CBSE MCQs
Class 10 Maths
Chapter 12
Areas Related To Circles

1. If the sum of the areas of two circles with radii R_1 and R_2 is equal to the area of a circle of radius R, then

(A) $R_1 + R_2 = R$ (B) $R_1^2 + R_2^2 = R^2$

(C) $R_1 + R_2 < R$ (D) $R_1^2 + R_2^2 < R^2$

Answer: (B)
Explanation: According to given codition ,
Area of circle = Area of first circle + Area of second circle

$$\pi R^2 = \pi R_1^2 + \pi R_2^2$$
$$R^2 = R_1^2 + R_2^2$$

2. If the circumference of a circle and the perimeter of a square are equal, then
(A) Area of the circle = Area of the square
(B) Area of the circle > Area of the square
(C) Area of the circle < Area of the square
(D) Nothing definite can be said about the relation between the areas of the circle and square.

Answer: (B)
Explanation: According to given condition
Circumference of a circle = Perimeter of square

$2\pi r = 4a$

[Where r and a are radius of circle and side of square respectively]

$\frac{22}{7} r = 2a$

$11r = 7a$

$r = \frac{7a}{11}$...(1)

Area of circle, $A_1 = \pi r^2$

$$= \pi \left(\frac{7a}{11} \right)^2$$
$$= \frac{14a^2}{11} \quad .....(2)$$

Area of square, $A_2 = a^2$ .....(3)

From equations (2) and (3)

$A_1 > A_2$

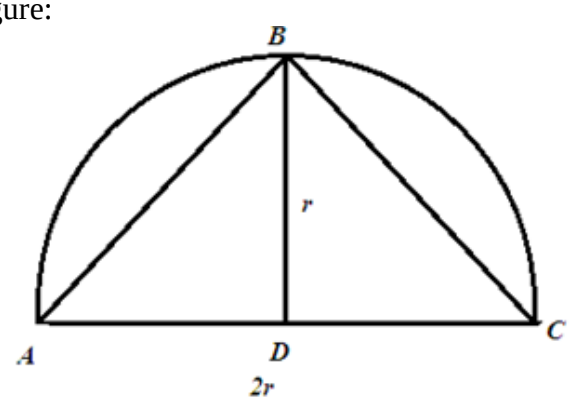
Hence Area of the circle > Area of the square

3. Area of the largest triangle that can be inscribed in a semi-circle of radius *r* units, in square units is:

(A) r^2 (B) $\frac{1}{2}r^2$

(C) $2\,r^2$ (D) $\sqrt{2}\,r^2$

Answer: (A)
Explanation: The triangle inscribed in a semi-circle will be the largest when the perpendicular height of the triangle is the same size as the radius of the semi-circle. Consider the following figure:



We know that,

$$\text{Area of a triangle} = \frac{1}{2} \times \text{base} \times \text{height}$$

$$\therefore \text{Area of } \Delta ABC = \frac{1}{2} \times AC \times BD$$

$$\Rightarrow \text{Area of } \Delta ABC = \frac{1}{2} \times 2r \times r$$

$$\Rightarrow \text{Area of } \Delta ABC = r^2$$

4. If the perimeter of a circle is equal to that of a square, then the ratio of their areas is:
(A) 22:7 (B) 14:11
(C) 7:22 (D) 11:14

Answer: (B)
Explanation: Perimeter of circle = Perimeter of square

$$2\pi r = 4a$$

$$\Rightarrow a = \frac{\pi r}{2}$$

$$\frac{\text{Area of circle}}{\text{Area of square}} = \frac{\pi r^2}{\left(\frac{\pi r}{2}\right)^2}$$

$$\Rightarrow \frac{\text{Area of circle}}{\text{Area of square}} = \frac{4}{\frac{22}{7}}$$

$$\Rightarrow \frac{\text{Area of circle}}{\text{Area of square}} = \frac{14}{11}$$

5. It is proposed to build a single circular park equal in area to the sum of areas of two circular parks of diameters 16 m and 12 m in a locality. The radius of the new park would be

(A) 10 m (B) 15 m

(C) 20 m (D) 24 m

Answer: (A)

