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

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

General Instructions

Read the following instructions carefully and follow them:

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

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

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

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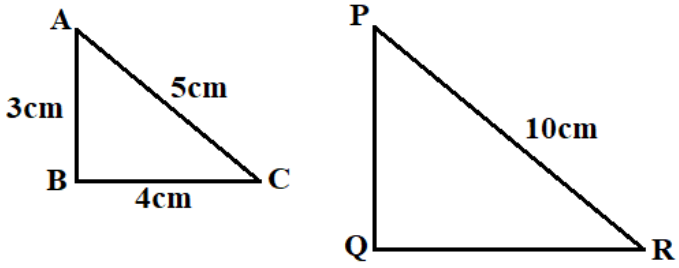
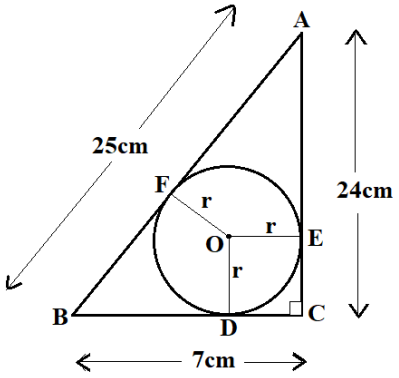
Q3.	The number of polynomials having -2 and 5 as its zeroes is A) one B) two C) three D) Infinitely many	1
Q4.	Which of the following is **not** a quadratic equation? A) $(x+2)^2 = 2(x+3)$ B) $x^2 + 3x = (-1)(1-3x^2)$ C) $(x+2)(x-1) = x^2 - 2x - 3$ D) $x^3 - x^2 + 2x + 1 = (x+1)^3$	1
Q5.	The value of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

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

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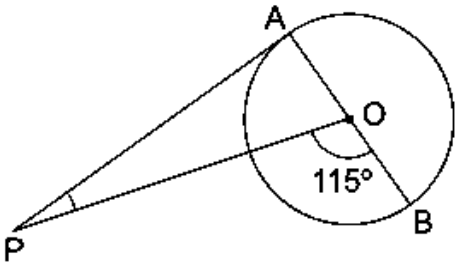
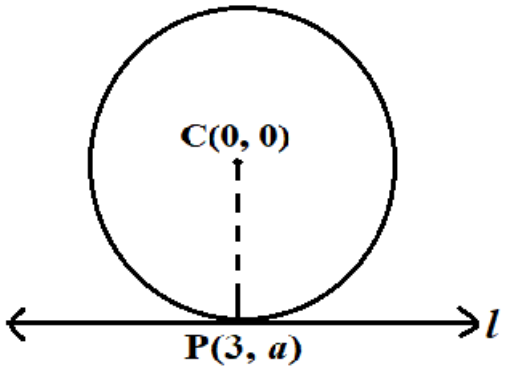
Frequency	11	12	13	9	11 | The upper limit of median class is A) 10 B) 13 C) 15 D) 20	1
Q14.	Let empirical relationship between the three measures of central tendency be **a**(Median) = Mode + **b**(Mean), then (2**b** + 3**a**) = A) 11 B) 12 C) 13 D) 14	1
Q15.	From an external point Q, the length of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

Q17.	The circumferences of two circles are in the ratio 3 : 4. The ratio of their areas is A) 3 : 4 B) 4 : 3 C) 9 : 16 D) 16 : 9	1
Q18.	An event is most unlikely to happen. Its probability is A) 0.0001 B) 0.001 C) 0.01 D) 0.1	1
	Each of the following questions contains two statements i.e., ASSERTION and REASON, and has following four choices. Only one of which is the correct answer.	
Q19.	**ASSERTION (A)**: Line joining the midpoints of two sides of triangle is parallel to the third side. **REASON (R)**: If a line divides two sides of a triangle in the same ratio then it is parallel to the third side. A) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A). B) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A). C) Assertion (A) is true but reason (R) is false. D) Assertion (A) is false but reason (R) is true.	1
Q20.	**ASSERTION (A)**: Two coins are tossed simultaneously. Possible outcomes are two heads, one head and one tail, two tails. Hence, the probability of getting two heads is $\frac{1}{3}$. **REASON (R)**: Probabilities of 'equally likely' outcomes of an experiment are always equal. A) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A). B) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A). C) Assertion (A) is true but reason (R) is false. D) Assertion (A) is false but reason (R) is true.	1

