



# UNIVERSAL EDUCATION CENTRE

Website :- [www.uecj4u.hpage.co.in](http://www.uecj4u.hpage.co.in) Email :- [uecclasses@gmail.com](mailto:uecclasses@gmail.com)

Jayant Sir ( 09818163814, 09414537474, 09929333374 )

Time Allowed : 3 hours

Class 10, Mathematics

Maximum marks : 90

## Section – A (1 mark each)

- Q.1 Find the 25th term of the A.P.  $-5, -\frac{5}{2}, 0, \frac{5}{2}, \dots$
- Q.2 A pole casts a shadow of length  $2\sqrt{3}$  m on the ground, when the sun's elevation is  $60^\circ$ . Find the height of the pole.
- Q.3 A game of chance consists of spinning an arrow which comes to rest pointing at one of the numbers 1, 2, 3, 4, 5, 6, 7, 8 and these are equally likely outcomes. Find the probability that the arrow will point at any factor of 8.
- Q.4 Two concentric circles of radii  $a$  and  $b$  ( $a > b$ ) are given. Find the length of the chord of the larger circle which touches the smaller circle.

## SECTION B(2 marks each)

- Q.5 In Figure 1, O is the centre of a circle. PT and PQ are tangents to the circle from an external point P.  $\angle TPQ = 70^\circ$ , find  $\angle TRQ$ .

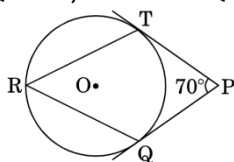


Figure 1

- Q.6 In Figure 2, PQ is a chord of length 8 cm of a circle of radius 5 cm. The tangents at P and Q intersect at a point T. Find the lengths of TP and TQ.

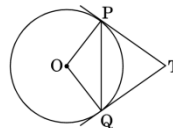


Figure 2

- Q.7 Solve for  $x$ :  $x^2 - (\sqrt{3} + 1)x + \sqrt{3} = 0$
- Q.8 The fourth term of an A.P. is 11. The sum of the fifth and seventh terms of the A.P. is 34. Find its common difference.
- Q.9 Show that the points  $(a, a)$ ,  $(-a, -a)$  and  $(-3a, 3a)$  are the vertices of an equilateral triangle.
- Q.10 For what values of  $k$  are the points  $(8, 1)$ ,  $(3, -2k)$  and  $(k, -5)$  collinear?

## Section – C (3 marks each)

- Q.11 Point A lies on the line segment PQ joining  $P(6, -6)$  and  $Q(-4, -1)$  in such a way that  $\frac{PA}{PQ} = \frac{2}{5}$ . If point P also lies on the line  $3x + k(y + 1) = 0$ , find the value of  $k$ .
- Q.12 Solve for  $x$ :  $x^2 + 5x - (a^2 + a - 6) = 0$
- Q.13 In an A.P., if the 12th term is  $-13$  and the sum of its first four terms is 24, find the sum of its first ten terms.
- Q.14 A bag contains 18 balls out of which  $x$  balls are red.  
 (i) If one ball is drawn at random from the bag, what is the probability that it is not red?  
 (ii) If 2 more red balls are put in the bag, the probability of drawing a red ball will be  $\frac{8}{9}$  times the probability of drawing a red ball in the first case. Find the value of  $x$ .
- Q.15 From the top of a tower of height 50 m, the angles of depression of the top and bottom of a pole are  $30^\circ$  and  $45^\circ$  respectively. Find  
 (i) how far the pole is from the bottom of a tower, (ii) the height of the pole. (Use  $\sqrt{3} = 1.732$ )
- Q.16 The long and short hands of a clock are 6 cm and 4 cm long respectively. Find the sum of the distances travelled by their tips in 24 hours. (Use  $\pi = 3.14$ )
- Q.17 Two spheres of same metal weigh 1 kg and 7 kg. The radius of the smaller sphere is 3 cm. The two spheres are melted to form a single big sphere. Find the diameter of the new sphere.