Explanation: Area of first circular park, whose diameter is 16m

$$= \pi r^2 = \pi\left(\frac{16}{2}\right)^2 = 64\pi \text{m}^2$$

Area of second circular park, whose diameter is 12m

$$= \pi r^2 = \pi\left(\frac{12}{2}\right)^2 = 36\pi \text{m}^2$$

According to question,

Area of new circular park =

$$\pi R^2 = \left(64\pi + 36\pi\right)\text{m}^2$$

$$\pi R^2 = 100\pi \text{m}^2$$

$$R = 10\text{m}$$

6. The area of the circle that can be inscribed in a square of side 6 cm is

(A) 36 π cm^2 (B) 18 π cm^2

(C) 12 π cm^2 (D) 9 π cm^2

Answer: (D)

Explanation: Given,

Side of square = 6 cm

Diameter of a circle = side of square = 6cm

Therefore, Radius of circle = 3cm

Area of circle

$$= \pi r^2$$

$$= \pi\left(3\right)^2$$

$$= 9\pi \text{ cm}^2$$

7. The area of the square that can be inscribed in a circle of radius 8 cm is

(A) 256 cm^2 (B) 128 cm^2

(C) 642 cm^2 (D) 64 cm^2

Answer: (B)

Explanation: Radius of circle = 8 cm

Diameter of circle = 16 cm = diagonal of the square

Therefore side of square = diagonal/ $\sqrt{2}$

$$= \frac{16}{\sqrt{2}}$$

Therefore, area of square is $= (\text{side})^2 = \left(\frac{16}{\sqrt{2}}\right)^2$

$$= \frac{256}{2}$$

$$= 128\,\text{cm}^2$$

8. The radius of a circle whose circumference is equal to the sum of the circumferences of the two circles of diameters 36 cm and 20 cm is

(A) 56 cm (B) 42 cm

(C) 28 cm (D) 16 cm

Answer: (C)

Explanation: According to question,

$\text{Circumference of circle} = \text{circumference of first circle} + \text{circumference of second circle}$

$\pi D = \pi d_1 + \pi d_2$

$D = 36 + 20$

$D = 56\text{cm}$

$\text{So, radius} = \frac{56}{2} = 28\text{cm}$

9. The diameter of a circle whose area is equal to the sum of the areas of the two circles of radii 24 cm and 7 cm respectively, is

(A) 31 cm (B) 25 cm

(C) 62 cm (D) 50 cm

Answer: (D)

Explanation: According to question

$$\pi R^2 = \left(\pi r_1^2 + \pi r_2^2\right) c^2$$
$$\pi R^2 = \left(\pi (24)^2 + \pi (7)^2\right) \text{cm}^2$$
$$R^2 = (576 + 49)\,\text{cm}^2$$
$$R^2 = 625\,\text{cm}^2$$
$$R = 25\,\text{cm}$$

Therefore diameter = 2×25 = 50cm

10. If the length of an arc of a circle of radius *r* is equal to that of an arc of a circle of radius 2 *r*, then
(A) the angle of the corresponding sector of the first circle is double the angle of the corresponding sector of the other circle.
(B) the angle of the corresponding sector of the first circle is equal the angle of the corresponding sector of the other circle.
(C) the angle of the corresponding sector of the first circle is half the angle of the corresponding sector of the other circle.
(D) the angle of the corresponding sector of the first circle is 4 times the angle of the corresponding sector of the other circle.

Answer: (A)
Explanation: According to Question,

$$\frac{\theta_1}{360} \times 2\pi r_1 = \frac{\theta_2}{360} \times 2\pi r_2$$
$$\theta_1 r_1 = \theta_2 r_2$$
$$\theta_1 r = \theta_2 (2r)$$
$$\theta_1 = 2\theta_2$$

11. The wheel of a motor cycle is of radius 35 cm. How many revolutions per minute must the wheel make so as to keep a speed of 66 km/h?
(A) 300 (B) 400
(C) 450 (D) 500

Answer: (D)
Explanation:

