



Mathematics

Class X

Sample Question Paper 2022-23

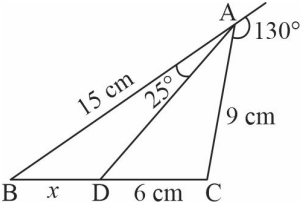
Max. Marks: 80

Time Allowed: 3 hours

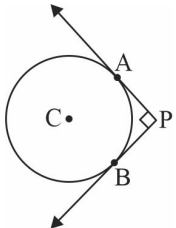
General Instructions:

- This question paper consists of 39 questions in 5 sections.
- All questions are compulsory. However, an internal choice is provided in some questions. A student is expected to attempt only one of these questions.
- Section A** consists of 20 objective type questions carrying 1 mark each.
- Section B** consists of 6 Very Short questions carrying 02 marks each. Answers to these questions should be in the range of 30 to 50 words.
- Section C** consists of 7 Short Answer type questions carrying 03 marks each. Answers to these questions should be in the range of 50 to 80 words.
- Section D** consists of 3 Long Answer type questions carrying 05 marks each. Answer to these questions should be in the range of 80 to 120 words.
- Section E** consists of 3 source-based/case-based units of assessment of 04 marks each with sub-parts.

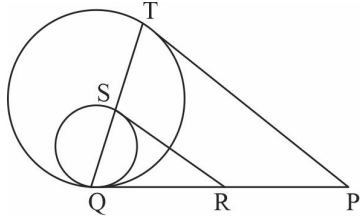
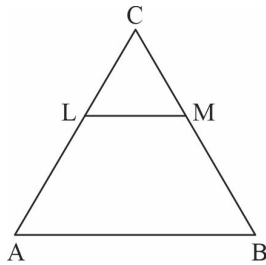
Section - A		
Q.No	Questions	Marks
1.	$\triangle ABC$ is a right triangle right-angled at A and $AD \perp BC$. Then $\frac{BD}{DC} =$ (a) $\frac{AB}{AD}$ (b) $\frac{AB}{AC}$ (c) $\left(\frac{AB}{AD}\right)^2$ (d) $\left(\frac{AB}{AC}\right)^2$	1

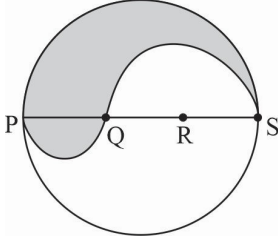
2.	<p>If α, β are the zeros of the polynomial $x^2 + 6x + 2$ then $\left(\frac{1}{\alpha} + \frac{1}{\beta}\right) = ?$</p> <p>(a) -3 (b) -12 (c) 3 (d) 12</p>	1
3.	<p>The pair of equations $5x - 15y = 8$ and $3x - 9y = \frac{24}{5}$ has:</p> <p>(a) Infinitely many solutions (b) No solution (c) Two solutions (d) One solution</p>	1
4.	<p>The larger of the two supplementary angles exceeds the smaller by 18°. The smaller angle is :</p> <p>(a) 99° (b) 81° (c) 100° (d) 180°</p>	1
5.	<p>Find the value of x given figure.</p>  <p>(a) 12 cm (b) 6 cm (c) 10 cm (d) 15 cm</p>	1
6.	<p>The probability of guessing the correct answer to a certain test questions is $\frac{x}{12}$. If the probability of not guessing the correct answer to this question is $\frac{2}{3}$, then $x =$</p> <p>(a) 6 (b) 4 (c) 2 (d) 3</p>	1
7.	<p>$\frac{\sin \theta}{1 + \cos \theta}$ is equal to:</p>	1

	(a) $\frac{1 - \sin \theta}{\cos \theta}$ (b) $\frac{1 - \cos \theta}{\cos \theta}$ (c) $\frac{1 - \cos \theta}{\sin \theta}$ (d) $\frac{1 + \cos \theta}{\sin \theta}$	
8.	If the mean of observations x_1, x_2, \dots, x_n is \bar{x} , then the mean of $x_1 + a, x_2 + a, \dots, x_n + a$ is: (a) $\bar{x} - a$ (b) $\frac{\bar{x}}{a}$ (c) $a\bar{x}$ (d) $\bar{x} + a$	1
9.	In $\triangle ABC$ and $\triangle DEF$, it is given that $\angle B = \angle E$, $\angle F = \angle C$ and $AB = 3DE$, then the two triangles are: (a) Congruent but not similar (b) Similar but not congruent (c) Neither congruent nor similar (d) Similar as well as congruent	1
10.	$(2 + \sqrt{2})$ is: (a) None of these (b) An integer (c) A rational number (d) An irrational number	1
11.	The discriminant of the quadratic equation $4x^2 - 6x + 3 = 0$ is: (a) 12 (b) -12 (c) $2\sqrt{3}$ (d) 84	1
12.	The distance between the points $(\sin \theta, \cos \theta)$ and $(\cos \theta, -\sin \theta)$ is: (a) $\sqrt{2}$ units (b) 2 units (c) $2\sqrt{2}$ units (d) $\sqrt{\sin \theta + \cos \theta}$ units	1

