



MATHS

BOOKS - VK GLOBAL PUBLICATION MATHS (HINGLISH)

AREAS RELATED TO CIRCLES

Very Short Answer Questions

1. Is it true to say that area of square inscribed in a circle of diameter p cm is $p^2 \text{ cm}^2$? Why ?



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2. Is the area of the circle inscribed in a square of side a cm, $\pi a^2 \text{ cm}^2$? Give reasons for your answer.

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3. Write the area of the sector of a circle whose radius is r and length of the arc is l .

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4. What is the ratio of the areas of a circle and an equilateral triangle whose diameter and a side are respectively equal?

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5. In figure, a square is inscribed in a circle of diameter d and another square is circumscribing the circle. Is the area of the outer square four times the area of the inner square? Give reason for your answer.



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6. If the circumference and the area of a circle are numerically equal, then diameter of the circle is (a) $\frac{\pi}{2}$ (b) 2π (c) 2 (d) 4



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7. The radius of a wheel is 0.25 m. The number of revolutions it will make to travel a distance of 11 km will be (a) 2800 (b) 4000 (c) 5500 (d) 7000



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8. If the perimeter of a semicircular protractor is 36cm, find its diameter.



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9. If the diameter of a semicircular protractor is 14 cm, then find its perimeter.



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Short Answer Questions I

1. If a square is inscribed in a circle, find the ratio of the areas of the circle and the square.



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2. What is the area of the largest triangle that can be inscribed in a semicircle of radius r unit.



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3. What is the angle subtended at the centre of a circle of radius 10 cm by an arc of length 5π cm?





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4. Is the area of the largest circle that can be drawn inside a rectangle of length a cm and breadth b cm ($a > b$) is πb^2 cm²? Why?



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5. The difference between the circumference and radius of a circle is 37 cm. Find the area of the circle



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6. The radii of two circles are 8 cm and 6 cm respectively. Find the radius of the circle having area equal to the sum of the areas of the two circles.



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7. The radii of two circles are 19 cm and 9 cm respectively. Find the radius of the circle which has circumference equal to the sum of the circumferences of the two circles.



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8. Find the area of a circle whose circumference is 22 cm.



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9. The area of a circular playground is 22176 m^2 . Find the cost of fencing this ground at the rate of Rs. 50 per m.



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10. Find the area of a sector of a circle with radius 6 cm if angle of the sector is 60°



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11. Find the area of a quadrant of a circle whose circumference is 22cm.



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12. The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand in 5

minutes.



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13. To warn ships for underwater rocks, a lighthouse spreads a red coloured light over a sector of angle 80° to a distance of 16.5 km. Find the area of the sea over which the ships are warned.



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Short Answer Questions II

1. If the perimeter of a semicircular protractor is 66 cm, find the diameter of the protractor (Take $\pi = 22/7$)



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2. The circumference of a circle exceeds the diameter by 16.8 cm. Find the radius of the circle



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3. A race track is in the form of a ring whose inner circumference is 352 m, and the outer circumference is 396 m. Find the width of the track.



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4. The inner circumference of a circular track is 220m. The track is 7m wide everywhere. Calculate the cost of putting up a fence along the outer circle at the rate of Rs. 2 per metre. $\left(Use \pi \frac{22}{7}\right)$



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5. The wheels of a car are of diameter 80 cm each. How many complete revolutions does each wheel make in 10 minutes when the car is travelling at a speed of 66 km per hour?



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6. An umbrella has 8 ribs which are equally spaced. Assuming umbrella to be a flat circle of radius 45 cm, find the area between the two consecutive ribs of the umbrella.



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7. A horse is tied to a peg at one corner of a square shaped grass field of side 15 m by means of a 5 m long rope. Find (i) the area of that part of the field in which the horse can graze. (ii) the increase in the grazing area if the rope were 10 m



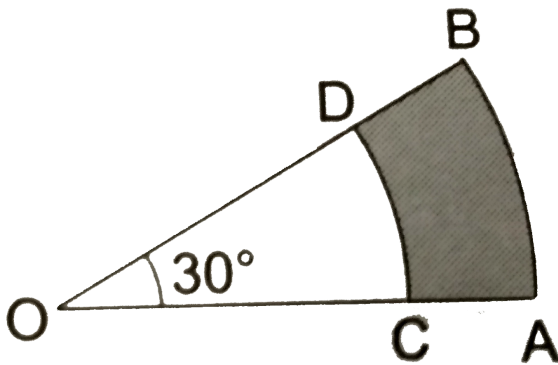
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8. A car has two wipers which do not overlap. Each wiper has a blade of length 25 cm sweeping through an angle of 115° . Find the total area cleaned at each sweep of the blades.



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9. In the give figure, the sectors of two concentric circles of radii 7 cm and 3.5 cm are shown. Find the area of the shaded region.



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10. The minute hand of a clock is 10 cm long. Find the area of the face of the clock described by the minute hand between 9 A.M. and 9.35 A.M.



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11. Find the area of the sector of a circle with 4cm and of angle 30° . Also find the area of the corresponding major sector.



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12. A chord of a circle of radius 15 cm subtends an angle of 60° at the centre. Find the areas of the corresponding minor and major segments of the circle.



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13. A chord of a circle of radius 12 cm subtends an angle of 120° at the centre. Find the area of the corresponding segment of the circle.



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14. A round table cover has six equal designs as shown in Fig. 12.14. If the radius of the cover is 28 cm, find the cost of making the designs at the rate of *Rs* 0.35 per cm^2 .



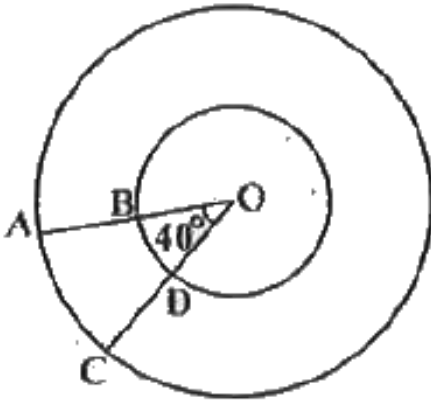
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15. Find the area of the shaded region in Fig. 12.19, if $PQ = 24\text{ cm}$, $PR = 7\text{ cm}$ and O is the centre of the circle.



