SET 1

No. of printed pages: 5

INDIAN SCHOOL SOHAR

PRE-BOARD I EXAMINATION (2023-24)

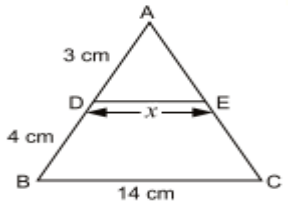
MATHEMATICS STANDARD (041)

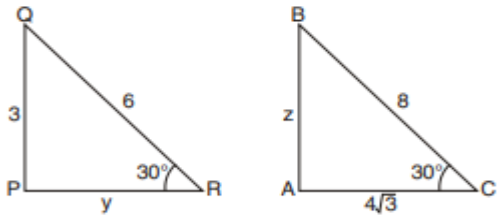
CLASS: X **MAX. MARKS: 80**

DATE: 20/01/24 **TIME: 3 HOURS**

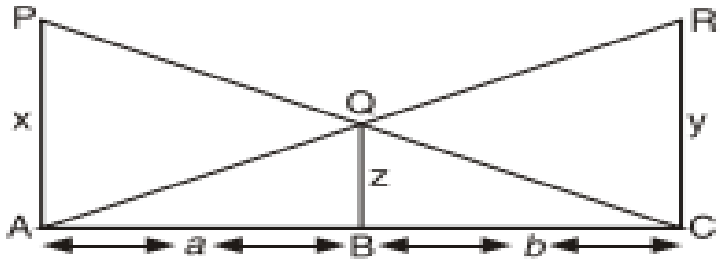
General Instructions:

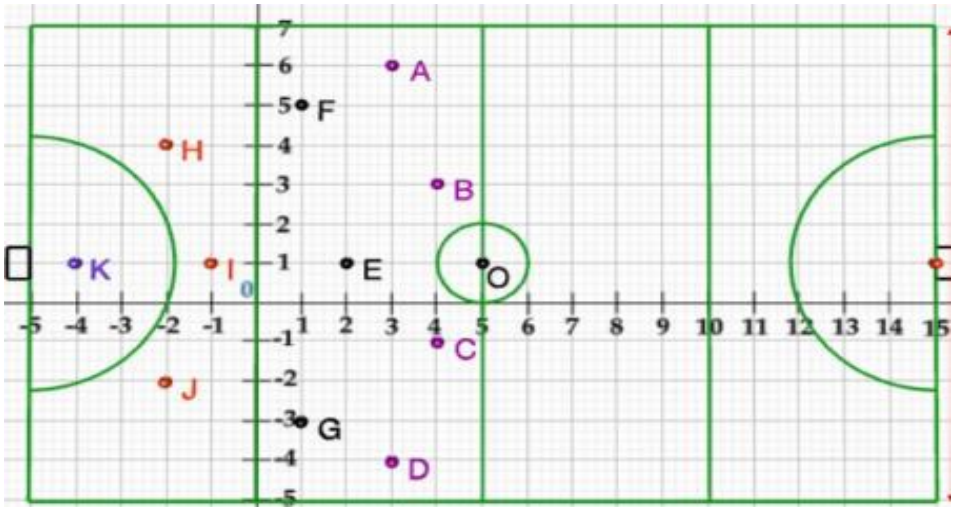
1. This Question Paper has 5 Sections A, B, C, D, and E.
2. Section A has 20 MCQs carrying 1 mark each.
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 Case Based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Questions of 2 marks, 2 Questions of 3 marks and 2 Questions of 5 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.
8. Draw neat diagrams wherever required. Take π = 22/7 wherever required if not stated.

	SECTION A	
	Section A consists of 20 questions of 1 mark each.	
Q. No		**Marks**
1	If $x = 2^3 \times 3 \times 5^2$ and $y = 2^2 \times 3^3$ then HCF (x, y) is: (a) 12 (b) 108 (c) 6 (d)36	1
2	If α, β are zeroes of $x^2 - 6x + k$, what is the value of "k" if $3\alpha + 2\beta = 20$? (a) 8 (b)2 (c) - 16 (d) - 8	1
3	The value of "c" for which the pair of equations $cx - y = 2$ and $6x - 2y = 4$ will have infinitely many solutions is (a) – 3 (b) 3 (c) - 12 (d) 12	1
4	In figure, if DE || BC, then x equals  (a) 6 (b) 7 (c) 3 (d) 4	1
5	The roots of the equation $2x^2 + 5x + 5 = 0$ are (a)Real and distinct (b) Not real (c) Real and equal (d)None of these	1
6	If $ax^2 + bx + c = 0$ has equal roots, then c is equal to: (a) $\frac{-b}{2a}$ (b) $\frac{b}{2a}$ (c) $\frac{-b^2}{4a}$ (d) $\frac{b^2}{4a}$	1
7	If p –1, p + 3, 3p – 1 are in A.P, then p is equal to: (a) 4 (b) - 4 (c) 2 (d) - 2	1

