# UNIVERSAL EDUCATION CENTRE

## JAYANT SHARMA ( 94145-37474 , 98181-63814)
### SUMMATIVE ASSESSMENT –II
### MATHEMATICS
### Class – X

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 $a = 5$, $d = 2.5$, $a_n = 10$, then the value of $n$ is:
   (a) 1                     (b) 2                     (c) 3                     (d) 4

2. If in a $\triangle$ ABC, $\angle C = 90^0$ and $\angle B = 45°$ , then state which of the following is true:
   (a) Base = Perpendicular                     (b) Base = Hypotenuse
   (c) Perpendicular = Hypotenuse               (d) Base + Perpendicular = Hypotenuse

3. The probability that two different friend have different birthdays (ignoring a leap year) is:
   (a) $\frac{364}{365}$          (b) $\frac{1}{365}$          (c) $\frac{1}{73}$          (d) $\frac{3}{73}$

4. The centroid of the triangle whose vertices are $(x_1, y_1)$ $(x_2, y_2)$ and $(x_3, y_3)$  is:
   (a) $\left(\frac{x_1+x_2+x_3}{3}, \frac{y_1+y_2+y_3}{3}\right)$                     (b) $(x_1 + x_2 + x_3 , y_1 + y_2 + y_3)$
   (c) $\left(\frac{x_1+x_2+x_3}{6}, \frac{y_1+y_2+y_3}{6}\right)$                     (d) $\left(\frac{x_1+x_2+x_3}{4}, \frac{y_1+y_2+y_3}{4}\right)$

### Section B

5. If 1 is a zero of the polynomial $p(x) = ax^2 - 3(a-1) x - 1$, then find the value of $a$.

6. If the first term of an AP is –4 and the common difference is 2, then find the sum of first 10 terms.

7. If $a$,$b$ and $c$ are the sides of a right angled triangle where $c$ is the hypotenuse, then prove that the radius $r$ of the circle which touches the sides of the triangle is given by  $r = \frac{a+b-c}{2}$ .

8. In the figure, O is the centre of the circle. The area of sector OAPB is $\frac{5}{18}$ of the area of the circle. Find $x$.
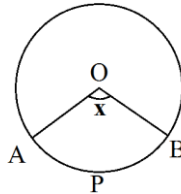


9. How many shots each having radius 3 cm can be made from a cubical lead solid of dimensions 49 cm x 36 cm x 22 cm?

10. Three cubes of a metal whose edges are in the ratio 3 : 4 : 5 are melted and converted into a single cube of diagonal $24\sqrt{3}$  cm. Find the edges of the three cubes.

## Section C

11. Solve the quadratic equation: $\sqrt{3}\,x^2 - \sqrt{2}\,2x - 2\sqrt{3} = 0$

12. The sum of $n$ terms of an AP is $3n^2 + 5n$. Find the AP and hence find its 16th term.

13. A point P is 13 cm from the centre of the circle. The length of the tangent drawn from P to the circle is 12 cm. Find the radius of the circle.

14. The angles of depression of the top and the bottom of a building 50 meters high as observed from the top of a tower are $30°$ and $60°$ respectively. Find the height of the tower and the horizontal distance between the building and the tower. $\left(\text{Take } \sqrt{3} = 1.73\right)$

15. Cards marked with the numbers 2 to 101 are placed in a box and mixed thoroughly. One card is drawn from this box. Find the probability that the number on the card is:
    (i) an even number.          (ii) a number less than 14.    (iii) a number which is a perfect square.

16. Find the ratio in which the point $\left(-3, k\right)$ divides the line segment joining the points $\left(-5, -4\right)$ and $\left(-2, 3\right)$. Hence, find the value of $k$.

