



**COMMON PRE-BOARD EXAMINATION**  
**MATHEMATICS (STANDARD)–Code No. 041**



**CLASS-X-(2025-26)**

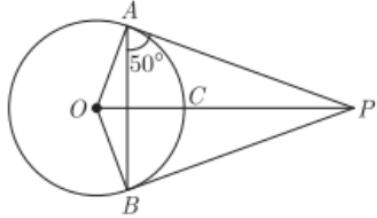
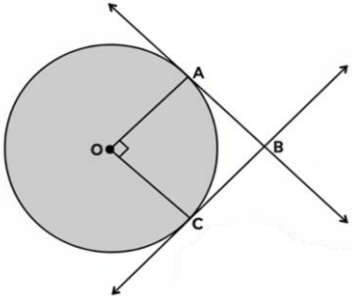
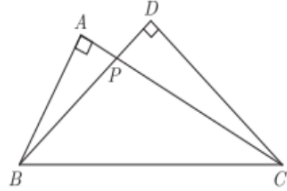
**SET: 2**

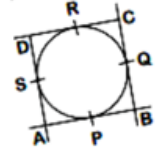
**Time allowed: 3 Hrs**

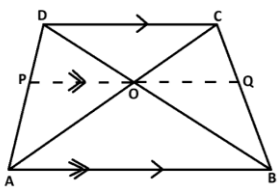
**Marking Scheme**

**Maximum Marks: 80**

(Section A)		
Section A consists of 20 questions of 1 mark each.		
1.	(D) $\sqrt{5}$	1
2.	(A) 1 : 2	1
3.	(C) rational number	1
4.	(B) 6	1
5.	(A) 2AB	1
6.	(A) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$	1
7.	(C) $10k^2$	1
8.	(C) 3	1
9.	(C) 8 cm	1
10.	(B) $\frac{4}{35}$	1
11.	(C) 7	1
12.	(C) 13	1
13.	(C) $\frac{\sqrt{b^2-a^2}}{b}$	1
14.	(D) $\frac{41}{40}$	1
15.	(C) $83^\circ$	1
16.	(A) $6\pi cm^2$	1
17.	(A) $R_1 + R_2 = R$	1
18.	(B) $\frac{1}{2}$	1

19.	(C) Assertion (A) is true but reason (R) is false	1
20.	(D) Assertion (A) is false but reason (R) is true	1
<b>(Section – B)</b> <b>Section B consists of 5 questions of 2 marks each.</b>		
21.	<p>Since the terms are in A.P.,  <math>(2x + 1) - (x + 3) = (x - 7) - (2x + 1)</math>  <math>\Rightarrow x - 2 = -x - 8 \Rightarrow 2x = -6 \Rightarrow x = -3</math></p> <p><b>(OR)</b></p> <p>Given <math>a_{17} = a_{10} + 7</math>  i.e. <math>a + 16d = a + 9d + 7</math>  <math>\Rightarrow 16d - 9d = 7 \Rightarrow 7d = 7 \Rightarrow d = 1</math></p>	<p>1 1</p> <p><b>(OR)</b></p> <p>1 <math>\frac{1}{2}</math> <math>\frac{1}{2}</math></p>
22.	$2(2)^2 + x\left(\frac{\sqrt{3}}{2}\right)^2 - \frac{3}{4}\left(\frac{1}{\sqrt{3}}\right)^2 = 10 \Rightarrow 8 + \frac{3x}{4} - \frac{1}{4} = 10 \Rightarrow x = 3$	<p>Each value <math>\frac{1}{2}</math> each Final answer <math>\frac{1}{2}</math></p>
23.	<p><math>\angle OAP = 90^\circ</math> (<math>r \perp t</math>)  <math>\angle OAB = \angle OAP - \angle BAP = 90^\circ - 50^\circ = 40^\circ</math>  Since <math>OA</math> and <math>OB</math> are radii, we have  <math>\angle OAB = \angle OBA = 40^\circ</math> (angles opp. to equal sides)  Now, <math>\angle AOB + \angle OAB + \angle OBA = 180^\circ</math> (angle sum property)  <math>\Rightarrow \angle AOB + 40^\circ + 40^\circ = 180^\circ</math>  <math>\Rightarrow \angle AOB = 100^\circ</math></p> <p><b>(OR)</b></p>	 <p><math>\frac{1}{2}</math> <math>\frac{1}{2}</math> <math>\frac{1}{2}</math> <math>\frac{1}{2}</math></p> <p><b>(OR)</b></p>
	<p><math>\angle OAB = 90^\circ</math> and <math>\angle OCB = 90^\circ</math> (<math>r \perp t</math>)  <math>\angle AOC = 90^\circ</math> (given)  <math>\Rightarrow \angle ABC = 90^\circ</math> (angle sum in a quadrilateral)  *Since all four interior angles of the quadrilateral OABC are <b><math>90^\circ</math></b>, it is a <b>rectangle</b>  *Now <math>OA = OC</math> (radii of the same circle)  i.e., OABC is a rectangle with adjacent sides OA and OC equal <math>\Rightarrow</math> It is a <b>square</b>.</p>	 <p><math>\frac{1}{2}</math> <math>\frac{1}{2}</math> <math>\frac{1}{2}</math> <math>\frac{1}{2}</math></p>
24.	<p>In <math>\triangle BAP</math> and <math>\triangle CDP</math> we have  <math>\angle BAP = \angle CDP = 90^\circ</math>  <math>\angle BPA = \angle CPD</math> (vertical opposite angles)  <math>\triangle BAP \sim \triangle CDP</math> (AA similarity)  Therefore <math>\frac{BP}{PC} = \frac{AP}{PD}</math> (corresponding parts of similar triangles)  <math>AP \times PC = BP \times PD</math>  Hence proven</p>	 <p>Fig <math>\frac{1}{2}</math> Proof (1) Criteria <math>\frac{1}{2}</math></p>
25.	<p><math>A = \frac{1}{2}lr \Rightarrow 54\pi = \frac{1}{2}l \cdot 36</math>  <math>\Rightarrow 54\pi = 18l \Rightarrow l = 3\pi = 3 \times \frac{22}{7} = \frac{66}{7} = 9.42\text{cm}</math></p>	<p><math>\frac{1}{2} + \frac{1}{2}</math> 1</p>

