RD SHARMA

Solutions

Class 10 Maths

Chapter 15

Ex 15.1

Q.1: Find the circumference of a circle with a radius of 4.2 cm.

Soln:

Given Data:

Radius = 4.2 cm

The formula to be used:

Circumference of a circle = 2

= 2 x 3.14 x 4.2 = 26.4 cm

Therefore, the circumference of the circle is 26.4 cm

Q.2: Find the circumference of a circle with area 301.84 cm^2 .

Soln:

Given Data: Area = 301.84 cm^2

We know that, Area of a Circle =

301.84 cm^2 = 3.14 x

r = 9.8 cm

Therefore, Radius, = 9.8 cm.

Circumference of a circle = 2

= 2 x 3.14 x 9.8 cm = 61.6 cm

Therefore, the circumference is 61.6 cm.

Q.3: Find the area of a circle whose circumference is 44 cm.

Soln:

Given Data:

Circumference = 44 cm

We know that, Circumference of a circle = 2

44 cm = 2 x 3.14 x r

r = 7 cm

Formula to be used:

Area of a Circle =

= 3.14 x 7 x 7

= 154 cm^2

Therefore, Radius, = 7 cm

Area of a Circle = 154 cm^2

Q.4: The circumference of a circle exceeds its diameter by 16.8 cm. Find the circumference of the circle.

Soln:

Let the radius of the circle be = r cm

Therefore, Diameter (d) = 2r [radius is half the diameter]

We know that, Circumference of a circle (C) = 2

Given Data : circumference of a circle exceeds its diameter by 16.8 cm

C = d + 16.8

2= 2r + 16.8 [d = 2r]

2- 2r = 16.8

2r (– 1) = 16.8

2r (3.14 – 1) = 16.8

r = 3.92 cm

Therefore, Radius, = 3.92 cm

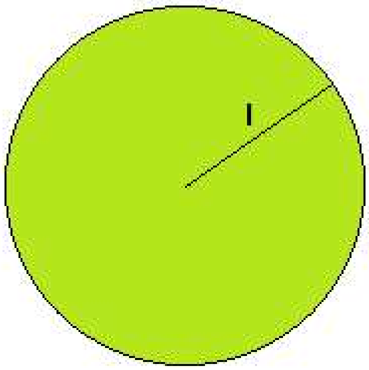
Circumference of a circle (C) = 2

C = 2 x 3.14 x 3.92

= 24.64 cm

Therefore, the circumference of the circle is 24.64 cm.

Q.5: A horse is tied to a pole with 28 m long string. Find the area where the horse can graze.



Soln:

Given Data: Length of the string l = 28 m

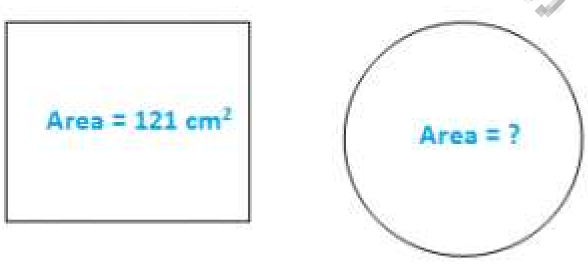
Area the horse can graze is the area of the circle in the figure shown with a radius equal to the length of the string.

We know that, Area of a Circle = = 3.14 x 28 x 28 = 2464 m^2

Therefore, the Area of the circle and the area the horse can graze is 2464 m^2

Q6. 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.

Soln:



Given Data : Area of the square = 121 cm^2

Area of the circle =?

We know that, area of a square = a^2

121 cm^2 = a^2

a = 11 cm [11^2 = 121]

Therefore, each side of the square ‘a’ = 11 cm

We know that, the perimeter of a square = 4a = 4 x 11 = 44 cm

Perimeter of the square = Circumference of the circle [in this case only]

We know that, Circumference of a circle (C) = 2

4a = 2

2 = 44

r = 7 cm

We know that, Area of a Circle = = 3.14 x 7 x 7 = 154 cm^2

Therefore, the Area of the circle is 154 cm^2

Q7. The circumference of two circles is in a ratio of 2 : 3. Find the ratio of their areas.

Soln:

Let the radius of two circles C1 and C2 be r1 and r2.

We know that, Circumference of a circle (C) = 2

Hence their circumference will be 2_1 and 2_2.

