RD SHARMA

Solutions

Class 7 Maths

Chapter 21

Ex 21.2

Q1) Find the area of a circle whose radius is

(i) 7 cm (ii) 2.1 m (iii) 7 km

Solution:

(i) We know that the area A of a circle of radius r is given by $A = \pi r^2$

Here, r = 7 cm

$\therefore A = \frac{22}{7} \times 7^2 = 154 \text{ cm}^2$

(ii) We know that the area A of a circle of radius r is given by $A = \pi r^2$

Here, r = 2.1 cm

$\therefore A = \frac{22}{7} \times 2.1^2 = 13.86 \text{ m}^2.$

(iii) We know that the area A of a circle of radius r is given by $A = \pi r^2$

Here, r = 7 km

$\therefore A = \frac{22}{7} \times 7^2 = 154 \text{ km}^2.$

Q2) Find the area of a circle whose diameter is

(i) 8.4 cm (ii) 5.6 m (iii) 7 km

Solution:

(i) Let r be the radius of the circle. Then, $r = \frac{8.4}{2} = 4.2$ cm.

$\therefore$ Area of the circle $= \pi r^2$

$\Rightarrow A = \frac{22}{7} \times 4.2^2 \text{ cm}^2$

$\Rightarrow A = 55.44 \text{ cm}^2.$

(ii) Let r be the radius of the circle. Then, $r = \frac{5.6}{2} = 2.8$ m.

$\therefore$ Area of the circle $= \pi r^2$

$\Rightarrow A = \frac{22}{7} \times 2.8^2 \text{ m}^2$

$\Rightarrow A = 24.64 \text{ m}^2.$

(iii) Let r be the radius of the circle. Then, $r = \frac{7}{2} = 3.5$ km.

$\therefore$ Area of the circle $= \pi r^2$

$\Rightarrow A = \frac{22}{7} \times 3.5^2 \text{ km}^2$

$\Rightarrow A = 38.5 \text{ km}^2.$

Q3) The area of a circle is 154 cm2. Find the radius of the circle.

Solution:

Let the radius of the circle be r cm.

Area of the circle (A) = 154 cm^2

$\Rightarrow 154 = \frac{22}{7} \times r^2 \Rightarrow r^2 = \frac{154 \times 7}{22} \Rightarrow r^2 = 49 \Rightarrow r = 7 \text{ cm.}$

Hence, the radius of the circle is 7 cm.

Q4) Find the radius of a circle, if its area is

(i) 4 it cm2 (H) 55.44 m2 (iii) 1.54 km2

Solution:

(i) Let the radius of the circle be r cm.

$\therefore$ Area of the circle (A) = 4π cm^2

=> $4\pi = \pi r^2$ cm^2

=> $r^2 = \frac{4\pi}{\pi}$

=> $r^2 = 4$

=> r = 2 cm.

(ii) Let the radius of the circle be r cm.

$\therefore$ Area of the circle (A) = 55.44 m^2

=> $55.44 = \pi r^2$ m^2

=> $r^2 = \frac{55.44 \times 7}{22}$

=> $r^2 = 17.64$

=> r = 4.2 m.

(iii) Let the radius of the circle be r cm.

$\therefore$ Area of the circle (A) = 1.54 km^2

=> $1.54 = \pi r^2$ km^2

=> $r^2 = \frac{1.54 \times 7}{22}$

=> $r^2 = 0.49$

=> r = 0.7 km = 700 m.

Q5) The circumference of a circle is 3.14 m, find its area.

Solution:

We have:

Circumference of the circle = 3.14 m = $2\pi r$

=> 3.14 m = $2 \times \frac{22}{7} \times$ r m

=> r = $\frac{3.14 \times 7}{22 \times 2}$ m

=> r = 0.5 m.

Area of the circle (A) = πr^2

=> A = $\frac{22}{7} \times 0.5^2$ m^2 = 0.785 m^2.

Q6) If the area of a circle is 50.24 m^2, find its circumference.

