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UNIVERSAL EDUCATION CENTRE

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SUMMATIVE ASSESSMENT –II
MATHEMATICS
Class – X

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Time allowed: 3 hours   Maximum Marks: 90

General Instructions:
a) All questions are compulsory.
b) The question paper consists of 31 questions divided into four sections – A, B, C and D.
c) Section A contains 4 questions of 1 mark each which are multiple choice questions, 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.
d) Use of calculator is not permitted.

Section A

1. In an AP, if $a = 3$, $d = 0$, $n = 7$, then a_n will be:
   (a) 4   (b) 1   (c) 3   (d) 2

2. A circus artist is climbing a 10 m long rope which is tightly stretched and tied from the top of a vertical pole to the ground. If the angle made by the rope with the ground level is $45°$, then the height of the pole is:
   (a) 15 m   (b) 20 m   (c) $5\sqrt{2}$ m   (d) 25 m

3. A bag contains 12 balls of which x are green, $2x$ are red and $3x$ are yellow. A ball is selected at random. The probability that it is not green is:
   (a) $\frac{5}{6}$ (b) $\frac{7}{12}$ (c) $\frac{5}{24}$ (d) $\frac{7}{24}$

4. The perpendicular distance of A (5, 12) from the y – axis is:
   (a) 13 units   (b) 5 units   (c) 12 units   (d) 17 units

Section B

5. For what value of p, (-4) is a zero of the polynomial $x^2 - 2x - (7p + 3) = 0$?

6. Find the 4_{th} term from the end of the AP $-8, -5, \ldots\ldots 46$.

7. In figure, two circles with centres A and B and of radii 5 cm and 3 cm touch each other internally. If the perpendicular bisector of segment AB meets the bigger circle in P and Q, then find the length of PQ.
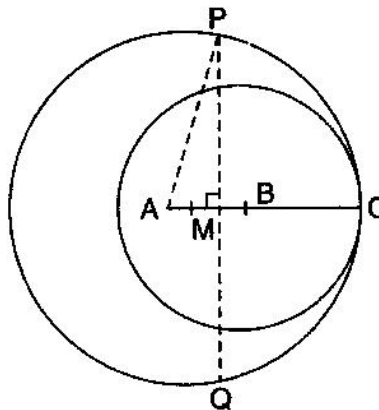
8. Find the area of the sector of the circle of radius 6 cm, if the corresponding arc length is 7 cm.

9. Three cubes each of side 5 cm and joined end to end. Find the surface area of the resulting cuboid.

10. A cubical block of side 7 cm is surmounted by a hemisphere. What is the greatest diameter the hemisphere can have? Find the surface area of the solid.

Section C

11. Solve for x : $x^2 - 2ax + a^2 - b^2 = 0$

12. Find the sum of all two digit numbers greater than 50 which when divided by 7 leave a remainder of 4.

13. In the following figure, find the length of the chord AB.
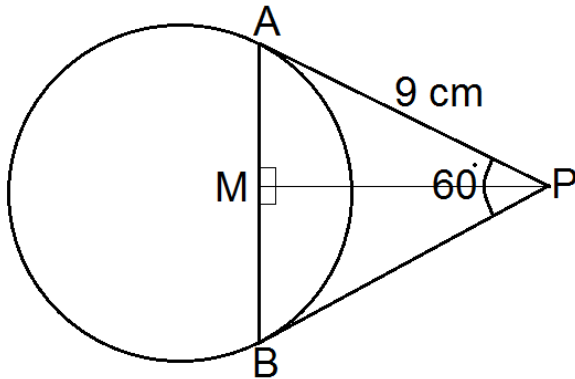
14. The angle of elevation of the top of the tower from a point on the same level as the foot of the tower is $30°$ On advancing 150 meters towards the foot of the tower, the angle of elevation becomes $60°$

Show that the height of the tower is 129.9 meters. $\left(\text{Take } \sqrt{3} = 1.732\right)$

15. Five cards – the ten, jack, queen, king and ace of diamonds, are well shuffled with their face downwards. One cad then picked up at random.
    (i) What is the probability that the card is queen?
    (ii) If the queen is drawn and put aside, what is the probability that the second card picked up is
        (a) an ace?   (b) a queen?

