Areas Related to Circles

Assertion & Reason Type Questions

In the following questions, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:

a. Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)

b. Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A)

c. Assertion (A) is true but Reason (R) is false

d. Assertion (A) is false but Reason (R) is true

Q 1. Assertion (A): In a circle of radius 6 cm, the angle of a sector 60°. Then the area of the sector is

$18\frac{6}{7}$ cm^2.

Reason (R): Area of the circle with radius r is πr^2.

Answer : (b) **Assertion (A):** Given, radius (r) = 6 cm and central angle (0) = 60°

Area of the sector

$$= \frac{\theta}{360^\circ}\pi r^2 = \frac{60^\circ}{360^\circ} \times \frac{22}{7} \times 6 \times 6$$

$$= \frac{132}{7} = 18\frac{6}{7}\text{cm}^2$$

So, Assertion (A) is true.

Reason (R): It is also true, but it is not the correct explanation of Assertion (A).

Q 2. Assertion (A): The length of the minute hand of a clock is 7 cm. Then the area swept by the minute

hand in 5 min is $12\frac{5}{6}$ cm^2.

Reason (R): The length of an arc of a sector of

angle θ and radius r is given by $l = \frac{\theta}{360^\circ} \times 2\pi r$.

Answer : (b) **Assertion (A):** Area swept by minute hand in 5 min

$$= \frac{\theta}{360} \times \pi r^2 = \frac{30^\circ}{360^\circ} \times \frac{22}{7} \times 7 \times 7$$

(∵ radius (r) = 7 cm and angle make by minute hand in 5 min is 30°)

$$= \frac{77}{6} = 12\frac{5}{6}\ \text{cm}^2$$

So, Assertion (A) is true.

Reason (R): It is also a true statement. Hence, both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).

Q 3. Assertion (A): If the perimeter of a sector of a circle of radius 5.6 cm is 27.2 cm, then the area of the sector is 44.8 cm^2.

Reason (R): The area of a sector of a circle of **radius (r) with central angle θ is $\frac{\theta}{360^\circ} \times \pi r$.**

Answer : (c) **Assertion (A):** Radius of circle (r) = 5.6 cm Let → be the central angle of sector.

$$\therefore \quad \text{Perimeter of sector} = r + r + \frac{\theta}{360^\circ} \times 2\pi r$$

$$\Rightarrow \quad 27.2 = 5.6 + 5.6 + \frac{\theta}{360^\circ} \times 2 \times \frac{22}{7} \times 5.6$$

$$\Rightarrow \quad 27.2 = 11.2 + 35.2 \times \frac{\theta}{360^\circ}$$

$$\Rightarrow \quad 16 = 35.2 \times \frac{\theta}{360^\circ}$$

$$\Rightarrow \quad \frac{\theta}{360^\circ} = \frac{16}{35.2} = \frac{16 \times 10}{352} = \frac{5}{11} \qquad \ldots(1)$$

Now, area of sector $= \frac{\theta}{360^\circ} \times \pi r^2$

$$= \frac{5}{11} \times \frac{22}{7} \times 5.6 \times 5.6 \quad \text{[using eq. (1)]}$$

$$= 44.8\ \text{cm}^2$$

So, Assertion (A) is true.

Reason (R): It is false, because area of sector is

$$\frac{\theta}{360^\circ} \times \pi r^2$$

Hence, Assertion (A) is true but Reason (R) is false.

Q 4. Assertion (A): A sector is cut from a circle of radius 42 cm. The central angle of the sector is 150°. The perimeter of the sector is 194 cm.
Reason (R): Perimeter of sector = 2 (radius) + Length of corresponding arc of sector.

Answer : (a) **Assertion (A):** We have, radius of circle,
r = 42 cm
Central angle θ = 150°

$$\therefore \text{Perimeter of sector} = 2r + \frac{\theta}{360^\circ} \times 2\pi r$$

$$= 2 \times 42 + \frac{150^\circ}{360^\circ} \times 2 \times \frac{22}{7} \times 42$$

$$= 84 + 110 = 194 \text{ cm}$$

So, Assertion (A) is true.

Reason (R): It is also true statement. Hence, both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

Q.5. Assertion (A): In a circle of radius 6 cm, the angle of a sector is 60°. Then the area of the sector is 132/7 cm^2.
Reason (R): Area of the circle with radius r is πr^2.

Answer : (b)

Q.6. Assertion (A): If the circumference of a circle is 176 cm, then its radius is 28 cm.
Reason (R): Circumference = 2π × radius.

Answer : (a)

Q.7. Assertion (A): If the outer and inner diameter of a circular path is 10 m and 6 m respectively, then area of the path is 16π m^2.
Reason (R): If R and r be the radius of outer and inner circular path respectively, then area of circular path = $\pi(R^2 - r^2)$.

Answer : (a)

Q.8. Assertion (A): The length of the minute hand of a clock is 7 cm. Then the area swept by the minute hand in 5 minute is 77/6 cm^2.
Reason (R): The length of an arc of a sector of angle q and radius r is given by

$$l = \frac{\theta}{360^\circ} \times 2\pi r$$

Answer : (b)