Circumference of the wheel $= 2\pi r$

$$= 2 \times \frac{22}{7} \times 35$$

$$= 220\text{cm}$$

Speed of the wheel $= 66\text{km/hr}$

$$= \frac{66 \times 1000}{60}$$

$$= 1100 \times 100\text{cm/min}$$

$$= 110000\text{cm/min}$$

$$\text{Number of revolutions per minute} = \frac{110000}{220} = 500$$

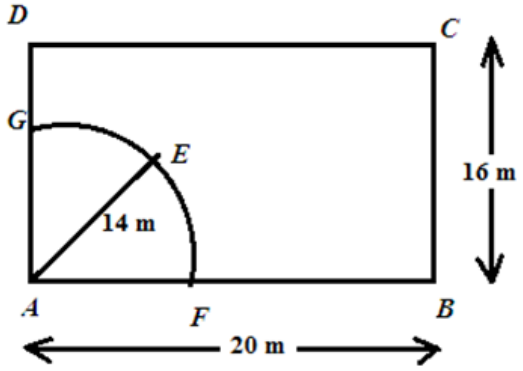
12. A cow is tied with a rope of length 14 m at the corner of a rectangular field of dimensions 20m × 16m, then the area of the field in which the cow can graze is:

(A) 154 m^2 (B) 156 m^2

(C) 158 m^2 (D) 160 m^2

Answer: (A)

Explanation: Figure according to question is:



Area of the field in which cow can graze = Area of a sector AFEG

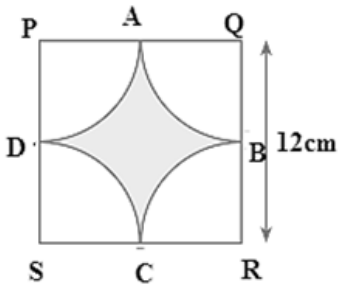
$$\frac{\theta}{360} \times \pi r^2$$

$$\frac{90}{360} \times \pi (14)^2$$

$$= \frac{1}{4} \times \frac{22}{7} \times 196$$

$$= 154\ m^2$$

13. The area of the shaded region in Fig., where arcs drawn with centres P, Q, Rand S intersect in pairs at mid-points A, B, C and D of the sides PQ, QR, RS and SP, respectively of a square PQRS, is:



(A) 25.25 cm^2 (B) 27.45 cm^2
(C) 29.65 cm^2 (D) 30.96 cm^2

Answer: (D)
Explanation:

$$\begin{aligned}\text{Area of the sahded region} &= \text{Area of square} - 4\times\text{Area of four quadrants}\\ &= \text{Area of square} - 4\times\text{Area of circle}\\ &= 12^2 - \pi r^2\\ &= 144 - 3.14\times\left(\frac{12}{2}\right)^2\\ &= 144 - 3.14\times 6^2\\ &= 144 - 3.14\times 36\\ &= 144 - 113.04\\ &= 30.96\,\text{cm}^2\end{aligned}$$

14. Area of a sector of central angle 120° of a circle is 3π cm^2. Then the length of the corresponding arc of this sector is:
(A) 5.8cm (B) 6.1cm
(C) 6.3cm (D) 6.8cm

Answer: (C)
Explanation:

Given that

Area of a sector of central angle 120° of a circle is 3π cm^2

Area of sector $= \frac{\theta}{360}\pi r^2$

$\Rightarrow \quad 3\pi = \frac{120}{360}\pi r^2$

$\Rightarrow \quad 3 = \frac{1}{3}r^2$

$\Rightarrow \quad r^2 = 9$

$\Rightarrow \quad r = 3\text{cm}$

Therefore, required length of arc $= \frac{\theta}{360}2\pi r$

$$= \frac{120}{360}\cdot 2\cdot \frac{22}{7}\cdot 3$$

$$= 2\cdot \frac{22}{7}$$

$$= 6.3\text{cm}$$

15. A round table cover has six equal designs as shown in the figure. If the radius of the cover is 28 cm, then the cost of making the design at the rate of Rs. 0.35 per cm^2 is:

(A) Rs.146.50 (B) Rs.148.75
(C) Rs.152.25 (D) Rs.154.75

Answer: (B)
Explanation: The area of the hexagon will be equal to six equilateral triangles with each side equal to the radius of circle.

Area of given hexagon = Area of 6 equilateral triangles.

$$= 6\times \frac{\sqrt{3}}{4}\times (\text{side})^2$$

$$= 6\times \frac{\sqrt{3}}{4}\times (28)^2$$

$$= 1999.2\,\text{cm}^2 \quad \left(\text{Taking}\sqrt{3} = 1.7\right)$$

Area of circle = πr^2

$= \pi \times 28^2$

$= 2464 \text{ cm}^2$

So, area of designed portion = 2464 – 1999.2 = 464.8 cm^2

Cost of making design = 464.8 × 0.35

= Rs. 162.68