17. Show that the points A $(1, 2)$, B $(5, 4)$, C $(3, 8)$ and D$\left(-1, 6\right)$ are the vertices of a square.

18. Three horses are tethered at 3 corners of a triangular plot having sides 20 m, 30 m, 40 m with ropes of 7 m length each. Find the area of the plot which can be grazed by the horses. Use = ( Use $\pi = \frac{22}{7}$ )
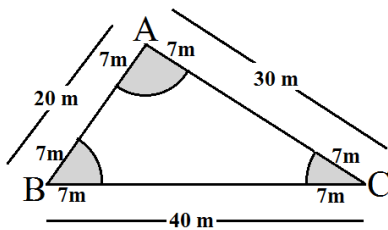


19. A rectangle 8 cm x 6 cm is inscribed in a circle as shown in figure. Find the area of the shaded region. $\left(\text{Use } \pi = 3.14\right)$
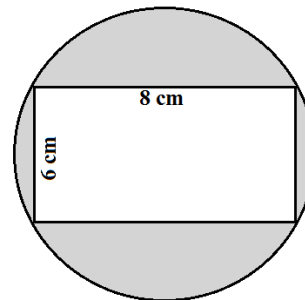


20. A solid iron rectangular block od dimensions 4.4 m x 2.6 m x 1 m is cast into a hollow cylindrical pipe of internal radius 30 cm and thickness 5 cm. Find the length of the pipe.

## Section D

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

22. Sum of the areas of two squares is 468 m². If the difference of their perimeters is 24 m, then find the sides of two squares.

23. Ram asks the labour to dig a well up to a depth of 10 m. Labour charges `150 for first meter and `50 for each subsequent meters. As labour was uneducated, he claims `550 for the whole work. Read the above passage and answer the following questions:
    (i) What should be the actual amount to be paid to the labour?
    (ii) What value of Ram is depicted in the question, if he pays `600 to the labour?
        [Value Based Question]

24. The incircle of Δ ABC touches the sides BC, CA and AB at D, E and F respectively. Show that:

AF + BD + CD = AE + BF + CE = $\frac{1}{2}$ (Perimeter of Δ ABC)
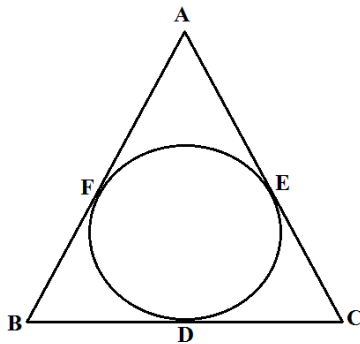


25. Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.　　　Using the above result, prove the following:

A tangent PQ at a point P of a circle of radius 5 cm meets a line through the centre of a point Q so that OQ = 13 cm. Find the length of PQ.

26. Draw a circle of radius 3 cm. From a point 5 cm away from the centre of the circle, draw two tangents to the circle. Find the lengths of the tangents.

27. The angle of elevation of the top of a tower as observed from a point on the ground is 'α ' and moving '$a$' meters towards the tower, the angle of elevation is 'β '. Prove that the height of the tower is

$$\frac{a \tan\alpha \ \tan\beta}{\tan\beta - \tan\alpha}$$

28. A card is drawn at random from a well-shuffled deck of playing cards. Find the probability that the card drawn is:

(i) a king or a jack　　　(ii) a non-ace　　　(iii) a red card (iv) neither a king nor a queen.

29. Find the coordinates of the points which divide the line segment joining the points $(-4,0)$ and (0, 6) in three equal parts.

30. In figure, the shape of a solid copper piece (made of two pieces) with dimensions is shown. The face of ABCDEFA is the uniform cross-section. Assume that the angles at A, B, C, D, E and F are right angles, calculate the volume of the piece.
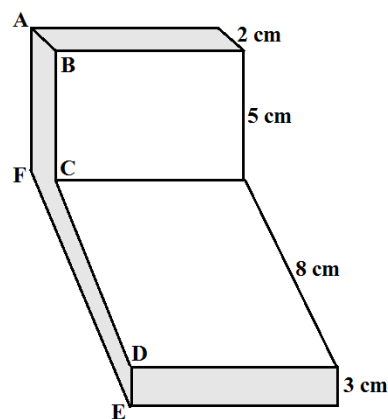


31. A milk container is in the form of a frustum of cone of height 18 cm with radius of its upper and lower ends as 8 cm and 32 cm respectively. Find the amount of milk which can completely fill the container and its cost at the rate of Rs.20 per litre. $(Use\ \pi = 3.14)$

*ALL THE BEST*