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16. Find the area of the shaded region in Fig., if radii of the two concentric circles with centre O are 7 cm and 14 cm respectively and $\angle AOC = 40^\circ$.



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17. Find the area of the shaded region in Fig. 12.21, if ABCD is a square of side 14 cm and APD and BPC are

semicircles.



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18. Find the area of the shaded region in Fig. 12.22, where a circular arc of radius 6 cm has been drawn with vertex O of an equilateral triangle OAB of side 12 cm as centre.



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19. From each corner of a square of side 4 cm a quadrant of a circle of radius 1 cm is cut and also a

circle of diameter 2 cm is cut as shown in Fig. 12.23.

Find the area of the remaining portion of the square.



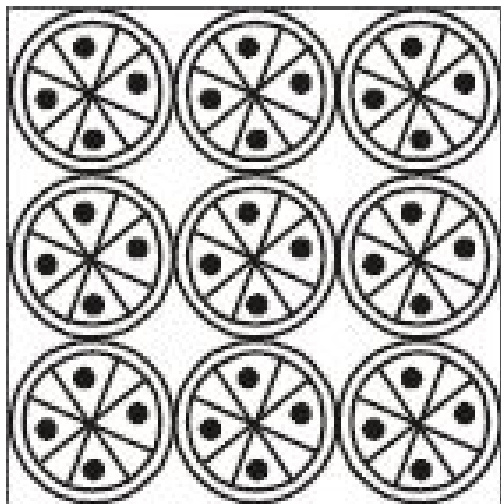
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20. In Fig. 12.25, ABCD is a square of side 14 cm. With centres A, B, C and D, four circles are drawn such that each circle touch externally two of the remaining three circles. Find the area of the shaded region.



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21. On a square handkerchief, nine circular designs each of radius 7 cm are made. Find the area of the remaining portion of the handkerchief



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22. In Fig. 12.30, $OACB$ is a quadrant of a circle with centre O and radius 3.5 cm. If $OD = 2\text{cm}$, find the area of the (i) quadrant $OACB$, (ii) shaded region.



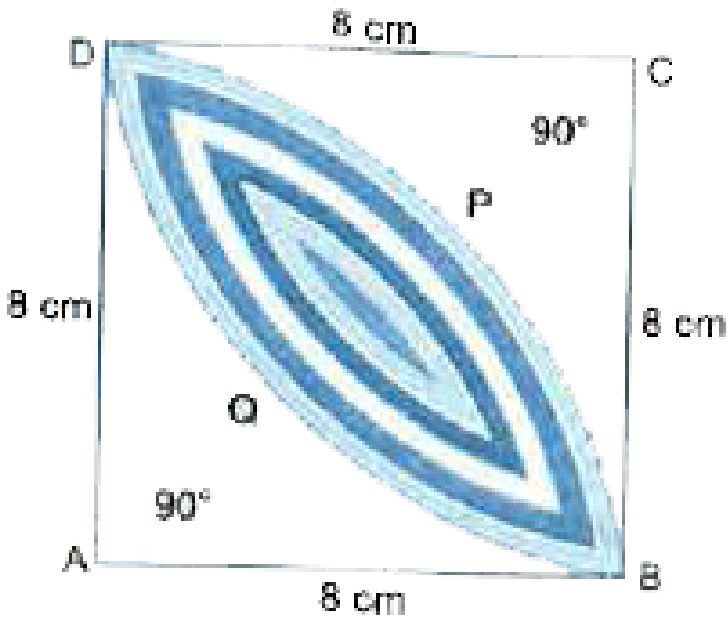
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23. find the area of the shaded region [Use $\pi = 3.14$].



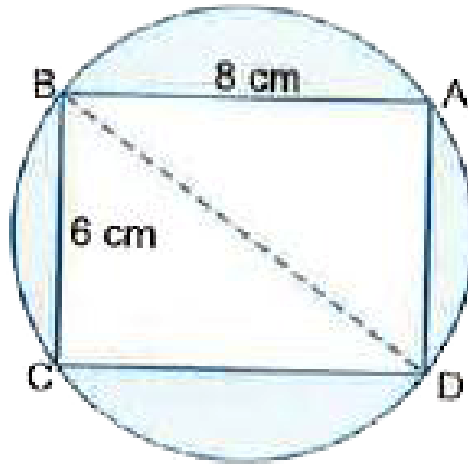
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24. Calculate the area of the designed region in Fig. 12.29, which is common between the two quadrants of circles of radius, 8 cm each.



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25. In the given Fig. 12.30, find the area of the shaded region.



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26. A square park has each side of 100 m. At each corner of the park, there is a flower bed in the form of a quadrant of radius 14 m as shown in Fig. 15.37.

Find the area of the remaining part of the park

(Use $\pi = 22/7$). (FIGURE)



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27. Find the area of the shaded region in Fig. 12.16, where ABCD is a square of side 14 cm.

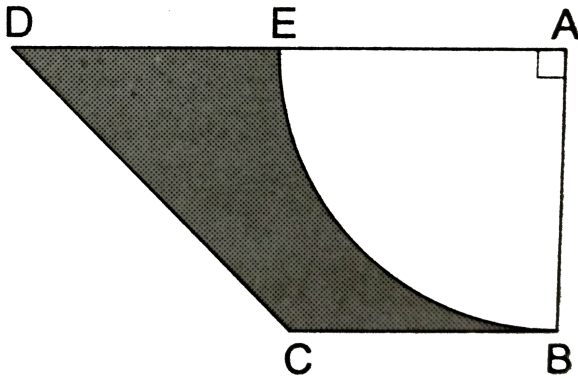


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28. In the given figure ABCD is a trapezium of area 24.5cm^2 . If

$AD \parallel BC, \angle DAB = 90^\circ, AD = 10\text{cm}, BC = 4\text{cm}$

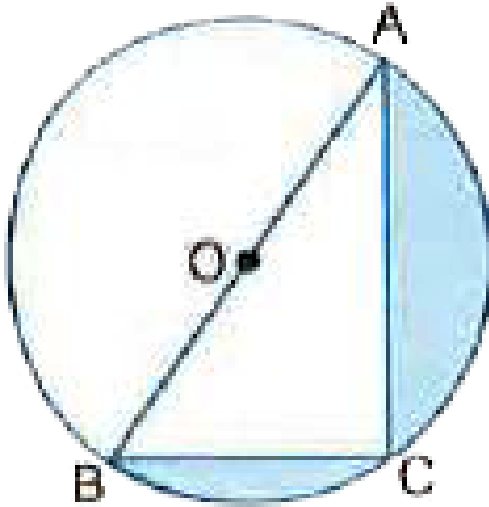
and ABE is quadrant of a circle then find the area of the shaded region.



