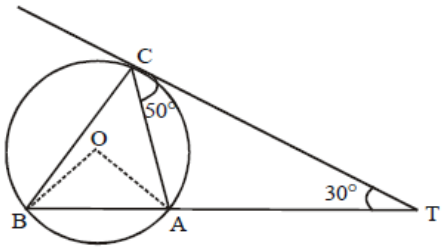
GEOMETRY PRACTISE

(Ref: FM-QAH2022015)

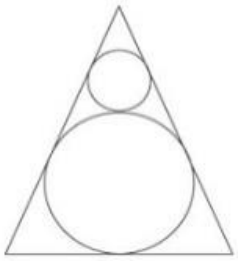
1. In the figure given below (not drawn to scale), A, B and C are three points on a circle with centre O. The chord BA is extended to a point T such that CT becomes a tangent to the circle at point C. If ∠ATC = 30° and ∠ACT = 50°, then the angle ∠BOA is



a) 100° b) 150° c) 80° d) CND

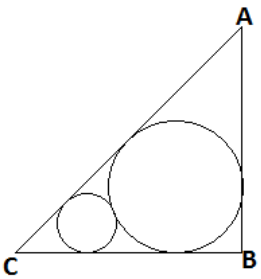
2. ABCD is a cyclic quadrilateral of which AB is the diameter. Diagonals AC and BD intersect at E. If ∠DBC = 35°, Then ∠AED measures
a) 35° b) 45° c) 55° d) 90°

3. Two circles are placed in an equilateral triangle as shown in the figure. What is the ratio of the area of the smaller circle to that of the equilateral triangle?



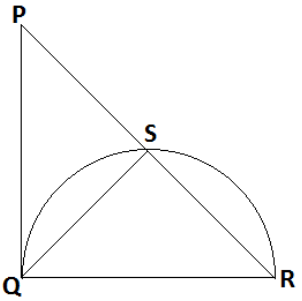
a) π : 36√3 b) π : 27√3
c) π : 18√3 d) None of these

4. In the given figure, ABC is a right angled triangle. ∠ABC = 90° and ∠ACB = 60°. If the radius of the smaller circle is 2 cm, then what is the radius (in cm.) of the larger circle?



a) 3 b) 3.5 c) 5.5 d) None

5. In the given figure, triangle PQR is a right angled triangle at Q. if PQ = 35 cm and QS = 28 cm, then what is the value (in cm) of SR?

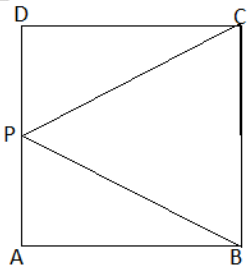


a) 35.33 b) 37.33 c) 41.33 d) 43.33

6. PQRA is a rectangle, AP = 22 cm, PQ = 8 cm. ΔABC is a triangle whose vertices lie on the sides of PQRA such the BQ = 2 cm and QC = 16 cm. Then the length of the line joining the mid points of the sides AB and BC is
a) 4√2 cm b) 5 cm c) 6 cm d) 10 cm.

7. Length and breadth of a rectangle are 8 cm. and 6 cm. respectively. The rectangle is cut on its four vertices such that the resulting figure is a regular octagon. What is the side (in cm.) of the octagon?
a) 3√11 – 7 b) 5√13 – 8
c) 5√7 – 11 d) 6√11 – 9

8. In the given figure, ABCD is a square whose side is 4 cm. P is a point on the side AD. What is the minimum value (in cm) of BP + CP?

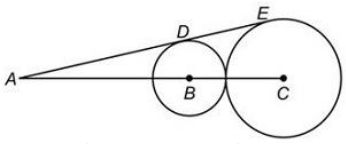


a) 4√5 b) 4√4 c) 6√3 d) 4√6

9. PQRS is a square whose side is 16 cm. what is the value of the side (in cm) of the largest regular octagon that can be cut from the given square?
a) 8 – 4√2 b) 16 + 8√2
c) 16√2 - √16 d) 16 – 8√2

10. A square is inscribed in a quarter circle in such a way that two of its adjacent vertices on the radius are equidistant from the centre and other two vertices lie on the circumference. If the side of square is $\sqrt{\frac{5}{2}}$ cm. then what is the radius (in cm) of the circle?
a) 2 b) 2.5 c) 5 d) 10

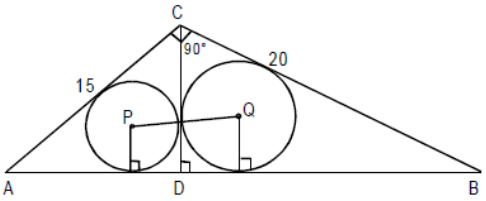
11. In the given figure, B and C are the centres of the two circles. ADE is the common tangent to the two circles. If the ratio of the radius of both the circles is 3:5 and AC = 40, then what is the value of DE?



