

MATHS

BOOKS - RD SHARMA MATHS (ENGLISH)

AREAS RELATED TO CIRCLES

Others

1. A circular pond is of diameter 17.5 m . It is surrounded by a 2 m wide path. Find the cost

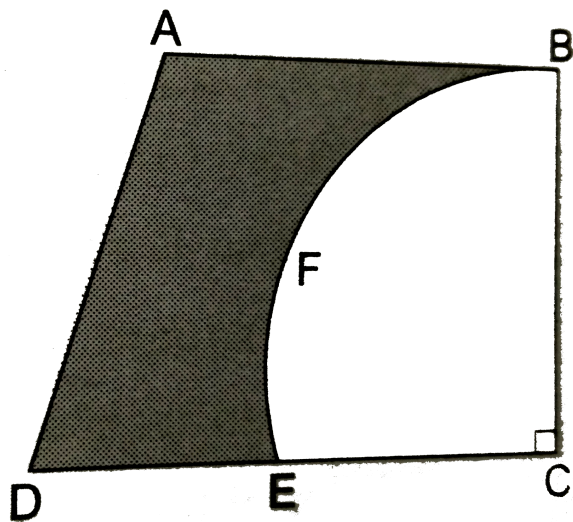
of constructing the path at the rate of $Rs. 25$ per square metre.



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2. From a thin metallic piece in the shaped of a trapezium $ABCD$ in which $AB \parallel CD$ and $\angle BCD = 90^\circ$, a quarter circle $BFEC$ is removed. Given, $AB = BC = 3.5cm$ and $DE = 2cm$ calculate the area of remaining

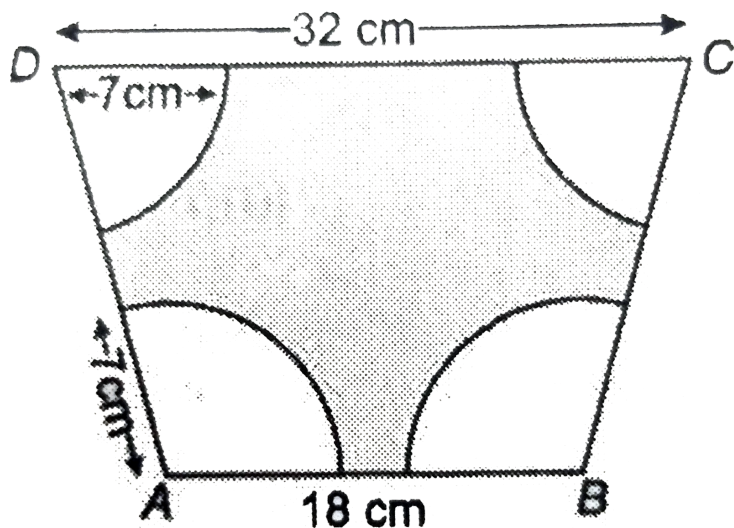
(shaded) part of metal sheet.



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3. In the adjoining figure, ABCD is a trapezium with $AB \parallel DC$, $AB = 18\text{cm}$, $DC = 32\text{cm}$ and the distance between AB and DC is 14 cm.

If arcs of equal radii 7 cm taking AB, C and D as centres, have drawn , then find the area of the shaded region.



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4. ABC is an equilateral triangle of side 8cm. A, B and C are the centres of circular arcs of radius 4cm. Find the area of the shaded region correct upto 2 decimal places.



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5. In figure, find the area of the shaded region

$$[Use \pi = 3.14]$$



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6. Find to the three places of decimal the radius of the circle whose area is the sum of the areas of two triangles whose sides are 35, 53, 66 and 33, 56, 65 measured in centimetres.



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7. Find the area of a shaded region in the figure, where a circular arc of radius 7cm has been drawn with vertex A of an equilateral triangle ABC of side 14cm as centre.



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8. Figure, shows a kite in which BCD is the shape of a quadrant of a circle of radius 42cm. ABCD is a square and CEF is an isosceles right angled triangle whose equal side are 6cm long. Find the area of the shaded region.



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9. A circular grassy plot of land, 42 m in diameter, has a path 3.5 m wide running round

it on the outside. Find the cost of gravelling the path at Rs 4 per square metre.



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10. From each of the two opposite corners of a square of side 8cm, a quadrant of a circle of radius 14. cm is cut. Another circle of radius 4.2cm is also cut from the centre as shown in figure. Find the area of the remaining (shaded) portion of the square.



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11. The diagram shown two arcs, A and B. Arc A is part of the circle with centre O and radius OP . Arc B is part of the circle with centre M and radius PM , where M is the mid-point of PQ . Show that the area enclosed by the two arcs is equal to $25\left(\sqrt{3} - \frac{\pi}{6}\right)cm^2$



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12. 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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13. 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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14. 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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15. The diameter of the driving wheel of a bus is 140cm. How many revolutions per minute

must the wheel make in order to keep a speed of 66km per hour?



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



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17. If the perimeter of a semi-circular protractor is 108cm, find the diameter of the

protractor.



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18. Two circles touch externally. The sum of their areas is 130π sq. cm and the distance between their centres is 14 cm. Find the radii of the two circles.



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19. In a circle of radius 6 cm, a chord of length 10 cm makes an angle of 110° at the centre of the circle. Find (i) the circumference of the circle, (ii) the area of the circle



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20. Figure shows a sector of a circle of radius r containing an angle θ° . The area of the sector is $A \text{ cm}^2$ and the perimeter is 50 cm. Prove that

$$\theta = \frac{360}{\pi} \left(\frac{25}{r} - 1 \right) \text{ and } A = 25r - r^2$$

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21. If the equation $x^3 + ax^2 + bx + 216 = 0$ has three real roots in G.P., then b/a has the value equal to ____.

