CBSE Board
Class X Mathematics
Sample Paper 5

Time: 3 hrs **Total Marks: 80**

General Instructions:

1. **All** questions are **compulsory.**
2. The question paper consists of **30** questions divided into **four sections** A, B, C, and D. **Section A** comprises of **6** questions of 1 mark each, **Section B** comprises of **6** questions of 2 marks each, **Section C** comprises of **10** questions of 3 marks each and **Section D** comprises of **8** questions of 4 marks each.
3. Use of calculator is **not** permitted.

Section A
(Questions 1 to 6 carry 1 mark each)

1. Find the probability that a randomly chosen number from 1 to 12 is a divisor of 12.

2. If α and β are the zeroes of the polynomial $5x^2 - 7x + 2$, then find the sum of their reciprocals.

OR

Determine the values of p for which the quadratic equation $2x^2 + p + 8 = 0$ has real and equal roots.

3. The ratio of the length of a pole and its shadow is $\sqrt{3}:1$. Find the angle of elevation of the Sun.

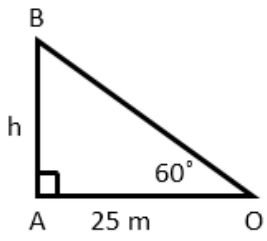
4. $\Delta ABC \sim \Delta PQR$. M is the mid-point of BC and B is the mid-point of QR. The area of ΔABC = 100 sq. cm and that of ΔPQR = 144 sq. cm. If AM = 4 cm, then find PN.

5. Is 0. 101100101010 an irrational number? Justify your answer.

OR

The product of two numbers is 1600 and their HCF is 5. Find the LCM of the number.

6. From the given figure, find h.



Section B
(Questions 7 to 12 carry 2 marks each)

s

7. The centre of a circle has the co-ordinates (3, 4) and one end of its diameter has (1, 2). Find the co-ordinates of the other end of the diameter.

OR

Find the distance of the point P(6, -6) from the origin.

8. Form a quadratic equation whose roots are $\frac{-1}{3}$ and $\frac{5}{2}$.

9. Using Euclid's division algorithm, find the H.C.F. of 240 and 6552.

10. If $\sqrt{3}\ \tan\theta = 3\sin\theta$, prove that $\sin^2\theta - \cos^2\theta = \frac{1}{3}$.

OR

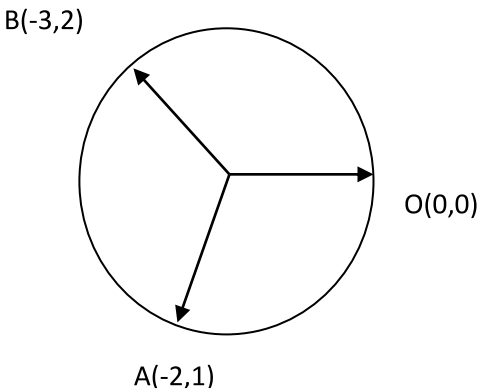
Find value of $\sqrt{\frac{\sec A - \tan A}{\sec A + \tan A}}$.

11. Show that the tangents at the end points of a diameter of a circle are parallel.

12. If $7\sin^2\theta + 3\cos^2\theta = 4$, then find θ and hence prove that $\sec\theta + \operatorname{cosec}\theta = 2 + \frac{2}{\sqrt{3}}$

Section C
(Questions 13 to 22 carry 3 marks each)

13. Find the co-ordinates of the centre of the circle passing through the points (0, 0), (−2, 1) and (−3, 2). Also, find its radius.



OR

Show that a quadrilateral with vertices (0, 0), (5, 0), (8, 4) and (3, 4).

14. For what value(s) of p does the equation $px^2 + (p - 1)x + (p - 1) = 0$ have a repeated root?

15. Rekha's mother is five times as old as her daughter. Five years later, Rekha's mother will be three times as old as Rekha. Find the present age of Rekha and her mother.

16. Without using trigonometric tables, evaluate:

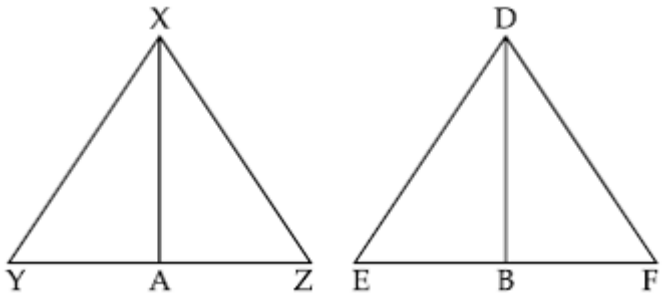
$$\frac{\cos 37^\circ.\operatorname{cosec} 53^\circ}{\tan 5^\circ.\tan 25^\circ.\tan 45^\circ.\tan 65^\circ.\tan 85^\circ}$$

17. Show that $6 + \sqrt{2}$ is irrational.

OR

Find the HCF of 96 and 404 by prime factorization method. Hence, find their LCM.