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29. In Fig. 12-34, O is the centre of a circle such that diameter $AB=13$ cm and $AC=12$ cm. BC is joined. Find

the area of the shaded region.



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30. In the given figure, are shown two arcs PAQ and PBQ. Arc PAQ is a part of circle with centre O and radius OP while are PBQ is a semi-circle drawn on

PQ as diameter with centre M. $OP=PQ=10$ cm show that area of shaded region is $25\left(\sqrt{3} - \frac{\pi}{6}\right)cm^2$



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Long Answer Questions

1. PQRS is a diameter of a circle of radius 6 cm. The lengths PQ, QR and RS are equal. Semi-circles are drawn on PQ and QS as diameters as shown in figure. Find the perimeter of the shaded region.



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2. Fig. 15.6, depicts an archery target marked with its five scoring areas from the centre outwards as Gold, Red, Blue Black and white. The diameter of the region representing Gold score is 21 cm and each of the other bands is 10.5 cm wide. Find the area of each of the five scoring regions.

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3. The short and long hands of a clock are 4cm and 6cm long respectively. Find the sum of distances travelled by their tips in 2 days. $\left(Take \pi \frac{22}{7} \right)$

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4. Fig. 12.26 depicts a racing track whose left and right ends are semicircular. The distance between the two inner parallel line segments is 60 m and they are each 106 m long. If the track is 10 m wide, find : (i) the distance around the track alon



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5. The area of an equilateral triangle ABC is 17320.5 cm^2 . With each vertex of the triangle as centre, a circle is drawn with radius equal to half

the length of the side of the triangle (see Fig. 12.28).

Find the area of the shaded region. (U



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6. In a circular table cover of radius 32 cm, a design is formed leaving an equilateral triangle ABC in the middle as shown in Fig. 12.24. Find the area of the design (shaded region).



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7. In Fig. 12.27, AB and CD are two diameters of a circle (with centre O) perpendicular to each other and OD is the diameter of the smaller circle. If $OA = 7\text{ cm}$, find the area of the shaded region



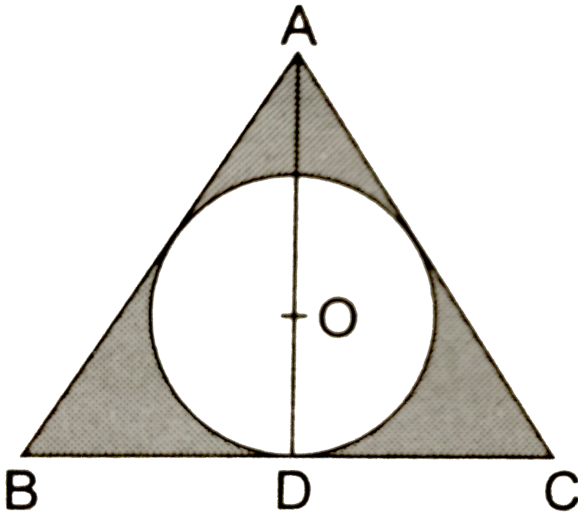
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8. In Fig. 12.33, ABC is a quadrant of a circle of radius 14 cm and a semicircle is drawn with BC as diameter. Find the area of the shaded region.



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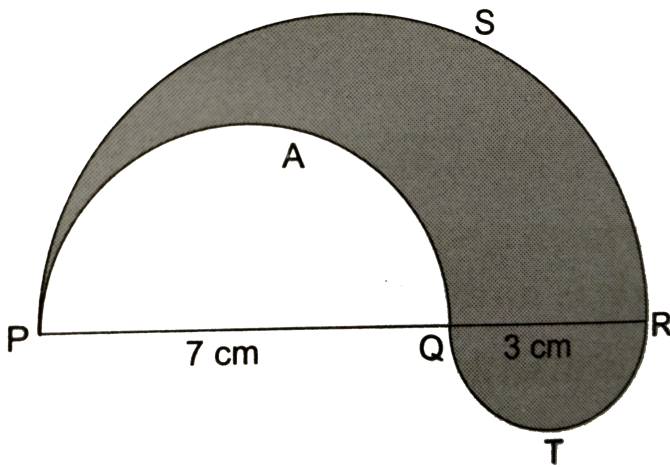
9. In the given figure, a circle is inscribed in an equilateral triangle ABC of side 12 cm. Find the radius of inscribed circle and the area of the shaded region. [Use $\sqrt{3} = 1.73$ and $\pi = 3.14$]



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10. In the given figure, PSR , RTQ and PAQ are three semicircles of diameter 10 cm, 3 cm and 7 cm respectively. Find the perimeter of shaded region.

[Use $\pi = 3.14$]



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11. An elastic belt is placed around the rim of a pulley of radius 5 cm (Fig.) From one point C on the belt, the elastic belt is pulled directly away from the centre O of the pulley until it is at P, 10 cm from the point O. Find the length of the belt that is still in contact with the pulley. Also, find the shaded area.

[use $\pi = 3.14$ and $\sqrt{3} = 1.73$]



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12. In the given figure, is shown a sector OAP of a circle with centre O, containing $\angle\theta$. AB is perpendicular to the radius OA and meets OP

produced at B. Prove that the perimeter of shaded region is $r \left[\tan \theta + \sec \theta + \pi \frac{\theta}{180} - 1 \right]$

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13. Find the area of the shaded region in Fig. 8, where APD, AQB, BRC and CSD are semi-circles of diameter 14 cm, 3.5 cm, 7 cm and 3.5 cm respectively.

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Hots Higher Order Thinking Skills

1. Two circles touch internally. The sum of their areas is $116\pi \text{ cm}^2$ and distance between their centres is 6 cm. Find the radii of the circles.



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2. A bicycle wheel makes 5000 revolutions in moving 11 km. Find the diameter of the wheel.



