

CLASS X PRE-BOARD EXAMINATION – 2024-25Q.P. Code: **041/2/1**

Roll No.

--	--	--	--	--	--	--	--

Candidate must write the Q.P. Code  
on the title page of the answer-book.

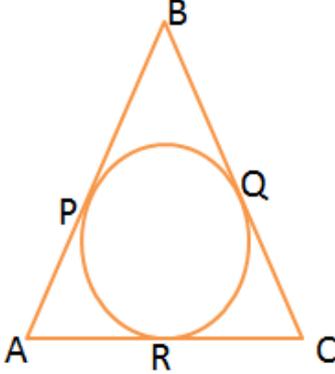
- Please check that this question paper contains **9** printed pages.
- Please check that this question paper contains **38** questions.
- Q.P. Code given on the right hand side of the question paper should be written on the title page of the answer-book by the candidate.
- **Please write down the serial number of the question in the answer-book before attempting it.**
- 15 minute time has been allotted to read this question paper. The students will read the question paper only and will not write any answer on the answer-book during this period.

**MATHEMATICS (STANDARD)***Time allowed : 3 hours**Maximum Marks : 80***General Instructions:**

*Read the following instructions very carefully and strictly 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**, Questions no. **1 to 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**, Questions no. **21 to 25** are very short answer (VSA) type questions, carrying **2** marks each.
5. In **Section C**, Questions no. **26 to 31** are short answer (SA) type questions, carrying **3** marks each.
6. In **Section D**, Questions no. **32 to 35** are long answer (LA) type questions, carrying **5** marks each.
7. In **Section E**, Questions no. **36 to 38** are case-study based questions carrying **4** marks each. Internal choice is provided in **2** marks question in each case-study.
8. There is no overall choice. However, an internal choice is provided in **2** Question of Section **B**, **2** Questions of Section **C** and **2** Questions of Section **D** and **3** questions of **2** marks in Section **E** 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  $\pi = 22/7$  wherever required if not stated.
10. Use of calculators is **NOT allowed**.

<b>SECTION A</b>	
<b>Directions(Q.Nos. 1 to 20): Multiple Choice Questions).Each question carries 1 mark</b>	
1	The number of polynomials having $-2$ and $5$ as zeroes is (a) 1      (b) 2      (c) 3      (d) infinitely many
2	If the system of equations $2x + 3y = 7$ and $(a + b)x + (2a - b)y = 21$ has infinitely many solutions, then (a) $a = 1, b = 5$ (b) $a = 5, b = 1$ (c) $a = -1, b = 5$ (d) $a = 5, b = -1$
3	If $P(2, 4), Q(0, 3), R(3, 6)$ and $S(5, y)$ are the vertices of a parallelogram $PQRS$ taken in order, then the value of $y$ is (a) 7      (b) 5      (c) $-7$ (d) $-8$
4	The number of real roots of the equation $(x - 1)^2 + (x - 2)^2 + (x - 3)^2 = 0$ , is (a) 1      (b) 2      (c) 3      (d) No real roots
5	If $\sin \theta - \cos \theta = 0$ , then the value of $\sin^6 \theta + \cos^6 \theta$ is (a) $\frac{2}{3}$ (b) 0      (c) $\frac{1}{3}$ (d) $\frac{1}{4}$
6	If the ratio of 18 <sup>th</sup> term to 11 <sup>th</sup> term of an A.P. is $3 : 2$ , then the ratio of the 21 <sup>st</sup> term to 5 <sup>th</sup> term is (a) $3 : 2$ (b) $1 : 3$ (c) $3 : 1$ (d) $2 : 3$
7	In the given figure, PQ is tangent to the circle with centre at O, at the point B. If $\angle AOB = 100^\circ$ , then $\angle ABP$ is equal to (a) $40^\circ$ (b) $60^\circ$ (c) $50^\circ$ (d) $80^\circ$
8	If zeroes of the quadratic polynomial $f(x) = (k^2 + 4)x^2 + 7x + 4k$ are reciprocal of each other, then the value of $k$ is (a) 1      (b) 2      (c) $-2$ (d) $-1$
9	The minute hand of a clock is $77$ cm long. The distance covered by the tip of minute hand from $10.10$ a.m. to $10.25$ a.m. is (a) $44$ cm      (b) $88$ cm      (c) $121$ cm      (d) $132$ cm