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22. A sector of 56° cut out from a circle contains area 4.4cm^2 . Find the radius of the circle

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23. A horse is tied to a pole with 28 m long string. Find the area where the horse can graze. (Take $\pi = \frac{22}{7}$).



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24. If a square is inscribed in a circle, what is the ratio of the areas of the circle and the square?



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25. 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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26. In a circle of radius 21cm, an arc subtends an angle of 60° at the centre. Find (i) the length of the arc (ii) area of the sector formed by the arc. $\left(Use \pi \frac{22}{7}\right)$



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27. In an equilateral triangle of side 24cm, a circle is inscribed touching its sides. Find the area of the remaining portion of the triangle
(*Take $\sqrt{3} = 1.732$*)



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28. An athletic track 14 m wide consists of two straight sections 120 m long joining and

semicircular ends inner diameter 35 m . find
area of track



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29. The area of an equilateral triangle is $49\sqrt{3}cm^2$. Taking each angular point as shown in Figure. Find the area of the triangle not included in the circle.



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



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31. ABCD is a field in the shape of a trapezium.

$$AB \parallel DC \quad \text{and} \quad \angle ABC = 90^\circ,$$

$\angle DAB = 60^0$. Four sectors are formed with centres A, B, C and D (See Figure). The radius of each sector is 17.6m. Find the total area of the four sectors. area of remaining portion given that $AB = 75m$ and $CD = 50m$.



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32. In Figure, a crescent is formed by two circles which touch at A. C is the centre of the larger circle. The width of the crescent at BD is

9cm and at EF it is 5cm. Find (i) the radii of two circles (ii) the area of the shaded region.



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33. In the given figure, three circles of radius 2 cm touch one another externally. These circles are circumscribed by a circle of radius R cm. Find the approximate value of R .



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34. Four equal circles, each of radius 5 cm, touch each other as shown in Fig.20. Find the area included between them. (Take $\pi = 3.14$).



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35. Four cows are tethered at four corners of a square plot of side 50m, so that they just cannot reach on another. What area will be left ungrazed?



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36. The inside perimeter of a running track (shown in figure) is 400m. The length of each of the straight portion is 90m and the ends are semi-circles. If track is everywhere 14m wide, find the area of the track. Also, find the length of the outer running track.



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37. In the figure below, the square ABCD is made up of two parts, X and Y. The part X, is

formed by a semicircle and line AB. The perimeter of X is 36 cm and perimeter of the shaded part Y is 64 cm. a. Find the perimeter of square ABCD b. Find the area of shaded region Y



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38. Figure, ABCD is a square of side $2a$. Find the ratio between the circumferences and the areas of the incircle and the circum-circle of the square.



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39. A bucket is raised from a well by means of a rope which is wound round a wheel of diameter 77 cm. Given that the bucket ascends in 1 minute 28 seconds with a uniform speed of 1.1 m/sec, calculate the number of complete revolutions the wheel makes in raising the bucket.



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40. A chord 10 cm long is drawn in the circle whose radius is $5\sqrt{2}$ cm. Find the area of both the segments



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41. In Figure, ABC is a right-angled triangle, $\angle B = 90^\circ$, $AB=28$ cm and $BC=21$ cm With AC as diameter a semicircle is drawn and with BC as radius a quarter circle is drawn. Find the area

of the shaded region correct to two decimal places.



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42. In Figure, there are three semicircles, A, B and C having diameter 3cm each, and another semicircle E having a circle D with diameter 4.5cm are shown. Calculate: (i) the area of the shaded region. (ii) the cost of painting the shaded region at the rate of 25 paise per cm^2 , to the nearest rupee.



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43. The inner and outer diameters of ring 1 of a dartboard are 32cm and 34cm respectively and those of rings II are 19cm and 21cm respectively. What is the total area of these two rings?



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44. In Figure $AB = 36$ cm and M is mid-point of AB . Semi-circles are drawn on AB , AM and MB

as diameters. A circle with centre C touches all the three circles. Find the area of the shaded region.



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45. A drain cover is made from a square metal plate of side 40cm having 441 holes of diameter 1cm each drilled in it. Find the area of the remaining square plate.



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



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47. A chord of a circle of radius 10cm subtends a right angle at the centre. Find: area of the minor sector area of the minor segment area of the major sector area of the major segment



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48. A pendulum swing through an angle of 30° and describes an arc 8.8 cm in length. Find the length of the pendulum.



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49. In Figure, there are shown sectors of two concentric circles of radii 7cm and 3.5cm. Find the area of the shaded region.

$$\left(\pi = \frac{22}{7} \right)$$



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50. A car travels 1 kilometre distance in which each wheel makes 450 complete revolutions. Find the radius of the its wheels.



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51. In Triangle ABC with fixed length of BC , the internal bisector of angle C meets the side AB at D and the circumcircle at E . The

maximum value of $CD \times DE$ is c^2 (b) $\frac{c^2}{2}$ (c) $\frac{c^2}{4}$ (d) none of these



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52. An elastic belt is placed round the rim of a pulley of radius 5cm. One point on the belt is pulled directly away from the centre O of the pulley until it is at P , 10cm from O . Find the length of the belt that is in contact with the rim of the pulley. Also, find the shaded area.



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53. 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.

$$\left(\pi = \frac{22}{7} \right)$$



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54. The perimeter of a sector of a circle of radius 5.2cm is 16.4cm. Find the area of the sector.