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3. Find the area of the shaded design in Fig. 12.17, where ABCD is a square of side 10 cm and semicircles are drawn with each side of the square as diameter.



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4. A copper wire, when bent in the form of a square, encloses an area of 484 cm^2 . If the same wire is bent in the form of a circle, find the area enclosed by it. (Use $\pi = \frac{22}{7}$).



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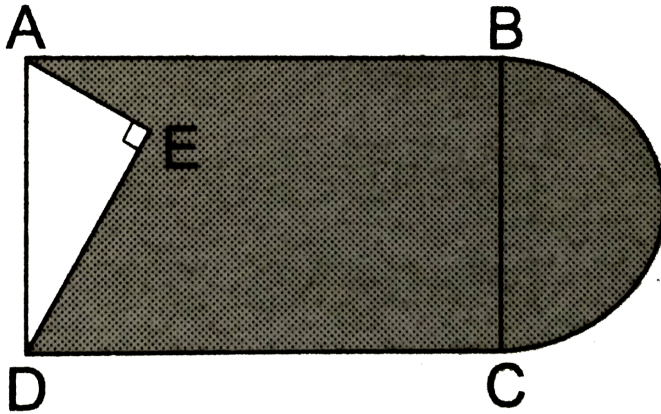
5. Two circles touch externally. The sum of their areas is $130\pi \text{ sq cm}$. and the distance between their centres is 14cm . Find the radii of the circles.



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6. In the given figure, from a rectangular region ABCD with $AB = 20\text{cm}$ a right triangle AED with $AE = 9\text{cm}$ and $DE = 12\text{cm}$, is cut off. On the other end, taking BC as diameter, a semicircle is added on outside the region. The area of the shaded region.

[Use $\pi = 3.14$]



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Proficiency Exercise Very Short Answer Questions

1. The difference between the area of circle and square of radius r is 105 cm^2 . What will be the

circumference of the circle?



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2. The diameter of a circle whose area is equal to the sum of the areas of the two circles of radii 24 cm and 7 cm is



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3. The area of a circle is 220 cm^2 . The area of a square inscribed in it is (a) 49 cm^2 (b) 70 cm^2 (c) 140 cm^2 (d) 150 cm^2

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4. What is the area of the square that can be inscribed in a circle of radius 12 cm?

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5. The area of the circle that can be inscribed in a square of side 6 cm is

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6. If the area of circle is 616 cm^2 , then what is its circumference?



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7. Find the diameter of a circle whose circumference is 66 cm.



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8. The circumference of a circle is 50 cm. Find the side of the largest square that can be inscribed in

the circle



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9. If the area of a circle increases from 9π to 16π then what will be the ratio of the circumference of the first circle to the second circle



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10. A wire can be bent in the form of a circle of radius 35 cm. If it is bent in the form of a square, then what will be its area?

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Proficiency Exercise Short Answer Questions I

1. What is the area of a square inscribed in a circle of diameter x cm?

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2. Is it true that the distance travelled by a circular wheel of diameter d cm in one revolution is $2\pi d$ cm?
? Why?

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3. The circumferences of two circles are in the ratio 3:4. Find the ratio of their areas.



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4. If the area of a sector of a circle is $\frac{5}{18}$ of the area of the circle, then the sector angle is equal to (a) 60° (b) 90° (c) 100° (d) 120°



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5. If a square is inscribed in a circle, then what is the ratio of the area of the circle and that of the square?



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6. Find the radius of semicircle if its perimeter is 18 cm.



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7. What is the length of an arc in terms of π that subtends an angle of 72° at the centre of a circle of radius 10 cm?

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8. In a circle of radius 10 cm, an arc subtends an angle of 108° at the centre. What is the area of the sector in terms of π ?

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9. The perimeter (in cm) of a square circumscribing a circle of radius a cm,



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10. What is the angle subtended at the centre of a circle of radius 5cm by an arc length 4π cm?



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11. Find the area of a quadrant of a circle whose circumference is 616 cm.





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12. If the perimeter of a semi-circular protractor is 36 cm, then its diameter is (a) 10 cm (b) 12 cm (c) 14 cm (d) 16 cm



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13. Find the circumference of a circle if the area of a quadrant of the circle is 154cm^2



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Proficiency Exercise Short Answer Questions Ii

1. Find the radius of a circle having area equal to the sum of the areas of two circles with radius 20 cm and 15 cm respectively.



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2. In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre. Find area of the sector formed by the arc.



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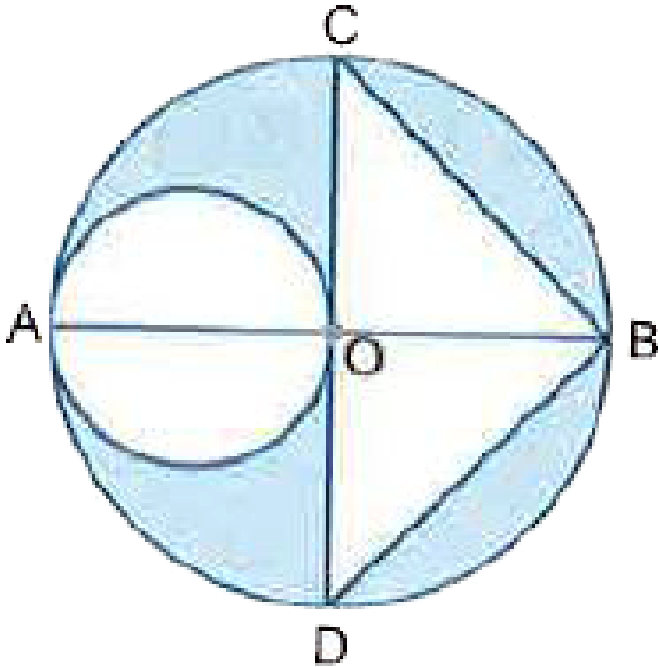
3. Find the radius of a circle whose circumference is equal to the sum of the A circumferences of two circles of radii 12 cm and 16 cm.



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4. In Fig. 12.55, AB and CD are two perpendicular diameters of a circle with centre O. If $OA = 7$ cm, find

the area of the shaded region. (Use $\pi = \frac{22}{7}$).



