CHENNAI SAHODAYA SCHOOLS COMPLEX

(General Instructions)

❖ Please check that this question paper contains ___8___ printed pages.

❖ Please check that this question paper contains __38__ questions.

❖ Please write down the serial number of the question before attempting it.

❖ Reading time of 15 minutes is given to read the question paper alone. No writing during this time.

COMMON EXAMINATION
Class-10- SET 1
(MATHEMATICS -041)

Roll No.:

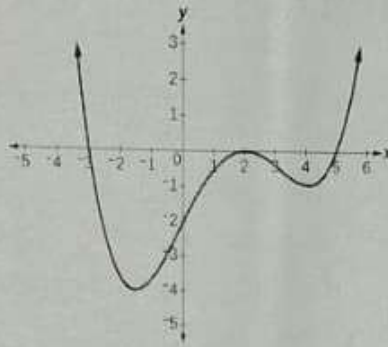**Date: 13/12/25**

Maximum Marks:80

Time allowed: 3 hours

1. This question paper contains 38 questions.

2. This Question Paper is divided into 5 Sections A, B, C, D and E.

3. In Section A, Questions no. 1-18 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. 21-25 are very short answer (VSA) type questions, carrying 02 marks each.

5. In Section C, Questions no. 26-31 are short answer (SA) type questions, carrying 03 marks each.

6. In Section D, Questions no. 32-35 are long answer (LA) type questions, carrying 05 marks each.

7. In Section E, Questions no. 36-38 are case study based questions carrying 4 marks each with sub parts of the values of 1, 1 and 2 marks each respectively.

8. All Questions are compulsory. However, an internal choice in 2 Question of Section B, 2 Questions of Section C and 2 Questions of Section D 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.

10. Take $\pi =22/7$ wherever required if not stated.

11. Use of calculators is not allowed.

SECTION A

1. If n is a natural number, then 8^n ends with the digit except

a) 4   b) 6   c) 2   d) 0

2. If the product of two co prime numbers is 553, then their HCF is

a) 1   b) 553   c) 7   d) 79

3. If α and β be the zeroes of the quadratic polynomial $2x^2 + 5x + 1$, then value of $\alpha\beta - \alpha - \beta$

a) -2 b) 3   c) -3 d) 2

4. The graph of $y = p(x)$ is given in the following fig. Zeros of the polynomial $p(x)$ are

a) -3 , -2, 2, 5   b) -2 -3   c) -3, 2 ,5   d) 2, 5

5. Which of the following equation when paired with $x + y = 4$ makes the system consistent with a unique solution ?

a) $2x - y = 2$ b) $x + y = 6$ c) $3x + 3y = 12$ d) $6x + 6y = -6$

6. If the discriminant of the quadratic equation $3x^2 - 2x + c = 0$ is 16, then the value of c is

a) 1   b) 0   c) -1   d) $\sqrt{2}$

7. Consider the equation $kx^2 + 2x = c(2x^2 + b)$. For the equation to be quadratic, which of these cannot be the value of k?

a) 2c   b) 3c   c) 4c   d) - 2c

8. The first term of an AP is p and the common difference is q, then its 10th term is

a) $q + 9p$ b) $p - 9q$ c) $p + 9q$ d) $2p + 9q$

9. The common difference of the AP whose n^{th} term is given by $a_n = 3n + 7$ is

a) 7   b) 3   c) 3n   d) 1

10. If $P(x,y)$ is equidistant from points $A(5,1)$ and $B(1,5)$, then relation between x and y is

a) $x = y$ b) $x + y = 0$ c) $\sqrt{x - y} = 5$ d) $x - 5y = 5$

11. Which of the following are the coordinates of the intersection points of the diagonals of the rectangle ABCD with vertices $A(0,3)$ $B(3,0)$ $C(1, -2)$ and $D(-2 ,1)$?

a) $\left(\frac{1}{2}, \frac{1}{2}\right)$ b) $\left(-\frac{1}{2}, -\frac{1}{2}\right)$ c) $(1.5, 1.5)$ d) $(2, -1)$
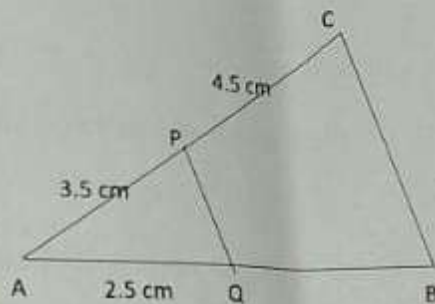
12. If $\sin\Theta + \cos\Theta = \sqrt{2}$, then $\tan\Theta + \cot\Theta =$

a) 1   b) 2   c) 3   d) 4

13. If the mean and the median of a data are 12 and 15 respectively, then its mode is
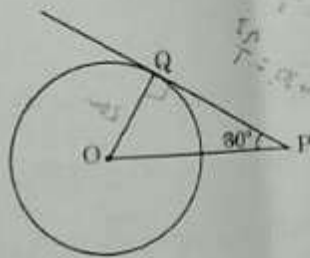
a) 13.5   b) 21   c) 6   d) 14

