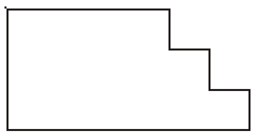
Area Of Plane Figures

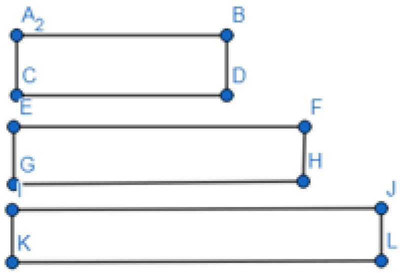
Exercise 9.1

Q. 1. A. Divide the given shapes as instructed

into 3 rectangles

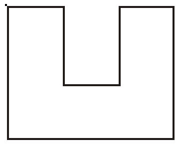


Answer :

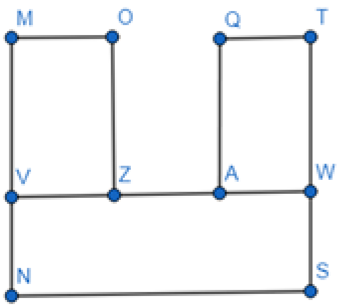


Q. 1. B. Divide the given shapes as instructed

into 3 rectangles

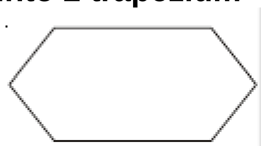


Answer :

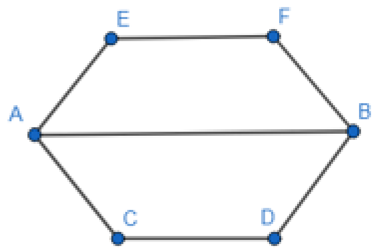


Q. 1. C. Divide the given shapes as instructed

into 2 trapezium

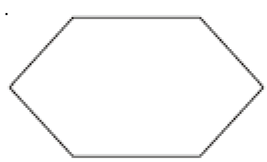


Answer :

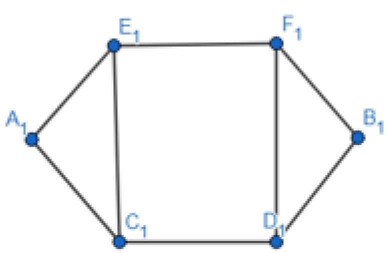


Q. 1. D. Divide the given shapes as instructed

2 triangles and a rectangle

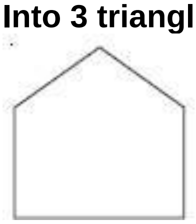


Answer :

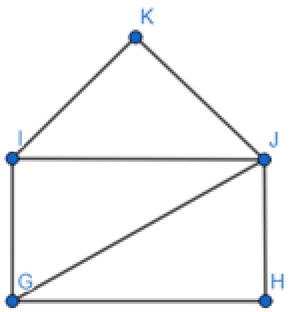


Q. 1. E. Divide the given shapes as instructed

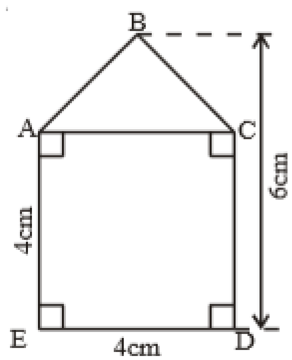
Into 3 triangles



Answer :



Q. 2. A. Find the area enclosed by each of the following figures



Answer : Side of square ACDE, a = 4 cm

As Area of square, Ar (ACDE) = a^2 sq. cm

⇒ A(ACDE) = $(4)^2$ = 16 sq.cm

Height of Δ ABC, h = 6 – 4 = 2 cm

$$\text{Area of } \Delta ABC, A(ABC) = \frac{1}{2} \times AC \times h$$

$$\Rightarrow Ar(ABC) = \frac{1}{2} \times 4 \times 2$$

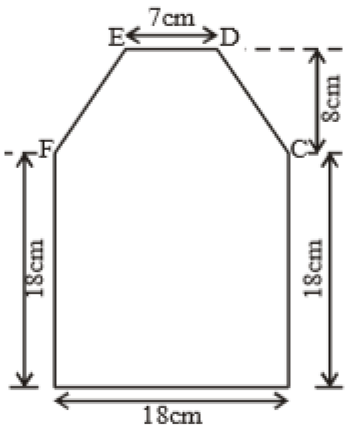
⇒ Ar (ABC) = 4 sq.cm

Area enclosed by the figure, Area = Ar(ABC) + Ar (ACDE)