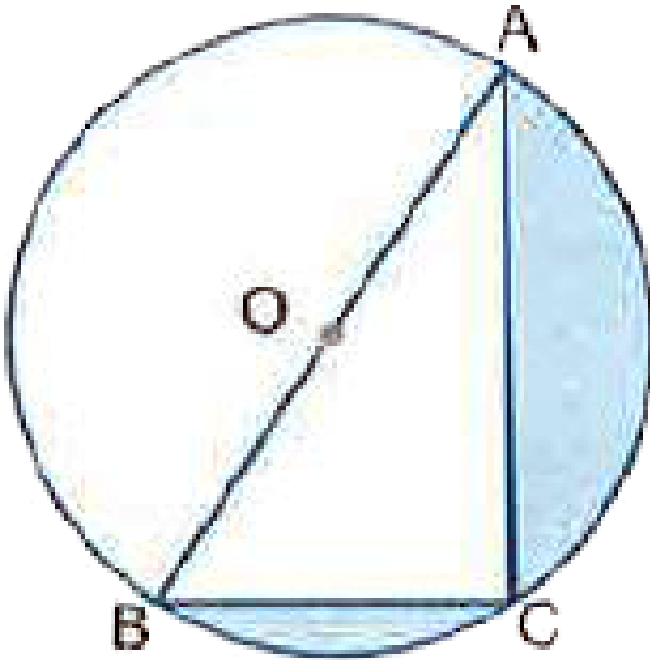
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5. Find the area of the minor segment of a circle of radius 28 cm, when the angle of the corresponding sector is 45° .



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6. Find the area of the shaded region in Fig. 12.56, if $AC = 24$ cm, $BC = 10$ cm and O is the centre of the circle. $(\pi = 3.14)$

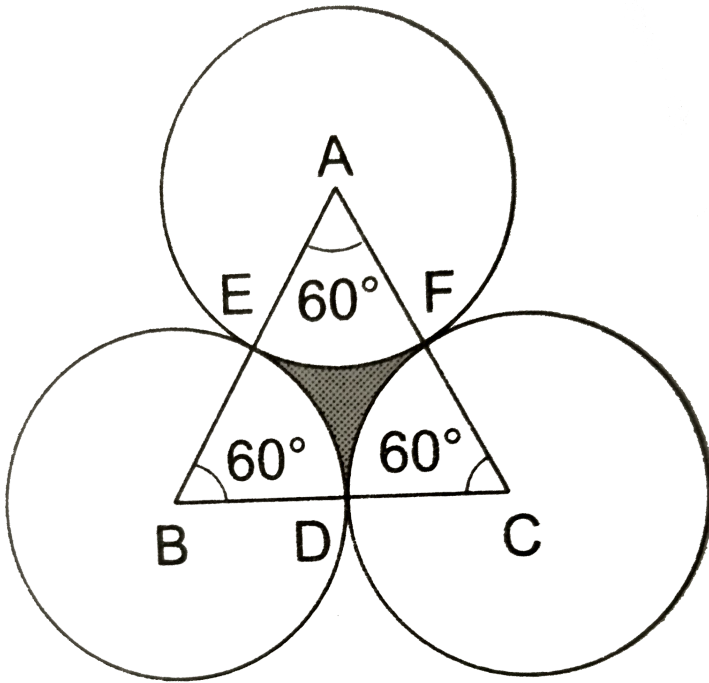


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7. The area of an equilateral triangle is $100\sqrt{3}\text{cm}^2$.

Taking each vertex as centre, a circle is described with radius equal to half the length of the side of the triangle, as shown in the figure. Find the area of that part of the triangle which is not included in the circles.

[Take $\pi = 3.14$ and $\sqrt{3} = 1.732$]



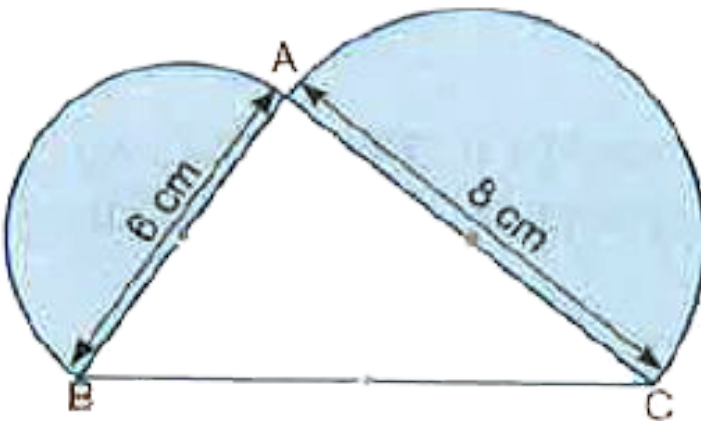
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8. In the given figure, the boundary of shaded region consists of four semicircular areas two

smallest beinequal. If diameter of the largest is 14cm .and that of the smallest is 3.5cm , calculate the area of the shaded region.

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9. In Fig 12.58, ABC is a triangle right angled at A. Semicircles are drawn on AB and AC as diameters. Find the area of the shaded region.



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10. The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand in 5 minutes.

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11. Area of a sector of a circle of radius 16 cm is 256 cm^2 . Find the length of the corresponding arc of the sector.

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12. The inner circumference of a circular track is 132 m. The track is 2.5 m wide everywhere. Calculate the cost of putting up a fence along the outer circle at the rate of 3.50 per metre.



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13. A wire when bent in the form of a square encloses an area of 1.96 m^2 . If the same wire is bent in the form of a circle, find the area of the circle.



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14. A race track is in the form of a ring whose inner and outer circumferences are 44cm and 66 cm respectively. Find the width of the track.



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15. Find the area of the minor segment of a circle of radius 14cm, when the angle of the corresponding sector is 60°



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16. A square of diagonal 18 cm is inscribed in a circle. Find the area included in the circle but not in the square.



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17. The wheel of a motor cycle is of radius 35 cm. How many revolutions per minute must the wheel make, so as to keep a speed of 66 km/h ?



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18. A circular park is surrounded by a road 28 m wide. Find the area of the road if the circumference of the park is 880 m.



