



INDIAN SCHOOL SOHAR
PRE-BOARD I EXAMINATION (2023-24)
MATHEMATICS STANDARD (041)

CLASS: X

DATE: 20/01/24

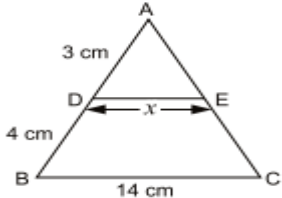
MAX. MARKS: 80

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 $\pi = 22/7$ wherever required if not stated.

SECTION A		
Section A consists of 20 questions of 1 mark each.		
Q. No		Marks
1	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
2	If $x \tan 45^\circ \cdot \cos 60^\circ = \sin 60^\circ \cdot \cot 60^\circ$, then x is equal to (a) 1 (b) $\sqrt{3}$ (c) $\frac{1}{2}$ (d) $\frac{1}{\sqrt{2}}$	1
3	If $\sec \theta - \tan \theta = \frac{1}{3}$, the value of $(\sec \theta + \tan \theta)$ is (a) 1 (b) 2 (c) 3 (d) 4	1
4	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
5	In the figure $\Delta ABC \sim \Delta PQR$, then $y + z$ is <div style="text-align: center;"> </div> (a) $2\sqrt{3}$ (b) $4 + 3\sqrt{3}$ (c) $4 + \sqrt{3}$ (d) $3 + 4\sqrt{3}$	1
6	If mode of a data is 45, mean is 27, then median is (a) 30 (b) 27 (c) 23 (d) None of these	1
7	The total surface area of a solid hemisphere of radius 7 cm is (a) $447\pi \text{ cm}^2$ (b) $239\pi \text{ cm}^2$ (c) $147\pi \text{ cm}^2$ (d) $174\pi \text{ cm}^2$	1

8	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
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	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
11	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
12	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
13	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
14	In figure, if $DE \parallel BC$, then x equals  (a) 6 (b) 7 (c) 3 (d) 4	1
15	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
16	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
17	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
18	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
	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° . Then the area of the sector is $18\frac{6}{7} \text{ cm}^2$ Reason (R): Area of the circle with radius r is $2\pi r^2$	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 $d = a_1 - a_2$	1

SECTION B																		
Section B consists of 5 questions of 2 marks each.																		
21	Find the LCM and HCF of the following pair of integers and verify that $LCM \times HCF = \text{product of the two numbers: } 336 \text{ and } 54$	2																
22	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 $\angle ADC = \angle BAC$. Show that $CA^2 = CB \cdot CD$	2																
23	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																
24	In ΔPQR , right-angled at Q, $PR + QR = 25$ cm and $PQ = 5$ cm. Determine the value of $\sin P$.	2																
25	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																
SECTION C																		
Section C consists of 6 questions of 3 marks each.																		
26	Prove that $2 + 3\sqrt{2}$ is irrational	3																
27	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																
28	Prove that the lengths of tangents drawn from an external point to a circle are equal.	3																
29	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																
30	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																
31	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 7.25 am	3																
SECTION D																		
Section D consists of 4 questions of 5 marks each																		
32	The median of the distribution given below is 35. Find the value of X and Y, if the sum all frequencies is 170. <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Class</td> <td>0 - 10</td> <td>10 - 20</td> <td>20 - 30</td> <td>30 - 40</td> <td>40 - 50</td> <td>50 - 60</td> <td>60 - 70</td> </tr> <tr> <td>Frequency</td> <td>10</td> <td>20</td> <td>X</td> <td>40</td> <td>Y</td> <td>25</td> <td>15</td> </tr> </table>	Class	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	Frequency	10	20	X	40	Y	25	15	5
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.																	
	<table border="1"> <tr> <td>Class</td> <td>Above 25</td> <td>Above 35</td> <td>Above 45</td> <td>Above 55</td> <td>Above 65</td> <td>Above 75</td> <td>Above 85</td> </tr> <tr> <td>Frequency</td> <td>52</td> <td>47</td> <td>37</td> <td>17</td> <td>8</td> <td>2</td> <td>0</td> </tr> </table>	Class	Above 25	Above 35	Above 45	Above 55	Above 65	Above 75	Above 85	Frequency	52	47	37	17	8	2	0	
Class	Above 25	Above 35	Above 45	Above 55	Above 65	Above 75	Above 85											
Frequency	52	47	37	17	8	2	0											
33	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																
34	In the figure, PA, QB and RC are perpendiculars to AC. Prove that $\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$	5																
35	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	5																
	OR																	
	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 $\frac{a \tan \alpha \tan \beta}{\tan \beta - \tan \alpha}$																	
	SECTION E																	
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36	<p>Case Study – 1</p> <p>On a weekend Rani was playing cards with her family. The deck has 52 cards. If her brother drew one card</p> <p>(i) Find the probability of getting a king of red color.</p> <p>(ii) Find the probability of getting a spade.</p>	<p>1</p> <p>1</p>																

	<p>(iii) Find the probability of getting a face card.</p> <p style="text-align: center;">OR</p> <p>Find the probability of getting a red face card.</p>	2
37.	<p>Case Study – 2</p> <p>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.</p> <p>Based on the above information answer the following questions.</p> <p>(i) Find the production in the 1st year.</p> <p>(ii) Find the production in the 12th year</p> <p>(iii) Find the total production in first 10 years.</p> <p style="text-align: center;">OR</p> <p>In which year the total production will reach to 15000 cars?</p>	1 1 2
38	<p>Case Study – 3</p> <p>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-</p> <ul style="list-style-type: none"> • 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 <p>Using the picture of football field given below, answer the questions that follow</p> <p>(i) Find the coordinates of the centroid of $\triangle E H J$</p> <p>(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</p> <p>(iii) The point on x axis equidistant from I and E is</p> <p style="text-align: center;">OR</p> <p>The point on y axis equidistant from B and C is</p>	1 1 2

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