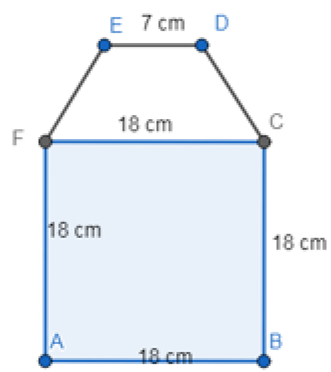
⇒ Area = 4 + 16

⇒ Area = 20 sq.cm

Q. 2 B. Find the area enclosed by each of the following figures



Answer :



Area of square ABCF, Ar(ABCF) = $(\text{side})^2$

⇒ Ar(ABCF) = 18^2 = 324 sq.cm

Given Height of trapezium EDCF, h = 8 cm

As we know that,

$$\text{Area of trapezium, Ar (EDCF)} = \frac{1}{2} \times (\text{sum of parallel sides}) \times h$$

$$\Rightarrow \text{Ar(EDCF)} = \frac{1}{2} \times (\text{ED} + \text{CF}) \times h$$

$$\Rightarrow \text{Ar (EDCF)} = \frac{1}{2} \times (18 + 7) \times 8$$

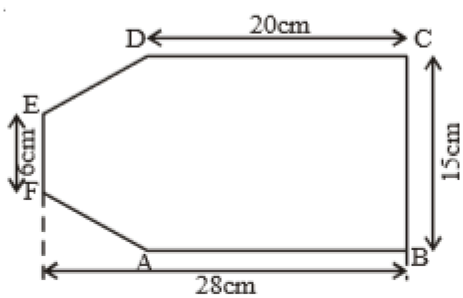
⇒ Ar(EDCF) = 100 sq.cm

Area of given figure, Req. area = Ar(EDCF) + Ar(ABCF)

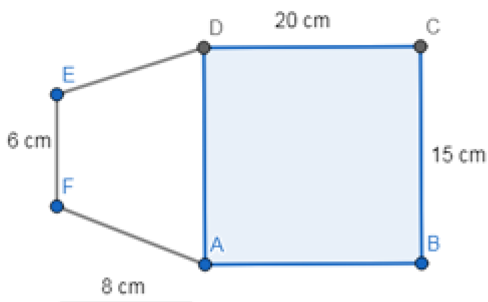
⇒ Req. area = 100 + 324 = 424 sq.cm

∴ Area of given figure is 424 sq. cm

Q. 2. C. Find the area enclosed by each of the following figures



Answer :



Area of rectangle ABCD, Ar(ABCD) = BC × CD

⇒ Ar(ABCD) = 20 × 15 = 300 sq.cm

Given height of trapezium, h = 8 cm

Sum of parallel sides of trapezium = EF + AD

⇒ 6 + 15 = 21 cm

$$\text{Area of trapezium} = \frac{1}{2} \times (\text{sum of parallel sides}) \times \text{height}$$

$\Rightarrow \text{Ar(EFAD)} = \frac{1}{2} \times (21) \times 8$

⇒ Ar(EFAD) = 84 sq.cm

Now, required area = Ar(EFAD) + Ar(ABCD)

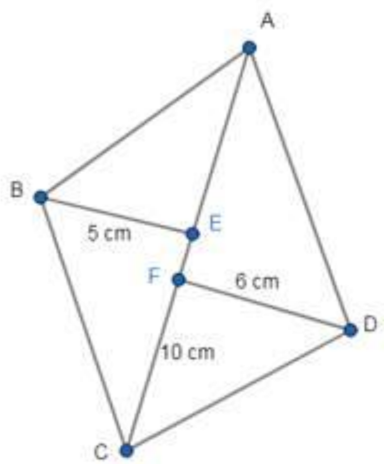
⇒ 84 + 300

⇒ 384 sq.cm

∴ Area of given figure is 384 sq.cm

Q. 3. Calculate the area of a quadrilateral ABCD when length of the diagonal AC = 10 cm and the lengths of perpendiculars from B and D on AC 5 cm and 6 cm be respectively.

