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Candidates must write the Code on the title page of the answer book.

- Please check that this question paper contains 12 printed pages.
- Code number 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 check that this question paper contains 38 questions.
- Please write down the Serial Number of the question before attempting it.
- 15 minutes 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.

II PRE-BOARD EXAMINATION : 2023-24
CLASS : X
MATHEMATICS [STANDARD] [041]

Time Allowed : 3 hours

Maximum Marks : 80

General Instructions :

- This question paper has 5 Sections A, B, C, D and 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 sub part of the values of 1, 1 and 2 marks each respectively.*

- vii) 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. In internal choice has been provided in the 2 marks questions of section-E.
- viii) Draw neat figures wherever required. Take $\pi = \frac{22}{7}$ wherever required if not stated.

SECTION - A

Section-A has 20 MCQs carrying 1 mark each.

1. If α and $\frac{1}{\alpha}$ are the zeroes of the quadratic polynomial $2x^2 - x + 8k$ then k is : 1
- (a) 4 (b) $\frac{1}{4}$
(c) $-\frac{1}{4}$ (d) 2
2. The pair of linear equations $x + 2y = 3$ and $2x + 4y = 7$ has : 1
- (a) unique solution
(b) no solution
(c) infinitely many solutions
(d) only solution (0, 0)
3. The roots of the quadratic equation $3x^2 - 6x = 0$ is/ are : 1
- (a) only 2
(b) only 3
(c) 0 and 6
(d) 0 and 2

4. In figure $PC = 5$ cm, $BR = 6$ cm, $AQ = 4$ cm. The perimeter of ΔABC is :

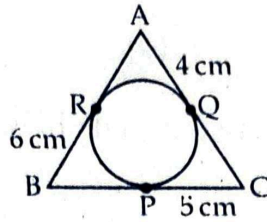
1

(a) 30 cm

(b) 60 cm

(c) 45 cm

(d) 15 cm



5. Rohan is 6 feet tall. At an instant, his shadow is 5 feet long. At the same instant, the shadow of a pole is 30 feet long. How tall is the pole ?

1

(a) 12 feet

(b) 24 feet

(c) 30 feet

(d) 36 feet

6. If $C(k, 4)$ divides the join of the points $A(2, 6)$ and $B(5, 1)$ in the ratio $2 : 3$ then

value of k is :

1

(a) 16

(b) $\frac{28}{5}$

(c) $\frac{16}{5}$

(d) $\frac{8}{5}$

7. The total number of factors of a prime even number is :

1

(a) 2

(b) 1

(c) 0

(d) 3

8. An AP 5, 12, 19, has 50 terms. Its last term is :

(a) 343

(b) 353

(c) 348

(d) 362

9. If the length of shadow of a tower is equal to its height. What is the angle of elevation of the sun ?

(a) 30°

(b) 45°

(c) 60°

(d) 90°

10. The sum of first 16 terms of the AP 10, 6, 1 is :

(a) 320

(b) -320

(c) -352

(d) -400

11. Value of $(\sec^2 \theta - \tan^2 \theta)$ is :

(a) 0

(b) $\frac{1}{2}$

(c) $\frac{\sqrt{3}}{2}$

(d) 1

12. Shown below is a solved trigonometric problem :

$$\begin{aligned} & 1 - \frac{\cot^2 \alpha}{1 + \operatorname{cosec} \alpha} \\ &= 1 - \frac{1 - \operatorname{cosec}^2 \alpha}{1 + \operatorname{cosec} \alpha} \quad \text{step - 1} \\ &= 1 - \frac{(1 + \operatorname{cosec} \alpha)(1 - \operatorname{cosec} \alpha)}{(1 + \operatorname{cosec} \alpha)} \quad \text{step - 2} \\ &= 1 - (1 - \operatorname{cosec} \alpha) \quad \text{step - 3} \\ &= 1 - 1 + \operatorname{cosec} \alpha \quad \text{step - 4} \\ &= \operatorname{cosec} \alpha \end{aligned}$$

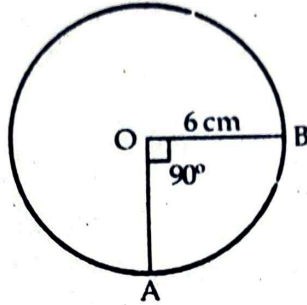
In which step is there an error in solving ?

