SECTION - A

Question numbers 1 to 10 carry 1 mark each. For each of the questions 1-10, four alternative choices have been provided of which only one is correct. You have to select the correct choice.

1. If $x^2 + 2kx + 4 = 0$ has a root $x = 2$, then the value of k is ?

   (A) -1 (B) -2 (C) 2   (D) -4

2. Which term of the A.P. 92, 88, 84, 80, ... is 0 ?

   (A) 23   (B) 32   (C) 22   (D) 24

3. If the height and length of the shadow of a man are the same, then the angle of elevation of the sun is

   (A) 30°   (B) 60°   (C) 45°   (D) 15°

4. If sun's elevation is 60° then a pole of height 6 m will cast a shadow of length.

   (A) $6\sqrt{3}$ m   (B) $\sqrt{3}$ m   (C) $2\sqrt{3}$ m   (D) $3\sqrt{2}$ m

5. The diameter of a circle whose area is equal to the sum of the areas of the two circles of radii 40 cm and 9 cm is :

   (A) 41 cm   (B) 49 cm   (C) 82 cm   (D) 62 cm

6. The curved surface area of a right circular cone of height 15 cm and base diameter 16 cm is.

   (A) 60π cm^2 (B) 68π cm^2 (C) 120π cm^2 (D) 136π cm^2

7. The length of the tangent drawn from a point 8 cm away from the centre of a circle, of radius 6 cm, is :

   (A) $\sqrt{7}$ cm   (B) $2\sqrt{7}$ cm   (C) 10 cm   (D) 5 cm

8. In Fig. 1, if from an external point T, TP and TQ are two tangents to a circle with centre O so that $\angle POQ = 110°$, then, $\angle PTQ$ is :
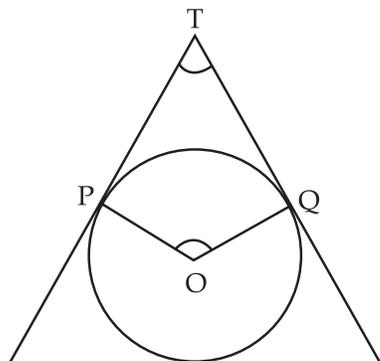
Fig. 1

   (A) 60°   (B) 70°   (C) 80°   (D) 90°

9. In Fig.2, P divides AB internally in the ratio :
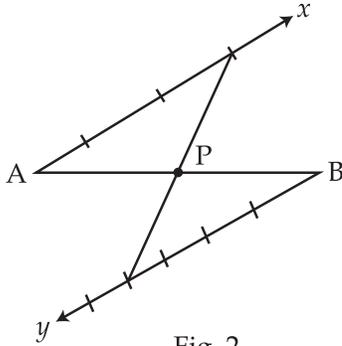
Fig. 2

(A) 3 : 4   (B) 4 : 3   (C) 3 : 7   (D) 4 : 7

10. To draw a pair of tangents to a circle which are inclined to each other at an angle of 45° it is required to draw tangents at the end points of those two radii of the circle, the angle between which is :

(A) 70°   (B) 145°   (C) 135°   (D) 105°

SECTION - B

Question numbers 11 to 18 carry 2 marks each.

11. For what value of k the equation $4x^2 - 2(k+1)x + (k+1) = 0$ has real and equal roots ?

12. Find the common difference of an A.P. whose first term is $\dfrac{1}{2}$ and the 8th term is $\dfrac{17}{6}$. Also write its 4th term.

13. A tower stands vertically on the ground. From a point on the ground which is 60 m away from the foot of the tower, the angle of elevation of the top of the tower is found to be 60°. Find the height of the tower.

14. In Fig. 3, arcs are drawn by taking vertices A, B and C of an equilateral triangle of side 10 cm, to intersect the sides BC, CA and AB at their respective mid-points D, E and F. Find the area of the shaded region (Use $\pi = 3.14$)
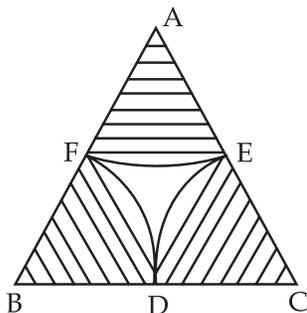
Fig. 3

15. Prove that the line segment joining the points of contact of two parallel tangents to a circle is a diameter of the circle.

OR

In Fig. 4, O is the centre of a circle and BCD is tangent to it at C. Prove that $\angle BAC + \angle ACD = 90°$.
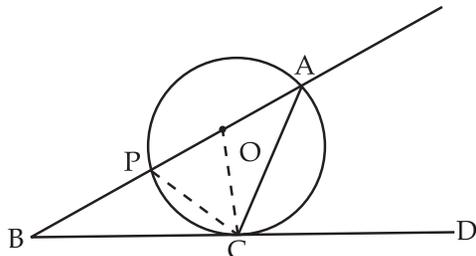
Fig. 4

16. Show that the point P $(-4, 2)$ lies on the line segment joining the points A $(-4, 6)$ and B $(-4, -6)$.

17. Find the point on x-axis which is equidistant from the points $(-2, 5)$ and $(2, -3)$.

18. The radius and slant height of a right circular cone are in the ratio of 7 : 13 and its curved surface area is 286 cm². Find its radius. (Use $\pi = \dfrac{22}{7}$)

SECTION - C

Question numbers 19 to 28 carry 3 marks each.