10	<p>The sum of the length, breadth and height of a cuboid is <math>6\sqrt{3}</math> cm and the length of its diagonal is <math>2\sqrt{3}</math> cm. The total surface area of the cuboid is</p> <p>(a) <math>96 \text{ cm}^2</math>      (b) <math>48 \text{ cm}^2</math>      (c) <math>72 \text{ cm}^2</math>      (d) <math>108 \text{ cm}^2</math></p>
11	<p>The probability that the drawn card from a pack of 52 cards is neither an ace nor a spade is</p> <p>(a) <math>\frac{35}{52}</math>      (b) <math>\frac{10}{13}</math>      (c) <math>\frac{19}{26}</math>      (d) <math>\frac{9}{13}</math></p>
12	<p>Given that <math>\sin(A + 2B) = \frac{\sqrt{3}}{2}</math> and <math>\cos(A + 4B) = 0</math>, where <math>A</math> and <math>B</math> are acute angles. The value of <math>A</math> is</p> <p>(a) <math>30^\circ</math>      (b) <math>45^\circ</math>      (c) <math>60^\circ</math>      (d) <math>90^\circ</math></p>
13	<p>The probability of guessing the correct answer to a certain question is <math>\frac{a}{b}</math>. If the probability of not guessing the correct answer to this question is <math>\frac{2}{3}</math>, then</p> <p>(a) <math>b = 4a</math>      (b) <math>b = 2a</math>      (c) <math>b = 3a</math>      (d) <math>b = a</math></p>
14	<p>In the given figure, <math>AB = BC = 10</math> cm. If <math>AC = 7</math> cm, then the length of <math>BP</math> is</p> <p>(a) 3.5 cm      (b) 7 cm      (c) 6.5 cm      (d) 5 cm</p> 
15	<p>At one end <math>A</math> of a diameter <math>AB</math> of a circle of radius 5 cm, tangent <math>XAY</math> is drawn to the circle. The length of the chord <math>CD</math> parallel to <math>XY</math> and at a distance 8 cm from <math>A</math> is</p> <p>(a) 4 cm      (b) 5 cm      (c) 6 cm      (d) 8 cm</p>
16	<p>If the height and base radius of a cone, each is increased by 50%, then the ratio between the volume of the given cone and the new cone is</p> <p>(a) 8 : 27      (b) 27 : 8      (c) 4 : 9      (d) 2 : 3</p>
17	<p>If <math>A(3, \sqrt{3})</math>, <math>B(0, 0)</math> and <math>C(3, k)</math> are the three vertices of an equilateral triangle <math>ABC</math>, then the value of <math>k</math> is</p> <p>(a) 2      (b) <math>-3</math>      (c) <math>\pm\sqrt{3}</math>      (d) <math>-\sqrt{2}</math></p>

18	<p>For the following distribution:</p> <table border="1" data-bbox="233 170 1098 286"> <tr> <td>Class</td> <td>0 – 5</td> <td>5 – 10</td> <td>10 – 15</td> <td>15 – 20</td> <td>20 – 25</td> </tr> <tr> <td>Frequency</td> <td>10</td> <td>15</td> <td>12</td> <td>20</td> <td>9</td> </tr> </table> <p>The sum of lower limits of median class and modal class is</p> <p>(a) 15      (b) 25      (c) 30      (d) 35</p>	Class	0 – 5	5 – 10	10 – 15	15 – 20	20 – 25	Frequency	10	15	12	20	9
Class	0 – 5	5 – 10	10 – 15	15 – 20	20 – 25								
Frequency	10	15	12	20	9								
	<p><b>Directions (Q.Nos. 19 to 20) :</b> In the following questions, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct option:</p> <p>a. Both Assertion(A) and Reason (R) are true and Reason(R) is the correct explanation of assertion(A).</p> <p>b. Both Assertion(A) and Reason (R) are true but Reason(R) is not the correct explanation of assertion(A).</p> <p>c. Assertion(A) is true but Reason (R) is false.</p> <p>d. Assertion (A) is false but Reason (R) is true.</p>												
19	<p>Assertion(A): If product of two numbers is 5780 and their HCF is 17, then their LCM is 340.</p> <p>Reason(R) : HCF is always a factor of LCM.</p>												
20	<p>Assertion (A) : If the median of a series exceeds the mean by 3, then mode exceeds the mean by 10.</p> <p>Reason(R): If mode = 12.3 and mean = 10.5, then the median is 11.1.</p>												
	<p style="text-align: center;"><b>SECTION – B</b></p> <p><b>Directions(Q.Nos.21 to 25): This section comprises of Very short answer type questions (VSA) of 2 marks each.</b></p>												
21	<p>If HCF of 144 and 80 is expressed in the form <math>5m - 9</math>, find the value of <math>m</math></p> <p style="text-align: center;"><b>OR</b></p> <p>Show that <math>6^n</math> cannot end with digit zero for any natural number <math>n</math>.</p>												
22	<p>If the mid-point of the line segment joining the points <math>A(3,4)</math> and <math>B(k,6)</math> is <math>P(x,y)</math> and <math>x + y - 10 = 0</math>, find the value of <math>k</math>.</p>												
23	<p>A box contains cards numbered 3, 5, 7, 9, 11, .....35, 37. A card is drawn at random from the box. Find the probability that the number on the drawn card is a prime number.</p> <p style="text-align: center;"><b>OR</b></p>												