Solution:

We have:

Area of the circle (A) = $\pi r^2 = 50.24$ m^2

=> 50.24 $m^2 = \frac{22}{7} \times r^2$

=> $r^2 = \frac{50.24 \times 7}{22} = \frac{351.68}{22} = 15.985$ m^2

=> r = 3.998 m.

Circumference of circle (C) = $2\pi r$

=> C = $2 \times \frac{22}{7} \times 3.998$ m

=> C = 25.12 m.

Q7) A horse is tied to a pole with 28 m long string. Find the area where the horse can graze. (Take $\pi = 22 / 7$).

Solution:

We have:

Length of the string = 28 m

The area over which the horse can graze is the same as the area of a circle of radius 28 m.

Hence, required area = $\pi r^2 = \frac{22}{7} \times 28 \times 28 = 22 \times 4 \times 28 = 2464\ m^2$.

Q8) A steel wire when bent in the form of a square encloses an area of 121 cm2. If the same wire is bent in the form of a circle, find the area of the circle.

Solution:

We have:

Area of the square = 121 cm^2

=> $(side)^2 = (11)^2\ cm^2$

=> side = 11 cm.

So, the perimeter of the square = 4 (side) = (4 x 11) cm = 44 cm

Let r be the radius of the circle. Then,

Circumference of the circle = Perimeter of the square

=> $2\pi r = 44$

=> $2 \times \frac{22}{7} \times r = 44$

=> r = 7 cm.

∴ Area of the circle = $\pi r^2 = \frac{22}{7} \times 7 \times 7 = 154\ cm^2$.

Q9. A road which is 7 m wide surrounds a circular park whose circumference is 352 m. Find the area of of road.

Solution:

We have:

Circumference of the circular park = $2\pi r = 352$ m

=> $2\pi r = 352$

=> $2 \times \frac{22}{7} \times r = 352$

=> r = 56 m.

Radius of the path including the 7 m wide road = (r + 7) = 56 + 7 = 63 m.

∴ Area of the road:

$= \pi \times (63)^2 - \pi \times (56)^2$

$= \frac{22}{7} \times 63 \times 63 - \frac{22}{7} \times 56 \times 56$

= 22 [9 x 63 – 8 x 56]

= 22 [567 – 448]

= 2618 m^2

∴ Area of the road = 2618 m^2

Q10. Prove that the area of a circular path of uniform width h surrounding a circular region of radius r is $\pi h(2r + h)$.

Solution:

Radius of the circular region = r

Radius of the circular path of uniform width h surrounding the circular region of radius r= (r + h)

Therefore, Area of the path

$= \pi(r + h)^2 - \pi r^2$

$= \pi r^2 + \pi h^2 + 2\pi rh - \pi r^2$

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

Q11) The perimeter of a circle is $4\pi r$ cm. What is the area of the circle?

Solution:

We have:

Given perimeter of the circle = $4\pi r$ cm = $2\pi(2r)$ cm

We know that, the perimeter of a circle = $2\pi r$

∴ Radius of the circle = 2r cm

Area of the circle = $\pi r^2 = \pi(2r)^2 = 4\pi r^2$

Q12) A wire of 5024 m length is in the form of a square. It is cut and made a circle. Find the ratio of the area of the square to that of the circle.

Solution:

We have:

Perimeter of the square = 5024 m = Circumference of the circle

=> 4 x Side of the square = 5024

∴ Side of the square = $\frac{5024}{4}$ = 1256 m.

Let the area of the square be A_1 and the area of the circle be A_2.

Area of the square (A_1) = side x side = $\frac{5024}{4} \times \frac{5024}{4}$ m^2

Circumference of the circle = 5024 m

=> $2\pi r$ = 5024 m

=> $2 \times \frac{22}{7} \times r$ = 5024 m

=> $r = \frac{5024 \times 7}{22 \times 2}$

Area of the circle (A_2) = $\pi r^2 = \frac{22}{7} \times \frac{5024 \times 7}{22 \times 2} \times \frac{5024 \times 7}{22 \times 2} = \frac{5024 \times 5024 \times 7}{22 \times 2 \times 2}$ m^2