(Section – C)		
Section C consists of 6 questions of 3 marks each.		
26.	<p>Let <math>(2 + 5\sqrt{3})</math> be rational</p> <p><math>\Rightarrow 2 + 5\sqrt{3} = \frac{p}{q}</math>, where <math>p</math> &amp; <math>q</math> are integral co- primes &amp; <math>q \neq 0</math></p> <p><math>\Rightarrow 5\sqrt{3} = \frac{p}{q} - 2</math></p> <p><math>\Rightarrow \sqrt{3} = \frac{1}{5} \left( \frac{p}{q} - 2 \right)</math></p> <p>Here, <math>LHS</math> is irrational but <math>RHS</math> is rational</p> <p>This is a contradiction</p> <p>Therefore, our assumption is wrong</p> <p>Hence, <math>(2 + 5\sqrt{3})</math> is irrational</p>	$\frac{1}{2}$  $\frac{1}{2}$  1  $\frac{1}{2}$  $\frac{1}{2}$
27.	<p><math>\alpha + \beta = 10 \Rightarrow \frac{5}{a} = 10 \Rightarrow a = \frac{1}{2}</math></p> <p><math>\alpha\beta = 10 \Rightarrow \frac{c}{a} = 10 \Rightarrow c = 5</math></p>	$1\frac{1}{2}$  $1\frac{1}{2}$
28.	<p>Total number of numbers = <math>(123 - 11) + 1 = 113</math></p> <p>(i) <math>P(\text{perfect square}) = \frac{8}{113}</math></p> <p>(ii) <math>P(\text{multiple of 7}) = \frac{16}{113}</math></p> <p><b>(OR)</b></p> <p>(i) <math>P(\text{non-face card}) = \frac{52-12}{52} = \frac{40}{52} = \frac{10}{13}</math></p> <p>(ii) <math>P(\text{a black king}) = \frac{2}{52} = \frac{1}{26}</math></p> <p>(iii) <math>P(\text{neither a red nor a jack}) = \frac{52-28}{52} = \frac{24}{52} = \frac{6}{13}</math></p>	1 1 1 <b>(OR)</b> 1 1 1
29.	<p>Since, Tangents from the same external point are equal in length.</p> <p><math>AP = AS \rightarrow (1)</math> <math>BP = BQ \rightarrow (2)</math> <math>CR = CQ \rightarrow (3)</math> <math>DR = DS \rightarrow (4)</math></p> <p>Adding equations <math>(1 + 2 + 3 + 4)</math></p> <p><math>AP + BP + CR + DR = AS + BQ + CQ + DS</math></p> <p><math>AB + CD = AD + BC</math></p> <p><math>6 + 8 = AD + 9 \Rightarrow AD = 14 - 9 = 5 \text{ cm}</math></p>	 1 1 1
30.	$\begin{aligned} LHS &= \sqrt{\frac{(1 + \sin A)}{(1 - \sin A)}} \times \frac{(1 + \sin A)}{(1 + \sin A)} = \sqrt{\frac{(1 + \sin A)^2}{1 - \sin^2 A}} = \sqrt{\frac{(1 + \sin A)^2}{\cos^2 A}} = \frac{1 + \sin A}{\cos A} \\ &= \frac{1}{\cos A} + \frac{\sin A}{\cos A} = \sec A + \tan A = RHS \end{aligned}$	$\frac{1}{2}$ each  $\frac{1}{2} + \frac{1}{2}$