	<p>On a particular day, Nisha and Usha could not decide on who would get to drive the car. They had one coin each and flipped their coins exactly three times. The following was agreed upon:</p> <ul style="list-style-type: none"> <li>• If Nisha gets two heads in a row, she would drive the car.</li> <li>• If Usha gets a head immediately followed by a tail, she would drive the car.</li> </ul> <p>Find the probability of Usha to drive the car that day ?</p>
24	Find the point on X-axis which is equidistant from the points $(2, -2)$ and $(-4, 2)$ .
25	If $\sqrt{3} \sin \theta - \cos \theta = 0$ and $0^\circ < \theta < 90^\circ$ , find the value of $\theta$ .
	<p><b>SECTION – C</b></p> <p><b>Directions(Q.Nos.26 to 31): This section comprises of short answer type questions (SA) of 3 marks each.</b></p>
26	The LCM of two number is 14 times their HCF. The sum of LCM and HCF is 600. If one number is 280, find the other number.
27	Find the zeroes of the quadratic polynomial $7y^2 - \frac{11}{3}y - \frac{2}{3}$ and verify the relationship between the zeroes and the coefficients.
28	<p>Had Aarush scored 8 more marks in a Mathematics test, out of 35 marks, 7 times these marks would have been 4 less than square of his actual marks. How many marks did he get in the test ?</p> <p style="text-align: center;"><b>OR</b></p> <p>Find the value of <math>k</math> for which one root of the quadratic equation <math>kx^2 - 14x + 8 = 0</math> is 6 times the other.</p>
29	If D and E are points on sides AB and AC respectively of a triangle ABC such that DE is parallel to BC and $BD = CE$ . Prove that $\Delta ABC$ is isosceles.
30	<p>The teacher asked the students to correctly complete the following sentence about the rhombus. "A rhombus has a side length of <math>x</math> units and one of its angles is equal to <math>\theta</math>. The ratio of the lengths of the two diagonals is dependent on _____".</p> <p>Ashima : only <math>x</math></p> <p>Prabhu: only <math>\theta</math></p> <p>Sushma : both <math>x</math> and <math>\theta</math></p> <p>Sushil: neither <math>x</math> nor <math>\theta</math></p> <p>Who answered the question correctly? Show your work and give valid reasons.</p> <p style="text-align: center;"><b>OR</b></p> <p>Prove that <math>2(\sin^6 \theta + \cos^6 \theta) - 3(\sin^4 \theta + \cos^4 \theta) + 1 = 0</math></p>
31	A chord AB of a circle of radius 10 cm makes a right angle at the centre of the circle. Find the area of the major and minor segments. (Take $\pi=3.14$ )

**SECTION – D**

**Directions(Q.Nos.32 to 35): This section comprises of Long answer type questions (LA) of 5 marks each.**

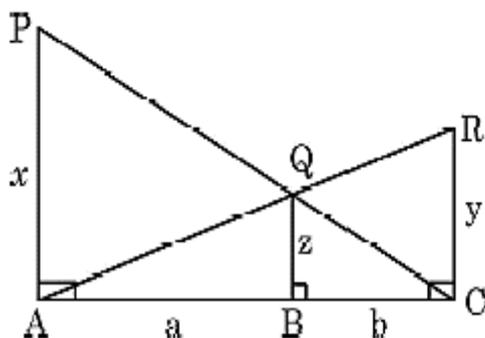
32 Vijay had some bananas, and he divided them into two lots A and B. He sold first lot at the rate of ₹ 2 for three bananas and the second lot at the rate of ₹ 1 per banana and got a total of ₹ 400. If he had sold the first lot at the rate of ₹ 1 per banana and the second lot at the rate of ₹ 4 per five bananas, his total collection would have been ₹ 460. Find the total number of bananas he had.

33 If the median of the following frequency distribution is 32.5, find the values of  $f_1$  and  $f_2$ .

Class	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	Total
Frequency	$f_1$	5	9	12	$f_2$	3	2	40

34  $PA$ ,  $QB$  and  $RC$  are each perpendicular to  $AC$ . If  $AP = x$ ,  $QB = z$ ,  $RC = y$ ,  $AB = a$  and

$BC = b$ , then prove that  $\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$ .