$\therefore A_1 : A_2 = \frac{5024}{4} \times \frac{5024}{4} : \frac{5024 \times 5024 \times 7}{22 \times 2 \times 2}$ $\frac{A_1}{A_2} = \frac{5024}{4} \times \frac{5024}{4} \div \frac{5024 \times 5024 \times 7}{22 \times 2 \times 2}$ $\frac{A_1}{A_2} = \frac{\frac{5024 \times 5024}{4 \times 4}}{\frac{5024 \times 5024 \times 7}{22 \times 2 \times 2}}$ $\frac{A_1}{A_2} = \frac{11}{14}$ $\therefore A_1 : A_2 = 11 : 14$

Hence, the ratio of the area of the square to the area of the circle is 11 : 14.

Q13) The radius of a circle is 14 cm. Find the radius of the circle whose area is double of the area of the circle.

Solution:

Let the area of the circle whose radius is 14 cm be A_1.

Let the radius and area of the circle, whose area is twice the area of the circle A_1, be r_2 and A_2 respectively.

Thus,

$A_1 = \pi r^2 = \pi(14)^2 = \frac{22}{7} \times 14 \times 14$ $cm^2 = 616$ cm^2 $A_2 = 2 \times A_1 = 2 \times 616 = 1232$ cm^2 $A_2 = \pi(r_2)^2 = 1232$ cm^2

=> $\frac{22}{7} \times (r_2)^2 = 1232$ cm^2

=> $(r_2)^2 = \frac{1232 \times 7}{22}$

=> $(r_2)^2 = (56 \times 7)$ cm^2

=> $(r_2)^2 = 8 \times 7 \times 7$

=> $(r_2)^2 = 7 \times 7 \times 4 \times 2$

=> $r_2 = 14\sqrt{2}$ cm

Hence the radius of the circle A_2 is $14\sqrt{2}$ cm.

Q14) The radius of one circluar field is 20 m and that of another is 48 m. Find the radius of the third circular field whose area is equal to the sum of the areas of two fields.

Solution:

Let the area of the circle whose radius is 20 m is A_1, and the area of the circle whose radius is 48 m be A_2. Let A_3 be the area of a circle that is equal to the sum of the areas of the two fields, with the radius of its field being r cm.

$\therefore A_3 = A_1 + A_2$ $A_1 = \pi(20)^2 = 400\pi$ m^2 $A_1 = \pi(48)^2 = 2304\pi$ m^2

$\therefore A_3 = A_1 + A_2$

$\Rightarrow A_3 = 400\pi + 2304\pi$

$\Rightarrow \pi r^2 = \pi(400 + 2304)$

$\Rightarrow r^2 = 2704$ m

$\Rightarrow r = 52$ m.

Q15) The radius of one circular field is 5 m and that of the other is 13 m. Find the radius of the circular field whose area is the difference of the areas of first and second field.

Solution:

Let the area of the circular field whose radius is 5 m be A_1, and the area of the circular field whose radius is 13 m be A_2. Let A_3 and 'r' cm be the area and the radius of the circular field, that is equal to the difference of the areas of the two fields.

$\therefore A_3 = A_1 + A_2$ $A_1 = \pi(5)^2 = 25\pi$ m^2 $A_1 = \pi(13)^2 = 169\pi$ m^2

$\therefore A_3 = A_2 - A_1$

$\Rightarrow A_3 = 169\pi - 25\pi$

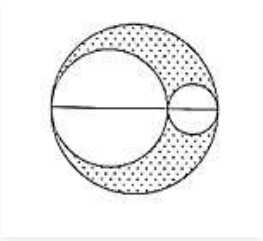
$\Rightarrow \pi r^2 = \pi(169 - 25)$

$\Rightarrow r^2 = 144$ m

$\Rightarrow r = 12$ m.

Hence, the radius of the circular field is 12 m.

Q16) Two circles are drawn inside a big circle with diameters $\frac{2}{3}$rd and $\frac{1}{3}$rd of the diameter of the big circle as shown in Figure. Find the area of the shaded portion, if the length of the diameter of the circle is 18 cm.



Let the left circle be denoted as the 1st circle and the right circle be denoted as the 2nd circle.

