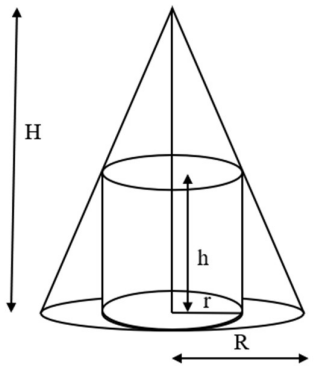
	OR	
(B)	Area of minor segment= Area of sector − area of triangle $=\frac{90°}{360°}\pi\ r^2-\frac{1}{2}\times r^2$ $=(\frac{25}{4}\pi-\frac{25}{2})\ cm^2$ Area of major segment = Area of circle – Area of minor segment $=\pi\ 5^2-(\frac{25}{4}\pi-\frac{25}{2})$ $=25\pi-\frac{25}{4}\pi+\frac{25}{2}$ $=(\frac{75}{4}\pi+\frac{25}{2})\ cm^2$	**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**

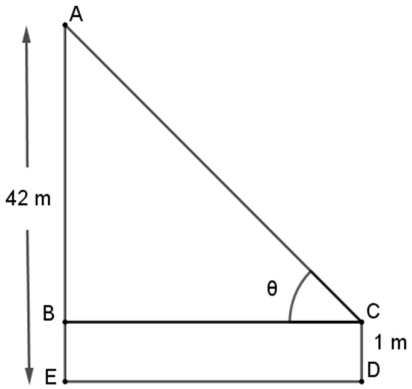
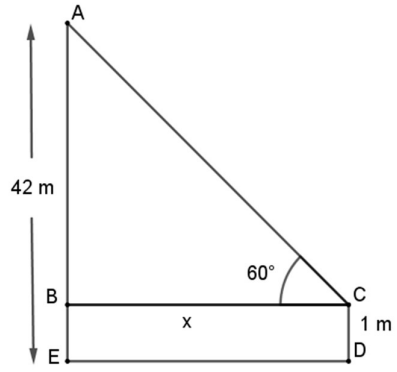
(iii) (A) Sum $= \frac{10}{2}[2(-5) + (10-1)(3)]$ **1**

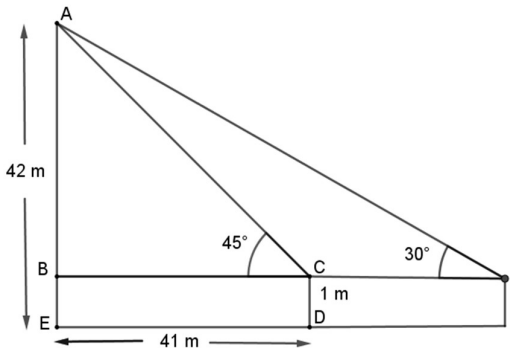
$= 85$ **1**

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

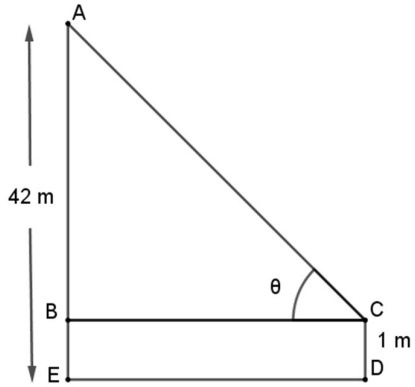
Let the distance moved back be x m

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**