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

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

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SECTION – C
(Short Answers)

This section comprises of SA type questions of 3 marks each

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

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

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

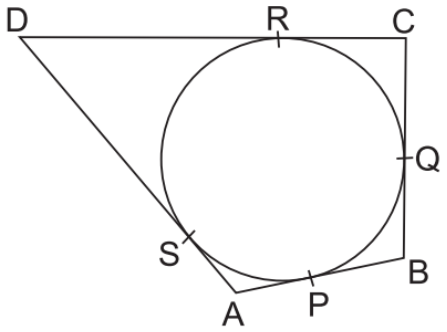
Find the modal agriculture holdings of the village.

OR

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

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

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



For visually Impaired students only

Show that parallelogram circumscribing a circle is a rhombus.

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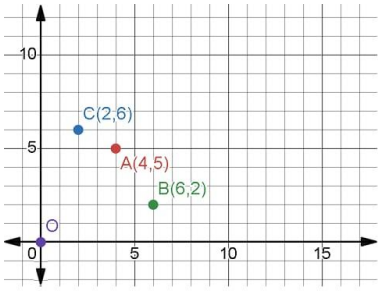
Q29.	**(A)** On a particular day, 50000 people attended a Cricket Test Match between India and Australia in Sydney Cricket Ground. Let $\boldsymbol{x}$ be the number of adults attended the cricket match and $\boldsymbol{y}$ be the number of children attended the cricket match. Cost of an adult ticket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

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

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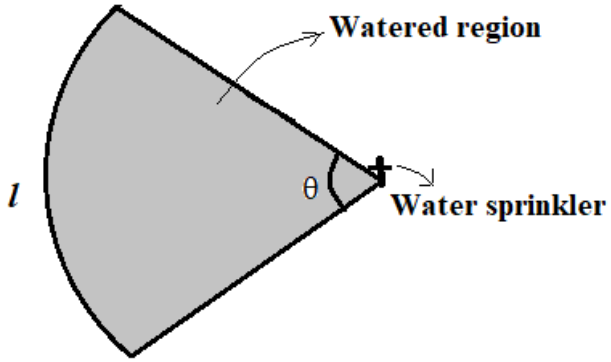
Q37. A water sprinkler is a device used to irrigate agricultural crops, lawns, landscapes, golf courses, and other areas. Water sprinklers can be used for residential, industrial, and agricultural usage.

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



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

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

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

OR

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

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

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

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

i) Find the value of x. 1

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

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

OR

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

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

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

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

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

Section –C

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

26.

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

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

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

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

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

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

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

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

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

27 (A).

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

1

∴ Modal class = 5 – 7 , l = 5, h = 2

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

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

OR

27 (B).

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

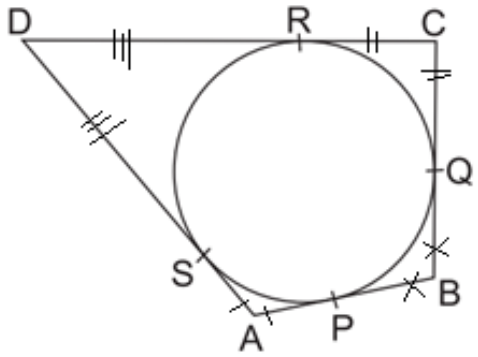
2

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

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

1

28.



