



SAMPLE PAPER 3 2024-25

Class 10 - Mathematics

Time Allowed: 3 hours

Maximum Marks: 80

General Instructions:

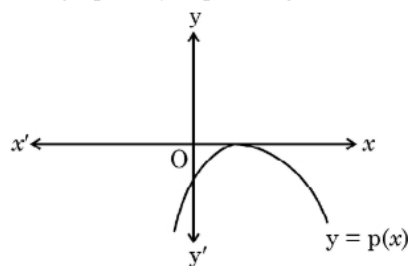
Read the following instructions carefully and follow them:

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 Questions 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

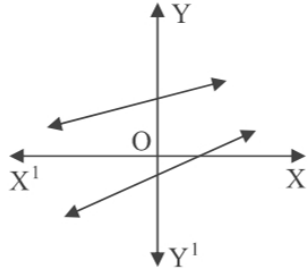
1. The exponent of 2 in the prime factorisation of 144, is [1]
a) 4 b) 2
c) 6 d) 1

2. The graph of $y = p(x)$ is given, for a polynomial $p(x)$. The number of zeroes of $p(x)$ from the graph is [1]



- a) 0 b) 3
c) 2 d) 1

3. In the given figure, graphs of two linear equations are shown. The pair of these linear equations is: [1]



- a) consistent with infinitely many solutions. b) consistent with unique solution.
 c) inconsistent but can be made consistent by extending these lines. d) inconsistent.

4. The equation $x^2 - 8x + k = 0$ has real and distinct roots if [1]

- a) $k = 8$ b) $k > 16$
 c) $k = 16$ d) $k < 16$

5. The next (4th) term of the A.P. $\sqrt{18}, \sqrt{50}, \sqrt{98}, \dots$ is: [1]

- a) $\sqrt{140}$ b) $\sqrt{162}$
 c) $\sqrt{128}$ d) $\sqrt{200}$

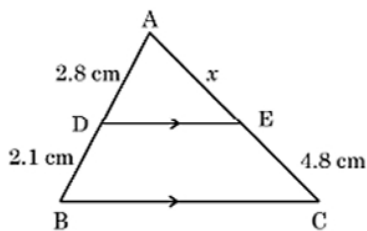
6. If AB is a chord of a circle with centre at $O(2, 3)$, where the coordinates of A and B are (4, 3) and (x, 5) respectively, then the value of x is: [1]

- a) 2 b) 3
 c) 4 d) 5

7. The distance of point $P(4, -5)$ from origin is [1]

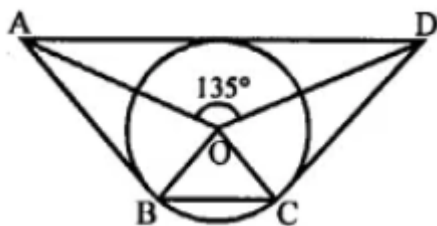
- a) $\sqrt{40}$ units b) 1 unit
 c) 3 units d) $\sqrt{41}$ units

8. If in the given figure, $DE \parallel BC$. If $AD = 2.8$ cm, $DB = 2.1$ cm and $EC = 4.8$ cm, then the value of x is [1]



- a) 4.8 cm b) 2.4 cm
 c) 6.4 cm d) 3.6 cm

9. In the given figure, If $\angle AOD = 135^\circ$ then $\angle BOC$ is equal to [1]



- a) 45° b) 25°

- c) 52.5° d) 62.5°
10. The number of tangents that can be drawn from an external point to a circle is [1]
 a) 1 b) 4
 c) 2 d) 3
11. $[\frac{3}{4} \tan^2 30^\circ - \sec^2 45^\circ + \sin^2 60^\circ]$ is equal to [1]
 a) $\frac{5}{6}$ b) $\frac{1}{6}$
 c) $\frac{-3}{2}$ d) -1
12. $\sec \theta$ when expressed in terms of $\cot \theta$, is equal to: [1]
 a) $\frac{\sqrt{1-\cot^2 \theta}}{\cot \theta}$ b) $\frac{1+\cot^2 \theta}{\cot \theta}$
 c) $\frac{\sqrt{1+\cot^2 \theta}}{\cot \theta}$ d) $\sqrt{1 + \cot^2 \theta}$
13. From a point on the ground, which is 30 m away from the foot of a vertical tower, the angle of elevation of the top of the tower is found to be 60° . The height (in metres) of the tower is: [1]
 a) 60 b) 30
 c) $30\sqrt{3}$ d) $10\sqrt{3}$
14. Area of a sector of angle θ (in degrees) of a circle with radius r is: [1]
 a) $\frac{\theta}{360} \times 2\pi r$ b) $\frac{\theta}{180} \times \pi r^2$
 c) $\frac{\theta}{720} \times 2\pi r^2$ d) $\frac{\theta}{180} \times 2\pi r$
15. Find the area of the sector if the radius is 5 cm and with an angle of 50° . [1]
 a) 10.90 cm b) 12.90 cm
 c) 13.90 cm d) 11.90 cm
16. A bag contains 100 cards numbered 1 to 100. A card is drawn at random from the bag. What is the probability that the number on the card is a perfect cube? [1]
 a) $\frac{1}{20}$ b) $\frac{1}{25}$
 c) $\frac{7}{100}$ d) $\frac{3}{50}$
17. Which of the following numbers **cannot** be the probability of an event? [1]
 a) 5% b) 0.5
 c) $\frac{1}{0.5}$ d) $\frac{0.5}{14}$
18. For the following distribution: [1]

