CHENNAI SAHODAYA SCHOOL COMPLEX
COMMON EXAMINATION
CLASS 10- SET 3
MATHEMATICS STANDARD (041)

Roll No: Max Marks : 80

Date: 03/01/2025 Max Time : 3 hr

General Instructions:

***** Check that this question paper contains 08 printed pages
***** Check that this question paper contains 38 questions
***** Write down the serial number of the question before attempting it
***** Reading time of 15 minutes is given to read the question paper. No writing is permitted during this time

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

SECTION A

1. If α and β are the zeros of the polynomial $x^2 - 6x + k$ and $3\alpha + 2\beta = 20$, then the value of k is

   a) - 8 b) 16 c) - 16 d) 8

2. The ratio of LCM and HCF of the least composite number and the least prime number is

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

3. If the vertices of a parallelogram PQRS taken in order are P(0,0) Q(-2 , 0) and R(-3,-2), then the coordinates of its fourth vertex S are

   a) (1, 2) b) (-1,-2) c) (-5,2) d) (5 ,0)

4. Which of the following is not a quadratic equation ?

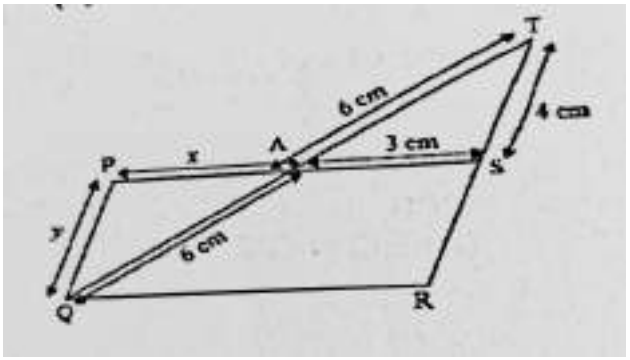
   a) $3(x+1)^2 = 2x^2 + x + 4$ b) $5x + 2x^2 = x^2 + 9$

   c) $(x^2 - 2x)^2 = x^4 + 3 + 4x^2$ d) $(\sqrt{2}x + \sqrt{3})^2 = 2x^2 - 3x$

5. If the first term of an AP is -5 and the common difference is 2, then the sum of first 6 terms is

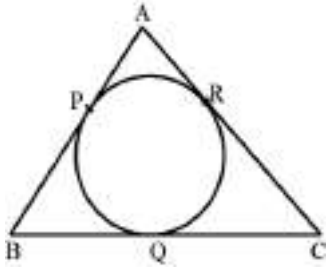
   a) 0 b) 5 c) 6 d) 15

6. In the fig, PQRS is a parallelogram, if AT = AQ = 6 cm, AS = 3cm and TS = 4 cm, then



   a) x = 4 , y = 5 b) x = 2 , y = 3 c) x = 1 , y = 2 d) x = 3 , y = 4

7. In the fig, AB = BC = 10 cm. If AC = 7cm, then the length of BP is



   a) 3.5 cm b) 7 cm c) 6.5 cm d) 5 cm

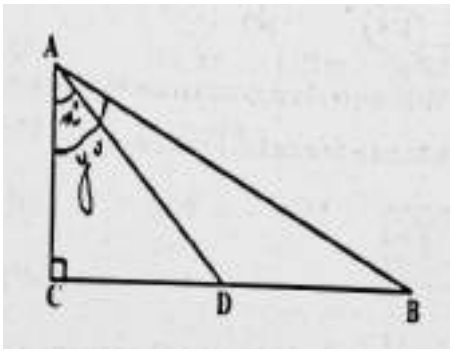
8. If two tangents inclined at an angle of 60º are drawn to a circle of radius 3 cm, then the length of each tangent is equal to

   a) $\frac{3\sqrt{3}}{2}$ cm b) 3 cm c) 6 cm d) $3\sqrt{3}$ cm

9. If the difference of mode and median of a data is 24, then the difference of median and mean is

   a) 12 b) 24 c) 8 d) 36

10. In the fig, D is the midpoint of BC, then the value of $\frac{\cot y}{\cot x}$



    a) 2 b) ½ c) 1/3 d)3/4

11. If sin A = ½ , then the value of $3\cos A - 4\cos^3 A$ is

a) -1 b) 0 c) 1 d) 2

12. The difference between two numbers is 26 and one number is three times the other. Find the numbers.

    (a) 39 and 13 (b) 50 and 24 (c) 36 and 10 (d) 42 and 16

13. If the perimeter of a semi circular protractor is 36 cm, then its diameter is

    a) 10 cm b) 12 cm c) 14 cm d) 16 cm

14. If the area of a sector of a circle bounded by an arc of length 5π cm is equal to 20π sq cm, then the radius of the circle is

    a) 12 cm b) 16 cm c) 8 cm d) 10 cm

15. The volume of the largest right circular cone that can be carved out from a cube of edge 6cm is

    a) 18π cu.cm b) 72π cu cm c)216π cu cm d) 36π cu cm

16. The probability of getting a bad apple in a box of 400 apples is 0.035, then the total number of good apples is

    a) 7 b) 14 c) 386 d) 376

17. A bag contains 3 red balls, 5 white balls and 7 black balls. The probability that a ball drawn from the bag at random will neither be red nor green

    a) $\frac{3}{15}$ b) 0 c) $\frac{12}{15}$ d) 1

18. 9^n , where n is any natural number cannot end with the digit

    a) 9 b) 0 c) 1 d) 7

19. **Directions:**

    (a) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
    (b) Both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion.
    (c)Assertion is correct but Reason is incorrect.
    (d) Assertion is incorrect but Reason is correct

