

## EXERCISE 21.2

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**1. Find the area of a circle whose radius is****(i) 7 cm****(ii) 2.1 m****(iii) 7 km****Solution:**

(i) Given radius = 7 cm

We know that area of circle =  $\pi r^2$ 

$$A = (22/7) \times 7^2$$

$$A = 22 \times 7$$

$$A = 154 \text{ cm}^2$$

(ii) Given radius = 2.1 m

We know that area of circle =  $\pi r^2$ 

$$A = (22/7) \times (2.1)^2$$

$$A = 22/7 \times 4.41$$

$$A = 13.86 \text{ m}^2$$

(iii) Given radius = 7 km

We know that area of circle =  $\pi r^2$ 

$$A = (22/7) \times 7^2$$

$$A = 22 \times 7$$

$$A = 154 \text{ km}^2$$

**2. Find the area of a circle whose diameter is****(i) 8.4 cm****(ii) 5.6 m****(iii) 7 km****Solution:**

(i) Given diameter = 8.4 cm

Therefore radius,  $r = d/2 = 8.4/2 = 4.2$ We know that area of circle =  $\pi r^2$

$$A = (22/7) \times (4.2)^2$$

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

(ii) Given diameter = 5.6 cm

Therefore radius,  $r = d/2 = 5.6/2 = 2.8$

We know that area of circle =  $\pi r^2$

$$A = (22/7) \times (2.8)^2$$

$$A = 24.64 \text{ cm}^2$$

(iii) Given diameter = 7 km

Therefore radius,  $r = d/2 = 7/2 = 3.5$

We know that area of circle =  $\pi r^2$

$$A = (22/7) \times (3.5)^2$$

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

**3. The area of a circle is  $154 \text{ cm}^2$ . Find the radius of the circle.**

**Solution:**

Given area of the circle =  $154 \text{ cm}^2$

$$A = \pi r^2$$

$$154 = 22/7 r^2$$

$$r^2 = (154 \times 7)/22$$

$$r^2 = 49$$

$$r = 7 \text{ cm}$$

**4. Find the radius of a circle, if its area is**

**(i)  $4 \pi \text{ cm}^2$**

**(ii)  $55.44 \text{ m}^2$**

**(iii)  $1.54 \text{ km}^2$**

**Solution:**

(i) We know that area of circle =  $\pi r^2$

Given area =  $4 \pi \text{ cm}^2$

$$A = \pi r^2$$

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

$$r^2 = 4$$

Therefore  $r = 2 \text{ cm}$

(ii) We know that area of circle =  $\pi r^2$

Given area =  $55.44 \text{ cm}^2$

$$A = \pi r^2$$

$$55.44 = \pi r^2$$

$$r^2 = (55.44 \times 7)/22$$

$$r^2 = 17.64 \text{ m}$$

$$r = 4.2 \text{ m}$$

(iii) We know that area of circle =  $\pi r^2$

Given area =  $1.54 \text{ km}^2$

$$A = \pi r^2$$

$$1.54 = \pi r^2$$

$$r^2 = (1.54 \times 7)/22$$

$$r^2 = 0.49 \text{ km}$$

$$r = 0.7 \text{ km}$$

$$r = 700 \text{ m}$$

**5. The circumference of a circle is 3.14 m, find its area.**

**Solution:**

Given circumference = 3.14m

We know that circumference of circle =  $2 \pi r$

$$3.14 = 2 \times 3.14 \times r$$

$$r = 3.14 / (2 \times 3.14)$$

$$r = 0.5$$

We know that area of circle =  $\pi r^2$

$$A = (22/7) \times (0.5)^2$$

$$A = 0.785 \text{ m}^2$$

**6. If the area of a circle is  $50.24 \text{ m}^2$ , find its circumference.**

**Solution:**

Given area of a circle is  $50.24 \text{ m}^2$

We know that area of circle =  $\pi r^2$

$$50.24 = (22/7) \times r^2$$

$$r^2 = (50.24 \times 7)/22$$

$$r^2 = 15.985$$

$$r = 3.998 \text{ m}$$

We know that circumference of circle =  $2 \pi r$

$$C = 2 \times (22/7) \times 3.998$$

$$C = 25.12 \text{ m}$$

**7. 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:**

Given the length of the string = 28m

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

Hence required area =  $\pi r^2$

$$A = (22/7) \times (28)^2$$

$$A = 2464 \text{ m}^2$$

**8. A steel wire when bent in the form of a square encloses an area of  $121 \text{ cm}^2$ . If the same wire is bent in the form of a circle, find the area of the circle.**

