



Class - X
Pre-Board
(2022-23)
Mathematics (Standard)

Date : 23 Jan 2023
Time: 3hrs.

Roll No.: 14...
M.M : 80

General Instructions :

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

SECTION - A		Marks
1.	Let a and b be two positive integers such that $a = p^3 q^4$ and $b = p^2 q^3$, where p and q are prime numbers. If $HCF(a,b) = p^m q^n$ and $LCM(a,b) = p^r q^s$, then $(m+n)(r+s) =$ _____ a) 15 b) 30 c) 35 d) 72	(1)
2.	The roots of quadratic equation $2x^2 + x + 4 = 0$ are _____ a) positive and negative <input checked="" type="checkbox"/> b) both positive c) both negative d) no real roots	(1)
3.	If α and β are the zeros of a polynomial $f(x) = px^2 - 2x + 3p$ and $\alpha + \beta = \alpha\beta$, then p is _____ a) $-\frac{2}{3}$ b) $\frac{2}{3}$ c) $\frac{1}{3}$ d) $-\frac{1}{3}$	(1)
4.	If the system of equations $2x + 3y = 7$, $2ax + (a + b)y = 28$ has infinitely many solutions, then _____ a) $a = 2b$ b) $b = 2a$	(1)

	c) $a + 2b = 0$	d) $2a + b = 0$	
5.	If the vertices of a parallelogram PQRS taken in order are P(3,4), Q(-2,3) and R(-3,-2), then the coordinates of its fourth vertex S are _____		(1)
	a) (-2,-1)	b) (-2,-3)	c) (2,-1) d) (1,2)
6.	$\Delta ABC \sim \Delta PQR$. If AM and PN are altitudes of ΔABC and ΔPQR respectively and $AB^2 : PQ^2 = 4 : 9$, then AM:PN = _____		(1)
	a) 3:2	b) 16:81	c) 4:9 d) 2:3
7.	Given that $\sin \alpha = \frac{1}{2}$ and $\cos \beta = \frac{1}{2}$, then the value of $\sin(\alpha + \beta)$ is _____		(1)
	a) 0	b) $\frac{3}{2}$	c) $\frac{1}{2}$ d) 1
8.	If $\sin \theta + \cos \theta = \sqrt{2}$, then $\tan \theta + \cot \theta =$ _____		(1)
	a) 1	b) 2	c) 3 d) 4
9.	If ΔABC is similar to ΔDEF such that $2 AB = DE$ and $BC = 8$ cm then EF is equal to _____		(1)
	a) 12 cm	b) 4 cm	c) 16 cm d) 8 cm
10.	ABCD is a trapezium with $AD \parallel BC$ and $AD = 4$ cm. If the diagonals AC and BD intersect each other at O such that $\frac{AO}{OC} = \frac{DO}{OB} = \frac{1}{2}$, then BC = _____		(1)
	a) 6cm	b) 7cm	c) 8cm d) 9 cm
11.	In the given figure, AB is a chord of the circle and AOC is its diameter such that $\angle ACB = 50^\circ$. If AT is the tangent to the circle at the point A, the $\angle BAT$ is equal to _____		(1)
	a) 65°	b) 60°	c) 50° d) 40°
12.	The area of the circle that can be inscribed in a square of 6cm is _____		(1)
	a) $36\pi \text{ cm}^2$	b) $18\pi \text{ cm}^2$	c) $12\pi \text{ cm}^2$ d) $9\pi \text{ cm}^2$
13.	The sum of the length, breadth and height of a cuboid is $6\sqrt{3}$ cm and the length of its diagonal is $2\sqrt{3}$ cm. The total surface area of the cuboid is _____		(1)

2r(b+bh+hr)

- a) 48 cm^2 b) 72 cm^2 c) 96 cm^2 d) 108 cm^2

14. Mode is the _____.
 a) middle most frequent value b) least frequent value
 c) most frequent value d) none of these (1)