Also, their circumference will be in a ratio of = 2_1 : 2_2

Given Data: circumference of two circles is in a ratio of 2 : 3

Therefore, 2_1 : 2_2 = 2 : 3

Also, the ratios of their areas = πr_{21}:$\pi r_{22}$$\pi r_1^2 : \pi r_2^2$

= (r1r2)^2$(\frac{r1}{r2})^2$

= (23)^2$(\frac{2}{3})^2$

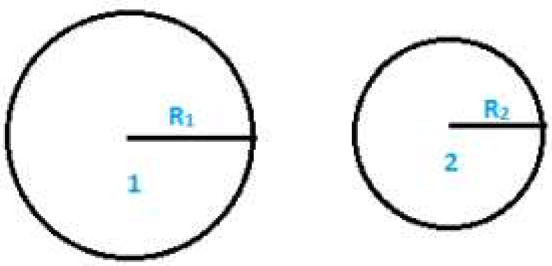
= 916 $\frac{9}{16}$

= 4 : 9

Therefore, ratio of their areas = 4 : 9 .

Q8. The sum of the radii of two circles is 140 cm and the difference of their circumference is 88 cm. Find the diameters of the circles.

Soln:



Let the radius of the circles be r1 and r2.

Let the circumferences of the two circles be C1 and C2.

Given Data:

We know that, Circumference of a circle (C) = 2

Sum of radii of two circles;   r1 + r2 = 140 cm   —- **(1)**

Difference of their circumference,

C1 – C2 = 88 cm

$2_1 – 2_2$ = 88 cm

2 $(r_1 – r_2)$ = 88 cm

(r1 – $r_{2)}$ = 14 cm

$r_1 = r_2 + 14$ —- **(2)**

Substituting the value of r_1 in equation **(1),** we have,

$r_2 + r_2 + 14 = 140$

2 r_2 = 140 – 14

2 r_2 = 126

r_2 = 63 cm

Substituting the value of r_2 in equation **(2),** we have,

r_1 = 63 + 14 = 77 cm

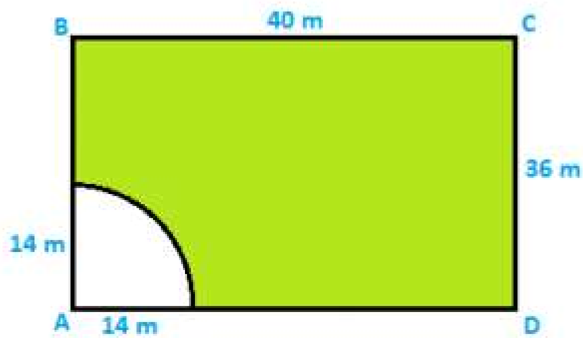
Diameter of circle 1 = $2r_1$ = 2 x 77 = 154 cm

Diameter of circle 2 = 2 r_2 = 2 x 63 = 126 cm

Therefore, Diameter 1 and diameter 2 are 154 cm and 126 cm

Q9. 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? (extra question)

Soln:



The figure shows rectangular field ABCD at corner A, a horse is tied with rope length = 14 m. the area it can graze is represented A as shaded region = area of quadrant with (radius = length) of string

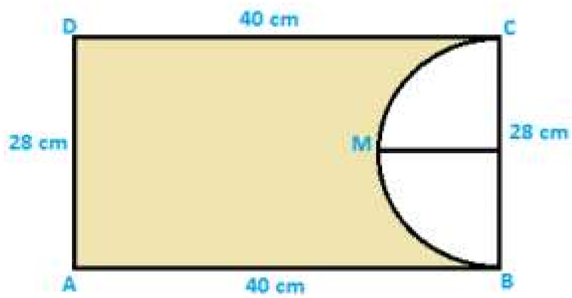
area=14×(areaofcircle)=πr2=14×227×14×14=(22×7)=154m2

$$\text{area} = \frac{1}{4} \times (\text{areaofcircle}) = \pi r^2 = \frac{1}{4} \times \frac{22}{7} \times 14 \times 14 = (22 \times 7) = 154\text{m}^2$$

Therefore, the area it can graze = 154 m^2

Q10. A sheet of paper is in the form of a rectangle ABCD in which AB = 40 cm and AD = 28 cm. A semicircular portion with BC as diameter is cut off. Find the area of the remaining paper.

Soln:



Given Data:

Sheet of paper ABCD, AB = 40 cm and AD = 28 cm

CD = 40 cm and BC = 28 cm [since it is a rectangle]

Semicircle is represented as BMC with BC as the diameter.

Therefore, The radius = 14 cm [diameter is double the radius]

We know that, Area of a Circle =

Area of the remaining (shaded region) = (area of rectangle) – (area of semicircle)

= (AB x BC) – (0.5 x)

= (40 x 28) – (0.5 x 3.14 x 14 x 14)

= 1120 – 308 = 812cm^2

Therefore, the Area of the circle is 812 cm^2

Q.10: 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 two circles.

