CBSE Board
Class X Mathematics
Sample Paper 7

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. A number x is chosen from the numbers −3, −2, −1, 0, 1, 2, 3. Find the probability that $|x| < 2$.

OR

Write the probability for a student to get pass marks in an examination.

2. An electrician has to repair an electric fault on a pole of height 4 m. He needs to reach a point 1.3 m below the top of the pole to undertake the repair work. What should be the length of the ladder which makes an angle of 60° with the road to help him reach the required position?

3. $\Delta ABC \sim \Delta DEF$ and their areas are 64 cm^2 and 121 cm^2, respectively. If EF = 15.4 cm, then find BC.

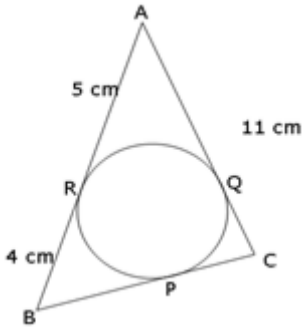
4. Find the roots of the equation $x^2 - 3\sqrt{3}x + 6 = 0$.

OR

Find discriminant for the equation $x^2 - 2x + 1 = 0$.

5. Express $0.\overline{8}$ as a fraction in simplest form.

6. In the given figure, AR = 5 cm, BR = 4 cm and AC = 11 cm. What is the length of BC?



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

7. Determine the set of values of p for which the quadratic equation $px^2 + 6x + 1 = 0$ has real roots.

OR

Find the quadratic polynomial whose sum is 8 and their product is 12. Find the zeroes of the polynomial.

8. Can the number 4^n, n being a natural number, end with the digit 0? Give reasons.

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

10. Two circular pieces of equal radii and maximum area, touching each other are cut out from a rectangular card board of dimensions 14 cm × 7 cm. Find the area of the remaining card board. (Use $\pi = \frac{22}{7}$)

11. Prove that $\frac{\cot^2\theta}{1+\operatorname{cosec}\theta} = \frac{1}{\sin\theta}$

OR

Prove that $(1 + \cot^2 A) \sin^2 A = 1$

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

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

13. If A and B are complementary angles, prove that $\cot B + \cos B = \sec A \cos B (1 + \sin B)$

OR

Prove the following: $\frac{\cos^3 A + \sin^3 A}{\cos A + \sin A} + \frac{\cos^3 A - \sin^3 A}{\cos A - \sin A}$

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

15. If the roots of the equation $(a - b)x^2 + (b - c)x + (c - a) = 0$ are equal then prove that $2a = b + c$.

16. The sum of the numerator and denominator of a fraction is 8. If 3 is added to both the numerator and the denominator, the fraction becomes $\frac{3}{4}$. Find the fraction.

17. Find LCM and HCF of 120 and 144 by fundamental theorem of arithmetic.

OR

Show that any positive odd integer is of the form 6q + 1, 6q + 3 or 6q + 5, where q is some integer.

18. Solve the given equations for x and y by the method of cross-multiplication. $7x - 2y = 3$; $11x - \frac{3}{2}y = 8$

19. Determine the ratio in which the line $3x + y - 9 = 0$ divides the segment joining the points (1, 3) and (2, 7).

20. Find the median of the following data.

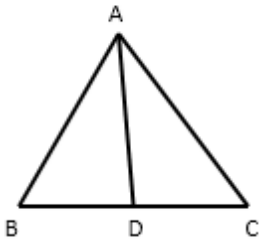
Class Interval	0-20	20-40	40-60	60-80	80-100	100-120
Frequency	7	8	12	10	8	5

OR

The following data gives the information on the observed lifetime (in hours) of 225 electrical components. Determine the modal lifetime of the components.

classes	f
0-20	10
20-40	35
40-60	52
60-80	61
80-100	38
100-120	29

21. In the figure, ΔABC is such that ∠ADC = ∠BAC. Prove that $CA^2 = CB \times CD$.



22. One card is drawn from a pack of 52 cards, each of which is equally likely to be drawn. Find the probability that the card drawn is

i. either red or king
ii. a red face card
iii. '10' of a black suit

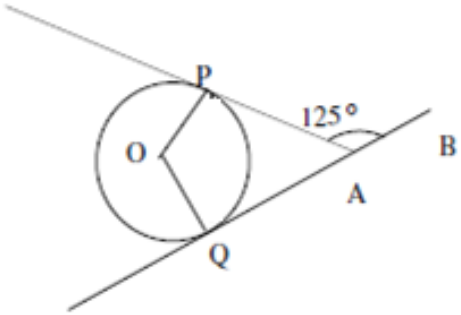
OR

17 cards numbered 1, 2, 3, 4, ..., 16, and 17, are put in a box and mixed thoroughly. A girl draws a card from the box. Find the probability that the number on the card is:

i. Prime
ii. Divisible by 3
iii. Divisible by both 2 and 3

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

23. In the given figure, O is the centre of the circle. AP and AQ are two tangents drawn to the circle. B is a point on the tangent QA and m∠PAB = 125°. Find m∠POQ.



24. If m^{th} term of an A.P. is $\frac{1}{n}$ and n^{th} term is $\frac{1}{m}$, then show that the sum of the m and terms is $\frac{1}{2}(mn + 1)$.

25. Prove that the ratio of the areas of two similar triangles is equal to the ratio of the square of their corresponding sides.

26. Solve graphically the pair of equations 2x + 3y = 11 and 2x - 4y = -24. Hence, find the value of coordinates of the vertices of the triangle formed by these lines and the x-axis.

OR

Find the ratio in which the point P(– 1, a) divides the line joining (– 5, 4) and B(3, – 2). Hence, find a. [3]

27. From a window of a house in a street, h metres above the ground, the angles of elevation and depression of the top and the foot of another house on the opposite side of the street are α and β respectively. Show that the height of the opposite house is h(1+ tan α . cot β) metres.

OR

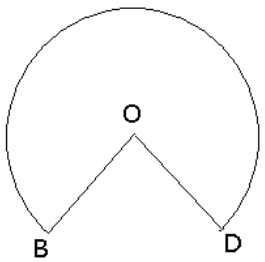
From the top of a light house 200m high, the angles of depression of two ships on opposite sides of it are 45° and 30° respectively. Find the distance between two ships to the nearest metre.

28. 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.

29. As shown in the given figure, the shape of the top of a table in a restaurant is that of a sector of a circle with centre O and m$\angle$ BOD = 90°. If BO = OD = 60 cm, find:

i. The area of the table top

ii. The perimeter of the table top



30. The mode of the following frequency distribution is 55. Find the value of p and q.

Class Interval	0 - 15	15 - 30	30 - 45	45 - 60	60 - 75	75 - 90	Total
Frequency	6	7	p	15	10	q	51

OR

The following distribution gives the daily income of 50 workers of a factory:

Daily Income (In)	100-120	120-140	140-160	160-180	180-200
Number of workers	12	14	8	6	10

Convert the distribution above to a less than type of cumulative frequency distribution and draw its ogive.