SAMPLE PAPER

SECOND TERM (SA-II)
MATHEMATICS
(With Answers)
CLASS X

| Time Allowed : 3 Hours]	[Maximum Marks : 80

General Instructions :

   (i) All questions are compulsory.

   (ii) The question paper consists of 34 questions divided into four sections A, B, C and D. Section A comprises of 10 questions of 1 mark each. Section B comprises of 8 questions of 2 marks each. Section C comprises of 10 questions of 3 marks each and Section D comprises of 6 questions of 4 marks each.

   (iii) Question numbers 1 to 10 in Section A are multiple choice questions where you are to select one correct option out of the given four.

   (iv) There is no overall choice. However, internal choice has been provided in 1 question of two marks, 3 questions of three marks each and 2 questions of four marks each. You have to attempt only one of the alternatives in all such questions.

   (v) Use of calculators is not permitted.

<div align="center">Section 'A'</div>

Question numbers 1 to 10 are of one mark each.

1. A balloon is connected to a meteorological ground stand by a cable of length 215 m inclined at 60° to the horizontal. Assume that there is no slack in the cable. Then the height of the balloon from the ground is
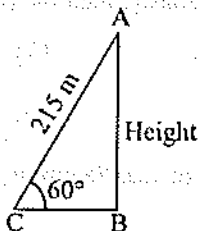
   (a) $\dfrac{215\sqrt{3}}{2}$ m   (b) $\dfrac{215}{\sqrt{3}}$ m

   (c) $215\sqrt{3}$ m   (d) $\dfrac{215}{\sqrt{2}}$ m

2. If $P\left(\dfrac{m}{3},\ 4\right)$ is the mid-point of the line segment joining the points $Q(-6, 5)$ and $R(-2, 3)$, then the value of m is

   (a) -12 (b) 12
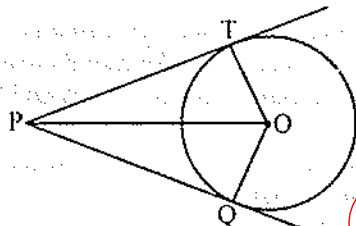
   (c) -6 (d) -4

3. If $\frac{1}{2}$ is a root of the equation $x^2 + kx - \frac{5}{4} = 0$, then the value of k is

(a) 2 (b) -2

(c) $\frac{1}{4}$ (d) $\frac{1}{2}$

4. Which term of the A.P. 92, 88, 84, 80, ... is 0 ?

(a) 23 (b) 32

(c) 22 (d) 24

5. PQ and PT are tangents to a circle with centre O and radius 5 cm. If $PQ = 12$ cm, then perimeter of quadrilateral $PQOT$ is

(a) 24 cm (b) 34 cm

(c) 17 cm (d) 20 cm

6. The value of k so that the sum of the roots of the quadratic equation $3x^2 + (2k+1)x - (k+5) = 0$ is equal to the product of the roots is

(a) 4 (b) 3

(c) 2 (d) 1

7. If the sum of first n terms of an A.P. is given by $S_n = 4n^2 - 3n$, then the nth term of an A.P. is

(a) $6n - 5$ (b) $8n - 7$

(c) $7n - 6$ (d) $5n - 4$

8. Three coins are tossed simultaneously, then the probability of getting exactly one head is

(a) $\frac{1}{8}$ (b) $\frac{1}{2}$

(c) $\frac{3}{8}$ (d) $\frac{5}{8}$

9. A wire, in the shape of a square of side 88 cm, is bend so as to form a circular ring. The radius of the circle will be

(a) 56 cm (b) 28 cm

(c) 14 cm (d) 42 cm

10. A cylinder, a cone and a hemi-sphere are of equal base and same height. The ratio of their volumes is

(a) $3 : 2 : 1$ (b) $3 : 1 : 2$

(c) $2 : 1 : 3$ (d) $1 : 2 : 3$

| Section 'B' |

Question numbers 11 to 18 carry 2 marks each.

11. A solid sphere of radius 3 cm is melted and then recasted into small spherical balls of diameter 0.6 cm. Find the number of small balls thus obtained.

12. A circular grassy plot of land, 42 m in diameter, has a path 3.5 m wide running round it on the outside. Find the cost of gravelling the path at ₹ 8 per square metre.

13. A paper is in the form of a rectangle $ABCD$ in which $AB = 20$ cm and $BC = 14$ cm. A semi-circular portion with BC as diameter is cut off. Find the area of a remaining part.