18. In the figure, sides XY and YZ and median XA of a triangle XYZ are proportional to sides DE, EF and median DB of Δ DEF. Show that $\Delta XYZ \sim \Delta DEF$.



19. The point P divides the join of (2, 1) and (−3, 6) in the ratio 2 : 3. Does P lie on the line $x - 5y + 15 = 0$?

20. An integer is chosen at random from 1 to 200. What is the probability that the integer chosen is divisible by 6 or 8?

OR

A dice is thrown once. What is the probability that

i. The number is odd
ii. The number is greater than 3?

21. If D, E and F are the mid-points of sides BC, CA and AB respectively of a ABC, whose vertices are A(−4, 1), B(6, 7) and C(2, -9), then prove that: ar (ΔDEF) = $\frac{1}{4}$ ar(ΔABC).

22. If mean of the following data is 86, then what is the value of p?

Wages (in Rs.)	50-60	60-70	70-80	80-90	90-100	100-110
Number of workers	5	3	4	p	2	13

OR

The following table shows the distribution of the heights of a group of factory workers:

Height (cm)	Number of workers
140 – 145	6
145 – 150	12
150 – 155	18
155 – 160	20
160 – 165	13
165 – 170	8
170 - 175	6

(i) Determine the cumulative frequencies.
(ii) Draw the cumulative frequency curve on a graph paper. Use 2 cm = 5 cm of height on one axis and 2 cm = 10 workers on the other.

Section D
(Questions 23 to 30 carry 4 marks each)

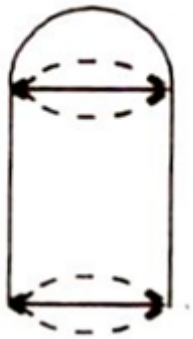
23. The m^{th} term of an A.P. is n and the n^{th} term is m. Find the r^{th} term of the A.P.

24. Construct a triangle similar to ΔABC in which AB = 4.6 cm, BC = 5.1 cm, $m\angle A = 60^o$ with scale factor 4 : 5.

25. Some students planned a picnic. The budget for food was Rs. 240. Since, four students of the group did not go to picnic, the cost of food increased by Rs. 5 per student. How many students went for the picnic?

26. A copper wire of 4 mm diameter is evenly wound around a cylinder whose length is 24 cm and diameter 20 cm so as to cover the whole surface. Find the length and weight of the wire assuming the density to be 8.68 gm/cm^3.

OR



With reference to the given figure, a metal container in the form of a cylinder is surmounted by a hemisphere of the same radius. The internal height of the cylinder is 7 m and internal radius is 3.5 m. Calculate:

(i) the total area of the internal surface excluding the base.

(ii) the internal volume of the container in m^3.(Take $\pi = 22/7$)

27. A solid toy is in the form of a hemisphere surmounted by a right circular cone. The height of the cone is 4 cm and the diameter of its base is 8 cm. Determine the volume of the toy. If a cube circumscribes the toy, then find the difference of the volumes of cube and the toy. Also, find the total surface area of the toy.

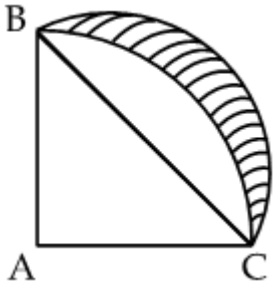
OR

Water flows through a cylindrical pipe of internal diameter 7 cm at the rate of 5 m/s. Calculate:

i. the volume (in litres) of water discharged by the pipe in one minute

ii. the time (in minutes) the pipe would take to fill an empty rectangular tank of dimensions 4 m x 3 m x 2.31 m

28. In the figure, ABC is a quadrant of a circle of radius 14 cm and a semi-circle is drawn with BC as diameter. Find the area of the shaded region.



29. Solve the following equations graphically:
x – y = 1 and 2x + y = 8. Shade the region between the two lines and y-axis.

30. The marks obtained in a class test by 30 students of a class are as follows:

Marks obtained	Number of students
More than or equal to 5	30
More than or equal to 10	28
More than or equal to 15	16
More than or equal to 20	14
More than or equal to 25	10
More than or equal to 30	7
More than or equal to 35	3

Draw less than type and more than type ogive curves for the given data and hence find the median.

OR

If the mean of the distribution is 62.8 and sum of frequencies is 50, find p and q.

Class	Frequency
0-20	5
20-40	p
40-60	10
60-80	q
80-100	7
100-120	8