Chapter : *Twelve*

Area Related to Circles

Competency Based Questions

✦ Multiple Choice Questions

1. The area of the circle is 154 cm². The radius of the circle is

(a) 7 cm **(b)** 14 cm **(c)** 3.5 cm **(d)** 17.5 cm

Ans. (a) 7 cm

Explanation: Area of circle = 154 cm²

$\Rightarrow \pi r^2 = 154 \text{ cm}^2$

$\Rightarrow \frac{22}{7} \times r^2 = 154 \qquad \Rightarrow r^2 = 154 \times \frac{22}{7}$

$\Rightarrow r^2 = 7 \times 7 = 49 \qquad \therefore r = \sqrt{49} = 7 \text{ cm}$

2. If angle of sector is 60°, radius is 3.5 cm then length of the arc is

(a) 3 cm **(b)** 3.5 cm **(c)** 3.66 cm **(d)** 3.8 cm

Ans. (c) 3.66 cm

Explanation: Here $r = 3.5 \text{ cm} = \frac{35}{10} = \frac{7}{2} \text{ cm}, \quad \theta = 60°$

Length of arc = $\frac{\theta}{360°} \times 2\pi r$

$= \frac{60°}{360°} \times 2 \times \frac{22}{7} \times \frac{7}{2} = \frac{1}{6} \times 22 = \frac{11}{3} = \mathbf{3.66 \text{ cm}}$

3. The area of a quadrant of a circle whose circumference is 22 cm, is

(a) $\frac{11}{8}$ cm² **(b)** $\frac{77}{2}$ cm² **(c)** $\frac{77}{4}$ cm² **(d)** $\frac{77}{8}$ cm²

Ans. (d) $\frac{77}{8}$ cm²

Explanation: Here circumference, $2\pi r = 22$ cm

$2 \times \frac{22}{7} \times r = 22 \qquad \Rightarrow \quad r = 22 \times \frac{7}{22} \times \frac{1}{2} = \frac{7}{2} \text{ cm}$

$\therefore$ Area of quadrant of circle = $\frac{1}{4}\pi r^2$

$= \frac{1}{4} \times \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} = \mathbf{\frac{77}{8} \text{ cm}^2}$

4. If θ is the angle in degrees of a sector of a circle of radius 'r', then area of the sector is

(a) $\frac{\pi r^2 \theta}{180°}$ **(b)** $\frac{\pi r^2 \theta}{360°}$ **(c)** $\frac{2\pi r \theta}{180°}$ **(d)** $\frac{2\pi r \theta}{360°}$

Ans. (b) $\frac{\pi r^2 \theta}{360°}$

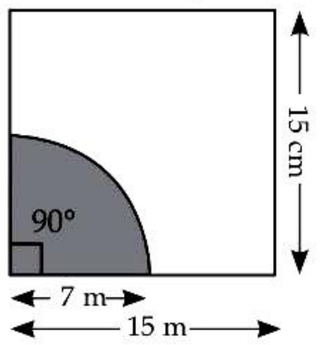
5. A horse is tied to a peg at one corner of a square shaped grass field of side 15 m by means of a 7 m long rope. The area of that part of the field in which the horse can graze, is

(a) 77 cm² **(b)** $\frac{77}{2}$ cm²

(c) 154 cm² **(d)** $\frac{77}{4}$ cm²

Ans. (b) $\frac{77}{2}$ cm²

Explanation: Here $r = 7$ m, $\theta = 90°$



$\therefore$ Area of sector = $\frac{\theta}{360°} \times \pi r^2 = \frac{90°}{360°} \times \frac{22}{7} \times 7 \times 7$

