CLASS X

SA – II MODEL EXAMINATION

MATHEMATICS

TIME: 3hrs.   MARKS: 90

GENERAL INSTRUCTIONS:

1. All questions are compulsory.
2. The question paper consists of 31 questions divided into four sections A,B,C and D
3. 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.
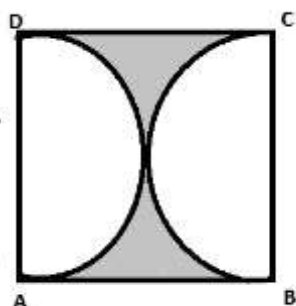4. Use of calculators is not permitted.

SECTION A

1. If 8 is a root of the equation $x^2 - 10x + k = 0$ then find the value of k.

2. Two tangents making an angle of 120° with each other are drawn to a circle of radius 6cm. Find the length of each tangent.

3. Two different dice are tossed together. Find the probability that the product of the two numbers on the top of the dice is 6.

4. A tower AB is 20m high and BC its shadow on the ground is $20\sqrt{3}$m long. Find the sun's altitude.

SECTION B

5. Find the roots of the quadratic equation $\sqrt{7}y^2 - 6y - 13\sqrt{7} = 0$.

6. Solve for $x : \sqrt{3x^2 - 2} + 1 = 2x$

7. CP and CQ are tangents from an external point C to a circle with centre O. AB is another tangent which touches the circle at R. If CP = 11cm and BR = 4cm, find the length of BC in the figure.
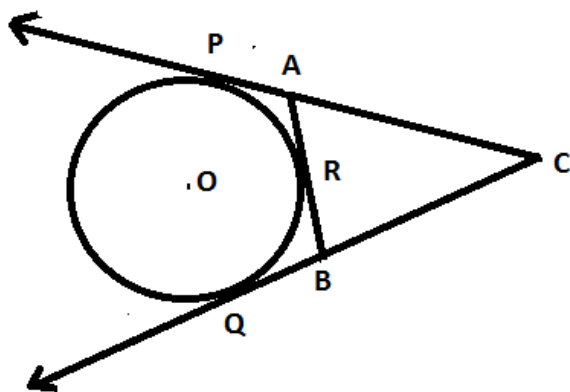
8. Find the centroid of the triangle whose vertices are (2, 3) (4, -5) and (3, 8).

9. Find the relation between x and y if the points A(x, y) B(-5, 7) and C(-4, 5) are collinear.

10. Find the perimeter of the shaded region in the figure,

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if ABCD is a square of side 14cm and APB and CPD are semi-circles.

SECTION C

11. The 16th term of an A.P is if five times its third term. If its 10th term is 41 then find the sum of its first 15 terms.

12. Prove that the points A(2, 3) B(-2, 2) C(-1, -2) and D(3, -1) are the vertices of a square ABCD.

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

14. Draw a pair of tangents to a circle of radius 4 cm which are inclined to each other at an angle of 60°.

15. The angle of elevation of the top of a tower as observed from a point on the ground is α and on moving 'a' metres towards the tower, the angle of elevation is β. Prove that the height of the tower is $\dfrac{atan\alpha \cdot tan\beta}{tan\beta - tan\alpha}$.

16. A box contains 80 discs which are numbered from 1 to 80. If one disc is selected at random from a box. Find the probability that it bears
a) a perfect square number   b) a one digit number
c) a prime number.

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17. The point A(3, y) is equidistant from the points P(6, 5) and Q(0, -3). Find the value of y.

18. A hemispherical bowl of internal radius 9cm is full of water. Its contents are emptied in a cylindrical vessel of internal radius 6cm. Find the height of water in the cylindrical vessel.