Answer :



Since the quadrilateral can be divided into two triangles, therefore the area of the figure is equal to the sum of these triangles.

As we know that,

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

$\Rightarrow \text{Area of } \Delta ABC, A_1 = \frac{1}{2} \times AC \times BE$

$$\Rightarrow A_1 = \frac{1}{2} \times 10 \times 5$$

⇒ A_1 = 25 sq.cm

Similarly,

$$\Rightarrow \text{Area of } \Delta ABC, A_2 = \frac{1}{2} \times AC \times FD$$

$$\Rightarrow A_1 = \frac{1}{2} \times 10 \times 6$$

⇒ A_2 = 30 sq.cm

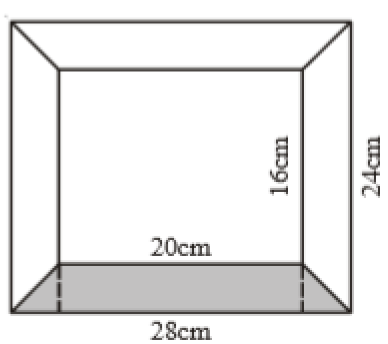
Required Area = $A_1 + A_2$

⇒ 25 + 30

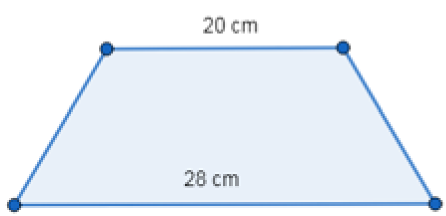
⇒ 55 sq.cm

∴ the area of quadrilateral ABCD is 55 sq.cm

Q. 4. Diagram of the adjacent picture frame has outer dimensions28 cm × 24 cm and inner dimensions 20 cm × 16 cm. Find the area of shaded part of frame if width of each section is the same.



Answer : We can see that the shaded region represents a trapezium, with the parallel sides are of length 20cm and 28 cm



Height of trapezium = h

$$h = \frac{(24 - 16)}{2} = 4 \text{ cm}$$

As we know that,

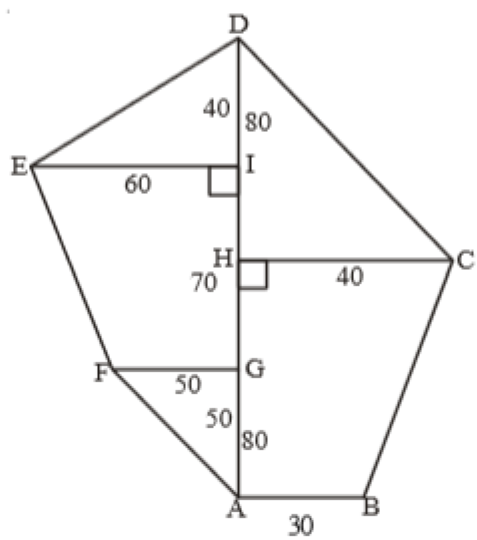
$$\text{Area of Trapezium} = \frac{1}{2} \times (\text{sum of parallel side}) \times \text{height}$$

