MATHAMATICS

Sample Paper 2 (Unsolved)

(Standard Level)

Time: 3 hrs. **Max. Marks: 80**

General Instructions

Same as Sample Paper 1

Section-A

1. If one of the zeroes of the cubic polynomial $x^3 + ax^2 + bx + c$ is -1, then the product of the other two zeroes is:

a. $b - a + 1$ b. $b - a - 1$

c. $a - b + 1$ d. $a - b - 1$

Or

If the zeroes of the quadratic polynomial $ax^2 + bx + c$, $c \neq 0$ are equal, then:

a. c and a have opposite signs

b. c and b have opposite signs

c. c and a have the same sign

d. c and b have the same sign

2. If the 2nd term of an AP is 13 and the 5th term is 25, what is its 7th term?

a. 30 b. 33

c. 37 d. 38

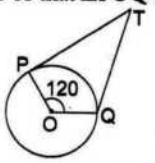
3. A tangent AB at a point A of a circle of radius 5 cm meets a line through the centre O at a point B so that OB = 12 cm. Length AB is:

a. 12 cm b. 13 cm

c. 8.5 cm d. $\sqrt{119}$ cm

Or

In the adjoining figure, if TP and TQ are two tangents to a circle with centre O so that $\angle POQ = 120°$, then $\angle PTQ$ is:



a. 60° b. 30°

c. 50° d. 70°

4. If a pole 6 m high casts a shadow $2\sqrt{3}$ m long on the ground, then Sun elevation is:

a. 60° b. 45° c. 30° d. 90°

5. Probability of getting a doublet on throwing two dice simultaneously is:

a. $\frac{1}{6}$ b. $\frac{5}{6}$

c. $\frac{4}{6}$ d. $\frac{5}{36}$

6. For some integer m, every even integer is of the form:

a. m b. $m + 1$

c. $2m$ d. $2m + 1$

Or

The HCF of 20, 50 and 80 is:

a. 20 b. 10

c. 50 d. 80

7. A number of tangents can be drawn from an external point to the circle is:

a. two b. three

c. four d. five

8. The value of (tan 1° tan 2° tan 3° .... tan 89°) is ..... .

9. The ratio of the ends of a bucket 30 cm high are 21 cm and 7 cm, then its capacity in litres is ..... .

10. If a bag contains 5 red and 4 black balls and a ball is drawn at random from the bag, the probability of getting a black ball is ..... .

11. The graph of the linear equation $y = x$ passes through the point $\left(\frac{3}{2}, -\frac{3}{2}\right)$. (T/F)

Or

If a linear equation has solutions (−2, 2), (0, 0) and (2, −2), then it is of the form $y - x = 0$. (T/F)

12. If S is a point on side PQ of a ΔPQR, such that PS = QS = RS then $QS^2 + RS^2 = QR^2$. (T/F)

13. In two concentric circles, all chords of the outer circle which touch the inner circle are of equal length. (T/F)

Or

If a point lies on a circle, then the number of tangents drawn from that point to the circle is 2. (T/F)

14. If the circumference of a circle exceeds its diameter by 180 cm, then its radius is 32 cm. (T/F)

15. The value of x if the mean of 5 observations x, $x + 2$, $x + 4$, $x + 6$ and $x + 8$ is 11, will be 7. (T/F)

16. If 1 is a root of the equations $ay^2 + ay + 3 = 0$ and $y^2 + y + b = 0$, then find the value of ab.

17. Find the coordinates of a point A, where AB is diameter of a circle whose centre is (2, −3) and B is the point (1, 4).

Or

The points A, B and C are collinear and AB = BC. If the coordinates of A, B and C are (3, a), (1, 3) and (b, 4) respectively, then find the values of a and b.

18. If PQR is an equilateral triangle and PX ⊥ QR, find PX^2.

Or

A girl walks 500 m towards east and then 1200 m towards north. Find her distance from the starting point.

19. If $\tan\theta + \cot\theta = 5$, find the value of $\tan^2\theta + \cot^2\theta$.

20. A cone of height 20 cm and radius of base 5 cm is made up of modelling clay. A child reshapes it in the form of a sphere. Find the diameter of the sphere.

Section-B

21. 'The product of two consecutive positive integers is divisible by 2.' Is this statement true or false? Give reason.

Or

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

22. For what values of k for which the system of equations $x - 2y = 3$ and $3x + ky = 1$ have a unique solution?

23. Find the ratio in which the segment joining the points (1, −3) and (4, 5) is divided by X-axis? Also find the coordinates of this point on X–axis.

Or

Prove that the points (3, 0), (6, 4) and (−1, 3) are the vertices of a right-angled isosceles.

24. Prove that the line segment joining the points of contact of two parallel tangents to a circle is a diameter of the circle.

25. If $2\sin^2\theta - \cos^2\theta = 2$, then find the value of θ.

26. The following is the distribution of weights (in kg) of 40 persons:

Weight (in kg)	No. of persons
40–45	4
45–50	4
50–55	13
55–60	15
60–65	6
65–70	5
70–75	2
75–80	1

Construct a cumulative frequency distribution (of the less than type) table for the above data.