8	If the distance between the points (4, p) and (1, 0) is 5, then the value of p is (a)4 (b) ± 4 (c) – 4 (d) 0	1
9	The coordinates of the centroid of the triangle with vertices (a, 0), (0, b) and (a, b) are (a)$(\frac{a}{2}, \frac{b}{2})$ (b) $)(\frac{a}{3}, \frac{b}{3})$ (c) $)(\frac{2a}{3}, \frac{2b}{3})$ (d)None of these	1
10	In the figure Δ ABC ~ ΔPQR, then y + z is  (a) $2\sqrt{3}$ (b) $4 + 3\sqrt{3}$ (c) $4 + \sqrt{3}$ (d)) $3 + 4\sqrt{3}$	1
11	The pair of linear equations x – 2y = 0 and 3x + 4y = 20 have: (a)one solution (b) two solution (c) no solution (d) many solutions	1
12	If x tan 45°.cos 60° = sin 60°.cot 60°, then x is equal to (a)1 (b) $\sqrt{3}$ (c)$\frac{1}{2}$ (d) $\frac{1}{\sqrt{2}}$	1
13	If sec θ – tan θ = $\frac{1}{3}$, the value of (sec θ + tan θ) is (a)1 (b)2 (c) 3 (d)4	1
14	The distance between two parallel tangents of a circle of radius 5 cm is (a)5 cm (b)10 cm (c) 15 cm (d) 2.5 cm	1
15	If the perimeter and the area of a circle are numerically equal, then the radius of the circle is (a)2 units (b)3 units (c) 4 units (d)5 units	1
16	If mode of a data is 45, mean is 27, then median is (a)30 (b) 27 (c)23 (d) None of these	1
17	The total surface area of a solid hemisphere of radius 7 cm is (a) 447 πcm^2 (b)239 πcm^2 (c) 147 πcm^2 (d)174 πcm^2	1
18	The probability that a leap year has 53 Sundays is (a) $\frac{1}{7}$ (b) $\frac{2}{7}$ (c) $\frac{3}{7}$ (d) $\frac{4}{7}$	1
	ASSERTION REASON BASED QUESTIONS: **In question numbers 19 and 20, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.** **(a)Both (A) and (R) are true and (R) is the correct explanation of (A)** **(b) Both (A) and (R) are true but (R) is not the correct explanation of (A)** **(c) (A) is true but (R) is false.** **(d) (A) is false but (R) is true.**	
19	**Assertion (A):** In a circle of radius 6 cm, the angle of a sector 60^0. Then the area of the sector is $18\frac{6}{7}$ cm^2 **Reason (R):** Area of the circle with radius r is πr^2	1
20	**Assertion (A):** Common difference of the AP: -5, -1, 3, 7, ... is 4. **Reason(R)**: Common difference of the AP: a, a + d, a + 2d, ... is given by $d = a_2 - a_1$	1