a) $3\sqrt{15}$ b) $5\sqrt{15}$ c) $6\sqrt{15}$ d)$4\sqrt{15}$

12. PQRA is a rectangle, AP = 22 cm, PQ = 8 cm. ΔABC is a triangle whose vertices lie on the sides of PQRA such that BQ = 2 cm and QC = 16 cm .Then the length of the line joining the mid points of the sides AB and BC is
a) $4\sqrt{2}$ cm b) 5 cm
c) 6 cm d) 10 cm

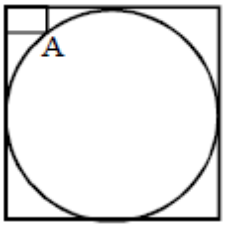
13. In the figure, ACB is a right-angle triangle. CD is the altitude. Circles are inscribed within the ΔACD and ΔBCD. P and Q are the centers of the circles. The distance PQ is



a) 5 b) $\sqrt{50}$ c) 7 d) 8

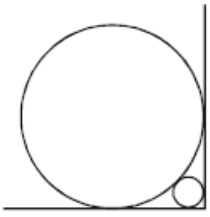
14. In a triangle ABC, AB =6, BC = 8 and AC = 10. A perpendicular dropped from B, meets the side AC at D. A circle of radius BD (with centre B) is drawn. If the circle cuts AB and BC at P and Q respectively, then AP: QC is equal to *(2003C)*
a) 1 : 1 b) 3 : 2 c) 4 : 1 d) 3 : 8

15. In the figure below, the rectangle at the corner measures 10 cm × 20 cm. The corner A of the rectangle is also a point on the circumference of the circle. What is the radius of the circle in cm?



a) 10 cm b) 40 cm
c) 50 cm d) None of the above.

16. A circle with radius 2 is placed against a right angle. Another smaller circle is also placed as shown in the adjoining figure. What is the radius of the smaller circle?



a) $3 - 2\sqrt{2}$ b) $4 - 2\sqrt{2}$
c) $7 - 4\sqrt{2}$ d) $6 - 4\sqrt{2}$

17. A certain city has a circular wall around it, and this wall has four gates pointing north, south, east and west. A house stands outside the city, 3 km north of the north gate, and it can just be seen from a point 9 km east of the south gate. What is the diameter of the wall that surrounds the city?
a) 6 km b) 9 km
c) 12 km d) none of these

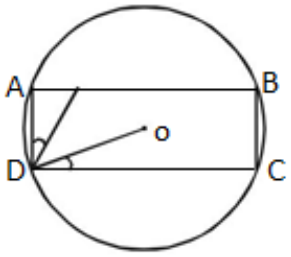
Direction for questions 218 to 220: Answer the questions on the basis of the information given below.
A city has two perfectly circular and concentric ring roads, the outer ring road (OR) being twice as long as the inner ring road (IR). There are also four (straight line) chord roads from E1, the east end point of OR to N2, the north end point of IR; from N1, the north end point of OR to W2, the west end point of IR; from W1, the west end point of OR, to S2, the south end point of IR; and from S1 the south end point of OR to E2, the east end point of IR. Traffic moves at a constant speed of 30π km/hr on the OR road, 20π km/hr on the IR road, and $15\sqrt{5}$ km/hr on all the chord roads.

18. The ratio of the sum of the lengths of all chord roads to the length of the outer ring road is
a) $\sqrt{5} : 2$ b) $\sqrt{5} : 2\pi$
c) $\sqrt{5} : \pi$ d) None of the above.

19. Amit wants to reach N2 from S1. It would take him 90 minutes if he goes on minor arc S1 – E1 on OR, and then on the chord road E1 – N2. What is the radius of the outer ring road in kms?
a) 60 b) 40
c) 30 d) 20

20. Amit wants to reach E2 from N1 using first the chord N1 – W2 and then the inner ring road. What will be his travel time in minutes on the basis of information given in the above question?
a) 60 b) 45.
c) 90 d) 105

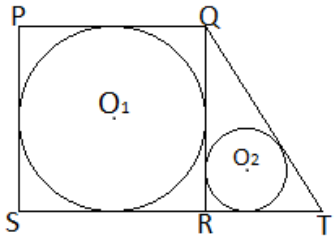
21. In the figure below (not drawn to scale), rectangle ABCD is inscribed in the circle with center at O. The length of side AB is greater than that of side BC. The ratio of the area of the circle to the area of the rectangle ABCD is $\pi:\sqrt{3}$. The line segment DE intersects AB at E such that ∠ODC = ∠ADE. What is the ratio AE : AD?



a) $1 : \sqrt{3}$ b) $1 : \sqrt{2}$
c) $1 : 2\sqrt{3}$ d) 1 : 2

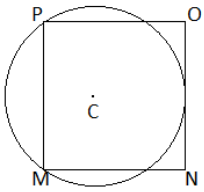
22. In the given figure, PQRS is a square of side 20 cm and SR is extended to point T. if the length of

QT is 25 cm, then what is the distance (in cm) between the centers O_1 and O_2 of the circles?



