

SAMPLE PAPER 3
Class 10 - Mathematics

Time Allowed: 3 hours

Maximum Marks: 80

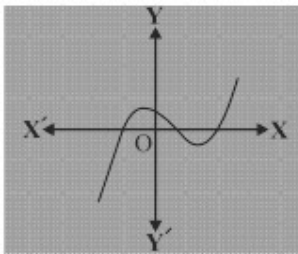
General Instructions:

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 $\pi = \frac{22}{7}$ wherever required if not stated.

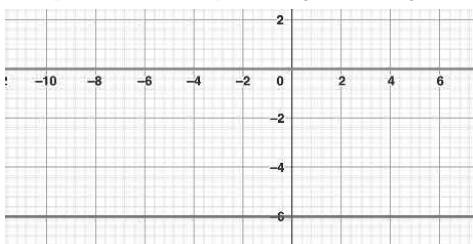
Section A

1. HCF of two numbers is 113, their LCM is 56952. If one number is 904, the second number is [1]
 - a) 7791
 - b) 7911
 - c) 7719
 - d) 7119

2. Find the number of zeroes of $p(x)$ in the figure given below. [1]



- a) 3
 - b) 0
 - c) 2
 - d) 1
3. The pair of linear equations $y = 0$ and $y = - 6$ has: [1]



- c) cosec A + cot A d) cosec A cot A
12. If $\tan \theta = \frac{1}{\sqrt{7}}$ then $\frac{\operatorname{cosec}^2 \theta - \sec^2 \theta}{\operatorname{cosec}^2 \theta + \sec^2 \theta} =$ [1]
- a) $\frac{1}{12}$ b) $\frac{3}{7}$
 c) $\frac{3}{4}$ d) $\frac{5}{7}$
13. An electric pole is tied from the top to a point (some distance away from the base) on the ground using a string. [1]
 The ratio of the height of pole to the string is $\sqrt{3} : 2$, then the angle of elevation of the top from the point on the ground is
- a) 60° b) 45°
 c) None of these d) 30°
14. Area of a sector of angle p (in degrees) of a circle with radius R is [1]
- a) $\frac{p}{360} \times 2\pi R$ b) $\frac{p}{180} \times \pi R^2$
 c) $\frac{p}{180} \times 2\pi R$ d) $\frac{p}{720} \times 2\pi R^2$
15. If the area of a sector of a circle is $\frac{7}{20}$ of the area of the circle, then the sector angle is equal to [1]
- a) 110° b) 100°
 c) 130° d) 126°
16. An unbiased die is thrown once. The probability of getting an odd number is [1]
- a) $\frac{1}{3}$ b) $\frac{1}{2}$
 c) $\frac{2}{5}$ d) $\frac{2}{3}$
17. An event is unlikely to happen. Its probability is closest to [1]
- a) 0.00001 b) 0.0001
 c) 0.1 d) 1

18. Consider the frequency distribution of the heights of 60 students of a class: [1]

Height (in cm)	No. of Students	Cumulative Frequency
150-155	16	16
155-160	12	28
160-165	9	37
165-170	7	44
170-175	10	54
175-180	6	60

The sum of the lower limit of the modal class and the upper limit of the median class is

- a) 320 b) 315
 c) 330 d) 310
19. **Assertion (A):** If we join two hemispheres of same radius along their bases, then we get a sphere. [1]
Reason (R): A tank is made of the shape of a cylinder with a hemispherical depression at one end. The height of the cylinder is 1.45 m and radius is 30 cm. The total surface area of the tank is 3.3 m^2 .

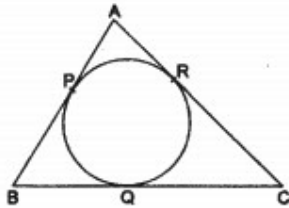
- a) Both A and R are true and R is the correct explanation of A. b) Both A and R are true but R is not the correct explanation of A.
- c) A is true but R is false. d) A is false but R is true.
20. **Assertion (A):** $\sqrt{3}, 2\sqrt{3}, 3\sqrt{3}, 4\sqrt{3}$ this series forms an A.P. [1]

Reason (R): Since common difference is same and equal to $\sqrt{3}$ therefore given series is an AP.

- 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. Classify the following numbers as rational or irrational and give justification of your answer. [2]
- i. 0.05918
- ii. 1.010010001...
- iii. $\sqrt{\frac{9}{27}}$
- iv. $\sqrt{\frac{12}{75}}$
22. ABCD is a trapezium in which $AB \parallel DC$ and its diagonals intersect each other at the point O. Show that [2]
- $$\frac{AO}{BO} = \frac{CO}{DO}.$$
23. A circle is inscribed in $\triangle ABC$ touching AB, BC and AC at P, Q and R respectively. If $AB = 10$ cm, $AR = 7$ cm [2] and $CR = 5$ cm, find the length of BC.



24. If $\sin\theta + \cos\theta = \sqrt{2}$, then prove that $\tan\theta + \cot\theta = 2$. [2]

OR

Prove the trigonometric identity:

$$(\sin\theta + \operatorname{cosec}\theta)^2 + (\cos\theta + \sec\theta)^2 = 7 + \tan^2\theta + \cot^2\theta$$

25. Find the area of a sector of a circle with radius 6 cm, if the angle of the sector is 60° . [2]

OR

A horse is placed for grazing inside a rectangular field 70 m by 52 m and is tethered to one corner by a rope 21 m long. On how much area can it graze?