$= \frac{1}{4} \times 22 \times 7 = \mathbf{\frac{22}{7} \text{ m}^2}$

6. The area of the circle whose diameter is 21 cm is

(a) 346.5 cm² **(b)** 37.68 cm²

(c) 18.84 cm² **(d)** 19.84 cm²

Ans. (a) 346.5 cm²

Explanation: Here diameter = 21 cm

$\therefore$ Radius, $r = \frac{21}{2}$ cm

Area of the circle, $A = \pi r^2$

$\therefore A = \frac{22}{7} \times \frac{21}{2} \times \frac{21}{2} = 11 \times 3 \times \frac{21}{2} = \frac{693}{2} = \mathbf{346.5 \text{ cm}^2}$

7. The area of the sector of a circle with radius 6 cm and of angle 60° is

(*a*) 9.42 cm^2 (*b*) 37.68 cm^2
(*c*) 18.84 cm^2 (*d*) 19.84 cm^2

Ans. (*c*) 18.84 cm^2

Explanation: Here $r = 6$ cm, $\theta = 60°$

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

$\therefore$ Area = $\frac{60}{360^o} \times 3.14 \times 6 \times 6$

$= \frac{1}{6} \times 3.14 \times 6 \times 6 = 3.14 \times 6 = 18.84\ cm^2$

8. The area of a circle whose circumference is 22 cm, is

(*a*) 11 cm^2 (*b*) 38.5 cm^2
(*c*) 22 cm^2 (*d*) 77 cm^2

Ans. (*b*) 38.5 cm^2

Explanation: Circumference of circle = 22 cm,

$2\pi r = 22$ cm

$\Rightarrow 2\left(\frac{22}{7}\right) r = 22 \qquad \Rightarrow r = \frac{22 \times 7}{2 \times 22} = \frac{7}{2}$ cm

$\therefore$ **Area of circle** = $\pi r^2 = \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} = \frac{77}{2} =$ **38.5 cm^2**

9. The area of a circle is 154 cm^2. Its diameter is

(*a*) 7 cm (*b*) 14 cm
(*c*) 21 cm (*d*) 28 cm

Ans. (*b*) 14 cm

Explanation: Here area of the circle, A = 154 cm^2, Radius, r = ?

Area of the circle = 154 cm^2 ...(Given)

$\therefore \pi r^2 = 154 \qquad \Rightarrow \frac{22}{7} \times r^2 = 154$

$\Rightarrow r^2 = 154 \times \frac{22}{7} = 7 \times 7 \qquad \Rightarrow r = 7$ cm

$\therefore$ Diameter of the circle = $2 \times r = 2 \times 7 = 14$ cm

10. The length of the minute hand of a clock is 14 cm. The area swept by the minute hand in 5 minutes is

(*a*) 153.9 cm^2 (*b*) 102.6 cm^2
(*c*) 51.3 cm^2 (*d*) 205.2 cm^2

Ans. (*c*) 51.3 cm^2

Explanation: Angle swept by the minute hand in 1 minute = $(360° \div 60) = 6°$

$\therefore$ Angle swept by the minute hand in 5 min. (θ)

$= 6° \times 5 = 30°$

Length of minute hand (r) = 14 cm

$\therefore$ **Area swept** = $\frac{\theta}{360^o} \pi r^2$

$= \frac{30^o}{360^o} \times \frac{22}{7} \times 14 \times 14 = \frac{154}{3} =$ **51.3 cm^2**

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

(*a*) 35 cm (*b*) 10 cm (*c*) 21 cm (*d*) 28 cm

Ans. (*d*) 28 cm

Explanation: Let the radii of two circles be r_1 and r_2 and the radius of large circle be r.