13.	<p>If $\sum f_i u_i = -7$, $u_i = \frac{x_i - a}{h}$, $\sum f_i = 25$, $a = 225$ and $h = 50$, then the value of \bar{x} is:</p> <p>(a) 211 (b) 212 (c) 214 (d) 213</p>	1
14.	<p>$\cot^2 \theta - \frac{1}{\sin^2 \theta} =$</p> <p>(a) $\tan^2 \theta$ (b) $\cos^2 \theta$ (c) -1 (d) 1</p>	1
15.	<p>A ladder 12 m long just reaches the top of a vertical wall. If the ladder makes an angle of 45° with the wall, then the height of the wall is:</p> <p>(a) 6 m (b) $12\sqrt{2}$ m (c) 12 m (d) $6\sqrt{2}$ m</p>	1
16.	<p>In figure, PA and PB are two tangents drawn from an external point P to a circle with centre C and radius 4 cm. If $PA \perp PB$, then the length of each tangent is:</p>  <p>(a) 5 cm (b) 3 cm (c) 4 cm (d) 8 cm</p>	1
17.	<p>In $\triangle ABC$ and $\triangle EDF$, $\frac{AB}{DE} = \frac{BC}{FD}$, then they will be similar, when:</p> <p>(a) $\angle B = \angle D$ (b) $\angle A = \angle D$ (c) $\angle A = \angle F$ (d) $\angle B = \angle E$</p>	1
18.	<p>If $x = 3$ is a solution of the equation $3x^2 + (k-1)x + 9 = 0$ then $k = ?$</p> <p>(a) 13 (b) -11</p>	1

	(c) 11 (d) -13	
19.	<p>Assertion: $(2 - \sqrt{3})$ is one zero of the quadratic polynomial then other zero will be $(2 + \sqrt{3})$, if all the coefficients are rational</p> <p>Reason: Irrational zeros (roots) always occurs in pairs.</p> <p>(a) Assertion and reason both are correct statements and reason is correct explanation for assertion.</p> <p>(b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.</p> <p>(c) Assertion is correct statement but reason is wrong statement.</p> <p>(d) Assertion is wrong statement but reason is correct statement</p>	1
20.	<p>Assertion : Two identical solid cubes of side 5 cm are joined end to end. The total surface area of the resulting cuboid is 300 cm^2.</p> <p>Reason : Total surface area of a cuboid is $2(lb + bh + lh)$</p> <p>(a) Assertion and reason both are correct statements and reason is correct explanation for assertion.</p> <p>(b) Assertion and reason both are correct statements but reason is not correct explanation for assertion.</p> <p>(c) Assertion is correct statement but reason is wrong statement.</p> <p>(d) Assertion is wrong statement but reason is correct statement</p>	1
Section – B		
21.	<p>Cards bearing numbers 1, 3, 5, ..., 35 are kept in a bag. A card is drawn at random from the bag. Find probability of getting a card bearing</p> <p>I. A prime number less than 15.</p> <p>II. A number divisible by 3 and 5.</p>	2
22.	<p>On comparing the ratios $\frac{a_1}{a_2}$, $\frac{b_1}{b_2}$ and $\frac{c_1}{c_2}$, find out whether the lines representing the pair of linear equations intersect at a point, are parallel or coincide: $9x + 3y + 12 = 0$; $18x + 6y + 24 = 0$</p>	2
23.	<p>If α and β are the zeros of the quadratic polynomial $f(x) = ax^2 + bx + c$, then evaluate: $\alpha^2\beta + \alpha\beta^2$</p>	2
24.	<p>Name the type of triangle PQR formed by the point $P(\sqrt{2}, \sqrt{2})$, $Q(-\sqrt{2}, -\sqrt{2})$ and $R(-\sqrt{6}, \sqrt{6})$.</p> <p style="text-align: center;">OR</p> <p>Let $A(4, 2)$, $B(6, 5)$ and $C(1, 4)$ be the vertices of triangle ABC. The median from A meets BC at D. Find the coordinates of the point D.</p>	2
25.	<p>From an external point P, two tangents PA and PB are drawn to the circle with centre O. Prove that OP is the perpendicular bisector of AB.</p> <p style="text-align: center;">OR</p> <p>In the following figure, PQ is the common tangent to both the circle. SR and PT are</p>	2