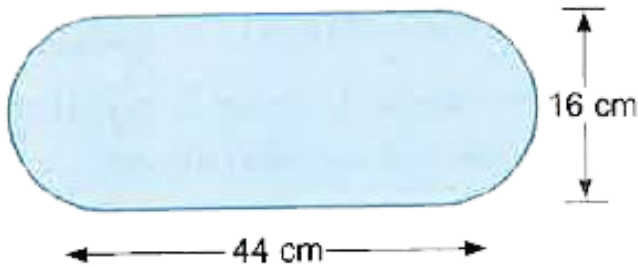
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19. A piece of wire 11 cm long is bent into the form of an arc of a circle subtending an angle of 45° at its centre. Find the radius of the circle.



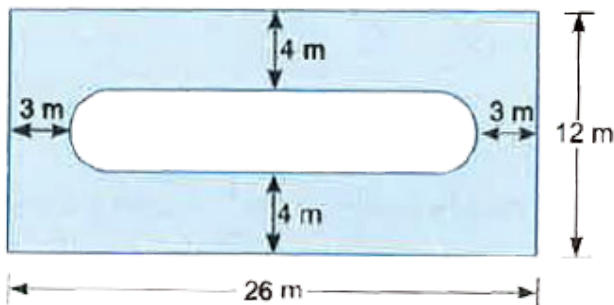
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20. Find the area of the flower bed (with semicircular ends).



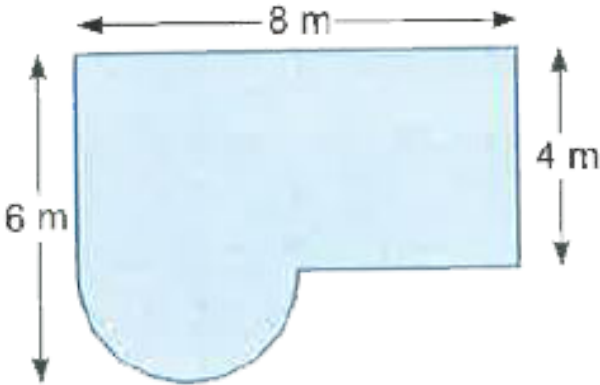
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21. Find the area of the shaded region in



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22. Find the area of the shaded field shown in Fig.



12.61.



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23. Find the area of the shaded region in figure, in figure, where arcs drawn with centres A, B, C and D intersect in pairs at mid-point P, Q, R and S of the

sides AB, BC, CD and DA, respectively of a square ABCD. (use $\pi = 3.14$)



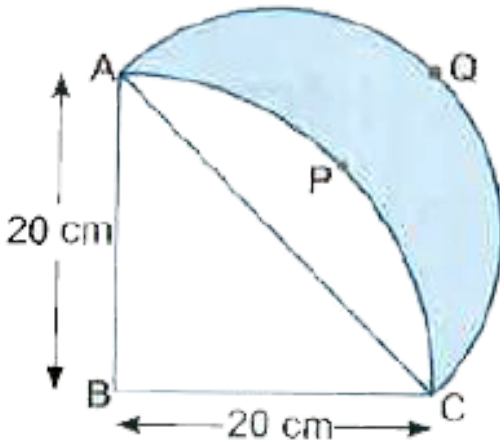
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24. In figure arcs are drawn by taking vertices A, B and C of an equilateral triangle of side 10 cm , To intersect the sides BC, CA and AB at their respective mid- points D, E and F. Find the area of the shaded region. (use $\pi = 3.14$)



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25. In Fig. 12.64, ABCP is a quadrant of a circle of radius 20 cm. With AC as diameter, a semi-circle is drawn. Find the area of the shaded portion.



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26. In the following figure, ABC is a right angled triangle at A. Find the area of the shaded region If

$AB = 6$ cm, $BC = 10$ cm and I is the center of incircle of $\triangle ABC$



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27. Prove that the area of a circular path of uniform width h surrounding a circular region of radius r is $\pi h(2r + h)$.



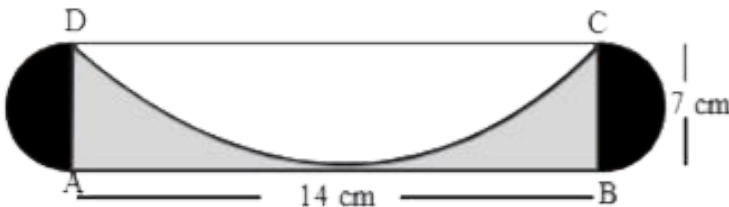
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28. A square water tank has its side equal to 40 m. There are four semi-circular grassy plots all round

it. Find the cost of turfing the plot at Rs 1.25 per square metre (*Take* $\pi = 3.14$)

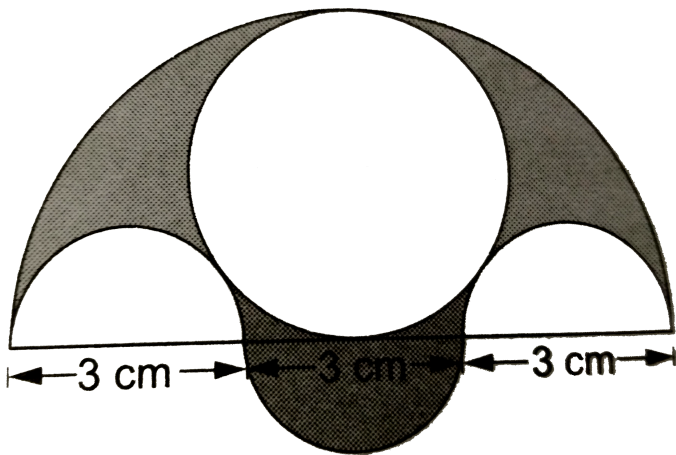
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29. In fig. ABCD is a rectangle with $AB = 14$ cm and $BC = 7$ cm. Taking DC, BC and AD as diameter, three semicircles are drawn. Find the area of the shaded portion.



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30. Three semicircles each of diameter 3 cm, a circle of diameter 4.5 cm and a semicircle of radius 4.5 cm are drawn in the given figure. Find the area of the shaded region.



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31. The cost of fencing a circular field at the rate of 16 per metre is 3014.40. The field is to be thoroughly ploughed at the rate of 0.40 per m^2 . Find the cost of ploughing the field. (Take $\pi = 3.14$)

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32. A sector of 100° cut off from a circle contains area 70.65 cm^2 . Find the radius of the circle. ($\pi = 3.14$)

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33. A boy is cycling such that the wheels of the cycle are making 140 revolutions per minute. If the diameter of the wheel is 60 cm, calculate the speed per hour with which the boy is cycling.