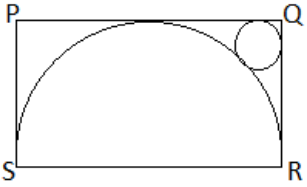
a) $5\sqrt{10}$ b) $4\sqrt{10}$
c) $8\sqrt{5}$ d) $16\sqrt{2}$

23. In the given figure, MNOP is a square of side 6 cm. what is the value (in cm) of radius of circle?



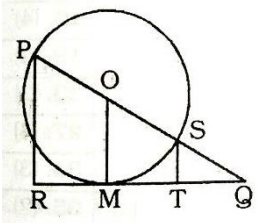
a) 4.25 b) 3.75
c) 3.5 d) 4.55

24. In the given figure, PQRS is a rectangle and a semicircle with SR as diameter is drawn. A circle is drawn as shown in the figure. If QR = 7 cm, then what is the radius (in cm.) of the small circle?



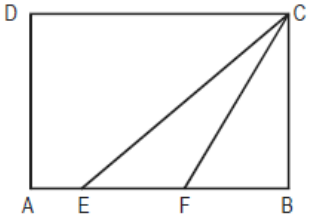
(a) $21 + 14\sqrt{2}$
(b) $21 - 14\sqrt{2}$
(c) Both $21 + 14\sqrt{2}$ and $21 - 14\sqrt{2}$
(d) None of these

25. In the given figure, PR and ST are perpendiculars to tangent QR. PQ passes through centre O of the circle whose diameter is 10 cm. If PR = 9 cm, what is the length (in cm) of ST?



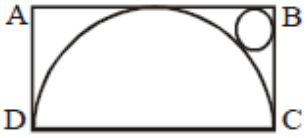
a) 1 b) 1.25
c) 1.5 d) 2

26. In the above diagram, ABCD is a rectangle with AE = EF = FB. What is the ratio of the areas of CEF and that of the rectangle?



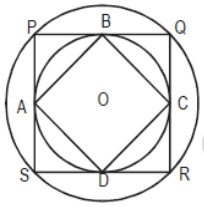
a) $\frac{1}{6}$ b) $\frac{1}{8}$
c) $\frac{1}{9}$ d) None

27. The figure shows a rectangle ABCD with a semi-circle and a circle inscribed inside it as shown. What is the ratio of the area of the circle to that of the semi-circle?



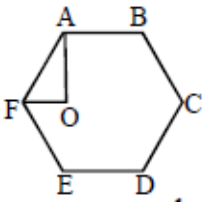
a) $(\sqrt{2}-1)^2 : 1$ b) $2(\sqrt{2}-1)^2 : 1$
c) $(\sqrt{2}-1)^2 : 2$ d) None

28. The figure below shows two concentric circles with centre O. PQRS is a square inscribed in the outer circle. It also circumscribes the inner circle, touching it at points B, C, D and A. What is the ratio of the perimeter of the outer circle to that of polygon ABCD?



a) $\frac{\pi}{4}$ b) $\frac{3\pi}{2}$ c) $\frac{\pi}{2}$ d) π

29. In the figure below, ABCDEF is a regular hexagon and ∠AOF =90°. FO is parallel to ED. What is the ratio of the area of the triangle AOF to that of the hexagon ABCDEF?

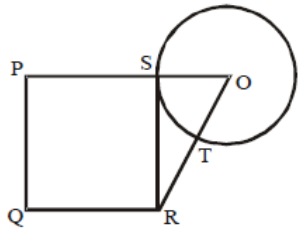


a) 1/12 b) 1/6 c) 1/24 d) 1/18

30. One side of an equilateral triangle is 24 cm. the mid-points of its sides are joined to form another triangle whose mid-points are in turn joined to form still another triangle. This process continues indefinitely. Find the sum of the perimeters of all the triangles.
a) 144 cm b) 72 cm
c) 536 cm d) 676 cm