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55. The length of minute hand of a clock is 14cm. Find the area swept by the minute hand in one minute. $\left(Use \pi \frac{22}{7} \right)$

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56. A chord AB of a circle of radius 10cm subtends a right angle at the centre. Find: area of the minor sector area of the minor

segment area of the major sector area of the
major segment



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57. AB is the diameter of a circle, centre O . C is a point on the circumference such that $\angle COB = \theta$. The area of the minor segment cut off by AC is equal to twice the area of the sector BOC . Prove that

$$\sin\left(\frac{\theta}{2}\right)\cos\left(\frac{\theta}{2}\right) = \pi\left(\frac{1}{2} - \frac{\theta}{120}\right)$$



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58. In a circle with centre O and radius 5cm , AB is a chord of length $5\sqrt{3}\text{cm}$. Find the area of sector AOB .



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59. An arc of a circle is a length $5\pi\text{cm}$ and the sector it bounds has an area of $20\pi\text{cm}^2$. Find the radius of the circle.



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60. A horse is placed for grazing inside a rectangular field 70m by 52m and is tethered to one corner by a rope 21m long. On how much area can it graze?



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61. Circle inside a Circle : PQRS is a diameter of a circle of radius 6 cm. The length PQ, QR and RS are equal. Semi circles are drawn on PQ and

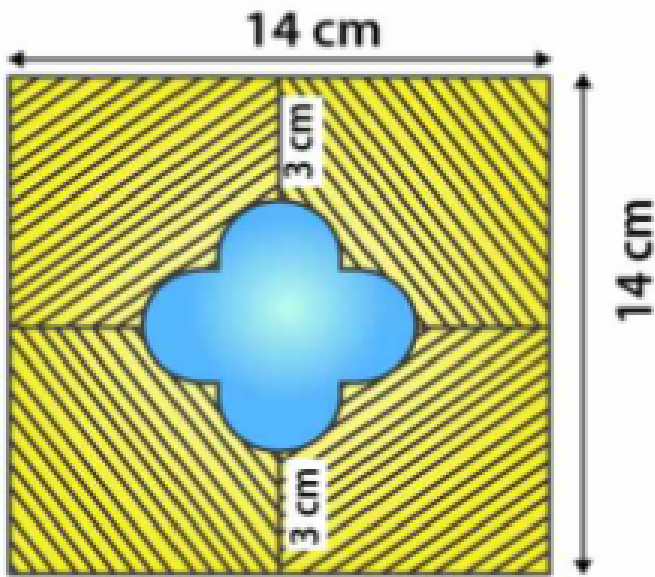
QS as diameters, as shown in Figure. Find the perimeter and area of shaded Region.



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62. In figure, find the area of the shaded region

$$[Use \pi = 3.14]$$



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63. A paper is in the form of a rectangle $ABCD$ in which $AB = 20cm$ and $BC = 14cm$. A semi-circular portion with BC

as diameter is cut off. Find the area of remaining part.



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64. Find the circumference and area of a circle of radius 8.4 cm.



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



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



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67. 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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68. A wire is looped in the form of a circle of radius 28 cm. It is re-bent into a square form. Determine the length of the side of the square.



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



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71. The diameter of a wheel is 84 cm. How many revolution will it make to cover 792 m ?



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72. A car has wheels which are 80 cm in diameter. 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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73. 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 m²* . Find the cost of ploughing the field.
(Take $\pi = 22/7$)



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74. Figure, 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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75. Find the circumference and area of a circle of radius 4.2 cm.



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76. Find the circumference of a circle whose area is 301.84 cm^2 .



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77. Find the area of a circle whose circumference is 44 cm.



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



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79. A steel wire when bent in the form of a square encloses an area of 121 cm^2 . If the same wire is bent in the form of a circle, find the area of the circle.



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80. A horse is placed for grazing inside a rectangular field 40 m by 36 m and is tethered to one corner by a rope 14 m long. Over how much area can it graze? (*Take $\pi = 22/7$*) .



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81. A sheet of paper is in the form of a rectangle $ABCD$ in which $AB = 40cm$ and $AD = 28cm$. A semi-circular portion with BC

as diameter is cut off. Find the area of the remaining paper.



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82. The circumference of two circles are in the ratio $2 : 3$. Find the ratio of their areas.



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83. The side of a square is 10 cm. Find the area of circumscribed and inscribed circles.



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84. The sum of the radii of two circles is 140 cm and the difference of their circumferences is 88 cm. Find the diameters of the circles.



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85. The area of a circle inscribed in an equilateral triangle is 154 cm^2 . Find the

perimeter of the triangle.

[Use $\pi = 22/7$ and $\sqrt{3} = 1.73$]



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86. A field is in the form of a circle. A fence is to be erected around the field. The cost of fencing would be Rs. 2640 at the rate of Rs. 12 per metre. Then, the field is to be thoroughly ploughed at the cost of Re. 0.50 *per* m^2 . What is the amount required to plough the field? [Take $\pi = 22/7$].



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



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88. The radii of two circles are 19 cm and 9 cm respectively. Find the radius and area of the

circle which has its circumference equal to the sum of the circumferences of the two circles.



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89. The area enclosed between the concentric circles is 770 cm^2 . If the radius of the outer circle is 21 cm, find the radius of the inner circle.



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90. A sector is cut from a circle of radius 21 cm. The angle of the sector is 150 degree . Find the length of its arc and area.



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91. Find the area of the sector of a circle whose radius is 14 cm and angle of sector is 45° .