16. Find the value of k if the points A $(2, 3)$, B$(4, k)$ and C$(6, -3)$ are collinear.

17. In what ratio is the line segment joining the points $(-2, -3)$ and $(3, 7)$ divided by the y – axis?
    Also, find the coordinates of the point of division.

18. The circumference of a circular plot is 220 m. A 14 cm wide concrete track runs around outside the plot. Find the area of the track. $\left(\text{Use } \pi = \frac{22}{7}\right)$

19. Find the area of the sector of a circle with radius 4 cm and of angle $30°$ Also, find the area of the corresponding major sector. $\left(\text{Use } \pi = 3.14\right)$
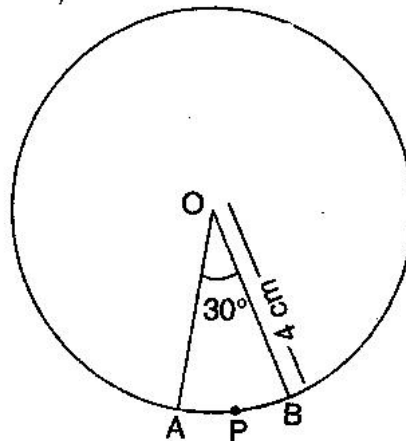
20. A hemispherical bowl of internal diameter 30 cm contains some liquid. This liquid is to be filled into cylindrical shaped bottles each of diameter 5 cm and height 6 cm. Find the number of bottles necessary to empty the bowl.

Section D

21. Solve for x : $\qquad abx^2 + (b^2 - ac)\, x - bc = 0$

22. The diagonal of rectangular field is 60 m more than the shorter side. If the longer side is 30 more than the shorter side, then find the sides of the field.

23. The sum of the first p, q, r terms of an AP are a, b, c respectively. Prove that:
$$\frac{a}{p}\,(q - r) + \frac{b}{q}\,(r - p) + \frac{c}{r}\,(p - q) = 0$$

24. Two tangents PA and PB are drawn to a circle with centre O such that $\angle APB = 60°$ Prove that OP = 2AP.

25. Prove that the angle between the two tangents drawn from an external point to a circle is supplementary to the angle subtended by the line-segment joining the points of contact at the centre.

26. Construct a $\triangle$ ABC whose sides are 7.5 cm, 7 cm and 6.5 cm. Construct another triangle similar to $\triangle$ ABC and with sides $\frac{2}{3}\, rd$ of the corresponding sides of $\triangle$ ABC and justify your construction.

27. From a building 60 meters high the angles of depression of the top and bottom of the lamppost are 30° and 60° respectively. Find the distance between the lamppost and building. Also find the difference of height between building and lamppost.

28. Three unbiased coins are tossed. What is the probability of getting:
    (i) two heads   (ii) at least two heads
    (iii) at most two heads   (iv) one head or two heads?

29. If A$(3,-4)$, B$(4,2)$, C$(5,-4)$ and D$(4,-10)$ are the vertices of a quadrilateral, then prove that ABCD is a rhombus.

30. Rajesh has two types of fields, one is in the form of a square area 144 m² and another is in the form of a rectangle of sides 16 m and 8 m. Rajesh wants to fence his fields. So he gave this work to Ramesh for square fields and Sarita for rectangular field.
    (i) Find the lengths of fencing of both the fields.   (ii) Which value is depicted by Rajesh?
                                                                    [Value Based Question]

31. A vessel is in the form of a hemispherical bowl mounted by a hollow cylinder. The diameter of the hemispherical bowl is 14 cm and the total height of the vessel is 25 cm. Find the capacity of the vessel.   Use $\pi = \frac{22}{7}$

ALL THE BEST