15. The number of revolutions made by a circular wheel of radius 0.25m in rolling a distance of 11km is _____.
 a) 2800 b) 4000 ~~c) 5500~~ d) 7000 (1)

16. For the following distribution, the number of students who got marks less than 30 is _____.
 (1)

Marks	0-10	10-20	20-30	30-40	40-50
No. of Students	3	9	13	10	5

~~a) 13~~ b) 25 c) 10 d) 12

17. Two dice are rolled simultaneously. What is the probability that 6 will come up at least once?
 a) $\frac{1}{6}$ b) $\frac{7}{36}$ c) $\frac{11}{36}$ d) $\frac{13}{36}$ (1)

18. $\frac{1 + \tan^2 A}{1 + \cot^2 A}$ is equal to _____.
 a) $\sec^2 A$ b) -1 c) $\cot^2 A$ d) $\tan^2 A$ (1)

DIRECTION: In the questions 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option.

19. **Statement A (Assertion):** If product of two numbers is 5780 and their HCF is 17, then their LCM is 340
Statement R (Reason): HCF is always a factor of LCM
 a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)
 b) Both assertion (A) and reason (R) are true but reason (R) is not the correct (1)

- e) explanation of assertion (A)
- e) Assertion (A) is true but reason (R) is false.
- d) Assertion (A) is false but reason (R) is true.

20. **Statement A (Assertion):** The value of y is 6, for which the distance between the points $P(2, -3)$ and $Q(10, y)$ is 10.

Statement R (Reason): Distance between two given points $A(x_1, y_1)$ and $B(x_2, y_2)$ is given by $AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

- a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)
- b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A)
- c) Assertion (A) is true but reason (R) is false.
- d) Assertion (A) is false but reason (R) is true.

(1)

SECTION-B

Section B consists of 5 questions of 2 marks each.

(2)

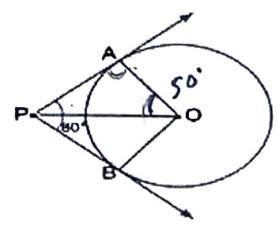
21. Point P divides the line segment joining the points $A(3, -5)$ and $B(-4, 8)$ such that $\frac{AP}{PB} = \frac{K}{1}$. If P lies on the line $x + y = 0$, then find the value of K. (3:4)

$x = 0.4$

22. Find whether the following pair of linear equations has a unique solution. If yes, find the $7x - 4y = 49$ and $5x - y = 22$ $x = 3$ $y = -7$

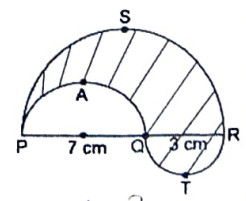
(2)

23. If tangents PA and PB from a point P to a circle with centre O are inclined to each other at angle of 80° , then find $\angle POA$.



(2)

24. In the figure, PSR, RTQ and PAQ are three semicircles of diameters 10 cm, 3 cm and 7 cm respectively. Find the perimeter of the shaded region. [Use $\pi = 3.14$]

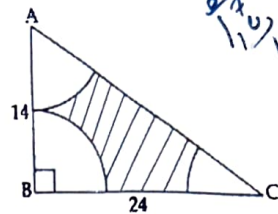


(2)

OR

Handwritten calculations and scribbles are present at the bottom of the page, including numbers like 100, 112, 118, 132, 138, 144, 150, 156, 162, 168, 174, 180, 186, 192, 198, 204, 210, 216, 222, 228, 234, 240, 246, 252, 258, 264, 270, 276, 282, 288, 294, 300.

In the given figure, ABC is a triangle right angled at B, with AB = 14 cm and BC = 24 cm. With the vertices A, B and C as centres, arcs are drawn, each of radius 7 cm. Find the area of the shaded region. (Use $\pi = 22/7$)



25. If $\sin(A+B) = 1$ and $\cos(A-B) = \frac{\sqrt{3}}{2}$, $0^\circ < A+B \leq 90^\circ$ and $A > B$, then find the measures of angles A and B.