19. Find the roots of the quadratic equation : $a^2b^2x^2 + b^2x - a^2x - 1 = 0$

OR

Solve for x : $6x^2 + 7x - 10 = 0$

20. How many terms of the A.P. 9, 17, 25, ... , must be taken to get a sum of 450 ?

21. Draw a right triangle with sides of length 5 cm and 4 cm making an right angle. Construct another triangle whose sides are $\dfrac{3}{5}$ times the corresponding sides of the first triangle.

22. A cylindrical pipe has inner diameter of 4 cm and water flows through it at the rate of 20 m per minute. How long would it take to fill a conical tank, with diameter of base as 80 cm and depth 72 cm ?

OR

A hemispherical bowl of internal diameter 36 cm. is full of liquid. This liquid is to be filled in cylindrical bottles of radius 3 cm and height 6 cm. How many such bottles are required to empty the bowl ?

23. Find the probability that a non leap year chosen at random has
(i)   52 Sundays   (ii)   53 Sundays

24. All the face cards of spades are removed from a pack of 52 playing cards and then the pack is shuffled well. A card is then drawn at random from the remaining pack of cards. Find the probability of getting (i) a black face card, (ii) a queen.

OR

An urn contains 8 red, 6 white, 4 black balls. A ball is drawn at random from the urn. Find the probability that the drawn ball is.

(i)   red or white   (ii)   neither black nor white

25. In Fig.5, in ΔABC, D and E are the mid-points of the sides BC and AC respectively. Find the length of DE. Prove that $DE = \dfrac{1}{2} AB$.

Fig. 5
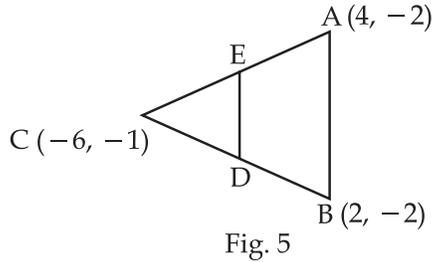
26. Show that the points $(-4, 0)$, $(4, 0)$ and $(0, 3)$ are vertices of an isosceles triangle.

27. In Fig. 6, XY and $X' Y'$ are two parallel tangents to a circle with centre O and another tangent AB, with point of contact C intersects XY at A and $X' Y'$ at B. Prove that $\angle AOB = 90°$.

Fig. 6
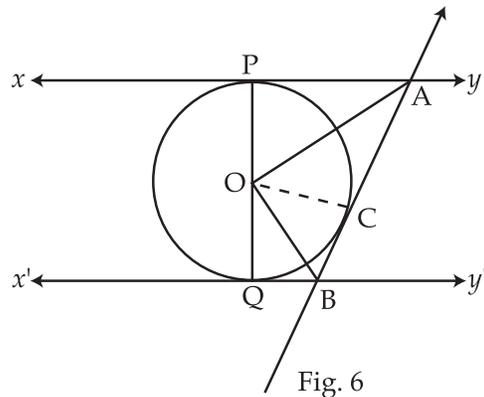
28. Find the area of the shaded region in Fig. 7 if $BC = BD = 8$ cm, $AC = AD = 15$ cm and O is the centre of the circle. (Take $\pi = 3.14$)
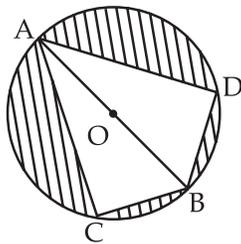
Fig. 7

SECTION - D

Question numbers 29 to 34 carry 4 marks each.

29. The product of Tanay's age (in years) five years ago and his age ten year later is 16. Determine Tanay's present age.

30. In November 2009, the number of visitors to a zoo increased daily by 20. If a total of 12300 people visited the zoo in that month, find the number of visitors on 1st Nov. 2009.

31. Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that $\angle PTQ = 2 \angle OPQ$.

32. A tent is of the shape of a right circular cylinder upto a height of 3 metres and conical above it. The total height of the tent is 13.5 metres above the ground. Calculate the cost of painting the inner side of the tent at the rate of Rs. 2 per square metre, if the radius of the base is 14 metres.

OR

A solid is in the form of a right circular cylinder with hemispherical ends. The total height of the solid is 19 cm and the diameter of the cylinder and the hemispheres is 7 cm. Find the volume and total surface area of the solid.

33. In Fig. 8, two circular flower beds have been shown on two sides of a square lawn ABCD of side 56 m. If the centre of each circular flower bed is the point of intersection O of the diagonals of the square lawn, find the sum of the areas of the lawn and flower beds
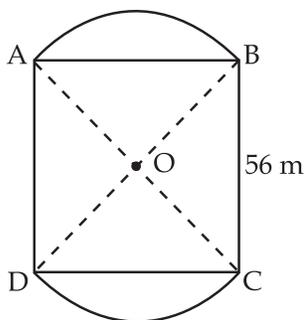
56 m

Fig. 8

34. A tree is broken by the wind. The top struck the ground at an angle of 30° and at a distance of 30 metres from its root. Find the whole height of the tree. (Use $\sqrt{3} = 1.732$)

OR

Find the height of a mountain if the elevation of its top at an unknown distance from the base is 60° and at a distance 10 km further off from the mountain, along the same line, the angle of elevation is 30°.

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