$$\Rightarrow \text{Area} = \frac{1}{2} \times (20 + 28) \times 4$$

⇒ Area = 96 sq.cm

∴ Area of the shaded part is 96 sq. cm

Q. 5. A. Find the area of each of the following fields. All dimensions are in metres.



Answer : As we know that,

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

And we have 3 triangles here, namely, Δ DEI, Δ DHC, Δ FGA

Therefore,

$$\text{Ar}(\Delta\text{DEI}) = \frac{1}{2} \times \text{EI} \times \text{DI}$$

$$\Rightarrow \text{Ar}\ (\Delta\text{DEI}) = \frac{1}{2} \times 60 \times 40$$

⇒ Ar(Δ DEI) = 1200 sq. m

Similarly,

$$\text{Ar}(\Delta\text{DHC}) = \frac{1}{2} \times \text{HC} \times \text{DH}$$

$$\Rightarrow \text{Ar}\ (\Delta\text{DHC}) = \frac{1}{2} \times 40 \times 80$$

⇒ Ar(Δ DHC) = 1600 sq. m

And,

$$\text{Ar}(\Delta\text{FGA}) = \frac{1}{2} \times \text{FG} \times \text{AG}$$

$$\Rightarrow \text{Ar}\ (\Delta\text{FGA}) = \frac{1}{2} \times 50 \times 50$$

⇒ Ar(Δ FGA) = 1250 sq. m

Also, there are two trapeziums, namely, EIGF and ABCH

$$\text{Area of trapezium} = \frac{1}{2} \times (\text{sum of parallel sides}) \times \text{height}$$

$$\Rightarrow \text{Ar}(\text{EIGF}) = \frac{1}{2} \times (50 + 60) \times 70$$

⇒ Ar(EIGF) = 3850 sq. m

Also,

$$\Rightarrow \text{Ar}(\text{ABCH}) = \frac{1}{2} \times (40 + 30) \times 80$$

⇒ Ar(ABCH) = 2800 sq. m

Now, the area of the given figure is equal to the sum of the individual areas of triangles and trapeziums.

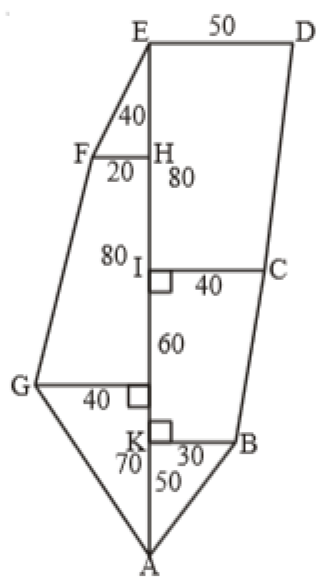
⇒ Req. area = Ar(Δ DEI) + Ar(Δ DHC) + Ar(Δ FGA) + Ar(EIGF) + Ar(ABCH)

⇒ Req. area = 1200 + 1600 + 1250 + 3850 + 2800

⇒ Req. area = 10700 sq. m

∴ the area of the given figure is 10700 sq. m

Q. 5. B. Find the area of each of the following fields. All dimensions are in metres.



Answer : As we know that,

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

And we have 3 triangles here, namely, Δ EFH, Δ AJG, Δ AKB

Therefore,

$$\text{Ar}(\Delta\text{EFH}) = \frac{1}{2} \times \text{FH} \times \text{EH}$$

$$\Rightarrow \text{Ar}\ (\Delta\text{EFH}) = \frac{1}{2} \times 20 \times 40$$

⇒ Ar(Δ EFH) = 400 sq. m

Similarly,

$$\text{Ar}(\Delta\text{AKB}) = \frac{1}{2} \times \text{KB} \times \text{AK}$$

$$\Rightarrow \text{Ar}\ (\Delta\text{AKB}) = \frac{1}{2} \times 30 \times 50$$

⇒ Ar(Δ AKB) = 750 sq. m

And,

$$\text{Ar}(\Delta\text{AJG}) = \frac{1}{2} \times \text{JG} \times \text{AJ}$$

$$\Rightarrow \text{Ar}\ (\Delta\text{AJG}) = \frac{1}{2} \times 40 \times 70$$

⇒ Ar(Δ AJG) = 1400 sq. m

Also, there are three trapeziums, namely, EICD, ICBK and FHJG

$$\text{Area of trapezium} = \frac{1}{2} \times (\text{sum of parallel sides}) \times \text{height}$$

$$\Rightarrow \text{Ar(EICD)} = \frac{1}{2} \times (50 + 40) \times 80$$

⇒ Ar(EICD) = 3600 sq. m

Also,

$$\Rightarrow \text{Ar(ICBK)} = \frac{1}{2} \times (40 + 30) \times 60$$

⇒ Ar(ICBK) = 2100 sq. m

And,

$$\Rightarrow Ar(FHJG) = \frac{1}{2} \times (40 + 20) \times 80$$

⇒ Ar(FHJG) = 2400 sq. m

Now, the area of the given figure is equal to the sum of the individual areas of triangles and trapeziums.

