CBSE Board

Class X Mathematics

Sample Paper 4 (Standard)

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

General Instructions:

1. **All** the questions are **compulsory**.
2. The question paper consists of **40** questions divided into **four sections** A, B, C, and D.
3. **Section A** comprises of **20** questions of 1 mark each. **Section B** comprises of **6** questions of 2 marks each. **Section C** comprises of **8** questions of 3 marks each. **Section D** comprises of **6** questions of 4 marks each.
4. There is no overall choice. However, an internal choice has been provided in two questions of 1 mark each, two questions of 2 marks each, three questions of 3 marks each, and three questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.
5. Use of calculator is **not** permitted.

Section A

Q 1 – Q 10 are multiple choice questions. Select the most appropriate answer from the given options

1. A decimal number $0.\bar{8}$ can be expressed in its simplest form as

A. $\frac{4}{9}$

B. $\frac{6}{9}$

C. $\frac{8}{9}$

D. $\frac{10}{9}$

2. The number 0. 1011001253…. is a/an

A. Rational number
B. Irrational number
C. Natural number
D. Whole number

3. The distribution below gives the weights of 30 students of a class.

Weight (in kg)	40 – 45	45 – 50	50 – 55	55 – 60	60 – 65	65 – 70	70 – 75
Number of students	2	3	8	6	6	3	2

The lower limit of the median class in the given data is

A. 45
B. 50
C. 55
D. 60

4. The value(s) of m, for which the lines represented by the following pair of linear equations $3x + 6y - 15 = 0$ and $9x + 18y - m = 0$ be coincident is/are

A. 30
B. 45
C. All real values except 45
D. $\frac{3}{2}$

5. In ΔABC, right angled at B, AB = 12 cm and BC = 5 cm. The value of sin A is

A. $\frac{5}{13}$
B. $\frac{12}{13}$
C. $\frac{5}{12}$
D. $\frac{12}{5}$

6. Given that $\sin 2x = 1$ and $\cos y = \frac{\sqrt{3}}{2}$, then the value of $x - y$ is

A. $\frac{\pi}{2}$
B. $\frac{\pi}{6}$
C. $\frac{\pi}{12}$
D. $\frac{\pi}{15}$

7. The value of sin 55° cos 35° + cos 55° sin 35° is

A. -1
B. 0
C. 1
D. Not defined

8. The coordinates of a point which divides the line segment joining the points A(–3, 6) and B(5, 2) in the ratio 1 : 3 are

A. (1, 3)
B. (2, 4)
C. (2, –3)
D. (–1, 5)

9. Distance of a point (–24, 7) from the origin (in units) is

A. 25
B. 24
C. 23
D. 22

10. Area of a triangle (in sq. units) whose vertices are (7, –2), (5, 1) and (3, 2) is

A. 0
B. 1
C. –1
D. 2

(Q 11 – Q 15) Fill in the blanks

11. If 4/5, a, 2 are three consecutive terms of an AP then the value of a is _____.

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

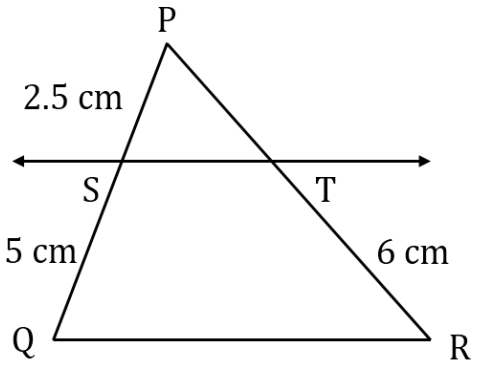
OR

The probability for a student to get pass marks in an examination is _____.

13. If the polynomial $p(x) = 3x^2 + 7x - 3$ is divided by another polynomial $x^2 - 2$ then the remainder will be _____.

14. 2 cubes each with side 4 cm are joined to form a cuboid. The surface area of the resulting cuboid is _____.

15. In the figure, ST is drawn parallel to the side QR.



Then, length of PT is _____.