**Solution:**

Given area of the square =  $121 \text{ cm}^2$

$$(\text{Side})^2 = 121$$

Therefore side = 11 cm

We know that the perimeter of the square = 4 (side)

$$= 4 (11)$$

$$= 44 \text{ cm}$$

According to the question circumference of the circle = perimeter of the square

So let  $r$  be the radius of the circle

$$2 \pi r = 44$$

$$2 \times (22/7) \times r = 44$$

Therefore  $r = 7 \text{ cm}$

We know that area of the circle =  $\pi r^2$

$$A = (22/7) \times (7)^2$$

$$A = 154 \text{ cm}^2$$

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

**Solution:**

Given circumference of park = 352 m

But we know that circumference of circle =  $2 \pi r = 352$  m

$$2 \times (22/7) \times r = 352$$

$$r = (352 \times 7) / 44$$

$$r = 56 \text{ m}$$

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

Therefore area of the road =  $\pi \times (63)^2 - \pi \times (56)^2$

$$A = 22/7 \times 63 \times 63 - (22/7) \times 56 \times 56$$

$$A = 22 (9 \times 63 - 8 \times 56)$$

$$A = 22 (567 - 448)$$

$$A = 2618 \text{ m}^2$$

**10. 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:**

Let radius of circular region =  $r$

Radius of circular path of uniform width  $h$  surrounding the circular region of radius,

$$r = r + h$$

Therefore area of path =  $\pi (r + h)^2 - \pi r^2$

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

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

Hence the proof.

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

**Solution:**

Given perimeter of circle =  $4\pi r$  cm

Which can be written as =  $2 \pi (2r)$

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

Therefore we have radius =  $2r$

We also know that area of circle =  $\pi r^2$

$$= \pi (2r)^2$$

$$= 4 \pi r^2 \text{ cm}^2$$

**12. 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:**

It is given that, Perimeter of the square = 5024 m

$$\Rightarrow 4 \times \text{side} = 5024$$

$$\Rightarrow \text{Side} = 5024/4$$

$$\Rightarrow \text{Side} = 1256 \text{ m}$$

The same wire is converted into the form of a circle. Therefore,

Circumference of the circle = Perimeter of the square

$$\Rightarrow 2\pi r = 5024$$

$$\Rightarrow 2 \times \pi \times r = 5024$$

$$\Rightarrow r = 2512/\pi$$

We know that area of the square: Area of the circle =  $(\text{side})^2 : \pi r^2$

$$\text{Area of square/ area of circle} = (\text{side})^2 / \pi r^2$$

$$\text{Area of square/ area of circle} = (1256 \times 1256) / [\pi \times (2512/\pi) \times (2512/\pi)]$$

$$= (1256 \times 1256 \times 22) / (2512 \times 2512 \times 7)$$

$$= 11/14$$

Area of the square: Area of the circle = 11: 14

**13. 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  $A_1$ .

We know that area of the circle =  $\pi r^2$

Therefore,

$$A_1 = \pi (14)^2$$

Let  $A_2$  and  $r_2$  be the area and radius of the second circle respectively whose area is double the area of circle  $A_1$ .

$$A_2 = 2 A_1$$

$$\Rightarrow \pi (r_2)^2 = 2 \times \pi (14)^2$$

$$\Rightarrow (r_2)^2 = 2 \times (14)^2$$

$$\Rightarrow r_2 = 14\sqrt{2} \text{ cm}$$

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

**14. The radius of one circular 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  $A_1$  = the area of the circle whose radius is 20 m [given]

$A_2$  = the area of the circle whose radius is 48 m [given]

Now we have to find the radius of third circle such that whose area is equal to the sum of areas of two fields.

Hence,

$$A_3 = A_1 + A_2$$

$$\Rightarrow \pi r^2 = \pi (20)^2 + \pi (48)^2$$

$$\Rightarrow \pi r^2 = \pi [(20)^2 + (48)^2]$$

$$\Rightarrow r^2 = 400 + 2304$$

$$\Rightarrow r = 52 \text{ m}$$

Therefore radius = 52 m

**15. 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  $A_1$  = the area of the circular field whose radius is 5 m [given]

$A_2$  = the area of the circular field whose radius is 13 m [given]

Now we have to find the area of circular field such that area is the difference of the areas of first and second field

$$A_3 = A_2 - A_1$$

$$\Rightarrow \pi r^2 = \pi (13)^2 - \pi (5)^2$$

$$\Rightarrow \pi r^2 = \pi (13)^2 - \pi (5)^2$$

$$\Rightarrow \pi r^2 = \pi [(13)^2 - (5)^2]$$

$$\Rightarrow r^2 = 169 - 25$$

$$\Rightarrow r^2 = 144$$

$$\Rightarrow r = 12 \text{ m}$$

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

**16. 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 Fig. 18. Find the area of the shaded portion, if the length of the diameter of the circle is 18 cm.**



