CBSE
Class X Mathematics
Board Paper – 2017
All India Set – 3

Time: 3 hours **Total Marks: 90**

General Instructions:

(i) All questions are compulsory.

(ii) The question paper consists of 31 questions divided into four sections – A, B, C and D.

(iii) Section A contains 4 questions of 1 mark each. Section B contains 6 questions of 2 marks each, Section C contains 10 questions of 3 marks each and Section D contains 11 questions of 4 marks each.

(iv) Use of calculators is not permitted.

SECTION A

Question numbers 1 to 4 carry 1 mark each.

1. The probability of selecting a rotten apple randomly from a heap of 900 apples is 0.18. What is the number of rotten apples in the heap?

2. If a tower 30 m high, casts a shadow $10\sqrt{3}$ m long on the ground, then what is the angle of elevation of the sun?

3. If the angle between two tangents drawn from an external point P to a circle of radius a and centre O, is 60°, then find the length of OP.

4. What is the common difference of an A.P. in which $a_{21} - a_7 = 84$?

SECTION B

Question numbers 5 to 10 carry 2 marks each.

5. A circle touches all the four sides of a quadrilateral ABCD. Prove that AB + CD = BC + DA

6. Prove that the tangents drawn at the end points of a chord of a circle make equal angles with the chord.

7. A line intersects the y-axis and x-axis at the points P and Q respectively. If (2, -5) is the mid-point of PQ, then find the coordinates of P and Q.

8. If the distances of P(x, y) from A(5, 1) and B(-1, 5) are equal, then prove that $3x = 2y$.

9. Find the value of p, for which one root of the quadratic equation $px^2 - 14x + 8 = 0$ is 6 times the other.

10. For what value of n, are the n^{th} terms of two A.Ps 63, 65, 67,…. and 3, 10, 17,….. equal?

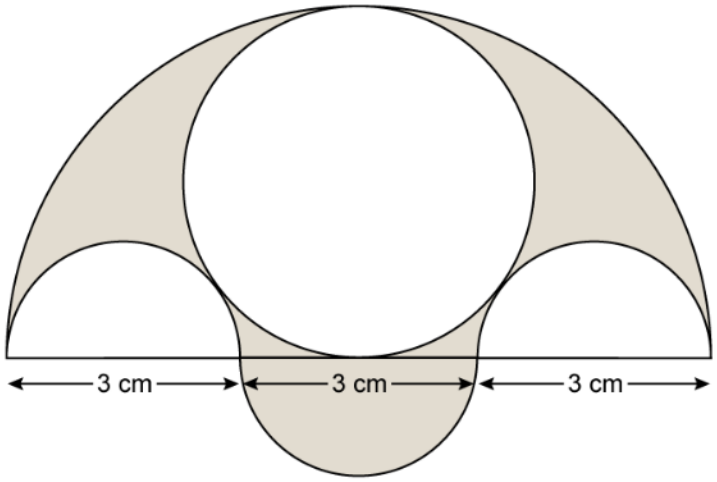
SECTION C

Question numbers 11 to 20 carry 3 marks each.

11. On a straight line passing through the foot of a tower, two points C and D are at distances of 4 m and 16 m from the foot respectively. If the angles of elevation from C and D of the top of the tower are complementary, then find the height of the tower.

12. A bag contains 15 white and some black balls. If the probability of drawing a black ball from the bag is thrice that of drawing a white ball, find the number of black balls in the bag.

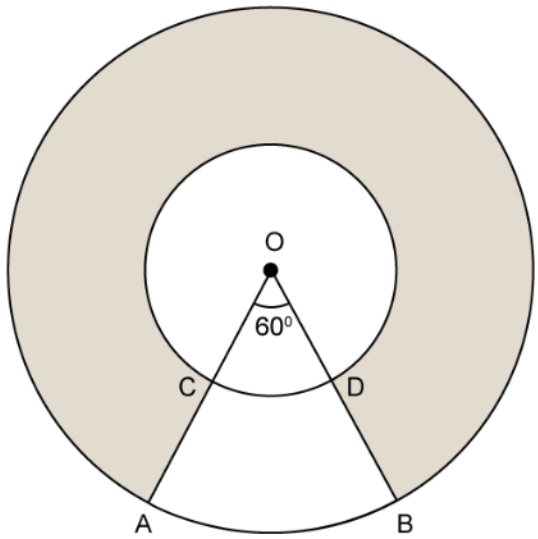
13. Three semicircles each of diameter 3 cm, a circle of diameter 4.5 cm and a semicircle of radius 4.5 cm are drawn in the given figure. Find the area of the shaded region.