(Q 16 – Q 20) Answer the following

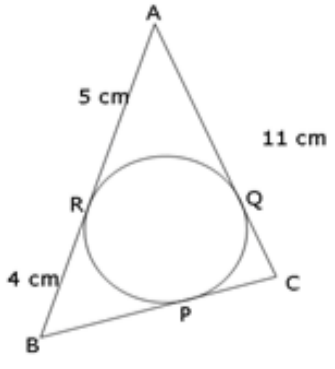
16. ΔABC ~ ΔDEF and their areas are 64 cm^2 and 121 cm^2, respectively. If EF = 15.4 cm, then find BC.

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

OR

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

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



19. The first and last terms of an A.P. are 1 and 11. If the sum of all its terms is 36, then find the number of terms in the A.P.

20. Without actually performing the long division, state whether $\frac{17}{8}$ is a terminating decimal expansion or a non-terminating repeating decimal expansion.

Section B

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

OR

Find the H.C.F of 455 and 84 using the division algorithm.

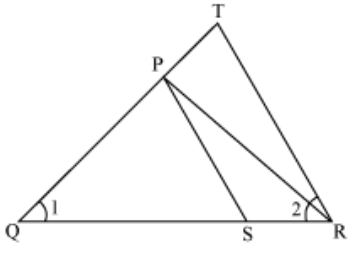
22. An electrician has to repair an electric fault on a pole of height 4 m. He needs to reach a point 1.3 m below the top of the pole to undertake the repair work. What should be the length of the ladder which makes an angle of 60° with the road to help him reach the required position?

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

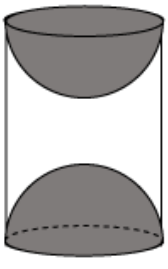
OR

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 $\pi = \frac{22}{7}$)

24. In figure, $\frac{QR}{QS} = \frac{QT}{PR}$ and $\angle 1 = \angle 2$. Show that $\Delta PQS \sim \Delta TQR$.



25. A wooden article was made by scooping out a hemisphere from each end of a solid cylinder, as shown in the given figure. If the height of the cylinder is 10 cm, and its base is of radius 3.5 cm, find the total surface area of the article.



26. 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

A. a red face card
B. '10' of a black suit

Section C

27. Solve the given equations for x and y by the method of cross-multiplication.

$7x - 2y = 3;\ 11x - \frac{3}{2}y = 8$

OR

For which values of *a* and *b* will the following pair of linear equations have an infinite number of solutions?

$2x + 3y = 7$

$(a - b)x + (a + b)y = 3a + b - 2$

28. 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.

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

OR

Prove the following: $\frac{\cos^3 A + \sin^3 A}{\cos A + \sin A} + \frac{\cos^3 A - \sin^3 A}{\cos A - \sin A} = 2$

30. Two APs have the same common difference. The difference between their 100^{th} term is 50, what is the difference between their 1000^{th} terms?

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

OR

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?

32. 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

33. On dividing $x^3 - 3x^2 + x + 2$ by a polynomial g(x), the quotient and remainder were x − 2 and − 2x + 4, respectively. Find g(x).

34. In a circle of radius 21 cm, an arc subtends an angle of 60 ° at the centre.
Find:

A. The length of the arc
B. Area of the sector formed by the arc
C. Area of the segment formed by the corresponding chord.

Section D

(Questions 23 to 30 carry 4 marks each)

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

36. 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 $h(1+ \tan\alpha \cdot \cot\beta)$ 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.

37. 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.

38. Two water taps together can fill a tank in $9\frac{3}{8}$ hours. The tap of larger diameter takes 10 hours less than the smaller one to fill the tank separately. Find the time in which each tap can separately fill the tank.

39. Draw a right triangle in which the sides (other than hypotenuse) are of lengths 4 cm and 3 cm then construct another triangle whose sides are $\frac{5}{3}$ times the corresponding sides of the given triangle.

OR

Construct a tangent to a circle of radius 4 cm from a point on the concentric circle of radius 6 cm and measure its length. Also verify the measurement by actual calculation.

40. 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.