D ┌─────────────────────┐ C
  │   14 cm
A └─────────────────────┘ B
        ── 20 cm ──
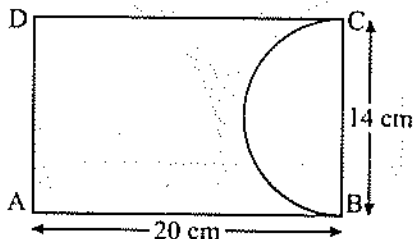
14. The radii of the bases of two right circular solid cones of same height are r_1 and r_2 respectively. The cones are melted and recast into a solid sphere of radius R. Show that the height of each cone is given by

$$h = \frac{4R^3}{r_1^2 + r_2^2}.$$

15. Two concentric circles of radii 5 cm and 3 cm. Find the length of the chord of larger circle which touches the smaller circle.

16. The centre of a circle is $(2\alpha - 1, 7)$ and it passes through the point $(-3, -1)$. If the diameter of the circle is 20 units, then find the values of α.

Or

Show that the points $(-2, 5)$ $(3, -4)$ and $(7, 10)$ are the vertices of a right angled isosceles triangle.

17. Solve for x : $a^2b^2x^2 + b^2x - a^2x - 1 = 0$.

18. The king, queen and jack of hearts are removed from a deck of 52 playing cards and then well shuffled. One card is selected from the remaining cards. Find the probability of getting
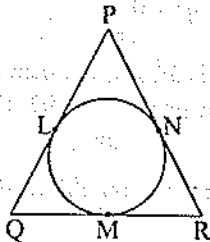
  (*i*) the '2' of hearts   (*ii*) '10' of red suit.

Section 'C'

Question numbers 19 to 28 carry 3 marks each.

19. Draw a right triangle ABC with $AB = 4.5$ cm, $AC = 7.5$ cm and $\angle B = 90°$. Construct a similar triangle whose sides are 4/5 times the sides of the triangle ABC.

20. In figure, $PQ = PR$, prove that $QM = MR$.

P
L   N
Q   M   R

21. Prove that the perpendicular at the point of contact to the tangent to a circle passes through the centre.

22. Two men on either side of a cliff 100 m high observe the angles of elevation of the top of the cliff to be 30° and 60° respectively. Find the distance between the two men.   [Use $\sqrt{3} = 1.732$]

23. *PQRS* is a rectangle in which length is two times the breadth and *L* is mid point of *PQ*. With *P* and *Q* as centres, draw two quadrants as shown in figure. Find the ratio of the area of rectangle *PQRS* to the area of shaded portion.

Or
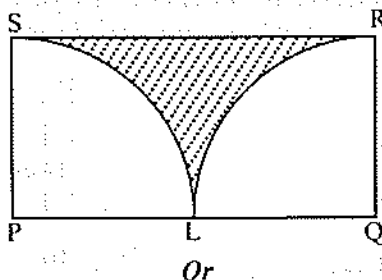
Find the area of the shaded region in figure, if $AC = 24$ cm, $BC = 10$ cm and *O* is the centre of the circle.
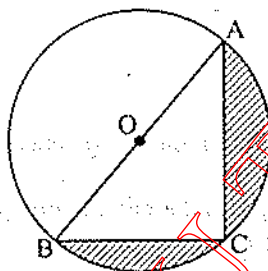
24. A toy is the in form of a cone mounted on a hemisphere of common base radius 7 cm. The total height of the toy is 31 cm. Find the total surface area of the toy. $\left[\text{Use } \pi = \dfrac{22}{7}\right]$

25. Prove that the area of a triangle whose coordinates are $(t, t - 2)$, $(t + 23, t + 2)$ and $(t + 3, t)$ is independent of *t*.

26. Two dice are thrown simultaneously. What is the probability that
  (*i*) 4 will not come up on either of them ?
  (*ii*) 4 will come up on at least one ?
  (*iii*) 4 will come up at both dice ?

27. If *p*th, *q*th and *r*th term of an A.P. are *a*, *b*, *c* respectively, then show that
$$a(q - r) + b(r - p) + c(p - q) = 0.$$
Or

Find four numbers in A.P. whose sum is 20 and the sum of whose squares is 120.

28. Two numbers differ by 4 and their product is 192. Find the numbers.

Or

The difference between two numbers is 7. If the difference of their reciprocals is $\dfrac{7}{30}$, find the two numbers.

Question numbers 29 to 34 carry 4 marks each.