14. In what ratio does the point $\left(\frac{24}{11}, y\right)$ divides the line segment joining the points P(2, -2) and Q(3, 7)? Also find the value of y.

15. Water in a canal, 5.4 m wide and 1.8 m deep, is flowing with a speed of 25 km/hour. How much area can it irrigate in 40 minutes, if 10 cm of standing water is required for irrigation?

16. In the given figure, two concentric circles with centre O have radii 21 cm and 42 cm. If ∠AOB = 60°, find the area of the shaded region. $\left(\text{Use } \pi = \frac{22}{7}\right)$



17. The dimensions of a solid iron cuboid are 4.4 m × 2.6 m × 1.0 m. It is melted and recast into a hollow cylindrical pipe of 30 cm inner radius and thickness 5 cm. Find the length of the pipe.

18. A toy is in the form of a cone of radius 3.5 cm mounted on a hemisphere of same radius on its circular face. The total height of the toy is 15.5 cm. Find the total surface area of the toy.

19. How many terms of an A.P. 9, 17, 25, …. must be taken to give a sum of 636?

20. If the roots of the equation $(a^2 + b^2)\, x^2 - 2(ac + bd)\, x + (c^2 + d^2) = 0$ are equal, prove that $\frac{a}{b} = \frac{c}{d}$.

SECTION D

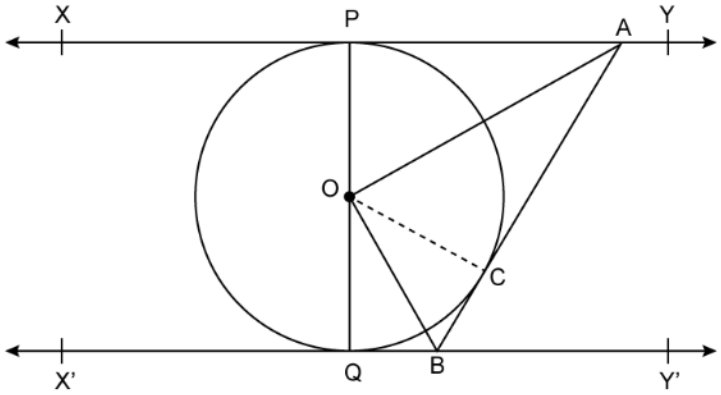
Question numbers 21 to 31 carry 4 marks each.

21. If the points A(k + 1, 2k), B(3k, 2k + 3) and C(5k – 1, 5k) are collinear, then find the value of k.

22. Construct a triangle ABC with side BC = 7 cm, ∠B = 45°, ∠A = 105°. Then construct another triangle whose sides are $\frac{3}{4}$ times the corresponding sides of the Δ ABC.

23. Two different dice are thrown together. Find the probability that the numbers obtained have
(i) even sum, and
(ii) even product

24. In the given figure, XY and X'Y' are two parallel tangents to a circle with centre O and another tangents AB with point of contact C, is intersecting XY at A and X'Y' at B. Prove that ∠AOB = 90°.



25. In a rain–water harvesting system, the rain-water from a roof of 22 m × 20 m drains into a cylindrical tank having diameter of base 2 m and height 3.5m. If the tank is full, find the rainfall in cm. Write your views on water conservation.

26. Prove that the lengths of two tangents drawn from an external point to a circle are equal.

27. If the ratio of the sum of the first n terms of two A.Ps is (7n + 1) : (4n + 27), then find the ratio of their 9^{th} terms.

28. Solve for x:

$$\frac{x-1}{2x+1}+\frac{2x+1}{x-1}=2, \text{where } x \neq -\frac{1}{2}, 1$$

29. A takes 6 days less than B to do a work. If both A and B working together can do it in 4 days, how many days will B take to finish it?

30. From the top of a tower, 100 m high, a man observe two cars on the opposite sides of the tower and in same straight line with its base, with its base, with angles of depression 30° and 45°. Find the distance between the cars.

$\left[\text{Take } \sqrt{3}=1.732\right]$

31. In the given figure, O is centre of the circle with AC = 24 cm, AB = 7 cm and ∠BOD = 90°. Find the area of the shaded region.