OR

Find an acute angle θ when $\frac{\cos\theta - \sin\theta}{\cos\theta + \sin\theta} = \frac{(1-\sqrt{3})}{(1+\sqrt{3})}$

SECTION-C

Section C consists of 6 questions of 3 marks each

26. Anni, Ria and Sohu start preparing cards for all persons of an old age home. In order to complete one card, they take 10, 16 and 20 minutes respectively. If all of them started together, after what time will they start preparing a new card together?

27. Find the zeroes of $p(x) = 2x^2 - x - 6$ and verify the relationship of zeroes with these co-efficients.

28. A train covered a certain distance at a uniform speed. If the train would have been 6 km/h faster, it would have taken 4 hours less than the scheduled time. And, if the train were slower by 6 km/hr; it would have taken 6 hours more than the scheduled time. Find the length of the journey.

OR

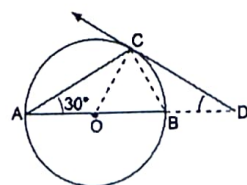
Anuj had some chocolates, and he divided them into two lots A and B. He sold the first lot at the rate of ₹ 2 for 3 chocolates and the second lot at the rate of ₹ 1 per chocolate, and got a total of ₹ 400. If he had sold the first lot at the rate of ₹ 1 per chocolate, and the second lot at the rate of ₹ 4 for 5 chocolates, his total collection would have been ₹ 460. Find the total number of chocolates he had.

29. Prove that $\frac{\tan^3\theta}{1+\tan^2\theta} + \frac{\cot^3\theta}{1+\cot^2\theta} = \sec\theta \operatorname{cosec}\theta - 2\sin\theta \cos\theta$

30. Prove that a parallelogram circumscribing a circle is a rhombus.

OR

AB is a diameter of a circle and AC is its chord such that $\angle BAC = 30^\circ$. If the tangent at C intersects AB extended at D, then prove that $BC = BD$.



31. In a single throw of a pair of different dice, what is the probability of getting
- $\frac{1}{6}$ a prime number on each dice? $\frac{1}{6} \times \frac{1}{6} = \frac{1}{36}$
 - a total of 9 or 11? $\frac{2}{36} = \frac{1}{18}$
 - is a doublet of odd numbers.

(3)

SECTION-D

Section D consists of 4 questions of 5 marks each.

32. In a rectangular park of dimensions 50 m × 40 m, a rectangular pond is constructed so that the area of grass strip of uniform width surrounding the pond would be 1184 m². Find the length and breadth of the pond.

OR

A part of monthly hostel charges is fixed and the remaining depends on the number of days one has taken food in the mess. When a student A takes food for 20 days, she has to pay 2600 as hostel charges whereas a student B, who takes food for 26 days, pays 3020 as hostel charges. Find the fixed charges and the cost of food per day.

(5)

- In a $\triangle ABC$ right angled at A, $AD \perp BC$. If $BD=2$ cm and $CD=8$ cm, find AD.
- Prove that a line through the point of intersection of the diagonals and parallel to the base of the trapezium divides the non parallel sides in the same ratio.

(2)

(3)

34. From a wooden solid cylinder of height 20 cm and diameter 12 cm, a conical cavity of height 8 cm and radius 6 cm is hollowed out. Find the total surface area of the remaining solid. Also find the volume of the remaining wood.

OR

There are two identical solid cubical boxes of side 7cm. From the top face of the first cube a hemisphere of diameter equal to the side of the cube is scooped out. This hemisphere is inverted and placed on the top of the second cube's surface to form a dome. Find (i) the ratio of the total surface area of the two new solids formed (ii) volume of each new solid formed.