	<p>tangent to both the circles. If $SR = 4$ cm, $PT = 7$ cm, then find RP.</p> 															
26.	<p>Out of a group of swans, $\frac{7}{2}$ times the square root of the total number of swans are playing on the shore of a tank. Remaining two are playing, with amorous fight, in the water. What is the total number of swans?</p>	2														
Section – C																
27.	<p>In figure $LM \parallel AB$. If $AL = x - 3$, $AC = 2x$, $BM = x - 2$ and $BC = 2x + 3$, find the value of x.</p> 	3														
28.	<p>The two opposite vertices of a square are $(-1, 2)$ and $(3, 2)$. Find the coordinates of the other two vertices.</p> <p style="text-align: center;">OR</p> <p>Point A lies on the line segment PQ joining $P(6, -6)$ and $Q(-4, -1)$ in such a way that $\frac{PA}{PQ} = \frac{2}{5}$. If the point A also lies on the line $3x + k(y + 1) = 0$, find the value of k.</p>	3														
29.	<p>Show that $\frac{\sqrt{2}}{3}$ is irrational.</p>	3														
30.	<p>The angle of elevation of the top of a tower at a point on the level ground is 30°. After walking a distance of 100 m towards the foot of the tower along the horizontal line through the foot of the tower on the same level ground the angle of elevation to top of the tower is 60°, find the height of the tower.</p> <p style="text-align: center;">OR</p> <p>A tower subtends an angle α at a point A in the plane of its base and the angle of depression of the foot of the tower at a point B which is at 'b' meters above A is β.</p> <p>Prove that the height of the tower is $b \tan \alpha \cot \beta$.</p>	3														
31.	<p>100 surnames were randomly picked up from a local telephone directory and the frequency distribution of the number of letters in the English alphabets in the surnames was obtained as follows:</p> <table border="1" data-bbox="323 1824 1180 1904"><tr><td>Number of letters</td><td>1-4</td><td>4-7</td><td>7-10</td><td>10-13</td><td>13-16</td><td>16-19</td></tr><tr><td>Number of surnames</td><td>6</td><td>30</td><td>40</td><td>16</td><td>4</td><td>4</td></tr></table>	Number of letters	1-4	4-7	7-10	10-13	13-16	16-19	Number of surnames	6	30	40	16	4	4	3
Number of letters	1-4	4-7	7-10	10-13	13-16	16-19										
Number of surnames	6	30	40	16	4	4										

	Determine the median number of letters in the surnames. Find the mean number of letters in the surnames? Also, find the modal size of the surnames.	
32.	<p>The sum of the numerator and denominator of a fraction is 8. If 3 is added to both the numerator and denominator the fraction becomes $\frac{3}{4}$. Find the fraction.</p> <p>OR</p> <p>Abdul travelled 300 km by train and 200 km by taxi taking 5 hours 30 minutes. But, if he travels 260 km by train and 240 km by taxi, he takes 6 minutes longer. Find the speed of the train and that of the taxi.</p>	3
33.	In a right triangle ABC in which $\angle B = 90^\circ$, a circle is drawn with AB as diameter intersecting the hypotenuse AC at P . Prove that the tangent to the circle at P bisects BC .	3
Section – D		
34.	<p>Find the area of the segment of a circle of radius 12 cm whose corresponding sector central angle is 60°. (Use $\pi = 3.14$).</p> <p>OR</p> <p>$PQRS$ is a diameter of a circle of radius 6 cm. The lengths PQ, QR and RS equal. Semi circles are drawn on PQ and QS as diameters as shown in figure. Find the perimeter and area of the shaded region.</p> 	5
35.	A number x is selected at random from the number 1, 2, 3, and 4. Another number y is selected at random from the numbers 1, 4, 9 and 16. Find the probability that product of x and y is less than 16.	5
36.	Find the value of p for which the quadratic equation $(2p+1)x^2 - (7p+2)x + (7p-3) = 0$ has equal roots. Also find these roots.	5
Section - E		
37.	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 4 th year and 2600 cars in 8 th year. Assuming that the production increases uniformly by a fixed number every year.	4



Based on the above information answer the following questions.