⇒ Req. area = Ar(Δ EFH) + Ar(Δ AKB) + Ar(Δ AJG) + Ar(EICD) + Ar(ICBK) + Ar(FHJG)

⇒ Req. area = 400 + 750 + 1400 + 3600 + 2100 + 2400

⇒ Req. area = 10650 sq. m

∴ the area of the given figure is 10650 sq. m

Q. 6. The ratio of the length of the parallel sides of a trapezium is 5:3 and the distance between them is 16cm. If the area of the trapezium is 960 cm^2, find the length of the parallel sides.

Answer : Let the parallel sides of the trapezium be 5x and 3x.

Distance between the parallel sides, h = 16 cm

Area of trapezium, A = 960 sq. cm

As we know that,

$$\text{Area of trapezium} = \frac{1}{2} \times (\text{sum of parallel sides}) \times \text{height}$$

$$\Rightarrow A = \frac{1}{2} \times (5x + 3x) \times 16$$

$$\Rightarrow 960 = \frac{1}{2} \times 8x \times 16$$

⇒ 16 × 4x = 960

⇒ 4x = 60

⇒ x = 15

⇒ 5x = 75 and 3x = 45

∴ the length of the parallel sides is 75cm and 45cm

Q. 7. The floor of a building consists of around 3000 tiles which are rhombus shaped and each of its diagonals are 45 cm and 30 cm in length. Find the total cost of flooring if each tile costs rupees 20 per m^2.

Answer : The diagonals of the rhombus given are 45 cm and 30 cm.

As we know that,

$$\text{Area of rhombus} = \frac{\text{Product of two diagonals}}{2}$$

$$\Rightarrow \text{Area of one tile} = \frac{45 \times 30}{2}$$

⇒ Area of one tile = 675 sq.cm

Total area of floor = (area of one tile) × (Total number of tiles)

⇒ Area of floor = 675 × 3000 = 2025000 sq.cm = 202.5 sq. m

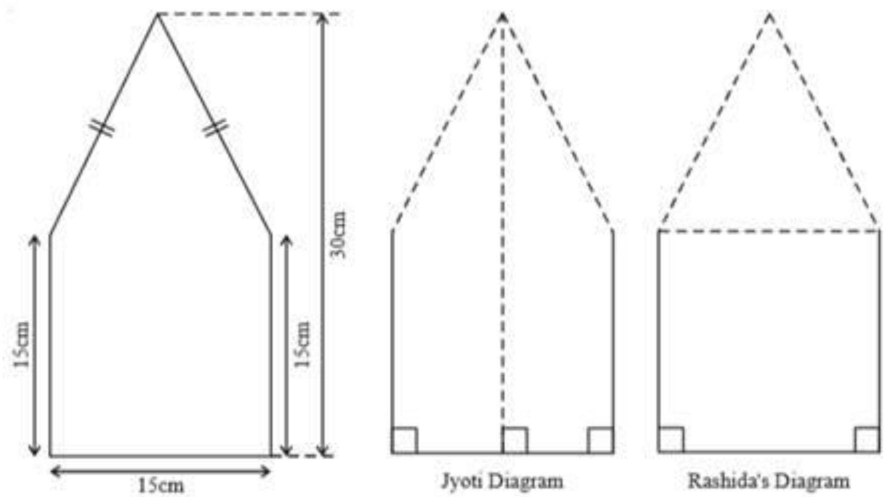
$$\text{Cost of flooring} = (\text{Area of floor}) \times (\text{Rate of flooring})$$

⇒ Cost of flooring = 202.5 × 20

⇒ Cost = Rs. 4050

∴ Total cost of flooring is Rs. 4050

Q. 8. There is a pentagonal shaped part as shown in figure. For finding its area Jyoti and Rashida divided it in two different ways. Find the area in both ways and what do you observe?



Answer : Considering Jyoti’s Diagram first,

The pentagon given is divided into two equal trapeziums by Jyoti, whose height, h = 15/2 = 7.5 cm

Also, the parallel sides of each trapezium are of length 15cm and 30 cm.