Soln:

Given Data :

Radii of circles are 6 cm and 8 cm

Area of circle with radius 8 cm = = $(8)^2$ = 64 cm^2

Area of circle with radius 6cm = = $(6)^2$ = 36 cm^2

Areas sum = 64 + 36 = 100 cm^2

Let the radius of circle be x cm

Area = = = 100 cm^2

$X^2 = 100$

x = $\sqrt{100}\sqrt{100}$= 10 cm

Hence, x = 10 cm

Q11. The radii of two circles are 19 cm and 9 cm respectively. Find the radius and area of the circle which has circumferences is equal to sum of the circumference of two circles.

Soln:

Given Data :

Radius of the 1st circle = 19 cm

Radius of the 2nd circle = 9 cm

Formula used :

Circumference of 1st circle = 2 (19) = 38 cm

Circumference of 2^{nd} circle = 2 (9) = 18 cm

Let radius of required circle be r cm

Circumference of required circle = 2 = C1 + C2

2 = 38 cm + 18 cm

2 = 56 cm

Radius, r = 28 cm

Area of required circle = = 3.14 x 28 x 28 = 2464 cm^2

Hence, the area of required circle = = 2464 cm^2

Q12. The side of a square field is 10 cm. Find the area of the circumscribed and inscribed circles.

Soln:

Circumscribed circle :

Radius = diagonalofsquare2 $\frac{diagonalofsquare}{2}$

= 12 $*\sqrt{2}\frac{1}{2}*\sqrt{2}$

= 0.5 x 1.414 x 10 = 7.07 cm

Therefore, Radius of the circle, = 7.07 cm

We know that, Area of a Circle =

= 3.14 x 7.07 x 7.07 = 157.41 cm^2

Therefore, the Area of the Circumscribed circle is 157.41 cm^2

Inscribed circle :

Radius = frac12*side frac12 * side

= 12 *side $\frac{1}{2} * \text{side}$

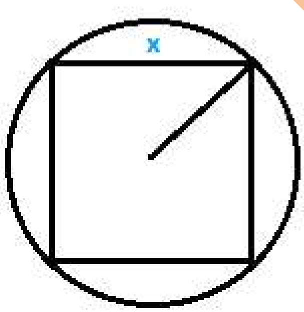
= 0.5 x 10 = 5 m

= 3.14 x 5 x 5 = 78.5 cm^2

Therefore, area of the circle is 78.5 cm^2

Q 13. If a square is inscribed in a circle. Find the ratio of areas of the circle and the square.

Soln:



Let side of square be x cm inscribed in a circle.

Given Data :

Radius of circle (r) = 12 $\frac{1}{2}$ (diagonal of square)

= 12(sqrt2x) $\frac{1}{2}$(sqrt2x)

= x2 $\frac{x}{2}$

We know that, area of a square $= x^2$

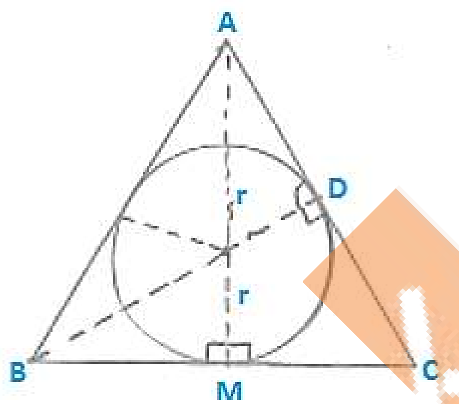
$= \pi(x\sqrt{2})^2 = \pi * x^2 2 \pi(\frac{x}{\sqrt{2}})^2 = \frac{\pi * x^2}{2}$

areaofcircleareaofsquare $= \pi 2 = \pi : 2 \frac{areaofcircle}{areaofsquare} = \frac{\pi}{2} = \pi : 2$

Hence, obtained.

Q14. The area of circle, inscribed in equilateral triangle is 154 cm^2. Find the perimeter of triangle.

Soln:



Let the circle inscribed in the equilateral triangle be with a centre O and radius r.

Formula used :

We know that, Area of a Circle =but the given that area is 154 cm^2.

= 154

3.14 x = 154

= 7 x 7 = 49

r = 7 cm

From the figure shown above, we infer that at point M, BC side is tangent and also at point M BM is perpendicular to OM. In equilateral triangle, the perpendicular from vertex divides the side into two halves.