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92. 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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93. Find the area of the sector of a circle with radius 4 cm and of angle 30° . Also, find the area of the corresponding major sector.
(Use $\pi = 3.14$)





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94. 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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95. To warn ships for underwater rocks, a light house throws a red coloured light over a sector of 80° angle to a distance of 16.5 km.

Find the area of the sea over which the ships are warned.



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96. 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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97. A brooch is made with silver wire in the form of a circle with diameter 35 mm. The wire also used in making 5 diameters which divide the circle into 10 equal sectors as shown in Fig. 15.16. Find: (i) the total length of the silver wire required (ii) the area of each sector of the brooch.



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98. Find, in terms of π , the length of the arc that subtends an angle of 30° at the centre of a circle of radius 4 cm.



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99. Find the angle subtended at the centre of a circle of radius 5 cm by an arc of length $(5\pi / 3)cm$.



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100. An arc of length 20π cm subtends an angle of 144° at the centre of a circle. Find the radius of the circle.



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101. An arc of length 15 cm subtends an angle of 45° at the center of a circle. Find in terms of π , the radius of the circle.



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102. Find the angle subtended at the centre of a circle of radius ' a ' by an arc of length $(a\pi / 4)$.



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103. Find the area of the sector of a circle with radius 4 cm and of angle 30° . Also, find the area of the corresponding major sector.
(Use $\pi = 3.14$)



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104. A sector of a circle of radius 8 cm contains an angle of 135° . Find the area of the sector.



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105. The area of a sector of a circle 2 cm is $\pi \text{ cm}^2$. Find the angle contained by the sector



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106. The area of a sector of a circle of radius 5 cm is $5\pi \text{ cm}^2$. Find the angle contained by the sector



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107. AB is a chord of a circle with centre O and radius 4 cm. AB is of length 4 cm. Find the area of sector of the circle formed by chord AB .



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108. In a circle of radius 35 cm, an arc subtends an angle of 72° at the centre. Find the length of the arc and area of the sector.



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109. The perimeter of a sector a circle of radius 5.7 m is 27.2 m. Find the area of the sector.



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110. The perimeter of a certain sector of a circle of radius 5.7 m is 27.2 m. Find the area of the sector.



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111. A sector is cut-off from a circle of radius 21 cm. The angle of the sector is 120° . Find the length of its arc and the area.



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112. The minute hand of a clock is $\sqrt{21}$ cm long. Find the area described by the minute hand on the face of the clock between 7.00 AM and 7.05 AM.



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113. In a circle of radius 6 cm, a chord of length 10 cm makes an angle of 110° at the centre of the circle. Find (i) the circumference of the circle, (ii) the area of the circle



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114. In a circle of radius 6 cm, a chord of length 10 cm makes an angle of 110° at the centre of the circle. Find (i) the length of the arc AB , (ii) the area of the sector OAB .

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115. Fig. 15.17, shows a sector of a circle, centre O , containing an angle θ° , prove that:
(FIGURE) (i) Perimeter of the shaded region is

$r \left(\tan \theta + \sec \theta + \frac{\pi \theta}{180} - 1 \right)$ (ii) Area of the shaded region is $\frac{r^2}{2} \left(\tan \theta - \frac{\pi \theta}{180} \right)$



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116. Find the area of the segment of a circle, given that the angle of the sector is 120° and the radius of the circle is 21 cm.
(Take $\pi = 22/7$)



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117. A chord AB of a circle of radius 15 cm makes an angle of 60° at the centre of the circle. Find the area of the major and minor segment. (Take $\pi = 3.14$, $\sqrt{3} = 1.73$)



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118. In a circle of radius 21 cm, an arc subtends an angle of 60° at the centre. Find: (i) length of the arc



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119. AB is a chord of a circle with centre O and radius 4 cm. AB is of length 4 cm and divides the circle into two segments. Find the area of the minor segment.



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120. A chord PQ of length 12 cm subtends a angle of 120° at the centre of a circle. Find the area of the minor segment cut off by the chord PQ .



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121. A chord of a circle of radius 14 cm makes a right angle at the centre. Find the areas of the minor and major segments of the circle.



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122. A chord AB of a circle, of radius 14 cm makes an angle of 60° at the centre of the

circle. Find the area of the minor segment of the circle.



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123. Find the area of the shaded region in Figure, where 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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124. AB and CD are respectively arcs of two concentric circles of radii 21 cm and 7 cm and centre O . If $\angle AOB = 30^\circ$, find the area of the shaded region.



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125. In Fig. 15.35, $AOBCA$ represents a quadrant of a circle of radius 3.5 cm with centre O . Calculate the area of the shaded portion ($Take \pi = 22/7$) .



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126. 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 Figure. Find the area of the remaining part of the park (*Use* $\pi = 22/7$).

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127. Four equal circles are described about the four corners of a square so that each touches

two of the others as shown in Fig. 15.38. Find the area of the shaded region, each side of the square measuring 14 cm. (FIGURE)



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128. Find the areas of the shaded region in the Fig. 15.39. (FIGURE)



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129. $ABCD$ is a flower bed. If $OA = 21\text{ m}$ and $OC = 14\text{ m}$, find the area of the bed.
(Take $\pi = 22/7$)



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130. $ABCP$ is a quadrant of a circle of radius 14 cm . With AC as diameter, a semi-circle is drawn. Find the area of the shaded portion.



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131. The area of an equilateral triangle is 1732.05 cm^2 . About each angular point as centre, a circle is described with radius equal to half the length of the side of the triangle. Find the area of the triangle not included in the circles. (Use $\pi = 3.14$).



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132. It is proposed to add to a square lawn measuring 58 cm on a side, two circular ends. The centre of each circle is the point of

intersection of the diagonals of the square.