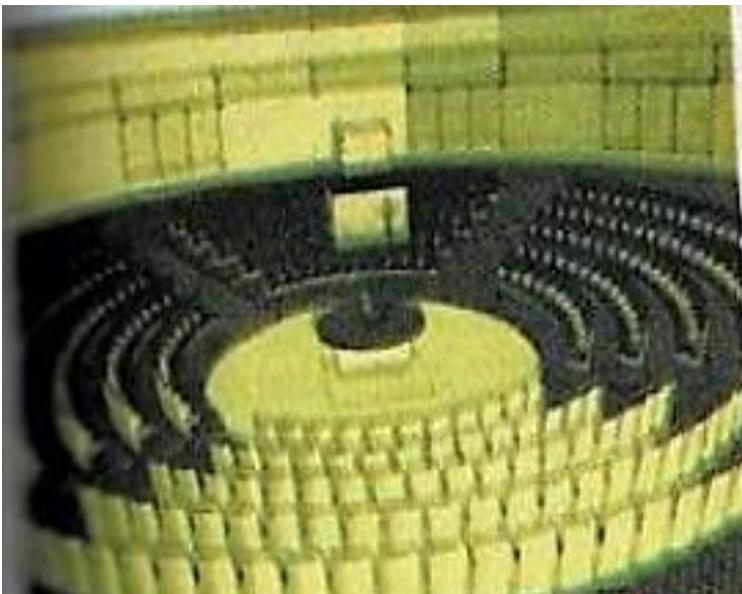


**OR**

Through the mid-point M of the side CD of a parallelogram ABCD, the line BM is drawn intersecting AC in L and AD produced in E. Prove that  $EL = 2 BL$ .

35	<p>A vertical tower stands on a horizontal plane and is surmounted by a vertical flag-staff of height <math>h</math>. At a point on the plane, the angles of elevation of the bottom and the top of the flag-staff are <math>\alpha</math> and <math>\beta</math> respectively. Prove that the height of the tower is <math>\frac{h \tan \alpha}{\tan \beta - \tan \alpha}</math>.</p> <p style="text-align: center;"><b>OR</b></p> <p>The angle of elevation of a jet plane from a point A on the ground is <math>60^\circ</math>. After a flight of 30 seconds, the angle of elevation changes to <math>30^\circ</math>. If the jet plane is flying at a constant height of <math>3600\sqrt{3}</math> m, find the speed of the jet plane.</p>
----	---

<p><b>SECTION – E</b></p> <p><b>This section comprises of 3 case-study/passage-based questions of 4 marks each with sub-parts.</b></p>
--

36	<p style="text-align: center;"><b>Case-Study 1:</b></p> <p>The school auditorium was to be constructed to accommodate at least 1500 people. The chairs are to be placed in concentric circular arrangement in such a way that each succeeding circular row has 10 seats more than the previous one.</p> <div style="text-align: center; margin: 10px 0;">  </div> <p>Based on the above information, answer the following questions.</p> <p>(i) If the first circular row has 30 seats, how many seats will be there in the 10<sup>th</sup> row ? (1)</p> <p>(ii) If there were 17 rows in the auditorium, how many seats will be there in the middle row ? (1)</p>
----	---

(iii) For 1500 seats in the auditorium, how many rows need to be there ? (2)

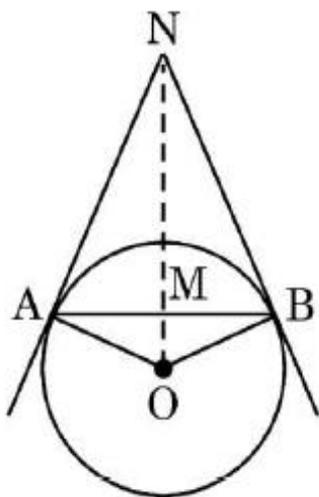
**OR**

(iii) If 1500 seats are to be arranged in the auditorium, how many seats are still left to be put after 10<sup>th</sup> row ? (2)

37

**Case Study 2:**

Circles play an important part in our life. When a circular object is hung on the wall with a cord at nail N, the cords NA and NB work like tangents. Observe the figure, given that  $\angle ANO = 30^\circ$  and  $OA = 5\text{cm}$ .



Based on the above, answer the following questions.

- (i) Find the distance AN. (1)
- (ii) Find the measure of  $\angle AOB$  (1)
- (iii) Find the total length of cords NA, NB and the chord AB. (2)

**OR**

- (iii) If  $\angle ANO = 45^\circ$ , then name the type of quadrilateral OANB. (2)  
Justify your answer.

38

**Case Study 3:**

Singing bowls (hemispherical in shape) are commonly used in sound healing practices. Mallet (cylindrical in shape) is used to strike the bowl in a sequence to produce sound and vibration.



One such bowl is shown here whose dimensions are:

Hemispherical bowl has outer radius 7 cm and inner radius 6 cm.

Mallet has height of 10 cm and radius 3 cm.

Based on the above, answer the following questions: (Use  $\pi = 3.14$ )

- (i) What is the volume of the material used in making the mallet? (1)
- (ii) The bowl is to be polished from inside. Find the inner surface area of the bowl. (1)
- (iii) (a) Find the volume of metal used to make the bowl. (2)

**OR**

- (iii) (b) Find the total surface area of the mallet. (2)