CBSE Board
Class X Mathematics
Sample Paper 6

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.   What is the probability of getting a prime number when a die is thrown once?

     OR

     If P(E) = 0.05 then P(not E) = ?
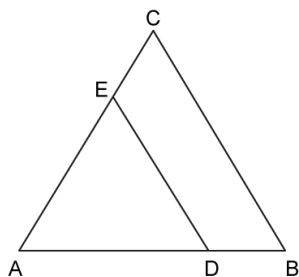
2.   Find the roots of the equation $x^2 - 3\sqrt{3}x + 6 = 0$.

     OR

     Find discriminant of $2x^2 + x - 1 = 0$.

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.   In the adjoining figure, DE is parallel to BC. If AD = x, DB = x − 2, AE = x + 2 and EC = x − 1, find the value of x.

5. A number when divided by 61 gives 27 as quotient and 32 as remainder. Find the number.

6. In ΔABC, $\angle A$ = 80° and $\angle B$ = 60°. If ΔABC ~ ΔRQP, find the value of $\angle P$.
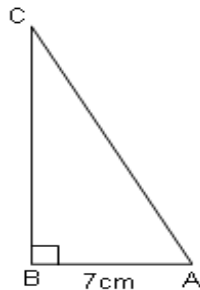
Section B
(Questions 7 to 12 carry 2 marks each)

7. In two concentric circles, the radius of the inner circle is 5 m. A chord of length 24 m of the outer circle becomes a tangent to the inner circle. Find the radius of the larger circle.

8. Find the roots of the quadratic equation $2x^2 - \sqrt{5}x - 2 = 0$ using the quadratic formula.

OR

Find the value of k for which x = 2 is a solution of the equation $kx^2 + 2x - 3 = 0$.

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

OR

Express $0.\bar{6}$ as a rational number in simplest form.

10. In ΔABC, $m\angle B = 90°$, AB = 7 cm and AC – BC = 1 cm. Determine the values of sin C and cos C.

11. Two tangents PQ and PR are drawn from an external point P to a circle with center O. Prove that PROQ is a cyclic quadrilateral.

12. Prove that: $\dfrac{\sec A + \tan A}{\sec A - \tan A} = \left(\dfrac{1 + \sin A}{\cos A}\right)^2$

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

13. If the point (x, y) is equidistant from the points (a + b, b – a) and (a – b, a + b), then prove that bx = ay.

OR

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

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

15. Solve for x and y:

$$\frac{x}{a} + \frac{y}{b} = 2; \quad ax - by = a^2 - b^2$$

16. If $0° < A < 90°$; find A, if $\dfrac{\cos A}{1 - \sin A} + \dfrac{\cos A}{1 + \sin A} = 4$

17. Prove that $\dfrac{3}{2\sqrt{5}}$ is an irrational number.

OR

Can the number 6^n, n being a natural number, end with the digit 5? Give reasons.

18. 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 $\dfrac{3}{4}$. Find the fraction.

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 mode for the following data which gives the literacy rate (in %) in 40 cities of India.

Literacy rate (%)	45-55	55-65	65-75	75-85	85-95
No. of cities	4	11	12	9	4

OR

The mean of the following distribution is 52 and the frequency of class interval 30-40 is 'f'. Find 'f'.

Class interval	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	5	3	f	7	2	6	13

21. In ΔABC, if AD is the median, then show that $AB^2 + AC^2 = 2[AD^2 + BD^2]$.

22. 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

OR

Calculate the median salary of the data.

The table below shows the salaries of 280 persons :

Salary (In thousand)	No. of persons
5-10	49
10-15	133
15-20	63
20-25	15
25-30	6
30-35	7
35-40	4
40-45	2
45-50	1

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

23. In November 2009, the number of visitors to a zoo increased daily by 20. If a total of 12300 people visited the zoo in that month, find the number of visitors on 1st Nov. 2009.

24. In triangle ABC, D is the mid-point of BC and AE $\perp$ BC. If AC > AB, then show that:

$AB^2 = AD^2 - BC \times DE + \dfrac{BC^2}{4}$.

25. Draw a circle of radius 2.9 cm and draw its diameter. Through one of the end points of the diameter, construct tangent to the circle.

26. Form a pair of linear equations for the following problem, and find the solution graphically.

"10 students of Class X took part in a Mathematics quiz. If the number of girls is 4 more than the number of boys, find the number of boys and girls who took part in the quiz."

OR

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 $\dfrac{3}{4}$. Find the fraction.

27. A bucket is in the form of a frustum of a cone of height 30 cm with radii of its lower and upper ends as 10 cm and 20 cm respectively. Find the capacity and surface area of the bucket. Also, find the cost of the milk required to completely fill the bucket, at the rate of Rs. 25 per litre (use π = 3.14).

OR

The area of the base of a right circular cone is 28.26 sq. cm. If its height is 4 cm, find its volume and the curved surface area. (use π = 3.14)

28. A circle is inscribed in a quadrilateral ABCD in which m∠B = 90°. If AD = 23 cm, AB = 29 cm and DS = 5 cm. Find the radius of the circle.
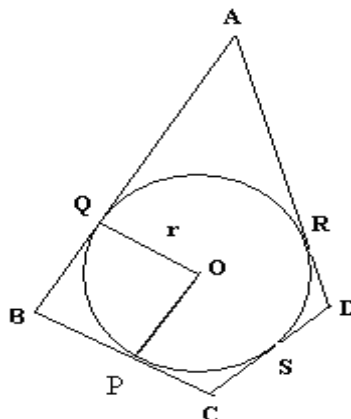
29. The following table shows the number of runs scored by a certain batsman in different overs:

Over	50-55	55-60	60-65	65-70	70-75	75-80
No. of runs	2	8	12	24	38	16

Change the distribution to a 'more than' type distribution and draw its OGIVE on the graph.

30. A bucket is raised from a well by means of a rope which is wound around a wheel of radius 38.5 cm. Given that the bucket ascends in 1 min 28 seconds with a uniform speed of 1.1 m/ sec, calculate the number of complete revolutions the wheel makes in raising the bucket.

OR

The surface area of a solid metallic sphere is 616cm². It is melted and recast into smaller spheres of diameter 3.5 cm. How many such spheres can be obtained?