Diameter of the big circle = 18 cm

Radius of the big circle = 9 cm

Diameter of the 1st circle = 23 x 18 = 12 cm

Radius of the 1st circle = 6 cm

Diameter of the 2nd circle = 13 x 18 = 6 cm

Radius of the 2nd circle = 3 cm

Area of the 1st circle = $\pi(6)^2 = 36\pi$ cm^2

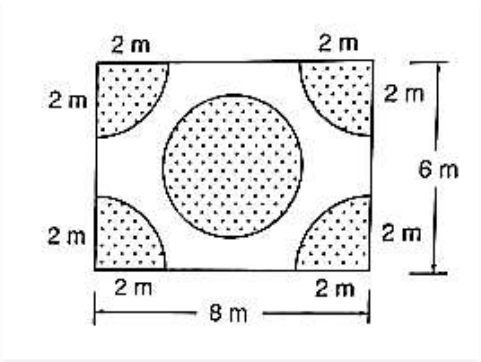
Area of the 2nd circle = $\pi(3)^2 = 9\pi$ cm^2

Area of the big circle = $\pi(9)^2 = 81\pi$ cm^2

Area of the shaded portion = Area of the big circle – (Area of the 1st circle + Area of the 2nd circle)

Area of the shaded portion = $81\pi - (36\pi + 9\pi) = 36\pi$ cm^2.

Q17) In Fig. 19, the radius of quarter circular plot taken is 2 m and radius of the flower bed is 2 m. Find the area of the remaining field.



Solution:

Solution:

Radius of the quarter circular plot = 2 m

Area of the quarter circular plot = $\pi(2)^2 = 4\pi = 12.57\ m^2$

Radius of each flower bed = 2 m

Area of four flower beds = $4 \times \frac{1}{4} \times \frac{22}{7} \times 2^2 = 12.57\ m^2$

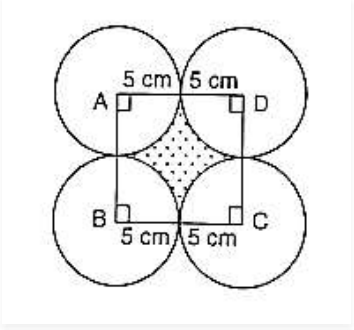
Area of the rectangular region = Length x Breadth

Area of the rectangular region = 8 x 6 = 48 m^2

Area of the remaining field = Area of the rectangular region – (Area of the quarter circle + Area of the four flower beds)

Area of the remaining field = [48 – (12.57 + 12.57)] m^2 = 22.86 m^2.

Q18) Four equal circles, each of radius 5 cm, touch each other as shown in Figure. Find the area included between them. (Take $\pi = 3.14$).



Solution:

Side of the square = 10 cm

Area of the square = side x side

Area of the square = 10 x 10 = 100 cm^2

Area of the four quarter circles = $4 \times \frac{1}{4} \times \frac{22}{7} \times 5^2 = 78.57\ cm^2$

Area included in them = Area of the square – Area of the four quarter circles

Area included in them = (100 – 78.57) cm^2 = 21.43 cm^2

Q19) The area of circle is 100 times the area of another circle. What is the ratio of their circumferences?

Solution:

Let the area of the first circle be A_1, the circumference be C_1 and the radius be r_1.

Let the area of the first circle be A_2, the circumference be C_2 and the radius be r_2.

Thus,

$C_1 : C_2 = 2\pi r_1 : 2\pi r_2 \Rightarrow \frac{C_1}{C_2} = \frac{2\pi r_1}{2\pi r_2} = \frac{r_1}{r_2}$

We know that:

$A_1 = 100A_2 \Rightarrow \pi r_1^2 = 100 \times \pi r_2^2 \Rightarrow r_1^2 = 100 \times r_2^2 \Rightarrow r_1 = 10 \times r_2 \Rightarrow \frac{r_1}{r_2} = 10$

Substituting the values, we get:

$\therefore \frac{C_1}{C_2} = \frac{r_1}{r_2} = \frac{10}{1}$ $C_1 : C_2 = 10 : 1$

Hence, the ratio of their circumferences is 10 : 1.