$\therefore r_1 = 19$ cm, $r_2 = 9$ cm

Circumference of two circles = $C_1 + C_2 = C$

...(where C = circle)

$= 2\pi r_1 + 2\pi r_2 = 2\pi \times 19 + 2\pi \times 9 = 38\pi + 18\pi = 56\pi$

$\therefore$ Circumference of large circle = 56π

$\Rightarrow 2\pi r = 56\pi \qquad \Rightarrow r = 28$

$\therefore$ Radius of large circle = 28 cm

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

(*a*) 18π cm^2 (*b*) 12π cm^2
(*c*) 9π cm^2 (*d*) 14π cm^2

Ans. (*c*) 9π cm^2

Explanation: Size of square = 6 cm, radius = $\frac{6}{2} = 3$ cm;

Area of the circle = $\pi r^2 = \pi \times 3 \times 3 =$ **9π cm^2**

✦ Assertion-Reason Questions

Direction: In the following questions, a statement of Assertion (A) is followed by a statement of Reason (R). Mark the correct choice as:

(*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*) *Assetion (A) is false but Reason (R) is true.*

1. Assertion: The length of the minute hand of a clock is 7 cm. Then the area swept by the minute hand in 5 minutes is $12\frac{5}{6}$ cm^2.

Reason: The length of an arc of a sector of angle θ and radius r is given by $l = \frac{\theta}{360^o} \times 2\pi r$.

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

Explanation: Angle made by minute hand in 5 minutes

$= \frac{360^o}{60} \times 5 = 30^o$

Area swept by minute hand in 5 mintues

$= \frac{\theta}{360^o} \times \pi r^2 = \frac{30^o}{360^o} \times \frac{22}{7} \times 7 \times 7$ ...[Here $r = 7$ cm

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

2. Assertion: A wire is looped in the form of a circle of radius 28 cm. It is bent into a square. Then the area of the square is 1936 cm^2.

Reason: Angle described by a minute hand in 60 minutes = 360^o.

Ans. (*d*) Assetion (A) is false but Reason (R) is true.

Explanation: We have, length of wire = $2\pi r$

$2 \times \frac{22}{7} \times 28$ = length of wire ...[Here, $r = 28$ cm

length of wire = 176 cm

Now, perimeter of square = length of wire = 176

$\Rightarrow 4a = 176 \qquad \Rightarrow a = 44$

$\therefore$ **Area of Square** = $(44)^2 =$ **1936 cm^2**

3. **Assertion:** If the outer and inner diameter of a circular path is 10 m and 6 m then area of the path is 16 π m^2.

Reason: If R and r be the radius of outer and inner circular path = $\pi(R^2 - r^2)$

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

Explanation: Area of the path = $\pi\left[\left(\frac{10}{2}\right)^2 - \left(\frac{6}{2}\right)^2\right]$

$= \pi(25 - 9) = \mathbf{16\ \pi}$

4. **Assertion:** If the circumference of a circle is 176 cm, then its radius is 28 cm.

Reason: Circumference = 2π × radius

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

Explanation:

Circumference = $2 \times \frac{22}{7} \times$ radius = 176

$\therefore$ radius = $\frac{176 \times 7}{2 \times 22} = \mathbf{28\ cm}$

5. **Assertion:** If a wire of length 22 cm is bent is the shape of a circle, then area of the circle so formed is 40 cm^2.

Reason: Circumference of the circle = length of the wire.

Ans. (*d*) Assetion (A) is false but Reason (R) is true.

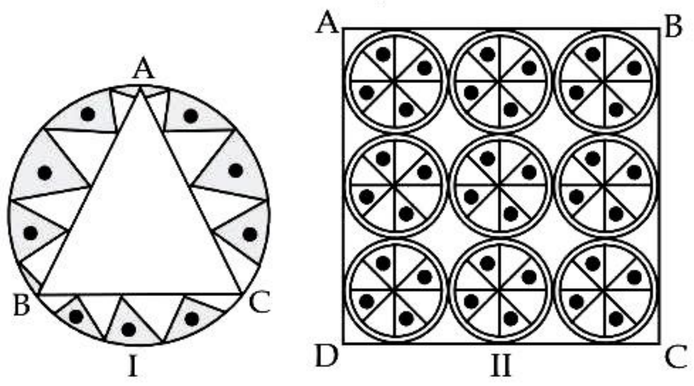
Explanation: We have, $2\pi r = 22$

$\Rightarrow$ radius, $r = 22 \times \frac{7}{22} \times \frac{1}{2} = \mathbf{3.5\ cm}$