BM= 12 BC $BM = \frac{1}{2}BC$ = 12 x $\frac{1}{2}x$ = x2 $\frac{x}{2}$

OB^2=BM^2+MO^2 $OB^2 = BM^2 + MO^2$ OB=√r2+ x24 =√49 x24 $OB = \sqrt{r^2 + \frac{x^2}{4}} = \sqrt{49\frac{x^2}{4}}$

BD= √32 (side)= √32 x=OB+OD $\frac{\sqrt{3}}{2}(side) = \frac{\sqrt{3}}{2}x = OB + OD$

√32 x−r=√49+ x24 ,r=7 $\frac{\sqrt{3}}{2}x - r = \sqrt{49 + \frac{x^2}{4}}, r = 7$

After solving the above equations we have,

x = 14√3cm $14\sqrt{3}cm$

perimeter=3x=3∗14√3=42√3cm $perimeter = 3x = 3 * 14\sqrt{3} = 42\sqrt{3}cm$

Hence the perimeter to be found is 42√3cm $42\sqrt{3}cm$.

Q15. A field is in the form of the circle. A fence is to be erected around the field. The cost of fencing would to Rs. 2640 at rate of Rs.12 per meter. Then the field is to be thoroughly plowed at cost of Rs. 0.50 per m^2. What is the amount required to plow the field?

Soln :

Given Data: Total cost of fencing the circuit field = Rs. 2640

Cost per meter fencing = Rs 12

Total cost of fencing = circumference x cost per fencing

2640 = circumference x 12

Therefore, Circumference = 220m

Let radius of field be ‘r’ m

Circumference of a circle (C) = 2

2

2 x 3.14 x r = 220

r = 35 m

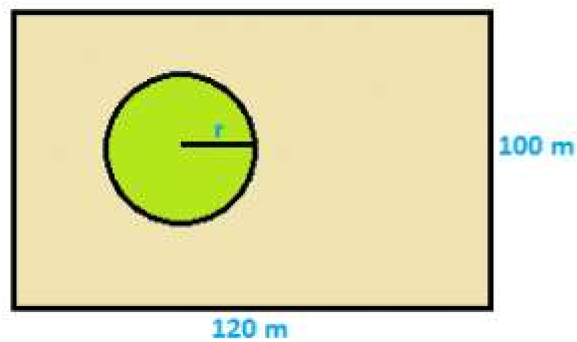
= 3.14 x 35 x 35 = 3850 m^2

Cost of ploughing per m^2 land = Rs. 0.5 x = 0.50 x 3850 m^2 = Rs. 1925

Therefore, Cost of ploughing per m^2 land = Rs. 1925

Q 16. A park is in the form of rectangle 120 m x 100 m. At the center of park, there is a circular lawn. The area of park excluding lawn is 8700 m^2. Find the radius of the circular lawn.

Soln:



Given Data :

Dimensions of rectangular park

length = 120 m

Breadth = 100 m

Area of park = l x b = 120 x 100 = 12000 m^2

Let radius of circular lawn be r

Formula used :

Area of circular lawn =

Area of remaining park excluding lawn = (area of park) x (area of circular lawn)

8700 = 12000 – = 12000 – 8700 = 3300 m^2

r = 32.4 m

Therefore, radius of circular lawn = 32.4 m

Q18. A truck travels 1 km distance in which each wheel makes 450 complete revolutions. Find the radius of the wheel.

Soln:

Given data:

Distance travelled = 1000 m

Number of revolutions made = n = 450

Formula used:

We know that, Circumference of a circle (C) = 2   = 2 x 3.14 x r

Distance for 450 revolutions = (2 x 3.14 x r) 450

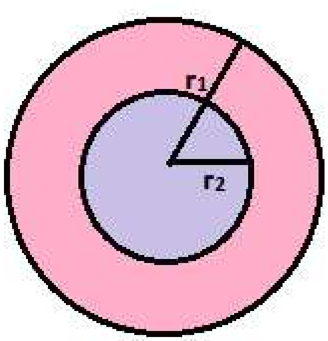
But we have been given with a distance of 1000 m, hence,

(2 x 3.14 x r) 450 = 1000

Radius, r = 10009π $\frac{1000}{9\pi}$ cm

Q19. The area enclosed between the concentric circles is 770 cm^2. If the radius of the outer circle is 21 cm , then find the radius of the inner circle.

Soln:



Given Data :

Radius of outer circle = R1 = 21 cm

Radius of inner circle = R2

Area between concentric circles = area of outer circle – area of inner circle

Formula used :

We know that, Area of a Circle =

770 cm^2 = ($R1^2$ – $R2^2$)

$R1^2$ – $R2^2$ = 245

21^2 – $R2^2$ = 245

R2 = 14 cm

Therefore, the radius of the inner circle is 14 cm.