    Assertion: All equilateral triangles are similar
    Reason: All similar triangles are equilateral

20. **Directions:**

    (a) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion.
    (b) Both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion.
    (c)Assertion is correct but Reason is incorrect.
    (d) Assertion is incorrect but Reason is correct

    Assertion: The graphic representation of the equations x + 2y = 3 and 2x + 4y + 7 = 0

gives a pair of parallel lines

Reason: If the equations are inconsistent then the lines are parallel and $\frac{a1}{a2} = \frac{b1}{b2} = \frac{c1}{c2}$

SECTION B

21. Write the coordinates of a point on the x-axis which is equidistant from points A(-2, 0) and B(6, 0).
22. Two dice are rolled together bearing numbers 4, 6, 7, 9, 11, 12. Find the probability that the product of numbers obtained is an odd number.

[OR]

How many positive three-digit integers have the hundredths digit 8 and unit's digit 5? Find the probability of selecting one such number out of all three digit numbers.

23. A rectangular courtyard is 32m long and 16cm broad. It is to be paved with square tiles of the same size. Find the least possible number of such tiles

[OR]

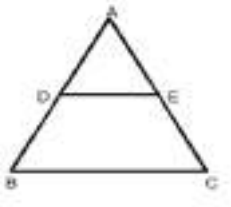
Prove that 5 - √7 is irrational, given that √7 is irrational

24. Find the value of x if : $2\ \text{cosec}^2 30^o + x \sin^2 60^o - \frac{3}{4}\tan^2 30^o = 10$
25. Solve for x and y : $mx - ny = m^2 + n^2$; $x + y = m - n$

SECTION C

26. If α and β are the zeros of the quadratic polynomial $25x^2 - 15x + 2$, find a quadratic polynomial whose zeros are $\frac{1}{2\alpha}$ and $\frac{1}{2\beta}$
27. A school has five houses A,B,C,D and E. In class X, House A has 4 students, 8 from house B, 5 from house C, 2 from house D and the rest from house E. If the total number of students in class X is 23 and if one student is chosen as class monitor, find the probability that the selected student is (i) not from A, B and C
    (ii) Either from C or E
    (iii) Neither from A nor D
28. A plane left 30 minutes late than its scheduled time and in order to reach the destination 1500 km away in time, it had to increase its speed by 100 km/hr from the usual speed. Find its usual speed.
29. Prove that $\frac{1}{1+sin^2\theta} + \frac{1}{1+cos^2\theta} + \frac{1}{1+sec^2\theta} + \frac{1}{1+cosec^2\theta} = 2$

30. In the given fig, D and E are the midpoints of the sides BC and AC respectively of Δ ABC, where A(4 , -2) B(2, -2) and C(-6, 2) are the vertices of the triangle. Find the lengths of DE and AB and hence prove that DE = ½ AB



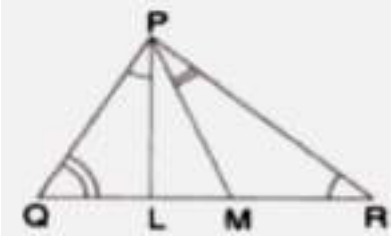
[OR]

The line segment joining the points (3 , -4) and (1,2) is trisected at the points P and Q. If the coordinates of P and Q are (p, -2) and ($\frac{5}{3}$, q) respectively , find the values of p and q

31. If one of the diagonals of a trapezium divides the other diagonal in the ratio 1: 2, prove that one of the parallel sides is twice the other

[OR]

In a triangle PQR, L and M are two points on the base QR, such that $\angle LPQ = \angle$ QRP Prove that PQ^2 = QR x QL



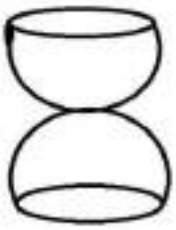
SECTION D

32. The angles of elevation and depression of the top and the bottom of a tower from the top of a building, 60 m high, are 30º and 60º respectively. Find the difference between the heights of the building and the tower and the distance between them. (use $\sqrt{3}$ = 1.732)