- (a) step 1 (b) step 3
(c) step 3 (d) step 4

13. In figure radius of circle is 6 cm. Area of major sector is :

1

- (a) $3\pi\text{ cm}^2$
(b) $6\pi\text{ cm}^2$
(c) $27\pi\text{ cm}^2$
(d) $15\pi\text{ cm}^2$



14. Formula of length of an arc of a circle is :

1

- (a) $\pi r^2 \frac{\theta}{360^\circ}$
(b) $\pi r \frac{\theta}{180^\circ}$
(c) $2\pi r \frac{\theta}{180^\circ}$
(d) $\pi r \frac{\theta}{360^\circ}$

15. A shuttle cock used for playing badminton has the shape of the combination of :

1

- (a) a cylinder and a sphere
(b) a cone and a hemisphere
(c) a sphere and a cone
(d) a cylinder and a cone

16. For the following distribution upper limit of modal class is :

1

Class	0-6	6-12	12-18	18-24	24-30
Frequency	13	10	15	8	11

- (a) 12 (b) 15
(c) 18 (d) 24

17. If the mean of data is 27 and mode is 45 then median is :

1

- (a) 30 (b) 27
(c) 32 (d) 33

18. If $P(A)$ denotes the probability of an event A , then which is true ?

1

- (a) $P(A) < 0$
(b) $P(A) > 1$
(c) $0 \leq P(A) \leq 1$
(d) $-1 \leq P(A) \leq 1$

In question number 19 and 20 STATEMENT-1 (Assertion) and STATEMENT-2 (Reason) and has following four choices (a), (b), (c) and (d), only one of which is the correct answer.

Mark the correct choice.

- (a) Both statements are true and statement - 2 is correct explanation of statement - 1
(b) Both statements are true but statement - 2 is not correct explanation of statement - 1
(c) Statement - 1 is true, statement - 2 is false.
(d) Statement - 1 is false, statement - 2 is true.

19. **Statement-1 (Assertion)** : If the system of equations $3x + 6y = 10$ and $2x - ky + 5 = 0$ is inconsistent, then $k = -4$. 1

Statement-2 (Reason) : The system of equations $a_1x + b_1y + c_1 = 0$ and

$a_2x + b_2y + c_2 = 0$ is inconsistent iff $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

20. **Statement-1 (Assertion)** : A tangent to a circle is perpendicular to the radius through the point of contact. 1

Statement-2 (Reason) : The lengths of tangents drawn from an external point to a circle are equal.

SECTION - B

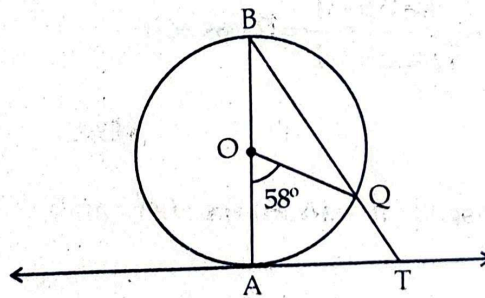
Section - B consists of 5 questions of 2 marks each.

21. The HCF and LCM of two numbers are 9 and 360 respectively, if one number is 45, find the other number. 2

22. Which term of the A.P. $-4, -1, 2, \dots$ is 101? 2

23. In figure AB is diameter of a circle with centre O and AT is a tangent if 2

$\angle AOQ = 58^\circ$, find $\angle ATQ$.



24. If $A = 30^\circ$ and $B = 30^\circ$, verify that 2

$$\sin(A + B) = \sin A \cos B + \cos A \sin B$$

OR

If $\tan(A+B) = \sqrt{3}$ and $\tan(A-B) = \frac{1}{\sqrt{3}}$, $0^\circ < A + B < 90^\circ$, $A > B$, find A and B.

25. If α and β are the zeroes of the polynomial $x^2 + x - 6$, find the value of $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$ 2

OR

Find the zeroes of the polynomial $\sqrt{3}x^2 - 11x + 6\sqrt{3}$

SECTION - C

Section C consists of 6 questions of 3 marks each.

26. Find the co-ordinates of a point on the x-axis which is equidistant from the points A(2, -5) and B(-2, 9) 3

OR

Find the ratio in which the line segment joining A(1, -5) and B(-4, 5) is divided by the x-axis. Also find the co-ordinates of the point of division.

27. A chord of a circle of radius 14 cm subtends an angle of 60° at the centre. Find the area of the corresponding minor segment of the circle.

