CBSE 10th

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Areas Related to Circles
Exercise–12.1

Q.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.

Sol:

Radius (r_1) of 1st circle = 19 cm

Radius (r_2) or 2nd circle = 9 cm

Let the radius of 3rd circle be r.

Circumference of 1st circle = $2\pi r1 = 2\pi\ (19) = 38\pi$

Circumference of 2nd circle = $2\pi r2 = 2\pi\ (9) = 18\pi$

Circumference of 3rd circle = $2\pi r$

Given that,

Circumference of 3rd circle = Circumference of 1st circle + Circumference of 2nd circle

$2\pi r = 38\pi + 18\pi = 56\pi$

$$r = \frac{56\pi}{2\pi} = 28$$

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

Q.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.

Sol: Radius (r_1) of 1st circle = 8 cm

Radius (r_2) of 2nd circle = 6 cm

Let the radius of 3rd circle be r.

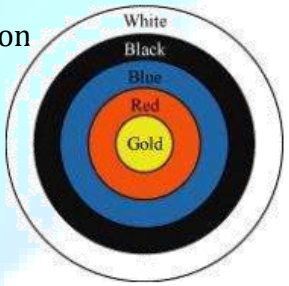
Area of 1st circle= $\pi r_1^2 = \pi(8)^2 = 64\pi$

Area of 2nd circle= $\pi r_2^2 = \pi(6)^2 = 36\pi$

Area of 3rd circle = Area of 1st circle + Area of 2nd circle.

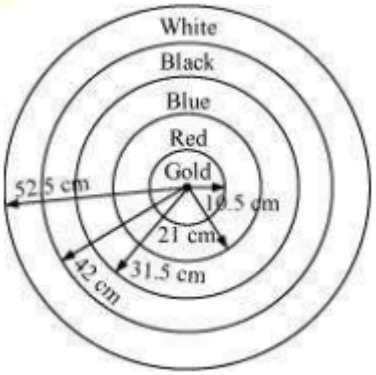
However, the radius cannot be negative. Therefore, the radius of the circle having area equal to the sum of the areas of the two circles is 10 cm.

Q.3 Given 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. [Use $\pi = \frac{22}{7}$]

Sol: Radius (r_1) of gold region (i.e., 1st circle)= $\frac{21}{2} = 10.5$ cm



Given that each circle is 10.5 cm wider than the previous circle.

Therefore, radius (r_2) of 2nd circle = 10.5 + 10.5 = 21 cm

Radius (r_3) of 3rd circle = 21 + 10.5 = = 31.5 cm

Radius (r_4) of 4th circle = 31.5 + 10.5 = 42 cm

Radius (r_5) of 5th circle = 42 + 10.5 = 52.5 cm

Area of gold region = Area of 1st circle

Area of red region = Area of 2nd circle − Area of 1st circle

$= \pi r_2^2 - \pi r_1^2 = \pi(21)^2 - \pi(10.5)^2$

$441\pi - 110\pi = 330.75\pi \ = 1039.5$ cm^2

Area of blue region = Area of 3rd circle − Area of 2nd circle

$= \pi r_3^2 - \pi r_1^2$

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

$992.25\pi - 441\pi = 551.25\pi \ = 1332.5$ cm^2

Area of white region = Area of 5th circle − Area of 4th circle

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

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

$272.25\pi - 1764\pi = 992.25\pi \ = 3118.5$ cm^2

Therefore, areas of gold, red, blue, black, and white regions are 346.5 cm^2, 1039.5cm^2, 1732.5 cm^2, 2425.5 cm^2, and 3118.5 cm^2 respectively.

Q.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 traveling at a speed of 66 km per hour? [Use $\pi = \frac{22}{7}$]

Sol: Diameter of the wheel of the car = 80 cm

Radius (r) of the wheel of the car = 40 cm

Circumference of wheel = $2\pi r$

$= 2\pi\ (40) = 80\pi$ cm

Speed of car = 66 km/hour

$= \dfrac{\dfrac{66 \times 100000}{60}\text{ cm}}{\text{min}} = \ 1100000$ cm/min

Distance travelled by the car in 10 minutes

$= 110000 \times 10 = 1100000$ cm

Let the number of revolutions of the wheel of the car be n.

n × Distance travelled in 1 revolution (i.e., circumference) = Distance travelled in 10 minutes

$n \times 80\pi = 1100000$

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

Therefore, each wheel of the car will make 4375 revolutions.

Q.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

Sol: Let the radius of the circle be r.

Circumference of circle $= 2\pi r$

Area of circle $= \pi r^2$

Given that, the circumference of the circle and the area of the circle are equal.

This implies $2\pi r = \pi r^2$

$2 = r$

Therefore, the radius of the circle is 2 units.

Hence, the correct answer is A.