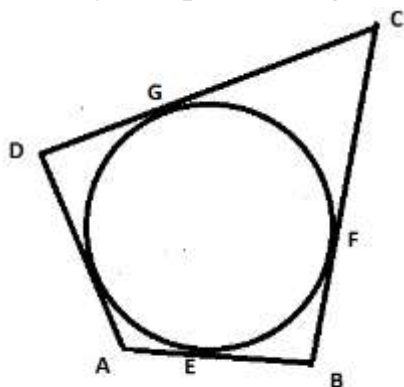19. Find the area of the shaded region in the figure if Radius of each circle is 4cm.
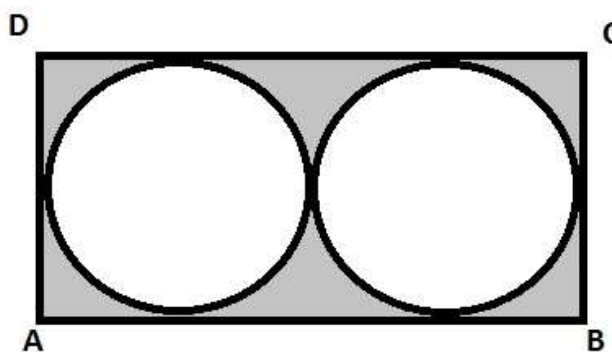
20. Find the area of the minor segment of a circle of radius 42cm, if the length of the corresponding arc is 44cm.

SECTION D

21. A train travels at a certain average speed for a distance of 63km and then travels a distance of 72km at an average speed of 6km/hr more than its original speed. If it takes 3 hrs to complete the total journey. What is its original average speed?

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22. 25 trees are planted in a straight line at intervals of 5 metres. To water them, the gardener must bring water for each tree separately from a well 10 metres from the first tree in line with the trees. How far he will have to cover in order to water all the trees beginning with the first if he starts from the well.

23. A card is drawn at random from a well shuffled deck of playing cards. Find the probability that the card drawn is
    a) A card of spade or an ace
    b) A black queen
    c) Neither a king nor a queen
    d) Either a jack or a king

24. Find the area of a quadrilateral ABCD whose vertices are A(-3, -1) B(-2, -4) C(4, -1) and D(3, 4).

25. Draw a triangle with sides 5cm, 6cm and 7cm. Then draw another triangle whose sides are $\frac{4}{5}$ of the corresponding sides of the first triangle.

26. The surface area of a solid metallic sphere is 616cm^2. It is melted and recast into a cone of height 28cm. Find the diameter of the base of the cone so formed (use $\pi = \frac{22}{7}$).

27. Solve for x: $\frac{1}{2a+b+2x} = \frac{1}{2a} + \frac{1}{b} + \frac{1}{2x}$

28. A container open at the top is in the form of a frustum of a cone of height 24cm with radii of its lower and upper circular ends as 8cm and 20cm respectively. Find the cost of milk which can completely fill the container at the rate of Rs.21 per litre (use $\pi = \frac{22}{7}$).

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29. A village panchayat constructed a circular tank to serve as a bird bath. A fencing was made in the shape of a quadrilateral, sides of the quadrilateral touches the circle as shown in the figure. If AB = 5 cm,   CD = 6 cm and BC = 7 cm then find AD. What values does the village panchayat depict through this action?

30. PQRS is a rectangle in which PQ = 40 cm, QR = 20cm. A semicircle is drawn with centre O and radius $20\sqrt{2}$cm. It passes through A and B as shown in the figure. Find the area of the shaded region.
    (use $\pi = 3.14$) (Hint: From the sides of $\Delta\,POQ$, find POQ and proceed).
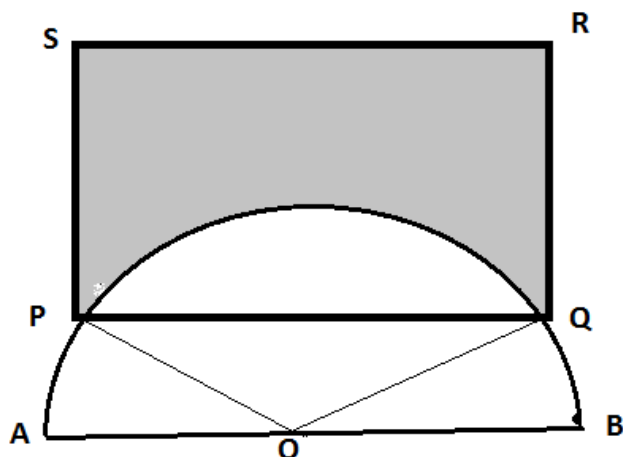
31. Two ships are sailing in the sea on the either side of a light house. The angles of depression of two ships as observed from the top of the light house are 60° and 45° respectively. If the distance between the ships is $100 \left(\frac{\sqrt{3}+1}{\sqrt{3}} \right) m,$ then find the height of the light house.

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