

Mathematics

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(Chapter - 12) (Areas Related to Circles)

(Class 10)

Exercise 12.1

Question 1:

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

Answer 1:

Radius of first circle (r_1) = 19 cm,

Radius of second circle (r_2) = 9 cm

Let, the radius of the third circle = r

Circumference of the first circle = $2\pi r_1 = 2\pi (19) = 38\pi$

Circumference of the second circle = $2\pi r_2 = 2\pi (9) = 18\pi$

Circumference of the third circle = $2\pi r$

According to question,

Circumference of the third circle = Circumference of the first circle + Circumference of the second circle

$$\Rightarrow 2\pi r = 38\pi + 18\pi \Rightarrow 2\pi r = 56\pi \Rightarrow r = \frac{56\pi}{2\pi} = 28$$

Hence, the radius of the circle, which has circumference equal to the sum of the circumferences of the two circles, is 28 cm.

Question 2:

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

Answer 2:

Radius of first circle (r_1) = 8 cm,

Radius of second circle (r_2) = 6 cm

Let the radius of the third circle = r

Area of the first circle = $\pi r_1^2 = \pi(64) = 64\pi$

Area of the second circle = $\pi r_2^2 = \pi(36) = 36\pi$

Area of the third circle = πr^2

According to question,

Area of the third circle = Area of the first circle + Area of the second circle

$$\Rightarrow \pi r^2 = 64\pi + 36\pi \Rightarrow \pi r^2 = 100\pi \Rightarrow r = \sqrt{100} = 10 \text{ cm}$$

Hence, the radius of the circle, having area equal to the sum of the areas of the two circles, is 10 cm.

Question 3:

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.

Answer 3:

Radius of (GOLD region) first circle (r_1) = $21/2 = 10.5$ cm

Radius of second circle (r_2) = $10.5 + 10.5 = 21$ cm

Radius of third circle (r_3) = $21 + 10.5 = 31.5$ cm

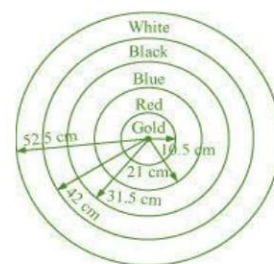
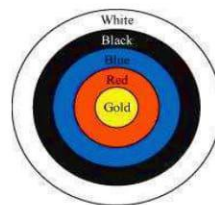
Radius of fourth circle (r_4) = $31.5 + 10.5 = 42$ cm

Radius of fifth circle (r_5) = $42 + 10.5 = 52.5$ cm

Area of (GOLD region) first circle = $\pi r_1^2 = \pi(10.5)^2 = \pi(110.25) = 346.50 \text{ cm}^2$

Area of RED region = Area of second circle - Area of first circle

$$= \pi r_2^2 - \pi r_1^2$$



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$$= \pi(21)^2 - \pi(10.5)^2$$

$$= 441\pi - 110.25\pi$$

$$= 330.75\pi$$

$$= 1039.5 \text{ cm}^2$$

Area of BLUE region = Area of third circle - Area of second circle

$$= \pi r_3^2 - \pi r_2^2$$

$$= \pi(31.5)^2 - \pi(21)^2$$

$$= 992.25\pi - 441\pi$$

$$= 551.25\pi$$

$$= 1732.5 \text{ cm}^2$$

Area of BLACK region = Area of fourth circle - Area of third circle

$$= \pi r_4^2 - \pi r_3^2$$

$$= \pi(42)^2 - \pi(31.5)^2$$

$$= 1764\pi - 992.25\pi$$

$$= 771.75\pi$$

$$= 2425.5 \text{ cm}^2$$

Area of WHITE region = Area of fifth circle - Area of fourth circle

$$= \pi r_5^2 - \pi r_4^2$$

$$= \pi(52.5)^2 - \pi(42)^2$$

$$= 2756.25\pi - 1764\pi$$

$$= 992.25\pi$$

$$= 3118.5 \text{ cm}^2$$

Question 4:

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

Answer 4:

Diameter of wheel = 80 cm

Radius of wheel (r) = 40 cm

Circumference of wheel = $2\pi r = 2\pi(40) = 80\pi$ cm

Speed of car = 66 km/hour = $\frac{66 \times 100000}{60}$ cm/min = 110000 cm/min

Distance travelled in 10 minutes = $110000 \times 10 = 1100000$ cm

Let the wheel makes n revolutions in 10 minutes. Therefore,

$n \times$ Distance travelled in one revolution (circumference) = Distance travelled in 10 minutes

$$\Rightarrow n \times 80\pi = 1100000$$

$$\Rightarrow n = \frac{1100000}{80\pi} = \frac{1100000 \times 7}{80 \times 22} = \frac{35000}{8} = 4375$$

Hence, the wheel take 4375 revolutions in 10 minutes.

Question 5:

Tick the correct answer in the following and justify your choice: If the perimeter and the area of a circle are numerically equal, then the radius of the circle is

(A) 2 units

(B) π units

(C) 4 units

(D) 7 units

Answer 5:

Let the radius of circle = r, Circumference of circle (perimeter) = $2\pi r$, Area of circle = πr^2

Given that the perimeter and area are equal in magnitude. Therefore

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

$$\Rightarrow 2 = r$$

Therefore, the radius of circle is 2 units.

Hence, the option (A) is correct.

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