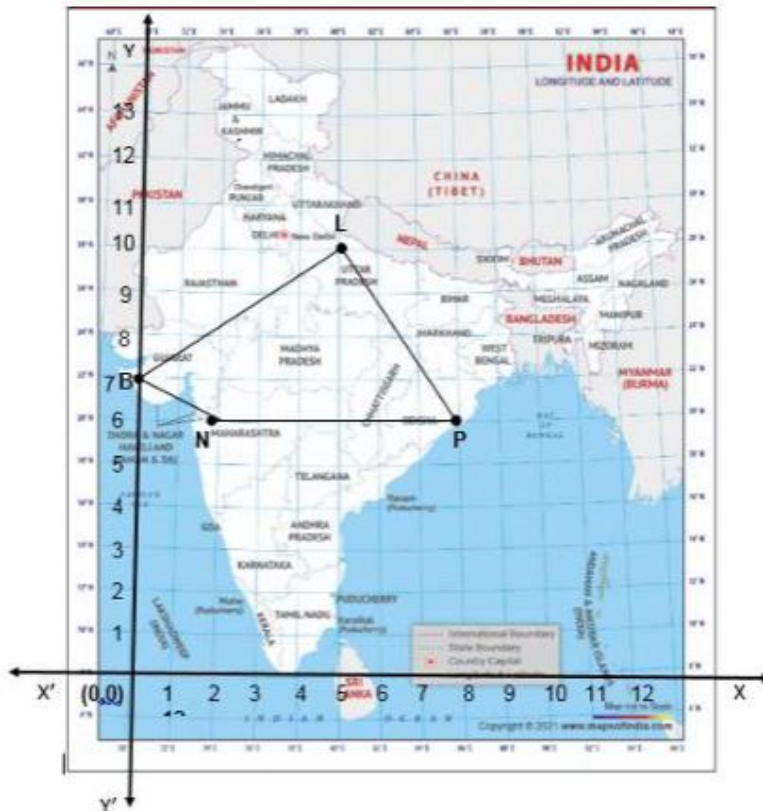
- I. Find the production in the 1st year.
- II. Find the production in the 12th year.
- III. Find the total production in first 10 years.

OR


In which year the total production will reach to **31200** cars?

38. In a GPS, The lines that run east-west are known as lines of latitude, and the lines running north-south are known as lines of longitude. The latitude and the longitude of a place are its coordinates and the distance formula is used to find the distance between two places. The distance between two parallel lines is approximately 150 km. A family from Uttar Pradesh planned a round trip from Lucknow (L) to Puri (P) via Bhuj (b) and Nashik (N) as shown in the given figure below.

4



Based on the above information answer the following questions using the coordinate

	<p>geometry.</p> <p>I. Find the distance between Lucknow (L) to Bhuj (B).</p> <p>II. If Kota (K), internally divide the line segment joining Lucknow (L) to Bhuj (B) into 3 : 2 then find the coordinate of Kota (K).</p> <p>III. Name the type of triangle formed by the places Lucknow (L), Nashik (N) and Puri (P)</p> <p style="text-align: center;">OR</p> <p>Find a place (point) on the longitude (y-axis) which is equidistant from the points Lucknow (L) and Puri (P).</p>	
39.	<p>Lakshaman Jhula is located 5 kilometers north-east of the city of Rishikesh in the Indian state of Uttarakhand. The bridge connects the villages of Tapovan to Jonk. Tapovan is in Tehri Garhwal district, on the west bank of the river, while Jonk is in Pauri Garhwal district, on the east bank. Lakshman Jhula is a pedestrian bridge also used by motorbikes. It is a landmark of Rishikesh. A group of Class X students visited Rishikesh in Uttarakhand on a trip. They observed from a point (P) on a river bridge that the angles of depression of opposite banks of the river are 60° and 30° respectively. The height of the bridge is about 18 meters from the river.</p>  <p>Based on the above information answer the following questions.</p> <p>I. Find the distance PA.</p> <p>II. Find the distance PB.</p> <p>III. Find the width AB of the river.</p> <p style="text-align: center;">OR</p> <p>Find the height BO if the angle of the elevation from P and Q be 30°.</p>	4