Find the area of the whole lawn.



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133. Find the area of the shaded region in Fig.

15.48, where $ABCD$ is a square of side 10 cm.

(Use $\pi = 3.14$) (FIGURE)



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134. Find the area of the shaded region in Fig. if $ABCD$ is a square of side 14 cm and APD and BPC are semi-circles.



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135. A round table cover has six equal designs as shown in Fig. 15.51. If the radius of the cover is 28 cm, find the cost of making the designs at the rate of Rs 3.50 per cm^2 .
(Use $\sqrt{3} = 1.7$) (FIGURE)





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136. Find the areas of the shaded region in Fig. 15.52, 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. (FIGURE)



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137. In a circular table cover of radius 32cm, a design is formed leaving an equilateral

triangle ABC as shown in figure. Find the area of shaded region.



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138. In the given figure, AB and CD are two diameters of circles (with centre O) Perpendicular to each other and OD is the diameter of the smallest circle. If $OA = 7\text{cm}$, Find the area of the shaded region.



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139. Calculate the area of the designed region in Figure common between the two quadrants of circles of radius 8 cm each.



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140. On a square handkerchief, nine circular designs each of radius 7 cm are made (see Figure). Find the area of the remaining portion of the handkerchief.



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



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142. In Figure, ABC is an equilateral triangle inscribed in a circle of radius 4 cm with centre O . Find the area of the shaded region.



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143. 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 L is the center of incircle of $\triangle ABC$



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144. In Figure, $ABCD$ is a trapezium with $AB \parallel DC$ and $\angle BCD = 60^\circ$. If $BFEC$ is a sector of a circle with centre C and $AB = BC = 7$ cm and $DE = 4$ cm, then

find the area of the shaded region

$$\left(\text{Use } \pi = \frac{22}{7} \text{ and } \sqrt{3} = 1.732 \right).$$



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145. A plot is in the form of a rectangle $ABCD$ having semi-circle on BC as shown in Fig. 15.64. If $AB = 60\text{ m}$ and $BC = 28\text{ m}$, find the area of the plot. (FIGURE)



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146. A play ground has the shape of a rectangle, with two semi-circles on its smaller sides as diameters, added to its outside. If the sides of the rectangle are 36 m and 24.5 m, find the area of the playground. (*Take $\pi = 22/7$*).



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147. The outer circumference of a circular race-track is 528 m. The track is everywhere 14 m

wide. Calculate the cost of levelling the track at the rate of 50 paise per square metre (*Use $\pi = 22/7$*).



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148. A rectangular piece is 20m long and 15m wide. From its four corners, quadrants of radii 3.5m have been cut. Find the area of the remaining part.



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149. A road which is 7 m wide surrounds a circular park whose circumference is 352 m. Find the area of road.



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150. Four equal circles, each of radius a , touch each other. Show that the area between them is $\frac{6}{7}a^2$ (Take $\pi = 22/7$).



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151. 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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152. 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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153. Find the area of Figure, in square cm, correct to one place of decimal.
(Take $\pi = 22/7$).



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154. In Figure, AB and CD are two diameters of a circle 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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155. In Figure, $OACB$ is a quadrant of a circle with centre O and radius 3.5 cm. If $OD = 2$ cm, find the area of the (i) quadrant $OACB$ (ii) shaded region.

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



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157. In Figure, $OABC$ is a square of side 7 cm. If $OAPC$ is a quadrant of a circle with centre O , then find the area of the shaded region.
(Use $\pi = 22/7$)



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158. A regular hexagon is inscribed the circle. If the area of hexagon is $24\sqrt{3} \text{ cm}^2$, find the

area of the circle. (Use $\pi = 3.14$)



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159. A path of width 3.5 m runs around a semi-circular grassy plot whose perimeter is 72 m.

Find the area of the path. (Use $\pi = 22/7$)



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160. A child makes a poster on a chart paper drawing a square $ABCD$ of side 14 cm. She

draws four circles with centre A , B , C and D in which she suggests different ways to save energy. The circles are drawn in such a way that each circle touches externally two of the three remaining circles. In the shaded region she write a message Save Energy. Find the perimeter and area of the shaded region.



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161. Three circles are placed on a plane in such a way that each circle just touches the other

two, each having a radius of 10 cm. Find the area of region enclosed by them.



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162. 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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163. Find the area of the circle in which a square of area 64 cm^2 is inscribed.

[Use $\pi = 3.14$]



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164. The diameter of a wheel of a bus is 90 cm which makes 315 revolutions per minute. Determine its speed in kilometres per hour.

$\left(\text{Take } \pi = \frac{22}{7} \right)$



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165. In Figure, $OE = 20\text{ cm}$. In sector $OBFT$, square $OFGH$ is inscribed. Find the area of the shaded region.



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166. In Figure, O is the centre of circle of radius 28 cm . Find the area of minor segment ASB .



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167. In Figure, $PQRS$ is a square of side 4 cm.
Find the area of the shaded region.



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168. A circle is inscribed in an equilateral triangle ABC of side 12 cm, touching its sides (Figure). Find the radius of the inscribed circle and the area of the shaded part.



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169. In Fig. an equilateral triangle ABC of side 6 cm has been inscribed in a circle. Find the area of the shaded region. (Take $\pi = 3.14$)



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170. A circular field has a perimeter of 650 m. A square plot having its vertices on the circumference of the field is marked in the field. Calculate the area of the square plot.



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171. In Fig. , $ABCD$ is a rectangle, having $AB = 20\text{ cm}$ and $BC = 14\text{ cm}$. Two sectors of 180° have been cut off. Calculate: (i) the area of the shaded region. (ii) the length of the boundary of the shaded region.



