CHENNAI SAHODAYA SCHOOL COMPLEX
COMMON EXAMINATION
CLASS 10- SET 1
MATHEMATICS STANDARD (041)

Roll No: Max Marks : 80

Date: 03/01/25   Max Time : 3 hr

General Instructions:

∗ Check that this question paper contains 07 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 π =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. Two Aps have the same common difference . The first term of one of these is 8 and that of the other is 3. The difference between their 30th terms is

    a)   11   b) 3   c) 8   d) 5

3. 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) $(\sqrt{2}x + \sqrt{3})^2 = 2x^2 - 3x$

4. The distance between the points (a cos 25º , 0) and (0 , a sin 25º) is

     a) a^2 b) a   c) 0   d) $\cos^2 25º + \sin^2 25º$

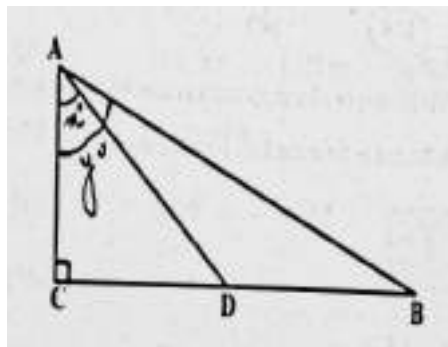5. In the fig, PQRS is a parallelogram, if AT = AQ = 6 cm, AS = 3cm and TS = 4 cm, then
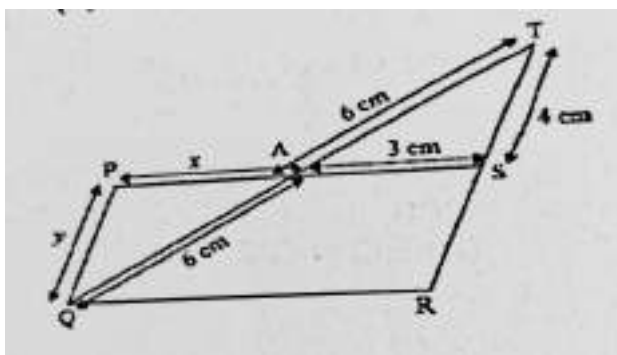
     a) x = 4 , y = 5   b) x = 2 , y = 3 c) x = 1 , y = 2 d) x = 3 , y = 4

6. In the fig, AB = BC = 10 cm. If AC = 7cm, then the length of BP is
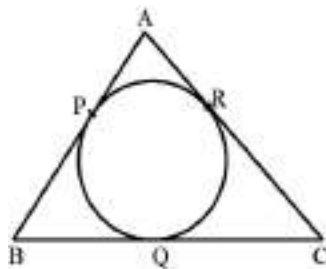
   a) 3.5 cm   b) 7 cm   c) 6.5 cm   d) 5 cm

7. Two circles touch externally at C and AB is a common tangent to the circles. Then ∠ACB

   a) 60⁰   b) 45⁰   c) 30⁰   d) 90⁰

8. 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

9. If $\tan^2 45^\circ - \cos^2 30^\circ = p \sin^2 45^\circ \cos^2 45^\circ$, then p =

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

10. The ratio of the length of a rod and its shadow is 1: √3. The angle of elevation of the sun is

   a) 30 ⁰   b) 45⁰   c) 60⁰   d) 90⁰

11. 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

12. If the ratio of the areas of two circles is 25 : 16, then the ratio of their circumferences is

   a) 16: 25   b) 4 : 5   c) 5 : 4   d) 625 : 256

13. The maximum volume of a cone that can be carved out of a solid hemisphere of radius r is

   a) $3\pi r^2$ b) $\frac{\pi r^3}{3}$ c) $\frac{\pi r^2}{3}$ d) $3\pi r^3$

14. 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

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

   a) 7   b) 14   c) 21   d) 28

16. The probability that a number selected at random from the numbers between 1 and 20 is a multiple of 4 is

   a) $\frac{1}{5}$ b) $\frac{2}{9}$ c) $\frac{1}{4}$ d) $\frac{4}{9}$

17. Δ ABC is such that AB = 3cm, BC = 2 cm and CA = 2.5 cm. If Δ DEF ~ ΔABC and EF = 4cm, then perimeter of ΔDEF is

   a) 7.5 cm   b) 15 cm   c) 22.5 cm   d) 30 cm

18. 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

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: HCF of two positive integers is always a factor of their LCM
   Reason: Every composite number can be uniquely expressed as the product of powers of primes, except for the order

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: Two similar triangles are always congruent

   Reason: Two congruent triangles are always similar

SECTION B

21. For what value of k, will the equation pair of equations

   $3x + y = 1$; $(2k -1)x + (k - 1)y = 2k + 1$ have no solution

22. 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 $5 - \sqrt{7}$ is irrational, given that $\sqrt{7}$ is irrational

23. 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.