$\therefore$ Area of the circle = $\frac{22}{7} \times 3.5 \times 3.5 = \mathbf{38.5\ cm^2}$

✦ Case Based Questions

I. Pookalam is the flower bed or flower pattern designed during Onam in Kerala. It is similar as Rangoli in North India and Kolam in Tamil Nadu. During the festival of Onam, your school is planning to conduct a Pookalam competition. Your friend who is a partner in competition, suggests two designs given below. Observe these carefully.



Design I: This design is made with a circle of radius 32 cm leaving equilateral triangle ABC in the middle as shown in the given figure.

Design II: This Pookalam is made with 9 circular designs each of radius 7cm.

Design I:

(*i*) The side of equilateral triangle is

(*a*) $12\sqrt{3}$ **(*b*)** $32\sqrt{3}$
(*c*) 48 cm **(*d*)** 64 cm

Ans. (*b*) $32\sqrt{3}$

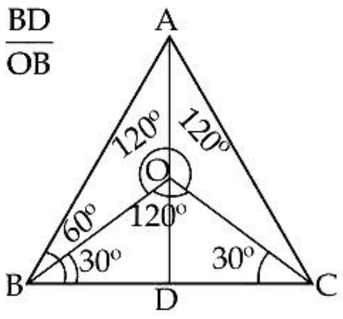
Explanation: In ΔOBD, $\cos 30^\circ = \frac{BD}{OB}$

$\Rightarrow$ BD = OB × cos 30°

$\Rightarrow$ BD = $32 \times \frac{\sqrt{3}}{2} = 16\sqrt{3}$

$\Rightarrow$ BD = $16\sqrt{3}$

$\therefore$ BC = 2BD = $2 \times 16\sqrt{3} = \mathbf{32\sqrt{3}}$



(*ii*) The altitude of the equilateral triangle is

(*a*) 8 cm **(*b*)** 12 cm
(*c*) 48 cm **(*d*)** 52 cm

Ans. (*c*) 48 cm

Explanation: In ΔABD, $\sin 60^\circ = \frac{AD}{AB}$

AD = $32\sqrt{3} \times \frac{\sqrt{3}}{2} = \mathbf{48\ cm}$ ...[$\because$ AB = BC = AC = $32\sqrt{3}$

Design II:

(*iii*) The area of square is

(*a*) 1264 cm^2 **(*b*)** 1764 cm^2
(*c*) 1830 cm^2 **(*d*)** 1944 cm^2

Ans. (*b*) 1764 cm^2

Explanation: Area of square = 42 × 42 = **1764 cm^2**

(*iv*) Area of each circular design is

(*a*) 124 cm^2 **(*b*)** 132 cm^2
(*c*) 144 cm^2 **(*d*)** 154 cm^2

Ans. (*d*) 154 cm^2

Explanation: r = 7 cm, $A = \pi r^2 = \frac{22}{7} \times 7 \times 7 = \mathbf{154\ cm^2}$

(*v*) Area of the remaining portion of the square ABCD is

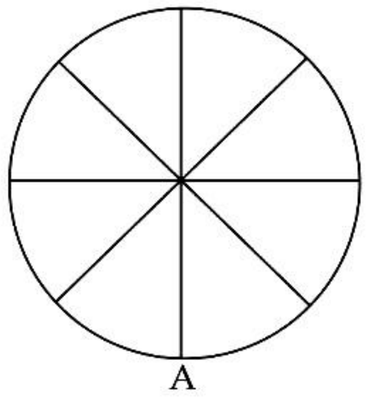
(*a*) 378 cm^2 **(*b*)** 260 cm^2
(*c*) 340 cm^2 **(*d*)** 278 cm^2