14. In the given figure, PQ ∥ CB , then length of QB is

a) 1.4 cm   b) 1.2 cm   c) 3.2 cm   d) 2.2 cm

15. In the given fig, PQ is tangent to a circle centered at O. If the radius of the circle is 5 cm, then the length of the tangent PQ is

a) 5 √3 cm   b) $\frac{10}{\sqrt{3}}$ cm   c) 10 cm   d) $\frac{5}{\sqrt{3}}$ cm

16. If Θ is and acute angle and 7 + 4sinΘ = 9, then the value of Θ is

a) 90° b) 30° c) 45°   d) 60°

17. If the length of the ladder placed against a wall is twice the distance between the foot of the ladder and the wall, then the angle made by the ladder with the horizontal is

a) 60° b) 30° c) 45° d) 22.5°

18. If the angle made by the sector at the centre is 126°, then area of the sector is

a) $\frac{7}{20}$ of the area of the circle

b) $\frac{20}{7}$ of the area of the circle

c) $\frac{7}{20}$ of the circumference of the circle

d) $\frac{20}{7}$ of the circumference of the circle

Directions: In the following questions, a statement of assertion is followed by a statement of reason. Mark the correct choice as:

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

19. **Assertion :** In a simultaneous throw of a pair of dice, the probability of getting a doublet is $\frac{1}{6}$

Reason : Probability of an event may be negative

20. **Assertion :** Two cubes of edge length 10 cm are joined together. The total surface area of newly formed cuboid is 1000 cm²

Reason : Sum of the Lateral surface areas of the two cubes is the total surface area of the newly formed cuboid

SECTION B

21. Prove that $\sqrt{sec^2\theta + cosec^2\theta} = \tan\theta + \cot\theta$

22. The coordinates of the centre of a circle are $(2a, a-7)$. Find the value(s) of 'a' if the circle passes through the point $(11, -9)$ and has diameter $10\sqrt{2}$ units
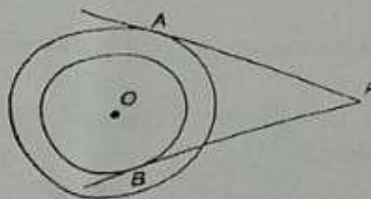
OR

The coordinates of the endpoints of the line segment AB are A(-2,-2) and B(2, -4). P is the point on AB such that $BP = \frac{4}{7} AB$. Find the coordinates of point P

23. From a pack of 52 cards, all aces and all kings are removed. A card is drawn at random from the remaining cards. Find the probability that the card so drawn is

(i) a face card (ii) neither a queen nor a red

24. A chord of a circle of radius 10 cm subtends a right angle at the centre of the circle. Find the area of the corresponding minor segment (use $\pi = 3.14$)
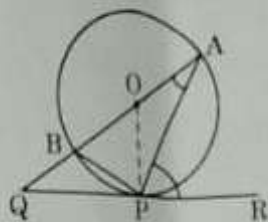
25. In the given fig, there are two concentric circles with centre O and of radii 5cm and 3 cm. From an external point P, tangents PA and PB are drawn to these circles. If AP = 12cm, find the length of BP

OR

In the given fig, O is the centre of the circle and QPR is a tangent to it at P. Prove that

$\llcorner QAP + \llcorner APR = 90^\circ$

SECTION C

26. Find the ratio in which the y axis divides the line segment joining the points $(5, -6)$ and

$(-1, -4)$. Also find the point of division

27. The sum of first 76 terms of an AP is 21850 and the sum of first 40 terms is 7900. Find

the nth term of the AP

OR

The sum of the first n terms of an AP is $4n^2 + 2n$. Find the AP and the nth term of the AP.

28. Prove that $\dfrac{\cos^4 x - \sin^4 x}{1 - \tan x} = \dfrac{\cot x + 1}{\sec x \csc x}$

OR

Prove that $\sqrt{\dfrac{\csc\theta - 1}{\csc\theta + 1}} + \sqrt{\dfrac{\csc\theta + 1}{\csc\theta - 1}} = 2\sec\theta$

29. Find the zeros of the polynomial $p(x) = 6x^2 - 5x - 1$. Hence, obtain a polynomial each of

whose zeros is three times the zeros of $p(x)$

30. State true of false for each of the following statements and justify in each case

(i) $2 \times 3 \times 5 \times 7 + 7$ is a composite number

(ii) $2 \times 3 \times 5 \times 7 + 1$ is a prime number

31. Sides AB and BC and median AD of triangle ABC are respectively proportional to sides

PQ and QR and median PM of $\triangle PQR$. Show that $\triangle ABC \sim \triangle PQR$

SECTION D

32. From a solid cylinder of height 24cm and radius 5cm, two cones of height 12cm and

radius 5 cm are hollowed out. Find the volume and surface area of the remaining solid

OR

A room is in the form of a cylinder surmounted by a hemispherical dome. The base radius of the hemisphere is half of the height of the cylindrical part. If the room contains $\frac{1408}{21}$ m^3 of air, find the height of the room. Also find the surface area of the room.