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34. In the given figure, ABCD is a square of side 14 cm. Semi-circles are drawn with each side of square as diameter. Find the area of the shaded region. Use

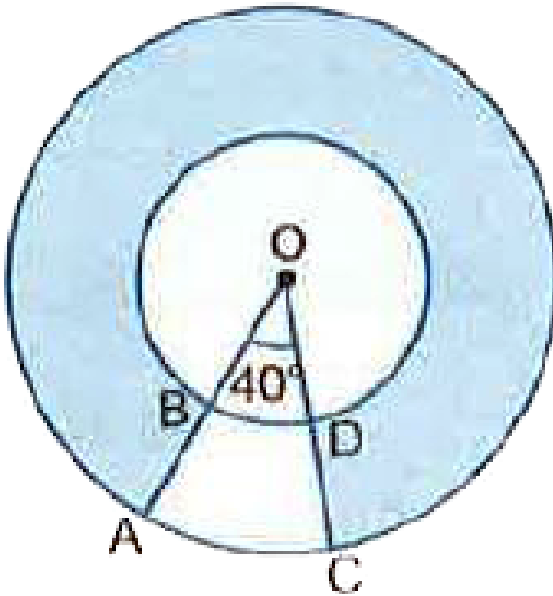
$$\pi = \frac{22}{7}.$$



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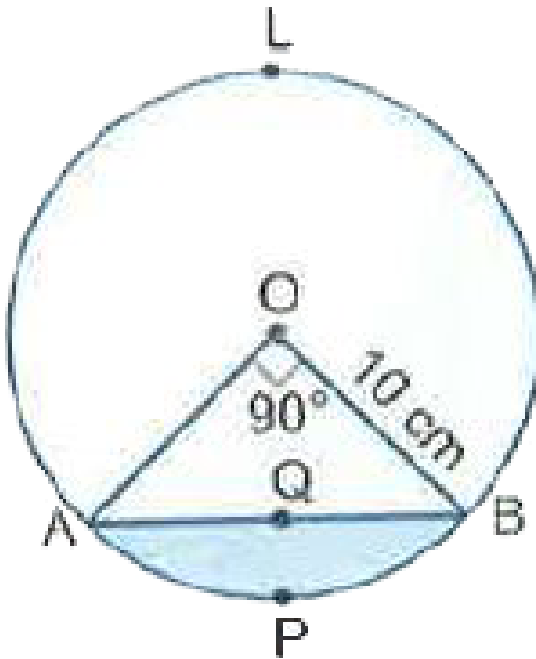
35. In Fig. 12.69, find the area of the shaded region, enclosed between two concentric circles of radii 7 cm and 14 cm where

$$\angle AOC = 40^\circ \left(\text{Use } \pi = \frac{22}{7} \right)$$



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36. In Fig. 12.70. a chord AB of a circle, with centre and radius 10 cm, that subtends a right angle at the centre of circle. Find the area of the minor segment AQB. Hence Find the area of major segment ALBQA. (Use $\pi = 3.14$)



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Proficiency Exercise Long Answer Questions

1. Three circles each of radius 7cm are drawn in such a way that each of them touches the other two. Find the area enclosed between the circles.



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2. A circular pond is of diameter 43 m is surrounded by a 3 m wide path. Find the cost of constructing the path at the rate of 25 per m^2 .



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3. The area of a circular playground is $88704m^2$.

Find the cost of fencing this ground at the rate of 65 per metre

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4. The diameters of front and rear wheels of a tractor are 80 cm and 2m, respectively. Find the number of revolutions that rear wheel will make in covering a distance in which the front wheel makes 1400 revolutions .

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5. Find the area of the segment of a circle of radius 12 cm whose corresponding sector has a central angle of 60° . (use $\pi = 3.14$)



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6. Find the area of the sector of a circle of radius 7cm, if the corresponding arc length 6.2 cm.



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7. A cow is tied with a rope of length 7 m at the corner of a triangular field with each side 15 m. If the length of the rope is increased by 4.5 m, find increase in area of the field in which the cow can graze.



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8. The length of the minute hand of a clock is 6.3 cm. Find the area swept by the minute hand during the time period 5:45 am to 6:10 am.



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9. Find the difference of the area of a sector of angle 90° and its corresponding major sector of a circle of radius 9.8 cm

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10. Find the difference of the areas of two segments of a circle formed by a chord of length 5cm subtending an angle of 90° at the centre.

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11. On a square cardboard sheet of area 784cm^2 , four congruent circular plates of maximum size are placed such that each circular plate touches the other two plates and each side of the square sheet is tangent to two circular plates. Find the area of the square not covered by the circular plates.



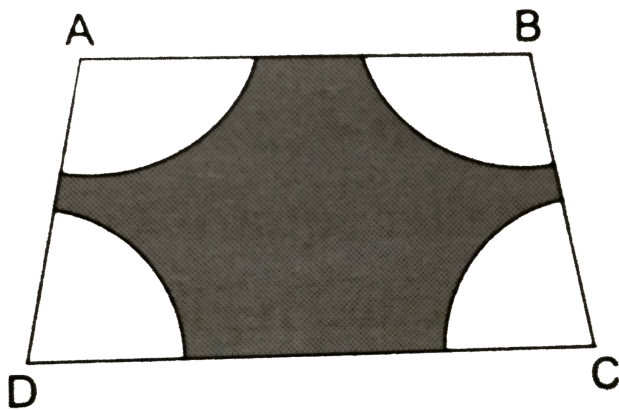
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12. Area of a sector of central angle 200° of a circle is 770cm^2 . Find the length of the corresponding arc of this sector.



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13. In the given figure ABCD is a trapezium in which $AB \parallel DC$, $AB = 18\text{cm}$, $DC = 32\text{cm}$ 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.



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14. Find the area of the shaded region given in Fig. 12.72.



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15. All the vertices of a rhombus lie on a circle. Find the area of the rhombus, if area of the circle is 2464 cm^2 .