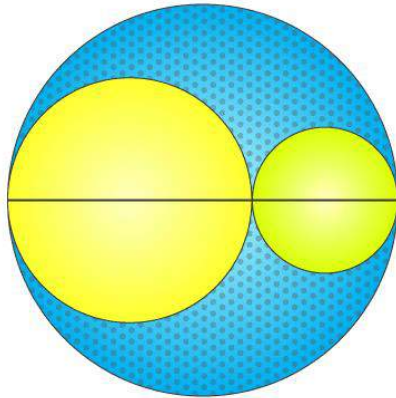


Fig. 18

**Solution:**

It is given that, diameter of the big circle = 18 cm

Radius of the big circle = 9 cm

Area of the big circle,  $A = \pi r^2 = \pi (9)^2 = 81\pi \text{ cm}^2$

Let  $d_1 = (2/3) \times 18 = 12 \text{ cm}$

$r_1 = 6 \text{ cm}$

Area of the circle,  $A_1 = \pi r^2 = \pi (6)^2 = 36\pi \text{ cm}^2$

$d_2 = (1/3) \times 18 = 6 \text{ cm}$

$r_2 = 3 \text{ cm}$

Area of the circle,  $A_2 = \pi r^2 = \pi (3)^2 = 9\pi \text{ cm}^2$

Area of the shaded portion =  $A - (A_1 + A_2)$

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

17. 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.

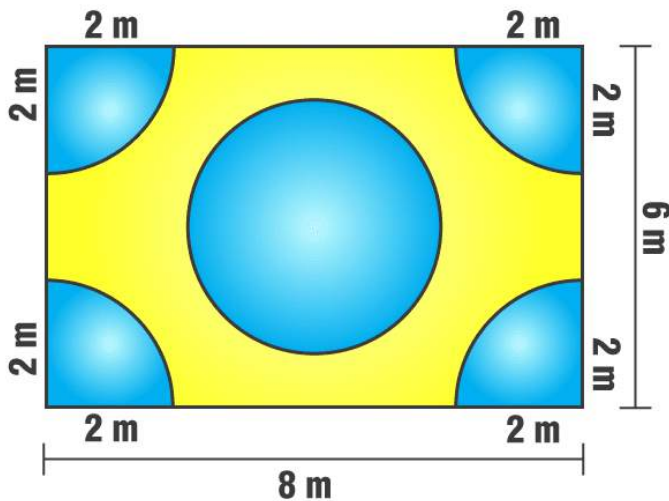


Fig. 19



**Solution:**

Given that Radius of flower bed = 2 m

$$\text{Area of flower bed} = \pi r^2 = \pi (2)^2 = 4\pi$$

Radius of the quarter circular plot = 2 m

$$\text{Area of the quarter circular plot} = (\pi r^2)/4$$

$$\text{Area of 4 quarter circular plots} = 4 \times (\pi r^2)/4$$

$$= \pi r^2$$

$$= \pi (2)^2$$

$$= 4\pi$$

We know that area of the rectangular region = Length x Breadth

$$\text{Area of the rectangular region} = 8 \times 6 = 48 \text{ m}^2$$

Area of the remaining field = Area of the rectangular region – (Area of 4 quarter circular plots + Area of the flower bed)

$$\text{Area of the remaining field} = 48 - (4\pi + 4\pi)$$

$$= 48 - 25.14$$

$$= 22.86 \text{ m}^2$$

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

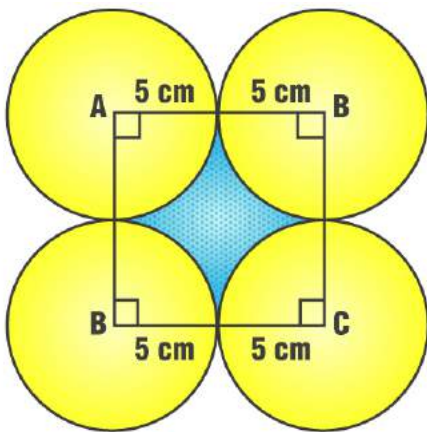


Fig. 20

**Solution:**

From the figure we can see that,

Side of the square = 10 cm

We know that area of the square = side x side = 10 x 10 = 100 cm<sup>2</sup>

Radius of the quarter circle = 5 cm

$$\text{Area of the quarter circle} = (\pi r^2)/4$$

$$\text{Area of 4 quarter circle} = 4 \times (\pi r^2)/4$$

$$\begin{aligned} &= \pi r^2 \\ &= 3.14 \times (5)^2 \\ &= 78.5 \text{ cm}^2 \end{aligned}$$

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

$$\begin{aligned} \text{Area included in them} &= (100 - 78.5) \text{ cm}^2 \\ &= 21.5 \text{ cm}^2 \end{aligned}$$

**19. 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 circles be  $A_1$  and  $A_2$  and their circumference be  $c_1$  and  $c_2$  respectively.

According to the question it is clear that  $A_1 = 100 A_2$

$$\Rightarrow \pi (r_1)^2 = 100 \times \pi (r_2)^2$$

$$\Rightarrow r_1 = 10 r_2$$

$$\Rightarrow r_1/r_2 = 10/1 \dots (i)$$

Finding the ratios of the circumference;

$$C_1: C_2 = 2\pi r_1: 2\pi r_2$$

$$C_1/C_2 = (2\pi r_1)/(2\pi r_2)$$

$$C_1/C_2 = r_1/r_2$$

Putting the value of  $r_1/r_2$  from equation (i)

$$C_1/C_2 = 10/1$$

$$C_1: C_2 = 10: 1$$

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