24. If $\cos(X + Y) = 0$ and $\sin(X - Y) = ½$. then find the values of X and Y , where X and Y are acute angles

25. Find the point(s) on the x-axis which is at a distance of $\sqrt{41}$ units from the point (8, -5)

SECTION C

26. If the sum of the zeros of the quadratic polynomial $ky^2 +2y - 3k$ is equal to twice their product, find the value of k

27. Prove that $\dfrac{(\sec A - \tan A)^2 + 1}{\sec A - \tan A} = 2 \sec A$

28. 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 $\angle LPQ = \angle QRP$ and $\angle RPM = \angle PQR$. Prove that $PQ^2 = QR \times QL$
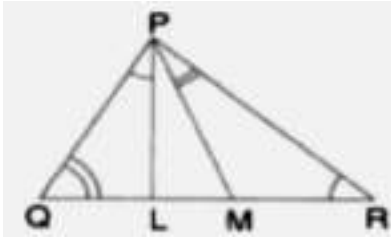
29. The denominator of a fraction exceeds the numerator by 1. If 2 be taken from each, the sum of the reciprocal of the new fraction and 4 times the original fraction is 5 , find the original fraction.

30. 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

31. 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, -1) are the vertices of the triangle. Find the lengths of DE and AB and hence prove that DE = ½ AB
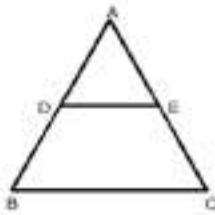

[OR]

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 (, q) respectively , find the values of p and q

SECTION D

32. 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
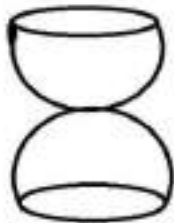
[OR]

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
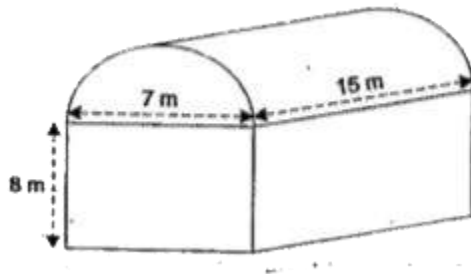
33. A tower stands on a horizontal plane and is surmounted by a flagstaff. At a point on the plane, 70 metres away from the tower, an observer notices that the angles of elevation of the top and the bottom of the flagstaff are respectively 60⁰ and 45⁰. Find the height of the flagstaff and that of the tower (use $\sqrt{3} = 1.732$)

34. The median of the following data is 525

| Class interval	0-100	100-200	200-300	300-400	400-500	500-600	600-700	700-800	800-900	900-1000
Frequency	2	5	x	12	17	20	y	9	7	4

Find the values of x and y , if the total frequency is 100

35. 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.
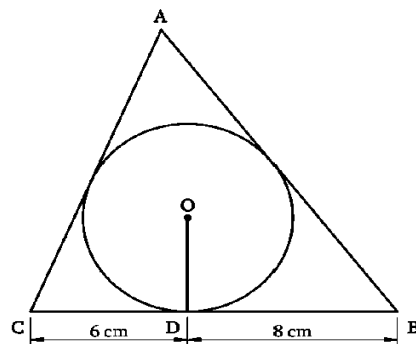

[OR]

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
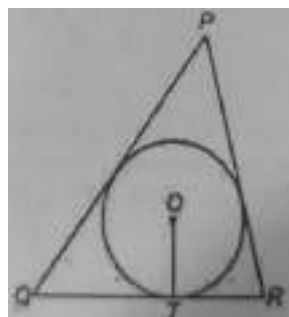
SECTION E

36. 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
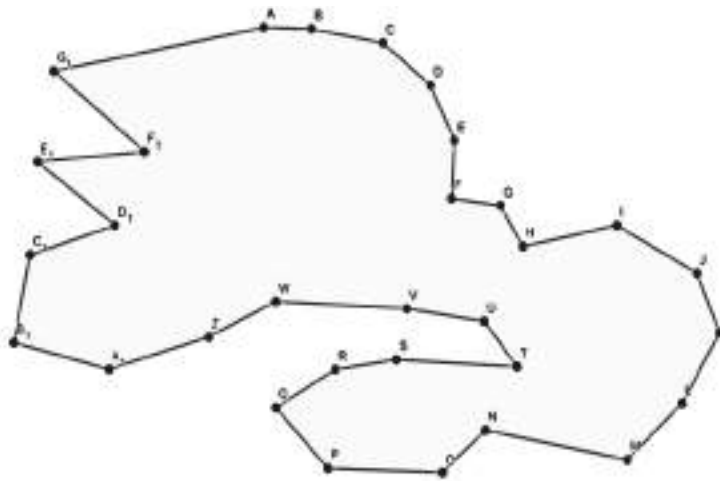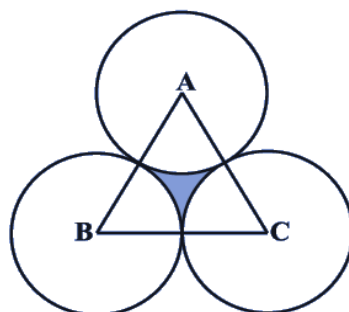
Answer the questions based on the information

(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 5th side and the 20th side   [2 marks]

37. In an art integrated class, a wall hanging was done by a group of students as shown in the fig. The wall handing was made in such a way that the area of the equilateral triangle ABC is 173.2 cm^2 and the radius of each circle is equal to half the length of the side of the triangle. A net is used to cover the portion enclosed between the triangle and the three sectors (shaded region). (use $\sqrt{3} = 1.732$, $\pi = 3.14$)

Answer the questions based on above information:

[i] Find the radius of the circle (1 mark)

[ii] Find the area of the portion covered with the net (2 marks)

[OR]

[ii] Find the area of the 3 major sectors (2 marks)

[iii] Find the perimeter of the shaded portion (1 mark)

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 *******