[Use $\pi = \frac{22}{7}$ and $\sqrt{3} = 1.73$] 3

28. Prove that : 3

$$\sqrt{\frac{\sec \theta + 1}{\sec \theta - 1}} + \sqrt{\frac{\sec \theta - 1}{\sec \theta + 1}} = 2 \operatorname{cosec} \theta$$

OR

Prove that : $\sec \theta (1 - \sin \theta) (\sec \theta + \tan \theta) = 1$

29. Find the solution of the pair of equations $\frac{x}{10} + \frac{y}{5} = 1$ and $\frac{x}{8} + \frac{y}{6} = 1$. Hence

find λ if $y = \lambda x + 5$ 3

30. A class teacher has the following absentee record of 40 students of a class for the whole term. Find the mean number of days a student was absent. (By Assumed mean method)

Number of days	0-6	6-12	12-18	18-24	24-30	30-36	36-42
No. of students	10	11	7	4	4	3	1

31. Solve for x : $\frac{1}{x+3} + \frac{1}{2x-1} = \frac{11}{7x+9}$, $x \neq -3, \frac{1}{2}, \frac{-9}{7}$ 3

SECTION - D

Section D consists of 4 questions of 5 marks each.

32. The sum of first n terms of an AP is given by $S_n = (3n^2 - 4n)$. Find it's : 5

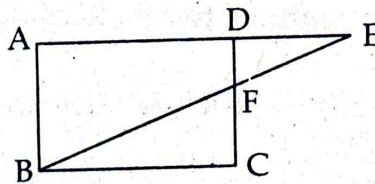
(i) n^{th} term

(ii) first term

(iii) common difference

33. (a) State and prove Basic Proportionality theorem. 5

(b) The side AD of a parallelogram ABCD is produced to a point E. BE intersects CD at F. Show that $\triangle ABE \sim \triangle CFB$



34. The shadow of a tower standing on a level ground is found to be 40 m longer when the Sun's altitude is 30° than when it was 60° . Find the height of tower. 5
(Use $\sqrt{3} = 1.732$).

OR

A man standing on the deck of a ship, which is 10 m above the water level, observes the angle of elevation of the top of a hill as 60° and the angle of depression of the base of the hill as 30° . Calculate the distance of the hill from the ship and the height of the hill.

35. Solve graphically the system of linear equations :

5

$$4x - 3y + 4 = 0 \text{ and } 4x + 3y - 20 = 0$$

Find the area bounded by these lines and x-axis.

OR

The sum of a two digit number and the number obtained by reversing the order of its digit is 165. If the digits differ by 3, find the number.

SECTION - E

Case Study Based questions are compulsory.

36. In two dice game, the player take turns to roll both dice, they can roll as many times as they want in one turn. A player scores the sum of the two dice thrown and gradually reaches a higher score as they continue to roll. If a single number 1 is thrown on either die, the score for that whole turn is lost. Two dice are thrown simultaneously.



On the basis of above information, answer the following questions :

(i) Find the probability of getting the sum as an even number.

2

OR

Find the probability of getting the sum as a prime number.

(ii) Find the probability of getting the sum of atleast 10. 1

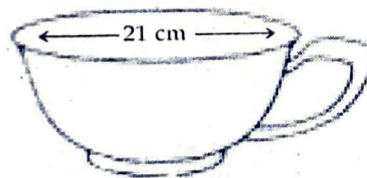
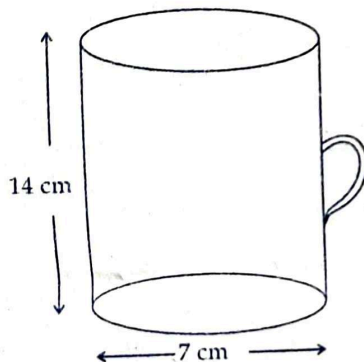
(iii) Find the probability of getting a doublet of even number. 1

37. In a coffee shop, coffee is served in two types of cups one is cylindrical in shape with diameter 7 cm. and height 14 cm and the other is hemispherical with diameter 21 cm.