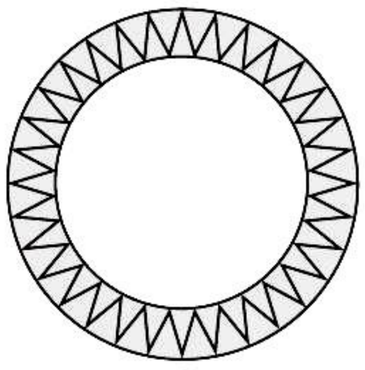
Ans. (*a*) 378 cm^2

Explanation: Area of remaining portion
= area of square – total area of 9 circles

= 1764 – 9 × 154 = 1764 – 1386 = **378 cm^2**

II. A BROOCH: A brooch is a small piece of jewellery which has a pin at the back so it can be fastened on a dress, blouse or coat.
Designs of some brooches are shown here. Observe them carefully.





B

Design A: Brooch A is made with silver wire in the form of a circle with diameter 28 mm. The wire is used for making 4 diameters which divide the circle into 8 equal parts.

Design B: Brooch B is made in two colours—Gold and Silver. Outer part is made with Gold. The circumference of Silver part is 44 mm and the Gold part is 3 mm wide everywhere.

Design A:

(*i*) The total length of silver wire required is

(*a*) 180 mm (*b*) 200 mm
(*c*) 250 mm (*d*) 280 mm

Ans. (*b*) 200 mm

Explanation: Given, diameter of circle, $d = 28$ mm

$\therefore$ Circumference of circle $= \pi d = \frac{22}{7} \times 28 = \mathbf{88\ mm}$

Now, length of 4 diameters $= 4 \times 28 = \mathbf{112\ mm}$

Total length of the silver wire $= \pi d + 4d$

$= 88 + 112 = \mathbf{200\ mm}$

(*ii*) The area of each sector of the brooch is

(*a*) 44 mm^2 (*b*) 52 mm^2
(*c*) 77 mm^2 (*d*) 68 mm^2

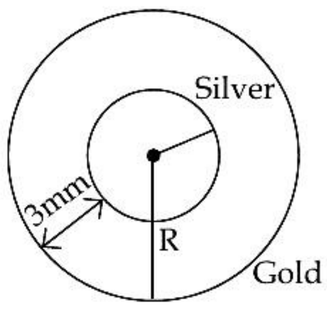
Ans. (*c*) 77 mm^2

Explanation: Here, we see that circle is divided into 8 parts.

$\therefore$ Area of each sector $= \frac{1}{8} \times$ Area of circle

$= \frac{1}{8} \times \pi r^2 = \frac{1}{8} \times \frac{22}{7} \times 14 \times 14 = \mathbf{77\ mm^2}$

Design B:



We have, circumference of silver part = 44 mm

$\therefore\ 2\pi r = 44 \quad \Rightarrow \quad r = 7$ mm

$\therefore\ R = r + 3 = 7 + 3 = 10$ mm

(*iii*) The circumference of outer part (golden) is

(*a*) 48.49 mm
(*b*) 82.2 mm
(*c*) 72.50 mm
(*d*) 62.86 mm

Ans. (*d*) 62.86 mm

Explanation:

Circumference of golden part $= 2\pi R = 2 \times \frac{22}{7} \times 10$

$= \mathbf{62.86\ mm}$

(*iv*) The difference of areas of golden and silver parts is

(*a*) 18 π
(*b*) 44 π
(*c*) 51 π
(*d*) 64 π

Ans. (*c*) 51 π

Explanation:

Difference of areas $= \pi R^2 - \pi r^2 = \pi(R^2 - r^2)$

$= (10^2 - 7^2)\pi = 51\pi\ mm^2$

(*v*) A boy is playing with brooch B. He makes revolution with it along its edge. How many complete revolutions must it take to cover 80 π mm ?