33. Find the value of p, if the mean of the given data is 15.45. Hence find the mode

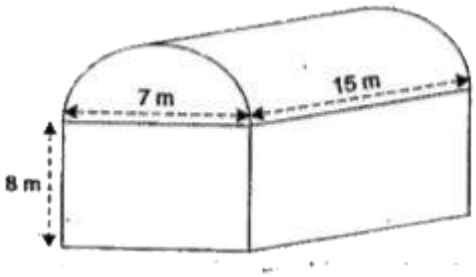
Class	0-6	6-12	12-18	18-24	24-30
Frequency	6	8	p	9	7

34. A solid spherical ball of the metal is divided into two hemispheres and joined as shown in the fig. The solid is placed in a cylindrical tub full of water in such a way that the whole solid is submerged in water. The radius and height of cylindrical tub are 4 cm and 11 cm respectively and the radius of spherical ball is 3 cm. Find the volume of the water left in the cylindrical tub

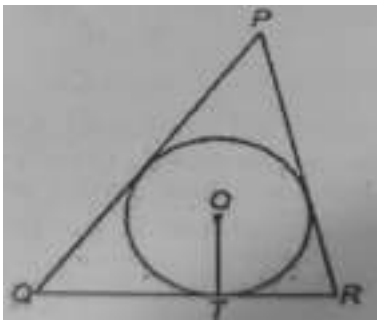


[OR]

A woman runs a small-scale industry in a shed made out of metal, which is in the shape of a cuboid surmounted by a half cylinder as shown in the figure. If the base of the shed is of dimensions 7m x 15 m and the height of the cuboidal portion is 8m, find the volume of the shed. Also find the amount of metal required to construct the shed

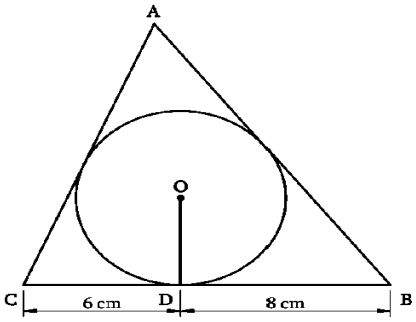


35. In the adjoining fig, a triangle PQR is drawn to circumscribe a circle of radius 6cm such that the segments QT and QR into which QR is divided by the point of contact T, are of lengths 12 cm and 9 cm respectively. If the area of ΔPQR is 189 sq cm, then find the lengths of PQ and PR



[OR]

A triangle ABC is drawn to circumscribe a circle of radius 4 cm such that the tangents BD and DC into which BC is divided by the point of contact D are of lengths 8 cm and 6 cm respectively. Find the sides AB and AC.



SECTION E

36. A Ferris wheel is an amusement ride consisting of a rotating upright wheel with multiple passenger carrying components attached to the rim in such a way that as the wheel turns, they are kept upright usually by gravity

The Ferris wheel had equally spaced seats such that the central angle formed was 20º. The diameter of the Ferris wheel is 42 m

Based on the above information, answer the following questions.

(i) How many passenger carrying components were there? (1 mark).

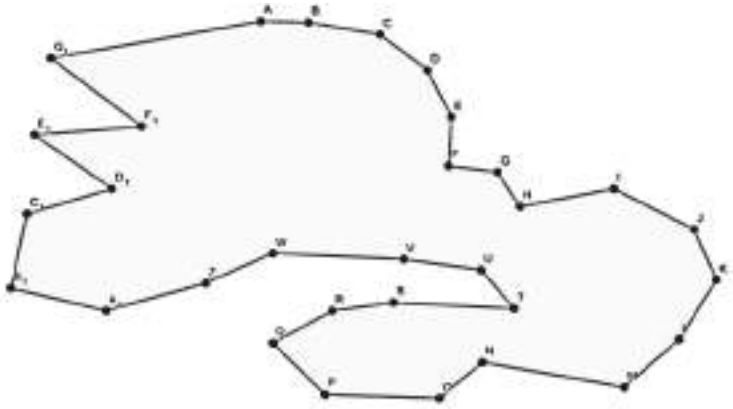
(ii) Into how many equal sectors will the circle be divided if the angle of a sector is to be 12° (1 mark)

(iii) How far apart along the circle are two adjacent seats. (2 mark)

[OR]

What is the area of the sector between two consecutive rims?

37. A teacher ask her class student to make an irregular polygon with 31 sides, using cardboard. The student made the polygon is such a way that the lengths of which, starting from the smallest are in AP. If the perimeter of the polygon is 527 cm and the length of the largest side is sixteen times the smallest



Answer the questions based on the information

(i) Find the common difference [1 mark]

(ii) Find the length of the smallest side [1 mark]

(iii) Find the sum of the lengths of the smallest side and the largest side of the polygon

[OR]

Find the ratio of the 5^{th} side and the 20^{th} side [2 marks]

38. A farmer was asked to design a rectangular field whose length is 10 m less than twice its breadth and the area is 600 sq m. If the breadth of the field is 'x' metre

Answer the following questions based on the information:

[i] Find the length of the field in terms of x (1 mark)

[ii] Find the equation obtained (1 mark)

[iii] Find the area of the field (2 marks)

[OR]

Find the perimeter of the field

******* End of the Paper *******