Class:	0-5	5-10	10-15	15-20	20-25
Frequency	10	15	12	20	9

- The sum of the lower limits of the median class and modal class is:
 a) 25 b) 30
 c) 35 d) 15
19. **Assrtion (A):** A toy is in the form of a cone mounted on a hemisphere with the same radius. The radius of the [1]

conical portion is 4 cm and its height is 3 cm. the surface area of the toy is 163.28 cm^2 . [Take $\pi = 3.14$]

Reason (R): Volume of hemisphere is $\frac{2}{3}\pi r^2$

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

20. **Assertion (A):** $a_n - a_{n-1}$ is not independent of n then the given sequence is an AP. [1]

Reason (R): Common difference $d = a_n - a_{n-1}$ is constant or independent of n.

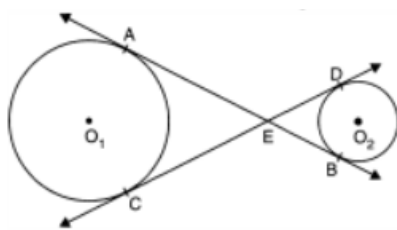
- a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.
 c) A is true but R is false. d) A is false but R is true.

Section B

21. If $\sqrt{2}$ is given as an irrational number, then prove that $(7 - 2\sqrt{2})$ is an irrational number. [2]

22. E is a point on the side AD produced of a parallelogram ABCD and BE intersects CD at F. Show that $\triangle ABE \sim \triangle CFB$. [2]

23. In Figure, common tangents AB and CD to the two circles with centres O_1 and O_2 intersect at E. Prove that $AB = CD$. [2]



24. Prove that $\frac{1+\sec \theta - \tan \theta}{1+\sec \theta + \tan \theta} = \frac{1-\sin \theta}{\cos \theta}$. [2]

OR

Given $15 \cot A = 8$ find $\sin A$ and $\sec A$.

25. A horse is tethered to one corner of a rectangular field of dimensions $70 \text{ m} \times 52 \text{ m}$, by a rope of length 21 m. [2]
 How much area of the field can it graze?

OR

A horse is tethered to one corner of a field which is in the shape of an equilateral triangle of side 12 m. If the length of the rope is 7 m, find the area of the field which the horse cannot graze. Take $\sqrt{3} = 1.732$. Write the answer correct to 2 places of decimal.

Section C

26. Prove that $5 - \sqrt{3}$ is an irrational number, given that $\sqrt{3}$ is an irrational number. [3]

27. Find the quadratic polynomial, sum and product of whose zeroes are -1 and -20 respectively. Also find the zeroes of the polynomial so obtained. [3]

28. Prove that the 11th term of an A.P. cannot be $n^2 + 1$. Justify your answer. [3]

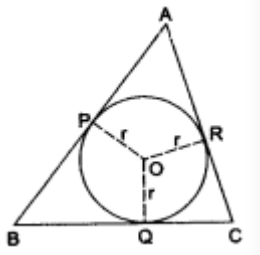
OR

If m times the mth term of an Arithmetic Progression is equal to n times its nth term and $m \neq n$, show that the $(m + n)$ th term of the A.P. is zero.

29. In the given figure, the sides AB, BC and CA of a triangle ABC touch a circle with center O and radius r at P, Q and R respectively. Prove that. [3]

a. $AB + CQ = AC + BQ$

b. $\text{area}(\Delta ABC) = \frac{1}{2}(\text{perimeter of } \Delta ABC) \times r.$



OR

A point P is at a distance of 29 cm from the centre of a circle of radius 20 cm. Find the length of the tangent drawn from P to the circle.