31.	<p>Assuming speeds as <math>x</math> km/hr and <math>y</math> km/hr,  Distance = Speed <math>\times</math> Time, we get <math>16 = (2x + 2y) \Rightarrow x + y = 8 \rightarrow (1)</math>  Similarly, <math>16 = (8x - 8y) \Rightarrow x - y = 2 \rightarrow (2)</math>  Solving, <math>x = 5</math> and <math>y = 3</math>  The walking speeds are <b>5km/h</b> and <b>3km/h</b></p> <p><b>(OR)</b></p> <p>For no solutions, <math>\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2} \Rightarrow \frac{k}{3} = \frac{k-2}{1} \neq \frac{1}{5}</math>  <math>\Rightarrow k = 3</math> and <math>\frac{1}{1} \neq \frac{1}{5}</math>  Since <math>1 \neq \frac{1}{5}</math>, the condition for no solutions is satisfied for <math>k = 3</math>.</p>	$\frac{1}{2}$ 1 1 $\frac{1}{2}$  <b>(OR)</b> $\frac{1}{2} + 1$ 1 $\frac{1}{2}$
<p align="center"><b>(Section – D)</b>  <b>Section D consists of 4 questions of 5 marks each</b></p>		
32.	<p>Diameter of base = 3.5m, radius = <math>7/4</math>m, Height of the cylindrical part = <math>14/3</math> m</p> <p>(i) Volume of vessel = <math>\pi r^2 h + \frac{2}{3} \pi r^3 = \pi r^2 \left( h + \frac{2}{3} r \right)</math>  <math>= \frac{22}{7} \times \frac{7}{4} \times \frac{7}{4} \left( \frac{14}{3} + \frac{2}{3} \times \frac{7}{4} \right) = \frac{2695}{48} = 56.15 \text{ m}^3</math></p> <p>(ii) CSA of vessel = <math>2\pi r h + 2\pi r^2 = 2\pi r(h + r)</math>  <math>= 2 \times \frac{22}{7} \times \frac{7}{4} \times \left( \frac{14}{3} + \frac{7}{4} \right) = \frac{847}{12} = 70.58 \text{ m}^2</math></p>	1  1+1  1 1
33.	<p><b>Statement</b> : If a line is drawn parallel to one side of a triangle to intersect the other two sides at distinct points, then the line divides the two sides in the same ratio.</p> <p>Given: Trapezium ABCD, <math>AB \parallel CD</math>, diagonals AC and BD intersect at O.</p> <p>To prove: <math>\frac{DP}{PA} = \frac{CQ}{BQ}</math></p> <p>Construction: Draw <math>PQ \parallel AB</math> through O to meet AD and BC at P and Q respectively</p> <p>Proof: <math>PQ \parallel AB</math> and <math>AB \parallel CD \Rightarrow PQ \parallel CD</math>  In <math>\triangle DAB</math>, <math>PO \parallel AB \therefore \frac{DP}{PA} = \frac{DO}{BO}</math> (BPT) —(1)  Similarly, in <math>\triangle BCD</math>, <math>OQ \parallel CD</math>  <math>\Rightarrow \frac{BQ}{QC} = \frac{BO}{DO} \Rightarrow \frac{QC}{BQ} = \frac{DO}{BO}</math> —(2)  from (1) &amp; (2), <math>\frac{DP}{PA} = \frac{QC}{BQ}</math>  Hence the result.</p>	 1  $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 1 $\frac{1}{2}$ $\frac{1}{2}$
34.	<p>Let the unit digit of the number be <math>y</math> and the tens digit of this number be <math>x</math>.  So, the number is <math>10x + y</math> and the number interchanging the digits = <math>10y + x</math>  Given <math>xy = 12</math> ... (1)  Also, <math>(10x + y) + 36 = 10y + x \Rightarrow x = (y - 4)</math> ... (2)  On substituting the value of <math>x</math> in equation (1), we get,  <math>y \cdot (y - 4) = 12 \Rightarrow y^2 - 4y - 12 = 0 \Rightarrow y = 6</math> or <math>-2</math></p>	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 1 1