As we know that,

$$\text{Area of trapezium} = \frac{1}{2} \times (\text{sum of parallel sides}) \times \text{height}$$

$$\Rightarrow \text{Area of trapezium} = \frac{1}{2} \times (30 + 15) \times 7.5$$

Since the pentagon is made of two equal trapeziums, so the area of pentagon = twice the area of trapezium

⇒ Area of pentagon = 2 × area of trapezium

$$\text{Area of pentagon} = 2 \times \frac{1}{2} \times 45 \times 7.5$$

⇒ Req. area = 45 × 7.5 = 337.5 sq.cm

∴ area of pentagon as found by Jyoti is 337.5 sq. cm

Now, in case of Rashida,

She divided the pentagon to form a square and a triangle.

Side of square, a = 15 cm

Height of triangle, H = 30 – 15 = 15 cm

Area of square = $a^2 = 15^2 = 225$ sq.cm

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

$$\Rightarrow \text{area of triangle} = \frac{1}{2} \times 15 \times 15$$

⇒ Area of triangle = 112.5 sq.cm

Area of pentagon = Area of triangle + Area of square

⇒ 112.5 + 225

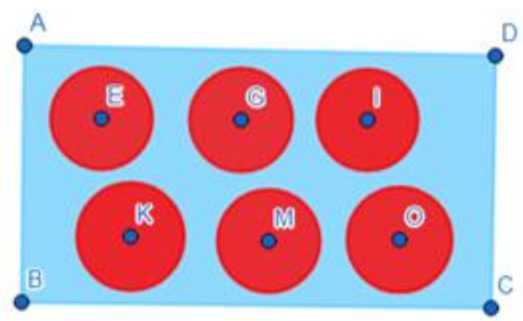
⇒ 337.5 sq.cm

∴ We see that, the area of pentagon found by both ways comes out to be same. Hence, It does not matter whichever way we divide a figure.

Exercise 9.2

Q. 1. A rectangular acrylic sheet is 36 cm by 25 cm. From it, 56 circular buttons, each of diameter 3.5 cm have been cut out. Find the area of the remaining sheet.

Answer :



The dimensions of rectangular sheet are 36 cm by 25 cm.

The Area of rectangular sheet = 36 × 25 = 900 sq.cm

From this sheet, 56 circular buttons are cut as shown,

Diameter of each circle = 3.5 cm

⇒ radius of each button, r = 1.75 cm

Area of one button = πr^2

$$\Rightarrow \text{Area of each button} = \frac{22}{7} \times (1.75)^2$$

⇒ Area of each button = 9.625 sq.cm

Total area of buttons cut = area of each button × 56

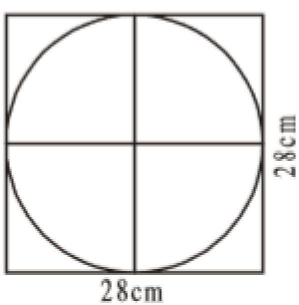
⇒ Total Area of buttons = 539 sq. cm

Area of remaining sheet (area shaded with blue) = (Area of rectangular sheet) – (total area of buttons)

⇒ Req. area = 900 – 539 = 361 sq.cm

∴ Area of the remaining sheet is 361 sq.cm

Q. 2. Find the area of a circle inscribed in a square of side 28 cm. [Hint: Diameter of the circle is equal to the side of the square]



Answer : Since the circle is inscribed in a square of side 28 cm, this means that the diameter of the circle is equal to the side of square.

Diameter of circle, d = 28cm

⇒ Radius of circle, r = 14 cm

As we know that,

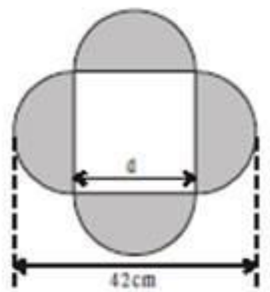
Area of a circle = π × r^2

$$\Rightarrow \text{Area of circle} = \frac{22}{7} \times 14^2$$

⇒ Area of circle = 616 sq.cm

∴ The area of circle inscribed in the square is 616 sq.cm

Q. 3. A. Find the area of the shaded region in each of the following figures.



[Hint: $d + \frac{d}{2} + \frac{d}{2} = 42$]

d = 21

∴ side of the square 21 cm

Answer : The shaded region is formed of four semicircles and as the base of these semicircles lie on the side of a square, therefore the diameter of the semicircle is equal to the side of the square.