- Q.18 A metallic cylinder has radius 3 cm and height 5 cm. To reduce its weight, a conical hole is drilled in the cylinder. The conical hole has a radius of  $\frac{2}{3}$  cm and its depth is  $\frac{8}{9}$  cm. Calculate the ratio of the volume of metal left in the cylinder to the volume of metal taken out in conical shape.
- Q.19 In Figure 3, ABCD is a trapezium with  $AB \parallel DC$ ,  $AB = 18$  cm,  $DC = 32$  cm and the distance between AB and DC is 14 cm. If arcs of equal radii 7 cm have been drawn, with centres A, B, C and D, then find the area of the shaded region.

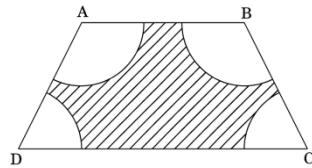


Figure 3

- Q.20 A solid right-circular cone of height 60 cm and radius 30 cm is dropped in a right-circular cylinder full of water of height 180 cm and radius 60 cm. Find the volume of water left in the cylinder, in cubic metres.

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

**SECTION D (4 marks each)**

- Q.21 If  $x = -2$  is a root of the equation  $3x^2 + 7x + p = 0$ , find the values of  $k$  so that the roots of the equation  $x^2 + k(4x + k - 1) + p = 0$  are equal.
- Q.22 Find the middle term of the sequence formed by all three-digit numbers which leave a remainder 3, when divided by 4. Also find the sum of all numbers on both sides of the middle term separately.
- Q.23 The total cost of a certain length of a piece of cloth is Rs 200. If the piece was 5 m longer and each metre of cloth costs Rs 2 less, the cost of the piece would have remained unchanged. How long is the piece and what is its original rate per metre ?
- Q.24 Prove that the tangent at any point of a circle is perpendicular to the radius through the point of contact.
- Q.25 In Figure 4, O is the centre of the circle and TP is the tangent to the circle from an external point T. If  $\angle PBT = 30^\circ$ , prove that  $BA : AT = 2 : 1$ .

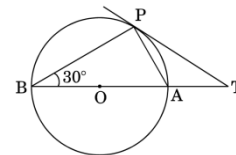


Figure 4

- Q.26 Draw a circle of radius 3 cm. From a point P, 7 cm away from its centre draw two tangents to the circle. Measure the length of each tangent.
- Q.27 Two poles of equal heights are standing opposite to each other on either side of the road which is 80 m wide. From a point P between them on the road, the angle of elevation of the top of a pole is  $60^\circ$  and the angle of depression from the top of another pole at point P is  $30^\circ$ . Find the heights of the poles and the distances of the point P from the poles.
- Q.28 A box contains cards bearing numbers from 6 to 70. If one card is drawn at random from the box, find the probability that it bears
- |                                   |  |
|-----------------------------------|--|
| (i) a one digit number.           | (ii) a number divisible by 5.              |
| (iii) an odd number less than 30. | (iv) a composite number between 50 and 70. |
- Q.29 The base BC of an equilateral triangle ABC lies on y-axis. The coordinates of point C are  $(0, -3)$ . The origin is the mid-point of the base. Find the coordinates of the points A and B. Also find the coordinates of another point D such that BACD is a rhombus.
- Q.30 A vessel full of water is in the form of an inverted cone of height 8 cm and the radius of its top, which is open, is 5 cm. 100 spherical lead balls are dropped into the vessel. One-fourth of the water flows out of the vessel. Find the radius of a spherical ball.
- Q.31 Milk in a container, which is in the form of a frustum of a cone of height 30 cm and the radii of whose lower and upper circular ends are 20 cm and 40 cm respectively, is to be distributed in a camp for flood victims. If this milk is available at the rate of Rs 35 per litre and 880 litres of milk is needed daily for a camp, find how many such containers of milk are needed for a camp and what cost will it put on the donor agency for this. What value is indicated through this by the donor agency ?

*ALL THE BEST*