	SECTION B	
Section B consists of 5 questions of 2 marks each.		
21	Explain why 7 × 11 × 13 + 13 is a composite number.	2
22	If α and β are the zeroes of $f(x) = 2x^2 + 5x + k$ such that $\alpha^2 + \beta^2 + \alpha\beta = \frac{21}{4}$, find the value of "k " **OR** Find a quadratic polynomial, the sum and product of whose zeroes are $\sqrt{2}$ and $\frac{1}{3}$ respectively.	2
23	In Δ PQR, right-angled at Q, PR + QR = 25 cm and PQ = 5 cm. Determine the value of sin P.	2
24	Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of the larger circle which touches the smaller circle	2
25	Prove that, the diagonals of a trapezium divide each other proportionally. **OR** D is a point on the side BC of a triangle ABC such that ∠ ADC = ∠ BAC. Show that $CA^2 = CB.CD$	2
	SECTION C	
Section C consists of 6 questions of 3 marks each.		
26	Prove that $5 + 6\sqrt{3}$ is irrational	3
27	Solve for x and y: $\sqrt{2}x + \sqrt{3}y = 0$, $\sqrt{3}x - \sqrt{8}y = 0$ **OR** Five years ago, Nuri was thrice as old as Sonu. Ten years later, Nuri will be twice as old as Sonu. How old are Nuri and Sonu?	3
28	Prove that the lengths of tangents drawn from an external point to a circle are equal.	3
29	The minute hand of a clock is $\sqrt{21}$ cm long. Find the area swept by the minute hand on the face of the clock from 7.00 am to 7.05 am	3
30	If $\sqrt{3}\tan\theta = 3\sin\theta$, then prove that $\sin^2\theta - \cos^2\theta = \frac{1}{3}$ **OR** If $7\sin^2\theta + 3\cos^2\theta = 4$, then show that $\tan\theta = \frac{1}{\sqrt{3}}$	3
31	A toy is in the form of a cone mounted on a hemisphere of common base radius 7 cm. The total height of the toy is 31 cm. Find the total surface area of the toy.	3
	SECTION D	
	Section D consists of 4 questions of 5 marks each	
32	From an aeroplane vertically above a straight horizontal road, the angles of depression of two consecutive kilometer stones on opposite sides of the aeroplane are observed to be 60° and 30°. Show that height (in meters) of aeroplane above the road is $\frac{\sqrt{3}}{4}$ km **OR**	5

	The angle of elevation of the top of a tower as observed from a point on the ground is 'α' and on moving 'a' meter towards the tower, the angle of elevation is 'β'. Prove that the height of the tower is $\frac{a\tan\alpha\tan\beta}{\tan\beta-\tan\alpha}$	
33	In the figure, PA, QB and RC are perpendiculars to AC. Prove that $\frac{1}{x}+\frac{1}{y}=\frac{1}{z}$  	5
34	The speed of a boat in still water is 15 km/hr. It can go 30 km upstream and return downstream to the original point in 4 hours 30 minutes. Find the speed of the stream.	5
35	The median of the distribution given below is 35. Find the value of X and Y, if the sum all frequencies is 170. Class: 0 - 10 | 10 - 20 | 20 - 30 | 30 - 40 | 40 - 50 | 50 - 60 | 60 - 70 Frequency: 10 | 20 | X | 40 | Y | 25 | 15 **OR** Calculate the mode of the following frequency distribution table. Class: Above 25 | Above 35 | Above 45 | Above 55 | Above 65 | Above 75 | Above 85 Frequency: 52 | 47 | 37 | 17 | 8 | 2 | 0	5
	SECTION E	
	Section E has 3 Case Based integrated units of assessment (04 marks each) with sub-parts of the values of 1, 1 and 2 marks each respectively.	
36	**Case Study – 1** In the month of April to June 2022, the exports of passenger cars from India increased by 26% in the corresponding quarter of 2021–22, as per a report. A car manufacturing company planned to produce 1800 cars in 4th year and 2600 cars in 8th year. Assuming that the production increases uniformly by a fixed number every year. Based on the above information answer the following questions. (i) Find the production in the 1st year. 1 (ii) Find the production in the 12th year 1 (iii) Find the total production in first 10 years. 2 **OR** In which year the total production will reach to 15000 cars?	
37	**Case Study – 2** A football field is given below. Each team plays with 11 players on the field during the game including the goalie. Positions you might play include- • Forward: As shown by players A, B, C and D. • Midfielders: As shown by players E, F and G. • Fullbacks: As shown by players H, I and J.	

	• Goalie: As shown by player K Using the picture of football field given below, answer the questions that follow  (i)Find the coordinates of the centroid of ΔEHJ (ii) If a player P needs to be at equal distances from A and G, such that A, P and G are in straight line, then position of P will be (iii) The point on x axis equidistant from I and E is **OR** The point on y axis equidistant from B and C is	1 1 2
38.	**Case Study – 3** On a weekend Rani was playing cards with her family. The deck has 52 cards.If her brother drew one card.  (i) Find the probability of getting a king of red color. (ii) Find the probability of getting a spade. (iii) Find the probability of getting a face card. **OR** Find the probability of getting a red face card.	1 1 2

*****END******