(5)

35. An aircraft has 120 passenger seats. The number of seats occupied during 100 flights are given in the following table :

Number of seats	100-104	104-108	108-112	112-116	116-120
Frequency	15	20	32	18	15

(5)

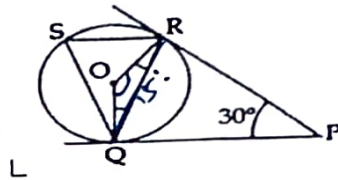
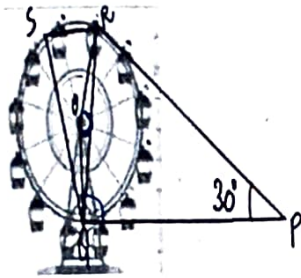
Determine the mean number of seats occupied over the flights. Also find the mode.

Handwritten calculations for the mean and mode of the data in question 35. The mean is calculated as $\frac{120 \times 15 + 112 \times 20 + 108 \times 32 + 112 \times 18 + 116 \times 15}{100} = \frac{2350}{100} = 23.5$. The mode is 108.

SECTION-E

Case study based questions are compulsory.

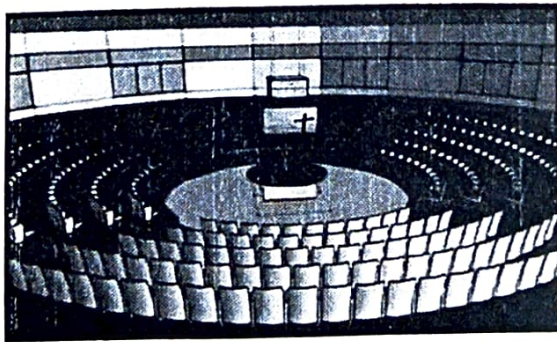
36. A Ferris wheel (or a big wheel in the United Kingdom) is an amusement ride consisting of a rotating upright wheel with multiple passenger-carrying components (commonly referred to as passenger cars, cabins, tubs, capsules, gondolas, or pods) attached to the rim in such a way that as the wheel turns, they are kept upright, usually by gravity.
- After taking a ride in the Ferris wheel, Aarti came out from the crowd and was observing her friends who were enjoying the ride. She was curious about the different angles and measures that the wheel will form. She forms the figure as given below.



1. In the given figure find $\angle ROQ$
2. Find $\angle RQP$
3. Find $\angle RSQ$

(1)
(1)
(2)

37. A school auditorium has 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.



- i) If the first circular row has 30 seats, how many seats will be there in the 10th row?
- ii) For 1500 seats in the auditorium, how many rows need to be there?

(1)
(1)

OR

If 1500 seats are to be arranged in the auditorium, how many seats are still

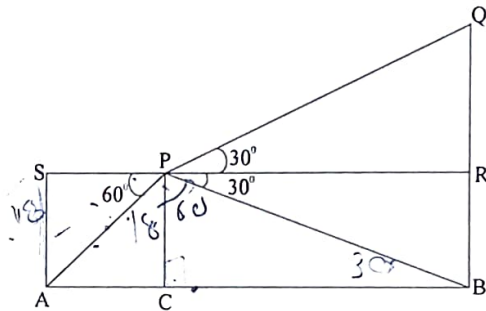
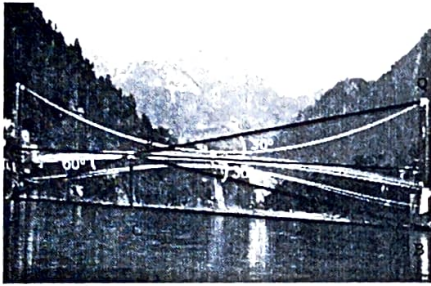
left to be put after 10th row?

iii) If there were 17 rows in the auditorium, how many seats will be there in the middle row?

(2)

38. Lakshman 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.



Based on the above information answer the following questions.

1. Find the distance PA.
2. Find the distance PB
3. Find the width AB of the river.

OR

Find the height BQ if the angle of the elevation from P to Q be 30° .

(1)

(1)

(2)