⇒ Diameter of semicircle = side of square = d

$$\Rightarrow \text{Radius of semicircle, r} = \frac{d}{2}$$

It is shown that, r + d + r = 42

$$\Rightarrow \frac{d}{2} + d + \frac{d}{2} = 42$$

⇒ d = 21 cm

$$\Rightarrow \text{Radius, r} = \frac{d}{2}$$

⇒ Radius, r = 10.5 cm

$$\text{Area of semicircle, } A = \frac{\pi \times r^2}{2}$$

$$\Rightarrow A = \frac{1}{2} \times \frac{22}{7} \times (10.5)^2$$

⇒ A = 173.25 sq.cm

Area of shaded region = 4 × (Area of semicircle)

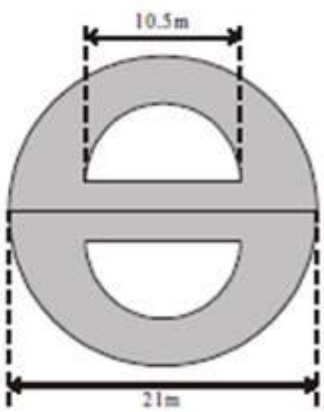
⇒ 4 × A

⇒ 4 × 173.25

⇒ 693 sq.cm

∴ Area of the shaded region is 693 sq.cm

Q. 3. B. Find the area of the shaded region in each of the following figures.



Answer : Diameter of bigger semicircle, D = 21 cm

⇒ Radius of bigger semicircle, R = D÷ 2

$$\Rightarrow R = \frac{21}{2} = 10.5 \text{ cm}$$

Diameter of smaller semicircle, d = 21 cm

⇒ Radius of smaller semicircle, r = d÷ 2

$\Rightarrow r = \frac{10.5}{2} = 5.25$ cm

$$\text{Area of semicircle} = \frac{\pi \times (\text{radius})^2}{2}$$

$$\Rightarrow \text{Area of bigger semicircle}, A_1 = \frac{1}{2} \times \frac{22}{7} \times (10.5)^2$$

$\Rightarrow A_1 = 173.25$ sq.cm

Similarly,

$$\text{Area of smaller semicircle}, A_2 = \frac{1}{2} \times \frac{22}{7} \times (5.25)^2$$

$\Rightarrow A_2 = 43.31$ sq.cm

Area of shaded region = $2 \times (A_1 - A_2)$

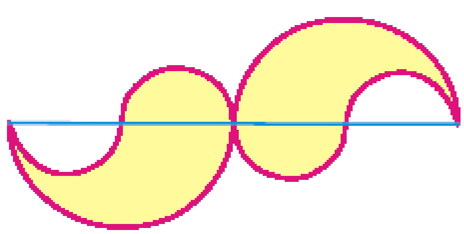
$\Rightarrow$ Req. area = $2 \times (173.25 - 43.31)$

$\Rightarrow 2 \times 129.94$

$\Rightarrow 259.87$ sq.cm

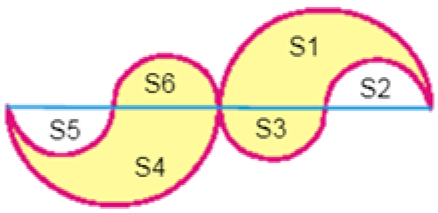
∴ Area of shaded region is 259.87 sq.cm

Q. 4. The adjacent figure consists of four small semi-circles of equal radii and two big semi-circles of equal radii (each 42 cm). Find the area of the shaded region.



Answer : As we know that,

$$\text{Area of semicircle} = \frac{\pi \times \text{radius}^2}{2}$$



From the above figure we see,

Diameter of bigger semi-circle, D = 42 cm

⇒ S1 and S4 are bigger semicircles with Radius, R = 21 cm

Also, S2, S3, S5 and S6 are smaller semi-circles with diameter, d equal to the radius of bigger semi-circle.