	<p>But the unit digit of the two-digit number cannot be negative.  <math>\Rightarrow y = 6 \Rightarrow x = 6 - 4 \Rightarrow x = 2</math>  <math>\Rightarrow 10x + y = 10 \times 2 + 6 = 26</math>  Hence the number is 26.</p> <p><b>(OR)</b></p> <p>For the first equation, <math>x^2 + kx + 64 = 0</math>:  The discriminant is <math>\Delta_1 = k^2 - 4(1)(64) = k^2 - 256</math>  For real roots, we must have <math>k^2 - 256 \geq 0 \Rightarrow k^2 \geq 256</math>  <math>\Rightarrow k \leq -16</math> or <math>k \geq 16</math>  Since the problem asks for positive values of k, we consider <math>k \geq 16 \rightarrow (1)</math></p> <p>For the second equation, <math>x^2 - 8x + k = 0</math>:  The discriminant is <math>\Delta_2 = (-8)^2 - 4(1)(k) = 64 - 4k</math>  For real roots, we must have <math>64 - 4k \geq 0</math>  <math>\Rightarrow 64k \geq 4k \Rightarrow 16 \geq k \rightarrow (2)</math>  The only value that satisfies both inequalities is when k is exactly equal to 16.  The positive value of k for which both equations will have roots is <b>16</b>.</p>	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$  <b>(OR)</b>  $\frac{1}{2}$ 1 $\frac{1}{2}$ $\frac{1}{2}$  $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ 1
35.	<p>The average performance of all countries from the graph is  <math>\frac{10 \times 13 + 30 \times 19 + 50 \times 6 + 70 \times 4}{13 + 19 + 6 + 4} = \frac{130 + 570 + 300 + 280}{42} = \frac{1280}{42} = 30.48 \%</math>.  <math>\Rightarrow</math> Japan performed better than the average performance.</p> <p><b>(OR)</b></p> <p>Cf values <math>\rightarrow p, p+15, p+40, p+60, p+q+60, p+q+68, p+q+78</math>  <math>\Rightarrow p + q + 78 = 90 \Rightarrow p + q = 12</math>  <math>\frac{N}{2} = \frac{90}{2} = 45</math>  Median = <math>L + \frac{\left(\frac{N}{2} - c.f.\right)}{f} \cdot h \Rightarrow 50 = 50 + \frac{45 - (p + 40)}{20} \cdot 10</math>  <math>\Rightarrow 0 = \frac{(5 - p)}{2} \Rightarrow 5 - p = 0 \Rightarrow p = 5</math>  Now <math>q = 12 - p = 12 - 5 \Rightarrow q = 7</math></p>	2+1+1 1  <b>(OR)</b>  1 1 $\frac{1}{2}$  $\frac{1}{2} + 1$  $\frac{1}{2}$ $\frac{1}{2}$
<p align="center"><b>(Section – E)</b></p> <p align="center"><b>Section E consists of 3 case study-based questions of 4 marks each.</b></p>		
36.	<p>(i) <math>a_1 = 20 + 4(1)a_1 = 20 + 4a_1 = 24</math>  The number on the first spot is <b>24</b>. (This is also the first term, <math>a</math>).</p> <p>(ii) Let <math>a_n = 112 \Rightarrow 20 + 4n = 112</math>  <math>4n = 92 \Rightarrow n = 23</math>  The spot numbered as 112 is the <b>23<sup>rd</sup> spot</b>.</p> <p><b>(OR)</b></p> <p><math>S_n = \frac{n}{2} [2a + (n - 1)d] \Rightarrow S_{10} = \frac{10}{2} [2(24) + (10 - 1)4]</math>  <math>S_{10} = 5[48 + 36] \Rightarrow S_{10} = 420</math>  The sum of all the numbers on the first 10 spots is <b>420</b>.</p>	1   $\frac{1}{2} + 1 + \frac{1}{2}$  <b>(OR)</b>  $\frac{1}{2} + 1 + \frac{1}{2}$