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172. The diameter of a coin is 1 cm (Fig. 15.83). If four such coins be placed on a table so that the rim of each touches that of the other two,

find the area of the shaded region

(Take $\pi = 3.1416$) (FIGURE)



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173. From a circular piece of cardboard of radius 3 cm two sectors of 90° have been cut off. Find the perimeter of the remaining portion nearest hundredth centimeters (Take

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



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174. The area of a sector is one-twelfth that of the complete circle. Find the angle of the sector.



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175. The radius of a circle with centre O is 5 cm. (Fig. 15.84). Two radii OA and OB are drawn at right angles to each other. Find the areas of the segments made by the chord AB (Take $\pi = 3.14$). (FIGURE)



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176. $ABCDEF$ is a regular hexagon with centre O). If the area of triangle OAB is 9 cm^2 , find the area of: (i) the hexagon and (ii) the circle in which the hexagon is inscribed.



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177. Find the area enclosed between two concentric circles of radii 3.5 cm and 7 cm. A third concentric circle is drawn outside the 7

cm circle, such that the area enclosed between it and the 7 cm circle is same as that between the two inner circles. Find the radius of the third circle correct to one decimal place.



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178. A path of 4 m width runs around a semi-circular grassy plot whose circumference is $163\frac{3}{7}$ m. Find: the area of the path and cost of gravelling the path at the rate of Rs. 1.50 per square metre



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179. Fig. 15.87, shows the cross-section of railway tunnel. The radius OA of the circular part is 2 m. If $\angle AOB = 90^\circ$, calculate: (i) the height of the tunnel (ii) the perimeter of the cross-section (iii) the area of the cross-section.



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180. In Fig. 15.90, O is the centre of a circular arc and AOB is a straight line. Find the

perimeter and the area of the shaded region correct to one decimal place. (Take $\pi = 3.142$) (FIGURE)



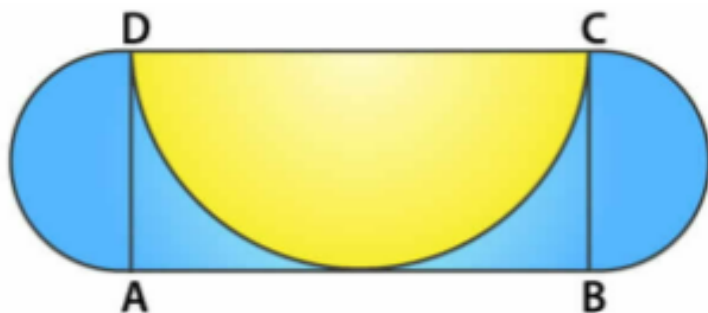
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181. In Figure, two circles with centres A and B touch each other at the point C . If $AC = 8\text{ cm}$ and $AB = 3\text{ cm}$, find the area of the shaded region.



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182. In Fig. 15.93, $ABCD$ is a rectangle with $AB = 14\text{ cm}$ and $BC = 7\text{ cm}$. Taking DC , BC and AD as diameters, three semi-circles are drawn as shown in the figure. Find the area of the shaded region.



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183. In Figure, the boundary of the shaded region consists of four semi-circular arcs, the smallest two being equal. If the diameter of the largest is 14 cm and of the smallest is 3.5 cm, find (i) the length of the boundary (ii) the area of the shaded region.



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184. In Fig. 15.98, ABC is a right angled triangle in which $\angle A = 90^\circ$, $AB = 21\text{ cm}$

and $AC = 28\text{ cm}$. Semi-circles are described on AB , BC and AC as diameters. Find the area of the shaded region. (FIGURE)



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185. In Fig. 15.99, a square $OABC$ is inscribed in a quadrant $OPBQ$ of a circle. If $OA = 21\text{ cm}$, find the area of the shaded region. (FIGURE)



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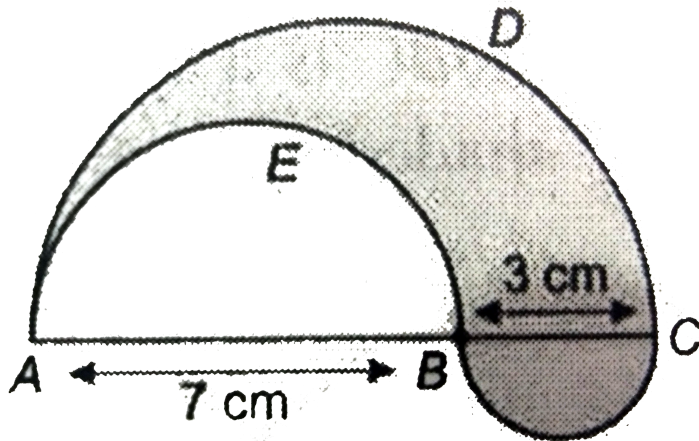
186. Two circular pieces of equal radii and maximum area, touching each other are cut out from a rectangular card board of dimensions $14\text{ cm} \times 7\text{ cm}$. Find the area of the remaining card board. (Use $\pi = 22/7$)



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187. In the given figure, three semicircles are drawn of diameter 10 cm, 7 cm and 3 cm, respectively Find the perimeter of shaded

regions (Use $\pi = 3.14$)



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188. In Figure, $ABCD$ is a trapezium of area 24.5 cm^2 . In it, $AD \parallel BC$, $\angle DAB = 90^\circ$, $AD = 10 \text{ cm}$ and $BC = 4 \text{ cm}$. If ABE is a

quadrant of a circle, find the area of the shaded region. (*Take $\pi = 22/7$*) .