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16. Find the number of revolutions made by a circular wheel of area 6.16 m^2 in rolling a distance of

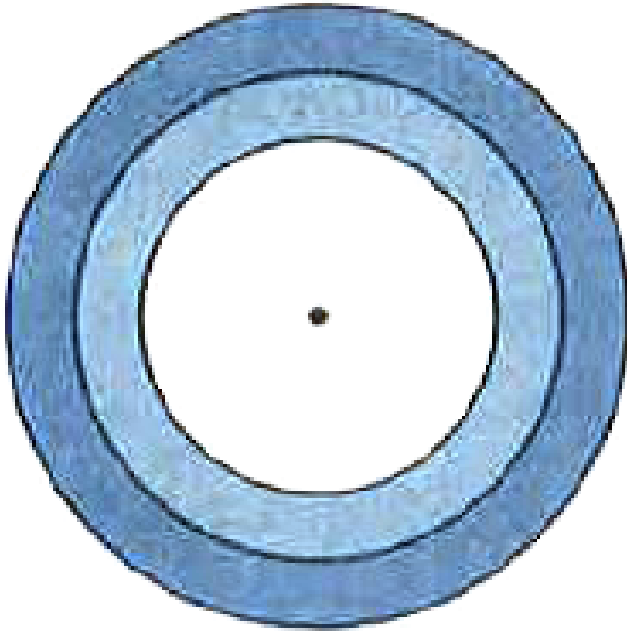
572 m.



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17. An archery target has three regions formed by three concentric circles in Fig. 12.73. If the diameters of the concentric circles are in the ratio 1:3:5. then

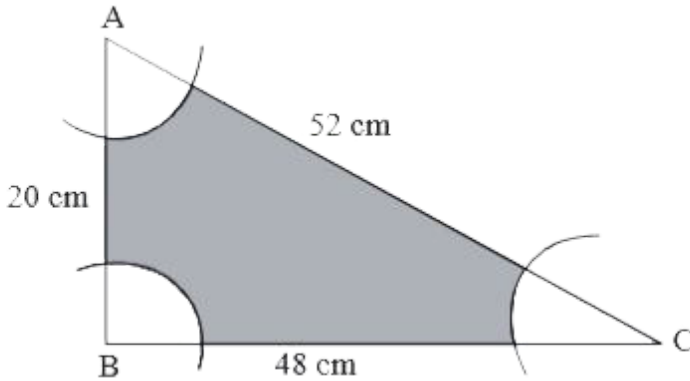
find the ratio of the areas of three regions.



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18. With vertices A, B and C of a triangle ABC as centres, arcs are drawn with radius 6 cm each in fig. If $AB = 20$ cm, $BC = 48$ cm and $CA = 52$ cm, then find

the area of the shaded region.

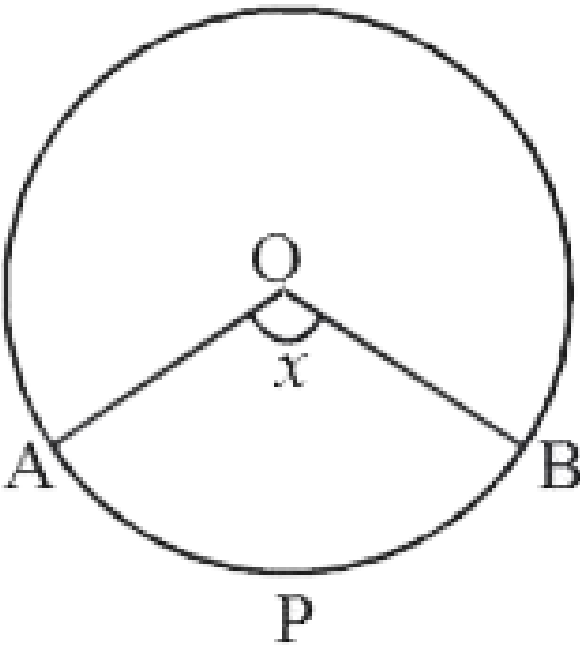


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19. . In the following figure, PQRS is square lawn with side $PQ = 42$ metres. Two circular flower beds are there on the sides PS and QR with centre at O, the intersections of its diagonals. Find the total area of the two flower beds (shaded parts).

Self Assessment Test

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





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2. The diameter of a circle whose area is equal to the sum of the areas of the two circles of radii 24 cm and 7 cm is



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3. If circumferences of two circles are equal, then what is the ratio between their areas?



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4. If the perimeter of a circle is numerically equal to its area, find the radius of the circle.



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5. Find the area of a circle whose circumference is 22 cm.



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6. The circumference of a circle exceeds the diameter by 16.8 cm. Find the radius of the circle.





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7. The wheels of a car are of diameter 80 cm each. How many complete revolutions does each wheel make in 10 minutes when the car is travelling at a speed of 66 km per hour?

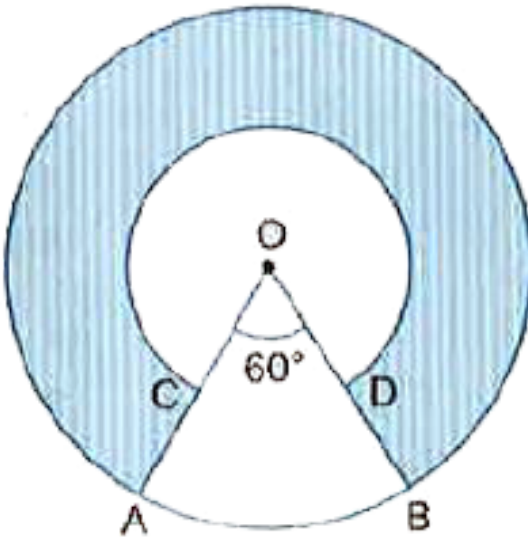


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8. Find the ratio of the area of the semicircle formed on the diagonal of a square of side 14 cm to that of the semicircle formed on the side of the square.

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9. In Fig., two concentric circles with centre O, have radii 21cm and 42cm. If $\angle AOB = 60^\circ$, find the area of the shaded region. [Use $\pi = \frac{22}{7}$]



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10. A chord AB of a circle of radius 10 cm makes a right angle at the centre of the circle. Find the area of the major and minor segment. (Use $\pi = 3.14$)



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11. The cost of fencing a circular field at the rate Rs 24 per metre is Rs 5280. The field is to be ploughed at the rate of Rs 0.50 *per* m^2 . Find the cost of ploughing the field. (*Take* $\pi = 22/7$)



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