	<p>(iii) <math>a_n = 20 + 4n \Rightarrow a_{n-2} = 20 + 4(n - 2)</math>  <math>a_{n-2} = 20 + 4n - 8 \Rightarrow a_{n-2} = 12 + 4n</math>  The number on the <math>(n - 2)^{\text{th}}</math> spot is <math>12 + 4n</math>.</p>	1
37.	<p>(i) 4 m</p> <p>(ii) <math>\sin(60^\circ) = \frac{BD}{BC} \Rightarrow \frac{\sqrt{3}}{2} = \frac{4}{L}</math>  <math>L = \frac{8}{\sqrt{3}} = \frac{8\sqrt{3}}{3}</math> m  The length of the ladder should be <math>\frac{8\sqrt{3}}{3}</math> m</p> <p>(iii) <math>\tan(60^\circ) = \frac{BD}{DC} \Rightarrow \sqrt{3} = \frac{4}{x} \Rightarrow x = \frac{4}{\sqrt{3}} = \frac{4\sqrt{3}}{3}</math> m  Using the approximate value <math>\sqrt{3} \approx 1.732</math>: <math>x \approx \frac{4 \times 1.732}{3} \approx \frac{6.928}{3} \approx 2.309</math> m  The foot of the ladder should be placed <math>\frac{4\sqrt{3}}{3}</math> m (or approximately 2.31 m) away from the foot of the pole.</p> <p><b>(OR)</b></p> <ul style="list-style-type: none"> <li>• Height to be reached (BD): 4 m (Opposite side)</li> <li>• Distance from the foot of the pole (DC): 4 m (Adjacent side)</li> <li>• Ladder length (BC): Hypotenuse (<math>L'</math>).</li> </ul> <p>Using the Pythagorean theorem:  <math>L'^2 = (BD)^2 + (DC)^2 \Rightarrow L'^2 = (4)^2 + (4)^2 \Rightarrow L' = 4\sqrt{2}</math> m  The length of the ladder is <math>4\sqrt{2}</math> m</p>	<p>1</p> <p>1</p> <p>2</p> <p><b>(OR)</b></p> <p>2</p>
38.	<p>(i) distance formula: <math>d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}</math></p> <ul style="list-style-type: none"> <li>• School S(3, 4) <math>\rightarrow (x_1, y_1)</math></li> <li>• Coaching Centre C(-2, 8) <math>\rightarrow (x_2, y_2)</math></li> </ul> $d = \sqrt{(-2 - 3)^2 + (8 - 4)^2} \Rightarrow d = \sqrt{(-5)^2 + (4)^2} \Rightarrow d = \sqrt{25 + 16} \Rightarrow d = \sqrt{41}$ The shortest distance between her school and coaching centre is $\sqrt{41}$ units. <p>(ii) • A(-2, 4) <math>\rightarrow (x_1, y_1)</math></p> <ul style="list-style-type: none"> <li>• B(3, 4) <math>\rightarrow (x_2, y_2)</math></li> <li>• D(1, 4) <math>\rightarrow (x, y)</math></li> <li>• Ratio = <math>k: 1</math></li> </ul> <p>Using the <b>section formula</b> for the <math>x</math>-coordinate: <math>x = \frac{kx_2 + x_1}{k + 1} \Rightarrow 1 = \frac{k(3) + 1(-2)}{k + 1}</math>  <math>(k + 1) = 3k - 2 \Rightarrow 3 = 2k \Rightarrow k = \frac{3}{2}</math></p> <p>(iii) The area covered by the perpendicular lines from points A and B to the <math>x</math>-axis, the line segment AB, and the <math>x</math>-axis itself forms a rectangle with</p> <ul style="list-style-type: none"> <li>• Length <math>l = 5</math> units</li> <li>• Width <math>w = 4</math> units</li> </ul> <p>Area = <math>l \times w = 5 \times 4 = 20</math> sq. units</p> <p><b>(OR)</b></p>	<p>1</p> <p>1</p> <p>2</p> <p><b>(OR)</b></p>

	<p>The mid-point of AB, <math>M = \left( \frac{x_1+x_2}{2}, \frac{y_1+y_2}{2} \right)</math></p> <p><math>M = \left( \frac{-2+3}{2}, \frac{4+4}{2} \right) \Rightarrow M = \left( \frac{1}{2}, 4 \right)</math></p> <p>Image of M with respect to X axis = <math>\left( \frac{1}{2}, -4 \right)</math></p>	2
	<b>End of the Marking Scheme</b>	