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

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

1½

On adding the above equations,

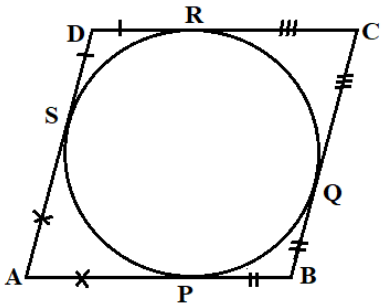
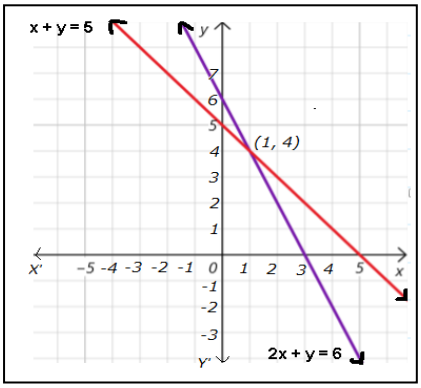
$(\text{AP} + \text{PB}) + (\text{CR} + \text{RD}) = (\text{AS} + \text{BQ}) + (\text{CQ} + \text{DS})$

1

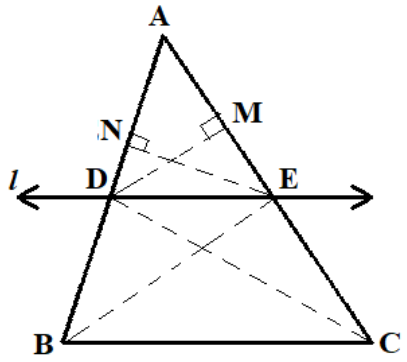
$\Longrightarrow \text{AB} + \text{CD} = \text{AD} + \text{BC}$

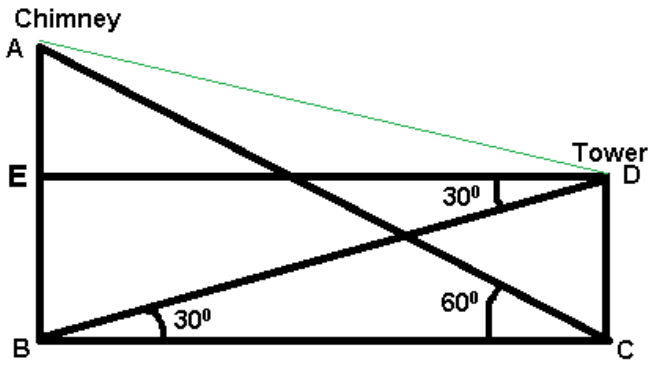
$\Longrightarrow \frac{\text{AB} + \text{CD}}{\text{AD} + \text{BC}} = 1$

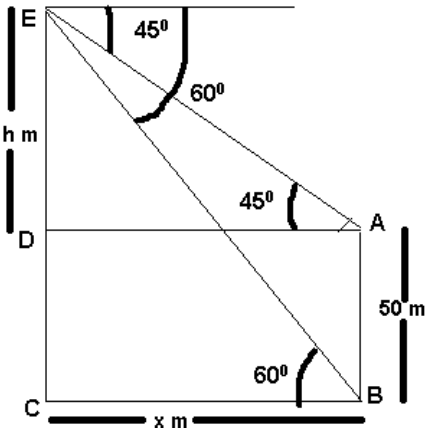
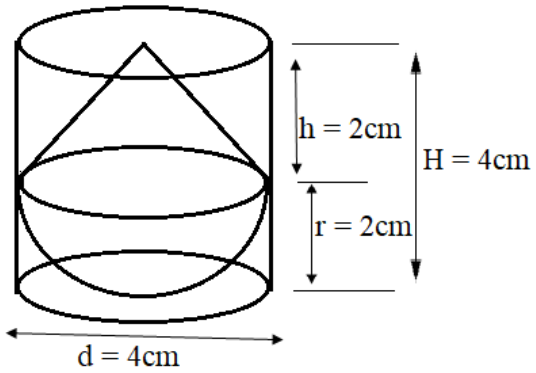
½

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

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

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

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

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

Section –E

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

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