Mathematics

April 5, 2024

QUESTIONS

1. The roots of the equation constant, are $x^2 + x - p(p+1) = 0$, where p is a constant,are

   (a) $p, (p+1)$

   (b) $-p, (p+1)$

   (c) $p, -(p+1)$

   (d) $-p, -(p+1)$

2. In an AP, if d=2, n=5 and $a_n = 0$, then value of a is

   (a) 10

   (b) 5

   (c) -8

   (d) 8

3. In Fig. 1, 0 is the centre of a circle, AB is a chord and AT is the tangent at A. If $\angle AOB = 100°$, then $\angle BAT$ is equal to
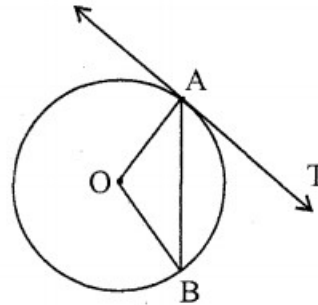
Fig.1

(a) 100°

(b) 40°

(c) 50°

(d) 90°

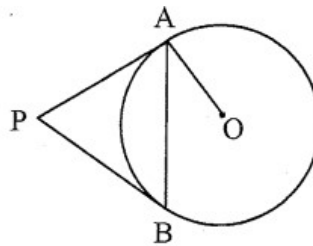4. In Fig.2, PA and PB are tangents to the circle with centre O. If $\angle APB = 100°$, then $\angle OAB$ is

Fig. 2

(a) 30°

(b) 60°

(c) 90°

(d) 15°

5. The radii of two circles are 4cm and 3cm respectively. The diameter of the circle having area equal to the sum of the area of the two circles $(in cm)$ is

(a) 5

(b) 7

(c) 10

(d) 14

6. A sphere of diameter 18 cm is dropped into a cylindrical vessel of diameter 36 cm, partly filled with water. If the sphere is completely

submerged, then the water level rises $(in\,cm)$ by

(a) 3

(b) 4

(c) 5

(d) 6

7. The angle of elevation of the top of a tower from a point on the ground, which is 30 m away from the foot of the tower is 45°. The height of the tower $(in\,metres)$ is

(a) 15

(b) 30

(c) $30\sqrt{3}$

(d) $10\sqrt{3}$

8. The point P which divides the line segment joining the points $A(2, -5)$ and $B(5, 2)$ in the ratio 2:3 lies in the quadrant

(a) I

(b) II

(c) III

(d) IV

9. The mid-point of segment AB is the point $P(0, 4)$. If the coordinates of B are $(-2, 3)$ then the coordinates of A are

(a) $(2, 5)$

(b) $(-2, -5)$

(c) $(2, 9)$

(d) $(-2, 11)$

10. Which of the following cannot be the probability of an event?

(a) 1.5

(b) $\dfrac{3}{5}$

(c) 25%

(d) 0.3

11. Find the value of p so that the quadratic equation $px(x-3)+9=0$ has two equal roots.

12. Find whether -150 is a term of the AP 17, 12, 7, 2,....?

13. Two concentric circles are of radii 7 cm and r cm respectively, where r ¿7. A chord of the larger circle, of length 48 cm, touches the smaller circle. Find the value of r.

14. Draw a line segment of length 6 cm. Using compasses and ruler, find a point P on it which divides it in the ratio 3 : 4.

15. In Fig. 3, APB and CQD are semi-circles of diameter 7 cm each, while ARC and BSD are semi-circles of diameter 14 cm each. Find the perimeter of the shaded region.[Use $\pi = \dfrac{22}{7}$]
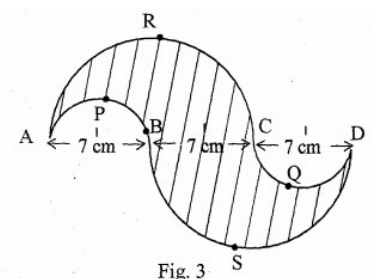

Fig. 3

16. Two cubes, each of side 4 cm are joined end to end. Find the surface area of the resulting cuboid.

17. Find that value(s) of x for which the distance between the points $P(x, 4)$ and $Q(9, 10)$ is 10units.

18. A coin is tossed two times. Find the probability of getting at least one head.

19. Find the roots of the following quadratic equation:
$2\sqrt{3}x^2 - 5x + \sqrt{3} = 0$

20. Find the value of the middle term of the following AP :
$-6, -2, 2, ..., 58$.

21. Determine the AP whose fourth term is 18 and the difference of the ninth term from the fifteenth term is 30

22. In Fig. 4, a triangle ABC is drawn to circumscribe a circle of radius 2cm such that the segments BD and DC into which BC is divided by the point of contact D are of lengths 4cm and 3cm respectively. If area of $\triangle ABC = 21cm^2$, then find the lengths of sides AB and AC.

Fig. 4
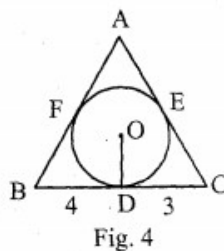
23. Draw a triangle ABC in which AB=5 cm, BC=6 cm and $\angle ABC = 60°$. Then construct a triangle whose sides are $\dfrac{5}{7}$ times the corresponding sides of $\triangle ABC$.

24. Find the area of the major segment APB, in Fig 5, of a circle of radius $35cm$ and $\angle AOB = 90°$.[Use $\pi = \dfrac{22}{7}$]

25. The radii of the circular ends of a bucket of height $15cm$ are $14cm$ and $rcm\,(r < 14cm)$. If the volume of bucket is $5390cm^3$, then find the value of r.[Use $\pi = \dfrac{22}{7}$]

26. Two dice are rolled once. Find the probability of getting such numbers on two dice, whose product is a perfect square.

27. A game consists of tossing a coin 3 times and noting its outcome each time. Hanif wins if he gets three heads or three tails, and loses otherwise. Calculate the probability that Hanif will lose the game.
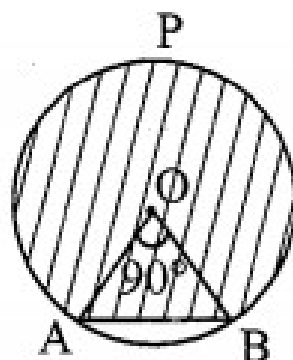
Fig. 5

28. From the top of a tower $100m$ high, a man observes two cars on the opposite sides of the tower with angles of depression $30°$ and $45°$ respectively. Find the distance between the cars. [Use $\sqrt{3} = 1.73$]

29. If $(3,3)$, $(6,y)$, $(x,7)$ and $(5,6)$ are the vertices of a parallelogram taken in order, find the values of x and y.

30. If two vertices of an equilateral triangle are $(3,0)$ and $(6,0)$, find the third vertex.

31. Find the value of k, if the points $P(5,4)$, $Q(7,k)$ and $R(9,-2)$ are collinear.

32. A motor boat whose speed is $20km/h$ in still water, takes 1 hour more to go 48 km upstream than to return downstream to the same spot. Find the speed of the stream.

33. Find the roots of the equation $\dfrac{1}{x+4} - \dfrac{1}{x-7} = \dfrac{11}{30}, x \neq -4, 7$

34. From a solid cylinder whose height is 15 cm and diameter 16 cm, a conical cavity of the same height and same diameter is hollowed out. Find the total surface area of the remaining solid. [Take $n = 3.14$]

35. Two poles of equal heights are standing opposite to each other on either side of the road, which is $100m$ wide. From a point between them on the road, the angles of elevation of the top of the poles are $60°$ and $30°$, respectively. Find the height of the poles.