33. Medical check up was carried out for 30 students of a class and their weight were recorded as follows:

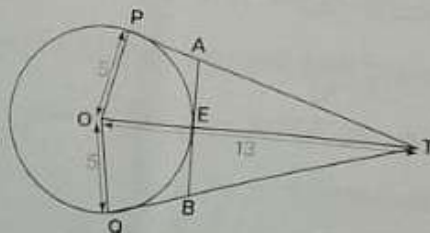| Weight(in Kg)	38 -40	40 - 42	42 - 44	44 - 46	46 - 48	48- 50	50 - 52
No. of students	3	2	3	6	8	5	3

Find the difference between the mean weight and median weight

34. A train travelling at a uniform speed for 360km would have taken 48 minutes less to travel the same distance if its speed were 5 km/h more. Find the original speed of the time

OR

The monthly incomes of two persons are in the ratio 9 : 7 and their monthly expenditure are in the ratio 4 :3. If each saved Rupees 5000, find their respective monthly incomes and expenditure

35. In the given figure, O is the centre of a circle of radius 5 cm. T is a point such that OT = 13 cm and OT intersects circle at E. If AB is a tangent to the circle at E, find the length of AB, where TP and TQ are two tangents to the circle

SECTION E

36. The statue of Unity situated in Gujarat is the world's largest statue which stands over a 58m high base. As part of the project, a student constructed an inclinometer and wishes to find the height of Statue of Unity using it. He noted following observations from the two places:

Situation I : The angle of elevation of the top of the staute from a point A which is $80\sqrt{3}$ m away from the base of the statue is found to be $60°$

Situation II : The angle of elevation of the top of statue from a point B which is 40 m above the ground is found to be $30°$ and the entire height of the statue including the base is found to be 240m.
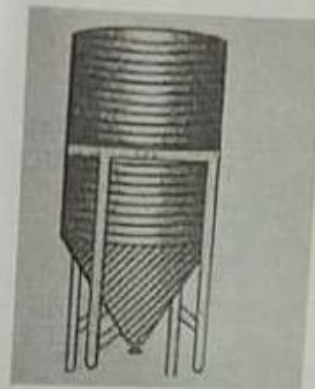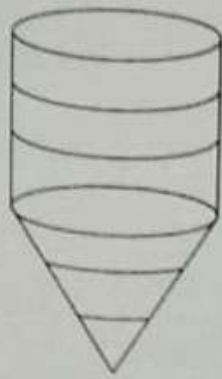
Based on the information , answer the following questions:

i) Represent the situation I with the help of a figure

ii) Represent the situation II with the help of a figure

iii) Calculate the height of statue excluding the base and also find the height including the base with the help of situation I

OR

Find the horizontal distance of point B (situation II) from the statue .

37. Fermentation tanks are designed in the form of cylinder mounted on a cone (without a lid) as shown in the figure. The total height of the tank is 3.3 m and the height of the conical part is 1.2 m. The diameter of the cylindrical as was conical part is 1 m.
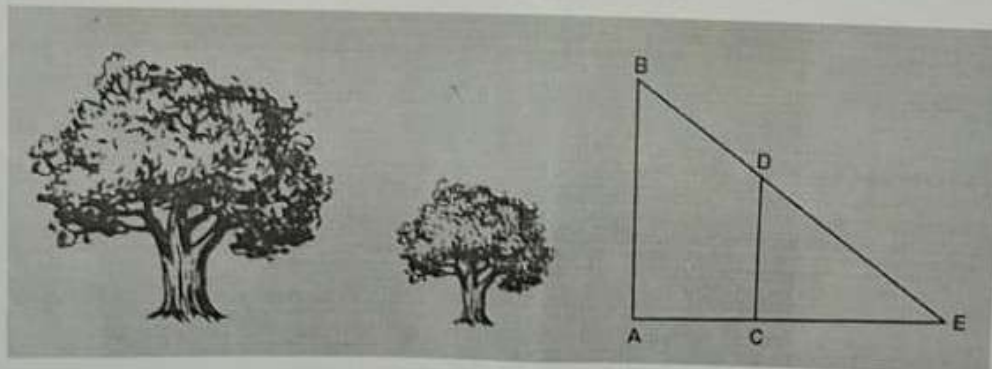
i) Find the height of the cylindrical part

ii) If the slant height of the conical part

iii) Find the capacity of the tank in terms of π

OR

Find the surface area of the tank in terms of π

38. Two trees are standing parallel to each other. The bigger tree 8m high, casts a shadow of 6 m

Based on the above information answer the following questions:

i) Find the distance of point B from E

ii) If AB and CD are the two trees and AE is the shadow of the longer tree, prove that
$\triangle AEB \sim \triangle CED$

iii) If the ratio of the height of two trees is 3: 1, then find the length of the shadow of the smaller tree

OR

If the ratio of the height of two trees is 3: 1, then find the perimeter of $\triangle$ AEB

----------------------------- END OF THE PAPER -----------------------------------