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189. In 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. Find the area of the shaded region. (*Use $\pi = 22/7$*)



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190. 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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191. The circumference of two circles are in the ratio $2 : 3$. Find the ratio of their areas.



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



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193. What is the length (in terms of π) of the arc that subtends an angle of 360° at the centre of a circle of radius 5 cm?



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194. What is the angle subtended at the centre of a circle of radius 6 cm by an arc of length 3π cm ?



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195. What is the area of a sector of a circle of radius 5 cm formed by an arc of length 3.5 cm?



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



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198. Write the formula for the area of a sector of angle θ (in degrees) of a circle of radius r .



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199. Write the formula for the area of a segment in a circle of radius r given that the sector angle is θ (in degrees).



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200. If the adjoining figure is a sector of a circle of radius 10.5 cm, what is the perimeter of the sector? (Take $\pi = 22/7$) (FIGURE)



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201. If the diameter of a semi-circular protractor is 14 cm, then find its perimeter.



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202. An arc subtends an angle of 90° at the centre of the circle of radius 14 cm. Write the area of minor sector thus formed in terms of π .



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



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204. 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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205. If the difference between the circumference and radius of a circle is 37 cm, then using $\pi = \frac{22}{7}$, the circumference (in cm) of the circle is

(a) 154

(b) 44

(c) 14

(d) 7



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206. A wire can be bent in the form of a circle of radius 56 cm. If it is bent in the form of a square, then its area will be (a) 3520 cm² (b) 6400 cm² (c) 7744 cm² (d) 8800 cm²



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207. If a wire is bent into the shape of a square, then the area of the square is 81 sq. cm. When the wire is bent into a semi-circular

shape, then the area of the semi-circle will be

(a) 22 cm^2 (b) 44 cm^2 (c) 77 cm^2 (d) 154 cm^2



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208. A circular park has a path of uniform width around it. The difference between the outer and inner circumferences of the circular path is 132 m. Its width is (a) 20 m (b) 21 m (c) 22 m (d) 24 m



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209. 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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210. The ratio of the outer and the inner perimeters of a circular path is 23 : 22. If the path is 5 metres wide, the diameter of the inner circle is

A. (a) 55 m

B. (b) 110 m

C. (c) 220 m

D. (d) 230 m

Answer: null



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211. The circumference of a circle is 100 cm. The side of a square inscribed in the circle is

$$50\sqrt{2} \text{ cm}^2 \quad (\text{b}) \quad \frac{100}{\pi} \text{ cm}^2 \quad (\text{c}) \quad \frac{50\sqrt{2}}{\pi} \text{ cm}^2 \quad (\text{d}) \quad \frac{100\sqrt{2}}{\pi} \text{ cm}^2$$



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212. The area of the incircle of an equilateral triangle of side 42 cm is $22\sqrt{3} \text{ cm}^2$ (b) 231 cm^2 (c) 462 cm^2 (d) 924 cm^2



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213. The area of incircle of an equilateral triangle is 154 cm^2 . The perimeter of the triangle is

A. (a) 71.5 cm

B. (b) 71.7 cm

C. (c) 72.3 cm

D. (d) 72.7 cm

Answer: null



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



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215. The perimeter of a triangle is 30 cm and the circumference of its incircle is 88 cm. The area of the triangle is (a) 70 cm^2 (b) 140 cm^2 (c) 210 cm^2 (d) 420 cm^2



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216. 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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217. If the circumference of a circle increases from 4π to 8π , what change occurs in its area? (a) It is halved. (b) It doubles. (c) It triples. (d) It quadruples.



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218. If the radius of a circle is diminished by 10%, then its area is diminished by (a) 10% (b) 19% (c) 20% (d) 36%



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219. If the area of a square is same as the area of the circle, then the ratio of their perimeters, in terms of π , is (a) $\pi : \sqrt{3}$ (b) $2 : \sqrt{\pi}$ (c) $3 : \pi$ (d) $\pi : \sqrt{2}$



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



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221. The ratio of the areas of a circle and an equilateral triangle whose diameter and a side are respectively equal, is (a) $\pi : \sqrt{2}$ (b) $\pi : \sqrt{3}$ (c) $\sqrt{3} : \pi$ (d) $\sqrt{2} : \pi$



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222. If the sum of the areas of two circles with radii r_1 and r_2 is equal to the area of a circle of radius r , then $r_1^2 + r_2^2$ (a) $> r^2$ (b) $= r^2$ (c)

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223. 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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224. The perimeter of the sector OAB shown in Fig. 15.106, is (a) $\frac{64}{3} \text{ cm}$ (b) 26 cm (c) $\frac{64}{5} \text{ cm}$ (d) 19 cm (FIGURE)



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225. If the perimeter of a sector of a circle of radius 6.5 cm is 29 cm, then its area is (a)

58 cm^2 (b) 52 cm^2 (c) 25 cm^2 (d) 56 cm^2



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226. If the area of a sector of a circle bounded by an arc of length 5π cm is equal to 20π cm^2 , then its radius is (a) 12 cm (b) 16 cm (c) 8 cm (d) 10 cm



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227. The area of the circle that can be inscribed in a square of side 10 cm is (a) $40\pi \text{ cm}^2$ (b) $30\pi \text{ cm}^2$ (c) $100\pi \text{ cm}^2$ (d) $25\pi \text{ cm}^2$



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228. If the difference between the circumference and radius of a circle is 37 cm, then its area is (a) 154 cm^2 (b) 160 cm^2 (c) 200 cm^2 (d) 150 cm^2



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229. The area of a circular path of uniform width h surrounding a circular region of radius r is

(A) $\pi(h + 2r)r$

(B) $\pi h(2r + h)$.