30. In figure, ΔPQR right angled at Q, $PQ = 6$ cm, $PR = 12$ cm, Determine $\angle QPR$ and $\angle PRQ$. [3]

31. Find the arithmetic mean of the following frequency distribution [3]

Class	25 - 29	30 - 34	35 - 39	40 - 44	45 - 49	50 - 54	55 - 59
Frequency	14	22	16	6	5	3	4

Section D

32. A motor boat whose speed is 18 km/h in still water takes 1 hour more to go 24 km upstream, than to return to the same point. Find the speed of the stream and total time of the journey. [5]

OR

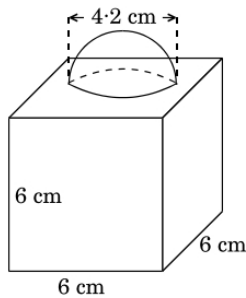
If the equation $(1 + m^2)x^2 + 2mcx + (c^2 - a^2) = 0$ has equal roots, prove that $c^2 = a^2(1 + m^2)$

33. The string of a kite is 100 metres long and it makes an angle of 60° with the horizontal. Find the height of the kite, assuming that there is no slack in the string. [5]

34. In Figure, a decorative block is shown which is made of two solids, a cube and a hemisphere. The base of the block is a cube with edge 6 cm and the hemisphere fixed on the top has a diameter of 4.2 cm. Find [5]

a. the total surface area of the block.

b. the volume of the block formed. (Take $\pi = \frac{22}{7}$)



OR

A toy is in the form of a cone mounted on a hemisphere. The diameter of the base of the cone is 7 cm and its height is 15.5 cm. Find the volume of the toy. (Use $\pi = 3.14$).

35. The monthly expenditure on milk in 200 families of a Housing Society is given below: [5]

Monthly Expenditure (in ₹)	1000 - 1500	1500 - 2000	2000 - 2500	2500 - 3000	3000 - 3500	3500 - 4000	4000 - 4500	4500 - 5000
Number of families	24	40	33	x	30	22	16	7

Find the value of x and also, find the median and mean expenditure on milk.

Section E

36. Read the following text carefully and answer the questions that follow:

[4]



Lokesh, a production manager in Mumbai, hires a taxi everyday to go to his office. The taxi charges in Mumbai consists of a fixed charges together with the charges for the distance covered. His office is at a distance of 10 km from his home. For a distance of 10 km to his office, Lokesh paid ₹ 105. While coming back home, he took another route. He covered a distance of 15 km and the charges paid by him were ₹ 155.

- i. What are the fixed charges? (1)
- ii. What are the charges per km? (1)
- iii. If fixed charges are ₹ 20 and charges per km are ₹ 10, then how much Lokesh have to pay for travelling a distance of 10 km? (2)

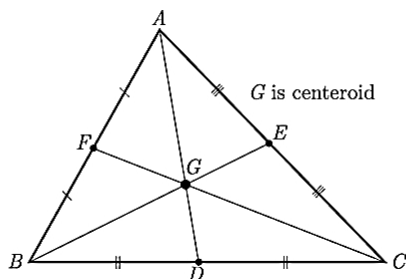
OR

Find the total amount paid by Lokesh for travelling 10 km from home to office and 25 km from office to home. [Fixed charges and charges per km are as in (i) & (ii). (2)]

37. Read the following text carefully and answer the questions that follow:

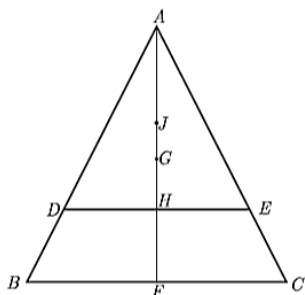
[4]

The centroid is the centre point of the object. It is also defined as the point of intersection of all the three medians. The median is a line that joins the midpoint of a side and the opposite vertex of the triangle. The centroid of the triangle separates the median in the ratio of 2 : 1. It can be found by taking the average of x-coordinate points and y-coordinate points of all the vertices of the triangle. See the figure given below



Here D, E and F are mid points of sides BC, AC and AB in same order. G is centroid, the centroid divides the median in the ratio 2 : 1 with the larger part towards the vertex. Thus $AG : GD = 2 : 1$

On the basis of above information read the question below. If G is Centroid of $\triangle ABC$ with height h and J is Centroid of $\triangle ADE$. Line DE parallel to BC, cuts the $\triangle ABC$ at a height $\frac{h}{4}$ from BC. $HF = \frac{h}{4}$



- i. What is the length of AH? (1)
- ii. What is the distance of point A from point G? (1)

iii. What is the distance of point A from point J? (2)

OR

What is the distance GJ? (2)

38. **Read the following text carefully and answer the questions that follow:**

[4]

The Chief Minister of Delhi launched the, 'Switch Delhi', an electric vehicle mass awareness campaign in the National Capital. The government has also issued tenders for setting up 100 charging stations across the city. Each station will have five charging points. For demo charging station is set up along a straight line and has charging points at $A\left(-\frac{7}{3}, 0\right)$, $B\left(0, \frac{7}{4}\right)$, $C(3, 4)$, $D(7, 7)$ and $E(x, y)$. Also, the distance between C and E is 10 units.



i. What is the distance DE? (1)

ii. What is the value of $x + y$? (1)

iii. Points C, D, E are collinear or not? (2)

OR

What is the ratio in which B divides AC? (2)

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