29. A circus tent of total height 50 metres is to be made in the form of a right circular cylinder surmounted by a right circular cone. If the height and radius of the conical portion of the tent are 15 metres and 20 metres respectively. Find the cost of the cloth required, at the rate of ₹ 14 per square metre to make the tent.

[Take $\pi = \frac{22}{7}$]

Or

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 the base. If the frustum so obtained be drawn into a wire of diameter $\frac{1}{16}$ cm, find the length of the wire.

30. Ram can row a boat 8 km downstream and return in 1 hour 40 minutes. If the speed of the stream is 2 km/h, find the speed of the boat in still water.

Or

A fast train takes 3 hours less than a slow train for a journey of 600 km. If the speed of the slow train is 10 km/h less than that of the fast train, find the speed of the two trains.

31. The angle of elevation of the top of a tower at a point on the horizontal line through the foot of the tower is 45°. After walking a distance of 80 m towards the foot of the tower along the same horizontal line, the angle of elevation of the top of the tower changes to 60°. Find the height of the tower.

32. If $\dfrac{a^{n+1} + b^{n+1}}{a^n + b^n}$ is the A.M. between a and b, then find the value of n.

33. Show that the points (a, a), $(-a, -a)$ and $(-\sqrt{3}a, \sqrt{3}a)$ are the vertices of an equilateral triangle. Also, find its area.

34. A circle touches the sides of a quadrilateral ABCD at P, Q, R, S respectively. Show that the angles subtended at the centre by a pair of opposite sides are supplementary.
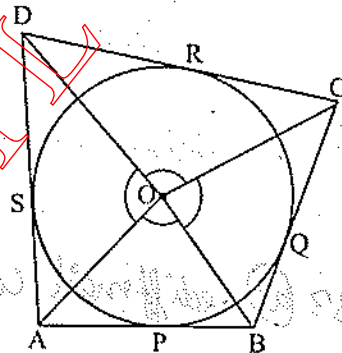
ANSWERS

Section 'A'

1. (*a*)   **2.** (*a*)   **3.** (*c*)

4. (*d*)   5. (*b*)   6. (*a*)
7. (*b*)   8. (*c*)   9. (*a*)
10. (*b*)
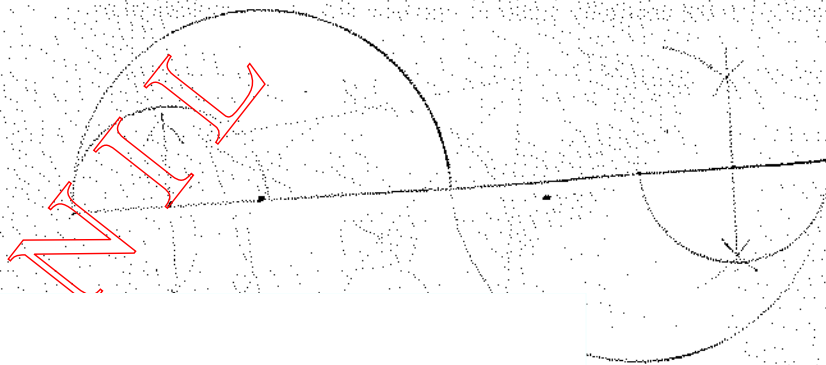
Section 'B'

11. Number of balls = 1000   12. ₹ 4004
13. Area of the remaining part = 203 cm^2
15. Length of the chord of larger circle = 8 cm   16. $\alpha = -4, 2$
17. $x = -\dfrac{1}{a^2}$ or $x = \dfrac{1}{b^2}$ 18. (*i*) $\dfrac{1}{49}$, (*ii*) $\dfrac{2}{49}$

Section 'C'

22. Distance between the two men = 230.8 m

23. $\dfrac{4}{4-\pi}$ *Or* Area = 145.57 cm^2

24. Surface area of the toy = 858 cm^2

26. (*i*) $\dfrac{25}{36}$, (*ii*) $\dfrac{11}{36}$, (*iii*) $\dfrac{1}{36}$ 27. *Or* Four numbers in A.P. 2, 4, 6, 8, or 8, 6, 4, 2

28. 12, 16 or – 16, – 12   *Or*   10 and 3

Section 'D'

29. ₹ 83,600 *Or* 7964.4 m
30. Speed of the boat in still water = 10 km/h
    Or Speed of slow train = 40 km/h; Speed of fast train = 50 km/h

31. $40(3+\sqrt{3})$ m   32. $n = 0$ 33. Area = $2\sqrt{3}\,a^2$ square units