(*a*) 2 (*b*) 3
(*c*) 4 (*d*) 5

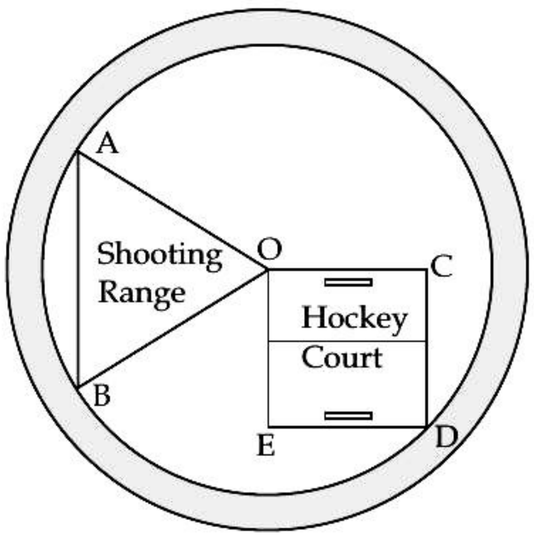
Ans. (*c*) 4

Explanation: Required number of revolutions

$= \frac{Distance\ covered}{Circumference}$

$= \frac{80\pi}{2\pi R} = \frac{80\pi}{2\pi \times 10} = 4$

III. Jawaharlal Nehru Stadium is a very popular multi-purpose sports stadium of Delhi. It has a capacity to seat 60,000 people. The stadium is conducting the annual sports competition soon. The curator of the stadium is asked to figure out the dimensions for carving out some areas allotted for a hockey court and a shooting range, as shown in the given figure.



The shapes of the hockey court and the shooting range are a square and a triangle respectively. Both of the courts have a common edge that touches the centre of the stadium. The construction the shooting range is such that the angle at centre is 90°.
The radius of the stadium is 180 metres.
(Take π = 3.14)

(*i*) What is the area allotted to shooting range?

(*a*) 12,600 m^2 **(*b*)** 16,200 m^2
(*c*) 18,660 m^2 **(*d*)** 16,880 m^2

Ans. **(*b*)** 16,200 m^2

Explanation:

Area of $\Delta = \frac{1}{2} \times Base \times height = \frac{1}{2} \times 180 \times 180$

$= 90 \times 180 =$ **16,200 m^2**

(*ii*) What is the area allotted to the hockey court?

(*a*) 16,200 m^2 **(*b*)** 22,000 m^2
(*c*) 20,000 m^2 **(*d*)** 16,880 m^2

Ans. **(*a*)** 16,200 m^2

Explanation: Let OC = CD = x
Using pythagoras theorem, $x^2 + x^2 = (180)^2$
$\Rightarrow 2x^2 = 32{,}400 \quad \Rightarrow \quad x^2 = 16{,}200$ or $x =$ **$90\sqrt{2}$**
$\therefore$ Area of square, OCDE = $x^2 =$ **16,200**

(*iii*) If the team of the curators managing the stadium likes to allot space for some more sports, how much area is available to them?

(*a*) 76,980 m^2 **(*b*)** 95,806 m^2
(*c*) 60,040 m^2 **(*d*)** 69,336 m^2

Ans. **(*d*)** 69,336 m^2

Explanation: $\pi r^2 - (16200 + 16200)$
$= 3.14 \times 180 \times 180 - 32400 =$ **69,336 m^2**

(*iv*) If the boudaries of the hockey court and shooting range are to be fenced, then what is the required length (in m) of the fence?