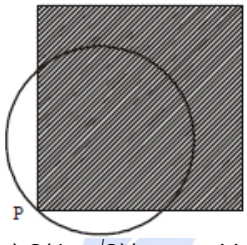
31. There is a regular octagon A B C D E F G H, a frog is at the vertex A. It can jump on to any of the vertices except the exactly opposite vertex. The frog visits all the vertices exactly once and then reaches vertex E then how many times did it jump before reaching E?
a) 7 b) 2n + 1
c) 6 d) can't be determined

32. PQRS is a square. SR is a tangent (at point S) to the circle with centre O and TR=OS. Then, the ratio of area of the circle to the area of the square is



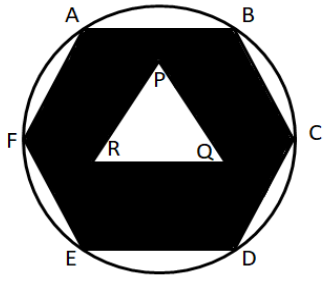
a) $\pi/3$ b) 11/ 7
c) $3/\pi$ d) 7 /11

33. Let S_1 be a square of side a. Another square S_2 is formed by joining the mid-points of the sides of S_1. The same process is applied to S2 to form yet another square S3 and so on. If A_1, A_2, A_3, ... be the areas and P_1 , P_2 , P_3..... be the perimeters of S_1, S_2, S_3 ..... , respectively, then the ratio $\frac{P_1+P_2+P_3+\cdots}{A_1+A_2+A_3+\cdots}$ equals



a) $2(1+\sqrt{2})/a$ b) $2(2-\sqrt{2})/a$
c) $2(2+\sqrt{2})/a$ d) $2(1+2\sqrt{2})/a$

34. ABCDEF is a regular hexagon and PQR is an equilateral triangle of side a. the area of the shaded portion is X and CD : PQ = 2 : 1. Find the area of the circle circumscribing the hexagon in terms of X.



a) $\frac{16\pi}{23\sqrt{3}}x$ b) $\frac{42\pi}{5\sqrt{3}}x$
c) $\frac{2\pi}{3\sqrt{3}}x$ d) $2\sqrt{3}\pi x$

35. A punching machine is used to punch a circular hole of diameter two units from a square sheet of aluminium of width 2 units, as shown below. The hole is punched such that the circular hole touches one corner P of the square sheet and the diameter of the hole originating at P is in line with a diagonal of the square.

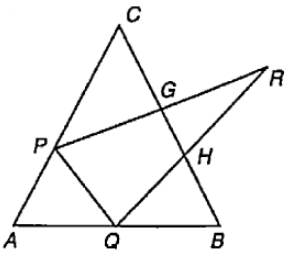
36. The proportion of the sheet area that remains after punching is:

a) $(\pi + 2)/8$ b) $(6 - \pi) / 8$
c) $(4 - \pi)$ d) $(\pi - 2) / 4$

37. Find the area of the part of the circle (round punch) falling outside the square sheet.

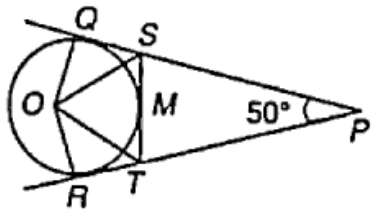
a) $\pi/4$ b) $(\pi - 1)/2$
c) $(\pi - 1)/4$ d) $(\pi - 2)/2$

38. In the given figure, P and Q are the mid-point of AC and AB. Also, PG = GR and HQ = HR. What is the ratio of area of ΔPQR: area of ΔABC?



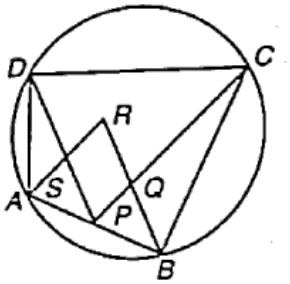
a) ½ b) 2/3
c) 3/5 d) None of these

39. In the adjoining figure 'O' is the centre of the circle and PQ, PR and ST are the three tangents. ∠QPR = 50°, then the value of ∠SOT is:



a) 30° b) 75°
c) 65° d) Can't be determined

40. ABCD is a cyclic quadrilateral. The angle bisector of ∠A, ∠B, ∠C and ∠D intersect at P, Q, R and S as shown in the figure. These four points form a quadrilateral PQRS. Quadrilateral PQRS is a:



a) square b) rhombus
c) rectangle d) cyclic quadrilateral

41. In the given diagram CT is tangent at C, making an angle of π/4 with CD. O is the centre of the circle. CD = 10 cm. what is the perimeter of the shaded region (ΔAOC) approximately?

a) 27 cm
b) 30 cm
c) 25 cm
d) 31 cm