Section C

26. A shopkeeper has 120 litres of petrol, 180 litres of diesel and 240 litres of kerosene. He wants to sell oil by filling the three kinds of oils in tins of equal capacity. What should be the greatest capacity of such a tin? [3]
27. Find a quadratic polynomial whose sum and product of the zeroes are $-2\sqrt{3}$, -9 respectively. Also find the zeroes of the polynomial by factorisation. [3]
28. Which term of the AP : 121, 117, 113, ... is the first negative term? [Hint : Find n for $a_n < 0$] [3]

OR

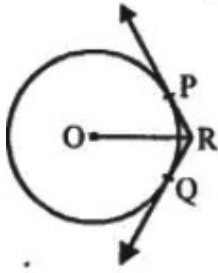
Find n if the given value of x is the n^{th} term of the given A.P, $1, \frac{21}{11}, \frac{31}{11}, \frac{41}{11}, \dots, x = \frac{171}{11}$

29. Two concentric circles are of radii 5 cm and 3 cm, find the length of the chord of the larger circle which touches [3]

the smaller circle.

OR

In the given figure, two tangents RQ and RP are drawn from an external point R to the circle with centre O. If $\angle PRQ = 120^\circ$, then prove that $OR = PR + RQ$.



30. If $\sin \theta = \frac{a}{b}$, show that $(\sec \theta + \tan \theta) = \sqrt{\frac{b+a}{b-a}}$. [3]

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

Class:	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35
Frequency:	4	10	5	6	5

Section D

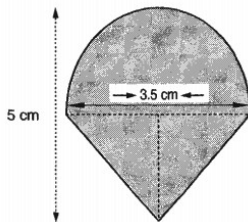
32. If the price of a book is reduced by ₹5, a person can buy 5 more books for ₹ 300. Find the original list price of the book. [5]

OR

If the roots of the quadratic equation $(x - a)(x - b) + (x - b)(x - c) + (x - c)(x - a) = 0$ are equal. Then show that $a = b = c$

33. PQRS is a trapezium with $PQ \parallel SR$ Diagonals PR and SQ intersect at M and $\Delta PMS \sim \Delta QMR$. Prove that $PS = QR$. [5]

34. Rasheed got a playing top (lattu) as his birthday present, which surprisingly had no colour on it. He wanted to colour it with his crayons. The top is shaped like a cone surmounted by a hemisphere. The entire top is 5 cm in height and the diameter of the top is 3.5 cm. Find the area he has to colour. (Take $\pi = \frac{22}{7}$). [5]



OR

From a cubical piece of wood of side 21 cm, a hemisphere is carved out in such a way that the diameter of the hemisphere is equal to the side of the cubical piece. Find the surface area and volume of the remaining piece.

35. Given below is the number of units of electricity consumed in a week in a certain locality: [5]

Consumption(in units)	65-85	85-105	105-125	125-145	145-165	165-185	185-205
Number of consumers	4	5	13	20	14	7	4

Calculate the median.

Section E

36. Read the text carefully and answer the questions: [4]

TOWER OF PISA : To prove that objects of different weights fall at the same rate, Galileo dropped two objects with different weights from the Leaning Tower of Pisa in Italy. The objects hit the ground at the same time. An object dropped off the top of Leaning Tower of Pisa falls vertically with constant acceleration. If s is the distance of the object above the ground (in feet) t seconds after its release, then s and t are related by an equation of the form $s = a + bt^2$ where a and b are constants. Suppose the object is 180 feet above the ground 1 second after its release and 132 feet above the ground 2 seconds after its release.



- (i) Find the constants a and b .
- (ii) How high is the Leaning Tower of Pisa?
- (iii) How long does the object fall?
- (iv) At $t = 2$ sec, the object is at what height?

37. **Read the text carefully and answer the questions:**

[4]

In an examination hall, students are seated at a distance of 2 m from each other, to maintain the social distance due to CORONA virus pandemic. Let three students sit at points A, B and C whose coordinates are $(4, -3)$, $(7, 3)$ and $(8, 5)$ respectively.



- (i) What is the distance between A and C?
- (ii) If an invigilator at point I, lying on the straight line joining B and C such that it divides the distance between them in the ratio of $1 : 2$. Then what are the coordinates of I(invigilator)?

OR

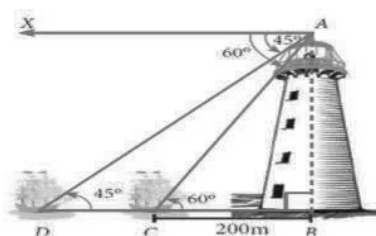
What is the ratio in which B divides the line segment joining A and C?

- (iii) What is the mid-point of the line segment joining A and C?

38. **Read the text carefully and answer the questions:**

[4]

A man is watching a boat speeding away from the top of a tower. The boat makes an angle of depression of 60° with the man's eye when at a distance of 200 m from the tower. After 10 seconds, the angle of depression becomes 45° .



- (i) What is the approximate speed of the boat (in km/hr), assuming that it is sailing in still water?
- (ii) How far is the boat when the angle is 45° ?

OR

As the boat moves away from the tower, angle of depression will decrease/increase?

- (iii) What is the height of tower?

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