(C) $\pi(h + r)r$

(D) $\pi(h + r)h$

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230. If AB is a chord of length $5\sqrt{3}$ cm of a circle with centre O and radius 5 cm, then area of sector OAB is (a) $\frac{3\pi}{8}cm^2$ (b) $\frac{8\pi}{3}cm^2$ (c) $25\pi cm^2$ (d) $\frac{25\pi}{3}cm^2$



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231. The area of a circle whose area and circumference are numerically equal, is (a) 2π sq. units (b) 4π sq. units (c) 6π sq. units (d) 8π sq. units



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232. If diameter of a circle is increased by 40%, then its area increases by (a) 96% (b) 40% (c) 80% (d) 48%

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233. In Fig. 15.107, the shaded area is (FIGURE)

(a) $50(\pi - 2)cm^2$ (b) $25(\pi - 2)cm^2$ (c) $25(\pi + 2)cm^2$ (d) $5(\pi - 2)cm^2$

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234. In Fig. 15.108, the area of the segment

PAQ is (FIGURE) (a) $\frac{a^2}{4}(\pi + 2)$ (b) $\frac{a^2}{4}(\pi - 2)$ (c) $\frac{a^2}{4}(\pi - 1)$ (d) $\frac{a^2}{4}(\pi + 1)$



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235. In Fig. 15.109, the area of segment ACB is

(FIGURE) (a) $\left(\frac{\pi}{3} - \frac{\sqrt{3}}{2}\right)r^2$ (b)

$$\left(\frac{\pi}{3} + \frac{\sqrt{3}}{2}\right) r^2 \text{ (c) } \left(\frac{\pi}{3} - \frac{2}{\sqrt{3}}\right) r^2 \text{ (d) None}$$

of these



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236. If the area of a sector of a circle bounded by an arc of length 5π cm is equal to $20\pi \text{ cm}^2$, then the radius of the circle is

(a) 12 cm

(b) 16 cm

(c) 8 cm

(d) 10 cm



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237. In Fig. 15.110, the ratio of the areas of two sectors S_1 and S_2 is (a) $5 : 2$ (b) $3 : 5$ (c) $5 : 3$ (d) $4 : 5$ (FIGURE)



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238. 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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239. If the area of a sector of a circle is $\frac{7}{20}$ of the area of the circle, then the sector angle is equal to (a) 110° (b) 130° (c) 100° (d) 126°



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240. In Fig. 15.111, if ABC is an equilateral triangle, then shaded area is equal to (FIGURE)

- (a) $\left(\frac{\pi}{3} - \frac{\sqrt{3}}{4}\right)r^2$ (b) $\left(\frac{\pi}{3} - \frac{\sqrt{3}}{2}\right)r^2$ (c) $\left(\frac{\pi}{3} + \frac{\sqrt{3}}{4}\right)r^2$ (d) $\left(\frac{\pi}{3} + \sqrt{3}\right)r^2$



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241. In Fig. 15.112, the area of the shaded region is (FIGURE) (a) $3\pi \text{ cm}^2$ (b) $6\pi \text{ cm}^2$ (c) $9\pi \text{ cm}^2$ (d) $7\pi \text{ cm}^2$



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242. If the perimeter of a circle is equal to that of a square, then the ratio of their areas is (a) 13 : 22 (b) 14 : 11 (c) 22 : 13 (d) 11 : 14



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243. 13. The radius of a circle is 20cm. Three more concentric circles are drawn inside it in such that it is divided into four parts of equal

area. The radius of the largest of the three concentric circles is



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244. The area of a sector whose perimeter is four times its radius r units, is (a) $\frac{r^2}{4}$ sq. units
(b) $2r^2$ sq. units (c) r^2 sq. units (d) $\frac{r^2}{2}$ sq. units



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245. If a chord of a circle of radius 28 cm makes an angle of 90° at the centre, then the area of the major segment is (a) 392 cm^2 (b) 1456 cm^2 (c) 1848 cm^2 (d) 2240 cm^2



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246. If area of a circle inscribed in an equilateral triangle is 48π square units, then perimeter of the triangle is (a) $17\sqrt{3}$ units (b) 36 units (c) 72 units (d) $48\sqrt{3}$ units



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247. The hour hand of a clock is 6 m long. The area swept by it between 11.20 am and 11.55 am is (a) 2.75 cm^2 (b) 5.5 cm^2 (c) 11 cm^2 (d) 10 cm^2

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248. $ABCD$ is a square of side 4 cm. If E is a point in the interior of the square such that CED is equilateral, then area of ACE is (a)

$$2(\sqrt{3} - 1)cm^2 \quad (b) \quad 4(\sqrt{3} - 1)cm^2 \quad (c)$$

$$6(\sqrt{3} - 1)cm^2 \quad (d) \quad 8(\sqrt{3} - 1)cm^2$$



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249. If the area of a circle is equal to the sum of the areas of two circles of diameters 10 cm and 24 cm, then diameter of the larger circle (in cm) is (a) 34 (b) 26 (c) 17 (d) 14



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250. If π is taken as $22/7$, the distance (in metres) covered by a wheel of diameter 35 cm, in one revolution, is (a) 2.2m (b) 1.1m (c) 9.625m (d) 96.25m



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251. ABCD is a rectangle whose three vertices are B(4, 0), C(4, 3) and D(0, 3). The length of one of its diagonals is (a) 5 (b) 4 (c) 3 (d) 25





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