Based on the above , answer the following :

(i) Find the area of the base of the cylindrical cup. 1

(ii) (a) What is the capacity of the hemispherical cup ? 2

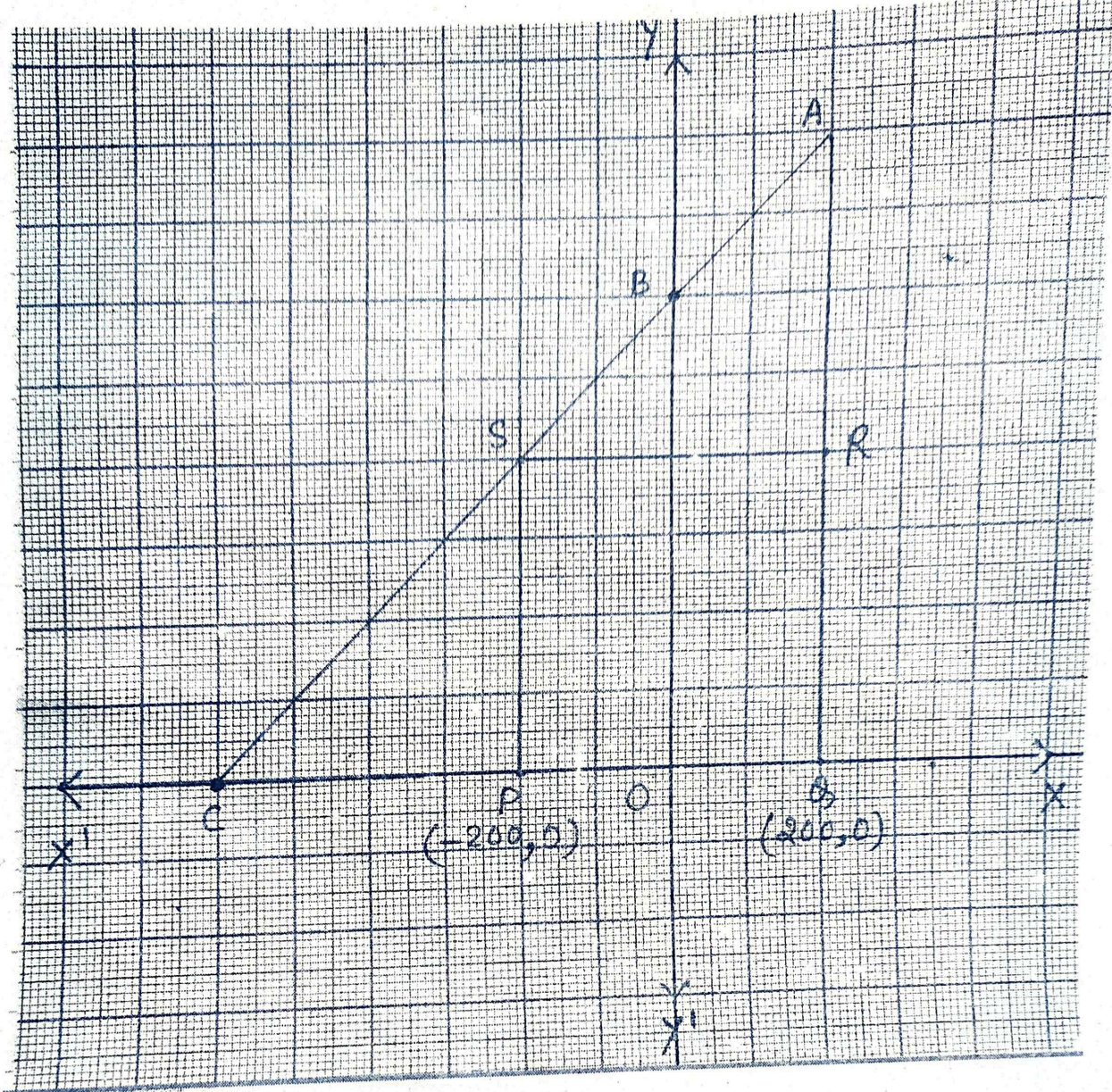


OR

(b) Find the capacity of the cylindrical cup.

(iii) What is the curved surface area of the cylindrical cup ? 1

38. Jagdish has a field which is in the shape of a right angled triangle AQC. He wants to leave a space in the form of a square PQRS inside the field for growing wheat and the remaining for growing vegetables (as shown is figure). In the field, there is a pole marked as O.



Based on the above information, answer the following question :

(i) Taking O as origin, co-ordinates of P are $(-200, 0)$ and of Q are $(200, 0)$. PQRS is being a square. What are the co-ordinates of R and S ?

(ii) (a) What is the area of a square PQRS ?

OR

(b) What is the length of diagonal PR in square PQRS.

(iii) If S divides CA in the ratio $K : 1$, what is the value of K, where point A is $(200, 800)$?

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