MATHEMATICS SAMPLE PAPER
CBSE 2019-2020
CLASS X

Time allowed: 3 Hours   **Max. Marks: 80**

General Instructions:
 i. All the questions are compulsory.
ii. The questions paper consists of 40 questions divided into 4 sections A, B, C and D.
iii. Section A comprises 20 questions of 1 mark each. Section B comprises 6 questions of 2 marks each. Section C comprises 8 questions of 3 marks each. Section D comprises 6 questions of 4 marks each.
iv. There is no overall choice. However, an internal choice has been provided. You have to attempt only one of the alternatives in all such questions.
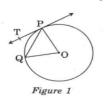**v.** Use of calculators is not permitted.

SECTION A   (1X20=20 MARKS)

CHOOSE THE MOST APPROPRIATE OPTION:

1. Find a rational number between $\sqrt{2}$ and $\sqrt{3}$
A. 12/7   B. 11/9   C. 17/8   D. 7/6

2. Find the value of k for which the roots of the equation $3x^2 - 10x + k = 0$ are reciprocal of each other.
A. 1   B.2   C.0   D.3

3. If S_n, the sum of first n terms of an AP is given by $S_n = 3n^2 - 4n$, find the 10th term.
A.70   B.84   C.53   D. 112

4. In an AP, if the common difference (d) = –4, and the seventh term (a_7) is 4, then find the first term.
A. 0   B.14   C.28   D.*56*

5. Find the ratio in which P(4, m) divides the line segment joining the points A(2, 3) and B(6, –3)
 A.1:2   B.3:1   C.2:1   D.1:1

6. A tower stands vertically on the ground. From a point on the ground which is 25 m away from the foot of the tower, the angle of elevation of the top of the towers is found to be 45°. Then the height (in meters) of the tower is
A.$25\sqrt{2}$ B.$25\sqrt{3}$ C. 25   D. 12.5

7. Find A if tan 2A = cot (A -24°)
A.32   B.34   C.38   D.42

8. O is the centre of a circle, PQ is a chord and PT is the tangent at P. If ∠POQ = 70 then ∠TPQ equals

Figure 1

(A)55°   (B) 70°   (C)45°   (D) 35°

9. Which of the following digits is ruled out in the unit's place of $12^n + 1$ for every positive integer n?
(A) 1   (B) 3   (C) 5   (D)7

10. The perimeter (in cm) of a square circumscribing a circle of radius a cm, is
(A) 8 a   (B) 4 a   (C) 2 a   (D) 16 a

11. The radius (in cm) of the largest right circular cone that can be cut out from a edge 4.2 cm is
(A)4.2   (B)2.1   (C)8.4   (D) 1.05

12. Area of a sector of angle p (in degrees) of a circle with radius R is

(A) $\dfrac{p}{180} \times 2\pi R$ (B) $\dfrac{p}{180} \times \pi R^2$ (C) $\dfrac{p}{360} \times 2\pi R$ (D) $\dfrac{p}{720} \times 2\pi R^2$

13. If $1 + \sin^2\theta = 3\sin\theta\cos\theta$, then $\theta =$
(A) 30   (B) 45   (C) 60   (D) 90

DO AS DIRECTED IN THE MOST CONCISE MANNER:

14. Write whether $\dfrac{2\sqrt{45} + 3\sqrt{20}}{2\sqrt{5}}$ is an irrational or a rational number.

15. Find the value of k for which the quadratic equation $kx^2 - 5x + k = 0$ have real equal roots.

16. Write the formula for centroid of a triangle.

17. State the basic proportionality theorem.

18. A game consists of tossing a coin 3 times and noting its outcome each time. Hanif wins if he gets three heads or three tails, and loses otherwise. Calculate the probability that Hanif will lose the game.

19. The King, Queen and Jack of diamonds are removed from a pack of 52 cards and then the pack is well-shuffled. A card is drawn from the remaining cards. Find the probability of getting a card of diamonds.

20. What is the HCF of smallest prime number and the smallest composite number?

SECTION B (2X6=12 MARKS)

21. Show that exactly one of the numbers n, n + 2 or n + 4 is divisible by 3.

22. Find the linear relation between x and y such that P(x, y) is equidistant from the points A(1, 4) and B(−1, 2).

23. Evaluate:

$$\frac{7}{2}\frac{\cos 70°}{\sin 20°} + \frac{3}{2}\frac{\cos 55° \csc 35°}{\tan 5° \tan 25° \tan 45° \tan 85° \tan 65°} + \left(\frac{\cos 58°}{\sin 32°}\right) - \sqrt{3}\left(\frac{\cos 38° \csc 52°}{\tan 15° \tan 60° \tan 75°}\right)$$
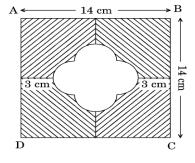
24. If two dice are thrown together, the probability that the difference of the numbers appearing on them is a prime number.

25. Draw a line segment of length 6cm. Using compassed and ruler, find a point P on it which divided it in the ratio 3:4

26. Find the value(s) of k for which the pair of linear equations kx + y = k² and x + ky = 1 have no solutions.
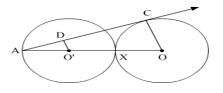
SECTION C (3X8=24 MARKS)

27. Find the area of the shaded region, where ABCD is a square of side 14 cm in which four semi-circles of same radii are drawn as shown.

28. From a point 100 m above a lake, the angle of elevation of a stationary helicopter is 30° and the angle of depression of reflection of the helicopter in the lake is 60°. Find the height of the helicopter.

29. in the figure, two equal circles, with centres O and O', touch each other at X. OO' produced meets the circle with centre O' at A. AC is tangent to the circle with centre O, at the point C. O'D is perpendicular to AC. Find the value of $\frac{DO'}{CO}$.

30. The zeroes of the cubic polynomial $x^3 - 14kx^2 + 56kx - 64k^3$ are in the ratio 1: 2: 4. Find the value of k and hence, the zeroes of the cubic polynomial.

31. The mid-point of sides of a triangle are (3,4),(4,6) and (5,7). Find the area of the triangle.

32. The median of the following data is 52.5. Find the values of x and y if the total frequency is 100.

CLASSES	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
FREQUENCY	2	5	x	12	17	20	y	9	7	4

33. For what values of m and n the following system of linear equations has infinitely many solutions.
3x + 4y = 12
(m + n) x + 2 (m − n) y = 5m − 1

34. A peacock is sitting on the top of a pillar 9m high. From a point 27m away from the bottom of the pillar, a snake is coming to its hole at the base of the pillar. Seeing this, the peacock pounces on the snake. If their speeds are equal, at what distance from hole is the snake caught?

SECTION D (4X6=24 MARKS)

35. The sum of the third and the seventh terms of an A.P. is 6 and their product is 8. Find the sum of first sixteen terms of the A.P.

36. A motor boat whose speed is 18 km/h in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream.

37. A metallic right circular cone 20 cm high and whose vertical angle is 60° is cut into two parts at the middle of its height by a plane parallel to its base. If the frustum so obtained be drawn into a wire of diameter 1/16 cm, find the length of the wire.

38. Prove that the area of an equilateral triangle described on one side of the square is equal to half the area of the equilateral triangle described on one of its diagonal.

39. Find the mean and mode of the following frequency distribution:

CLASS	0-10	10-20	20-30	30-40	40-50
FREQUENCY	4	4	7	10	12

40. Prove that
$$\frac{TanA}{1-CotA} + \frac{CotA}{1-TanA} = 1 + CotA + TanA$$

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