(*a*) $400(2 + 5\sqrt{2})$ **(*b*)** $180(2 + 3\sqrt{2})$
(*c*) $180(2 + 5\sqrt{2})$ **(*d*)** $300(2 + 3\sqrt{2})$

Ans. **(*b*)** $180(2 + 3\sqrt{2})$

Explanation: In ΔOAB, $AB = \sqrt{(180)^2 + (180)^2} = 180\sqrt{2}$
...[Pythagoras' theorem

$ar(\Delta OAB) = \frac{1}{2} \times 180\sqrt{2} \times h = 16200$

$h = \frac{16200 \times 2}{180\sqrt{2}} = 90\sqrt{2}$ m

$\therefore$ Perimeter (ΔOAB + $\square OCDE$)
$= 180 + 180 + 180\sqrt{2} + [4 \times 90\sqrt{2}] = 360 + 540\sqrt{2}$
$=$ **$180(2 + 3\sqrt{2})$m**

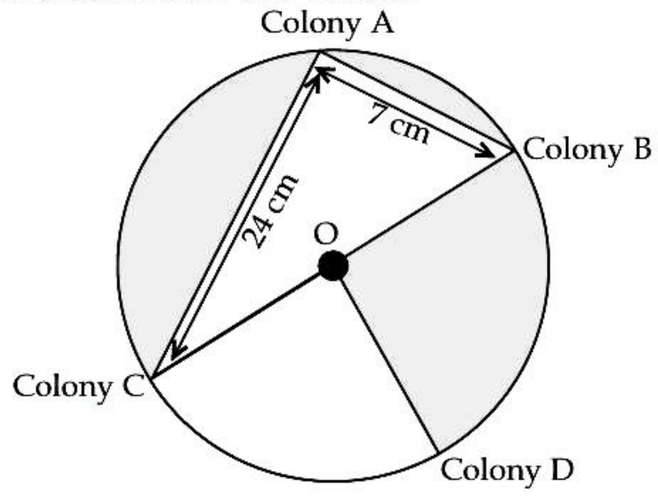
(*v*) If the cost of fencing is ₹6 per metre, what is the total cost (in ₹) of fencing?

(*a*) $1800(2 + 3\sqrt{2})$ **(*b*)** $1080(2 + 5\sqrt{2})$
(*c*) $1080(2 + 3\sqrt{2})$ **(*d*)** $2400(2 + 5\sqrt{2})$

Ans. **(*c*)** $1080(2 + 3\sqrt{2})$

Explanation: Total cost = $180(2 + 3\sqrt{2}) \times 6$
$=$ **₹ $1080(2 + 3\sqrt{2})$**

IV. To find the polluted region in different areas of Dwarka (a part of Delhi represented by the given circle given) a survey was conducted by the students of class X. It was found that the shaded region is the polluted region. where O is the centre of the circle.



Based on the above information, answer the following questions:

(*i*) Find the radius of the circle.

(*a*) 12.5 cm **(*b*)** 13.5 cm
(*c*) 15 cm **(*d*)** 16.5 cm

Ans. **(*a*)** 12.5 cm

Explanation: In ΔBAC, $BC = \sqrt{AB^2 + AC^2}$
...[Pythagoras' theorem

$\therefore$ $BC = \sqrt{7^2 + 24^2} = \sqrt{625} = 25$
$\Rightarrow$ BC = 25 cm

$\therefore$ Radius of the circle = $\frac{25}{2}$ cm = **12.5 cm**

(*ii*) Find the area of the circle.

(*a*) 481.7 cm^2 **(*b*)** 490 cm^2
(*c*) 491.07 cm^2 **(*d*)** 495.6 cm^2

Ans. **(*c*)** 491.07 cm^2

Explanation:

Area of circle = $\pi(12.5)^2 = \frac{22}{7} \times 12.5 \times 12.5 =$ **491.07 cm^2**

(*iii*) If D lies at the middle of arc BC, then area of region COD is

(*a*) 121 cm^2 **(*b*)** 122.77 cm^2
(*c*) 126 cm^2 **(*d*)** 129.8 cm^2

Ans. **(*b*)** 122.77 cm^2

Explanation:
Clearly, $\angle COD = 90°$
[$\therefore$ $\angle COB = 180°$ and equal arcs subtends equal angles at the centre]