Section-C

27. Use Euclid's division lemma to show that the cube of any positive integer is of the form $9m$ or $9m + 1$ or $9m + 8$.

28. Solve the following equation by using factorisation method:

$$4x^2 - 4ax + (a^2 - b^2) = 0.$$

Or

If 3 is a root of the quadratic equation $x^2 - x + k = 0$, find the value of p so that the roots of the equation $x^2 + k(2x + k + 2) + p = 0$ are equal.

29. The 24th term of an AP is twice its 10th term. Show that its 72nd term is 4 times its 15th term.

30. For what value of p, are the points (2, 1), (p, −1) and (−1, 3) collinear?

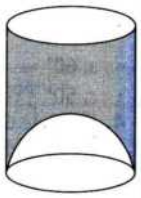
31. From a point O on the ground, the angle of elevation of the top of a tower is 30° and that of the flagstaff on the top of the tower is 60°. If the length of the flagstaff is 5 m, find the height of the tower.

Or

A vertical tower stands on a horizontal plane. A helicopter passes h m above the tower. At a point on the plane, the angle of elevation of the tower is α and that of the helicopter is β. Prove that the height of the tower is $\frac{h\tan\alpha}{\tan\beta - \tan\alpha}$.

32. How many spherical solid bullets can be made out of a solid cube of lead whose edge measures 44 cm, each bullet being 4 cm in diameter?

Or



A Juice seller was serving his customers using glasses as shown in figure. The inner diameter of the cylindrical glass was 5 cm but bottom of the glass had a hemispherical raised portion which reduced the capacity of the glass. If the height of a glass was 10 cm, find the apparent and actual capacity of the glass. (Use $\pi = 3.14$)

33. Find the mode of the following frequency distribution:

Class	0–10	10–20	20–30	30–40	40–50	50–60	60–70
Frequency	8	10	10	16	12	6	7

34. Construct an isosceles triangle whose base is 6 cm and altitude 4 cm. Then construct another triangle whose sides are $\frac{3}{4}$ times the corresponding sides of the first triangle.

Section-D

35. If the polynomial $f(x) = 3x^4 - 9x^3 + x^2 + 15x + k$ is completely divisible by $3x^2 - 5$, then find the value of k and hence the other two zeroes of the polynomial.

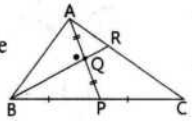
36. Solve the following pair of linear equations graphically: $6x - y + 4 = 0$ and $2x - 5y = 8$. Shade the region bounded by the lines and Y-axis.

Or

Solve the following systems of equations graphically:

$2x + 3y = 4$ and $4x + 6y = 12$.

37. In the figure of Δ ABC, P is the mid-point of BC and Q is the middle point of AP. If extended BQ meets AC in R, prove that $RA = \frac{1}{3}CA$.

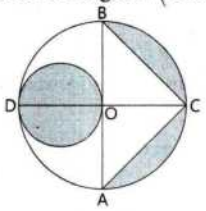


38. If $\frac{\sec\alpha}{\sec\beta} = m$ and $\frac{\sec\alpha}{\operatorname{cosec}\beta} = n$, show that $m^2 + n^2 = n^2 \operatorname{cosec}^2\beta$.

Or

If $m = \cos\theta - \sin\theta$ and $n = \cos\theta + \sin\theta$, then show that $\sqrt{\frac{m}{n}} + \sqrt{\frac{n}{m}} = \frac{2}{\sqrt{1 - \tan^2\theta}}$.

39. In the given figure, AB and CD are two diameters of a circle (with centre O) perpendicular to each other and OD is the diameter of the smaller circle. If OA = 7 cm, find the area of shaded region. $\left(\text{Use } \pi = \frac{22}{7}\right)$



40. A card is drawn at random from a well-shuffled deck of 52 cards. Find the probability of getting:

(i) a queen (ii) a diamond

(iii) a king or an ace (iv) a red ace

Answer Key

Sample Paper-2

1. (a) OR (c) **2.** (b) **3.** (d) OR (a) **4.** (a) **5.** (a) **6.** (c) OR (b) **7.** (a) **8.** 1 **9.** 20.02 **10.** $\frac{4}{9}$

11. False OR False **12.** False **13.** True OR False **14.** False **15.** True **16.** 3 **17.** (3, –10) OR $a = 2$ and $b = -1$ **18.** $3(RX)^2$ OR 1300 m **19.** 23 **20.** 10 cm **22.** $k \neq -6$ **23.** $\left(\frac{17}{8}, 0\right)$ **25.** $\theta = 90°$ **28.** Roots are $\frac{a+b}{2}$ and $\frac{a-b}{2}$ **OR** $p = 12$ **30.** $p = 5$ **31.** $h = 2.5$ m **32.** 2541 bullets **OR** 32.71 cm^3 and 163.54 cm^3

33. 36 **35.** $x = 2$ and $x = 1$ **39.** 66.5 cm^2 **40.** (i) $\frac{1}{13}$ (ii) $\frac{1}{4}$ (iii) $\frac{2}{13}$ (iv) $\frac{1}{26}$