$\therefore$ Area of region $\angle COD = \frac{90^\circ}{360^\circ} \times \pi r^2$

$= \frac{1}{4}(491.07) =$ **122.77 cm²**

(*iv*) Area of the ΔBAC is

(*a*) 77 cm² **(*b*)** 79 cm²
(*c*) 81 cm² **(*d*)** 84 cm²

Ans. (*d*) 84 cm²

Explanation:

Area of $\Delta BAC = \frac{1}{2} \times AB \times AC = \frac{1}{2} \times 7 \times 24 =$ **84 cm²**

(*v*) Find the area of the polluted region.

(*a*) 280.31 cm² **(*b*)** 284.31 cm²
(*c*) 285.31 cm² **(*d*)** 240.31 cm²

Ans. (*b*) 284.31 cm²

Explanation:

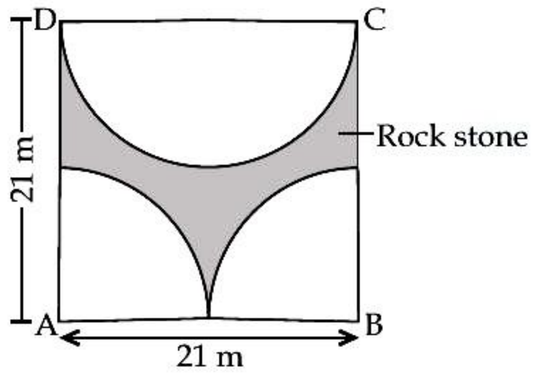
Area of the polluted region

= *Area of circle – Area of sector COD – Area of* ΔABC

= 491.07 – 122.77 – 84 = **284.3 cm²**

V. A builder of residential project has a vacant square land of side 21 m. He wants to make a temple in the shape of semi-circle and a park in the shape of two quadrants of a circle as shown in the figure.

Based on the above information, answer the following questions:



Based on the above information, answer the following questions:

(*i*) Find the area of square.

(*a*) 436 m² **(*b*)** 438 m²
(*c*) 441 m² **(*d*)** 444 m²

Ans. (*c*) 441 m²

Explanation: Area of square ABCD = 21 × 21 = 441 m²

(*ii*) Area of two quadrants, shown in figure is

(*a*) 170.25 m² **(*b*)** 173.25 m²
(*c*) 175 m² **(*d*)** 178.25 m²

Ans. (*b*) 173.25 m²

Explanation: Area of two quadrants $= 2\left(\pi r^2 \times \frac{90^\circ}{360^\circ}\right)$

$= \frac{22}{7} \times \frac{21}{2} \times \frac{21}{2} \times \frac{1}{2}$

= **173.25 m²**

(*iii*) Find the area of semi-circular temple.

(*a*) 163.25 m² **(*b*)** 168.25 m²
(*c*) 173.25 m² **(*d*)** 178.25 m²

Ans. (*c*) 173.25 m²

Explanation: Area of semi-circular temple $= \frac{1}{2}(\pi r^2)$

$\frac{1}{2} \times \frac{22}{7} \times \frac{21}{2} \times \frac{21}{2} =$ **173.25 m²**

(*iv*) Find the area of unshaded region.

(*a*) 340.5 m² **(*b*)** 346.5 m²
(*c*) 350.5 m² **(*d*)** 355.65 m²

Ans. (*b*) 346.5 m²

Explanation: Area of unshaded region

= *Area of semi-circle + Area of two quadrants*

= 173.25 + 173.25 = **346.5 m²**

(*v*) Find the area of shaded region.

(*a*) 88.5 m² **(*b*)** 90.5 m²
(*c*) 92.5 m² **(*d*)** 94.5 m²

Ans. (*d*) 94.5 m²

Explanation: Area of shaded region = *Area of square*

–(Area of two quadrants + Area of semi-circle)

= 441 – 346.5 = **94.5 m²**