⇒ d = R

$$\Rightarrow \text{Radius of smaller semicircle, } r = \frac{d}{2} = \frac{R}{2} = 10.5 \text{ cm}$$

$$\text{Area of bigger semicircle, } A_B = \frac{\pi \times R^2}{2}$$

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

⇒ A_B = 693 sq.cm

Similarly,

$$\text{Area of smaller semicircle, } A_S = \frac{\pi \times r^2}{2}$$

$$A_S = \frac{1}{2} \times \frac{22}{7} \times 10.5^2$$

⇒ A_S = 173.25 sq.cm

Area of shaded region = Area(S1) + Area(S4) + Area(S3) + Area(S6) – Area (S2) – Area(S5)

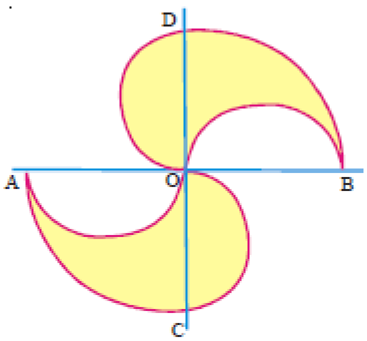
⇒ Area of shaded region = A_B + A_B + A_S + A_S – A_S - A_S

⇒ Area = 2 × A_B

⇒ 2 × 693 = 1386 sq.cm

∴ Area of shaded region is 1386 sq.cm

Q. 5. The adjacent figure consists of four half circles and two quarter circles. If OA = OB = OC = OD = 14 cm. Find the area of the shaded region.

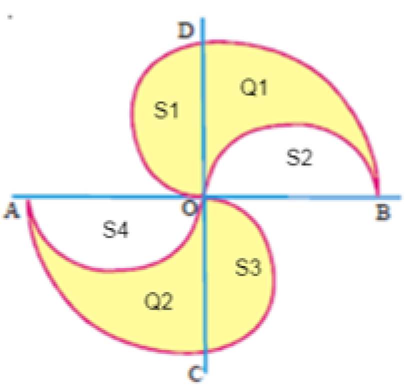


Answer : Let the area of a semicircle be A_S and the area of a quadrant be A_Q

Since there are four semi-circles, out of which two are shaded and two are unshaded, therefore the area of shaded region is equal to:

Since the area of shaded region is equal on both sides of line AOB,

So, if we calculate area of upper portion, then we can simply twice that area in order to get required area.



In figure above, S1, S2, S3,and S4 represents semi-circles and Q1 and Q2 represents quadrants.

⇒ Area of shaded region = 2 × (area of upper shaded portion on line AOB)

⇒ Area of shaded region = 2 × [area(S1) + area(Q1) – area(S2)]

As S1 and S2 are equal because of same radius, therefore their area will also be equal i.e area(S1) = area(S2)

⇒ Area of shaded region = 2 × area(Q1)

$$\text{Area of quadrant} = \frac{1}{4} \times \pi \times r^2$$

$$\Rightarrow \text{Area of quadrant, Q1} = \frac{1}{4} \times \pi \times OB^2$$

$$\Rightarrow \text{Area(Q1)} = \frac{1}{4} \times \frac{22}{7} \times 14^2$$

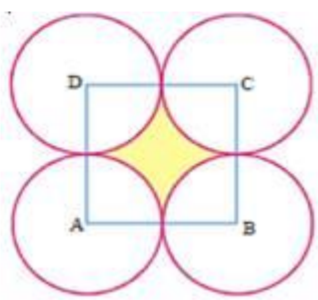
⇒ Area (Q1) = 154 sq.cm

⇒ Required area = 2 × area(Q1)

⇒ 2 × 154 = 308 sq.cm

∴ Area of shaded region is 308 sq.cm

Q. 6. In adjacent figure A, B, C and D are centers of equal circles which touch externally in pairs and ABCD is a square of side 7 cm. Find the area of the shaded region.



Answer : Side of square, a = 7cm

Area of square, $A_S = a^2$

⇒ $A_S = 7^2 = 49$ sq.cm

$$\text{Radius of each circle, R} = \frac{a}{2}$$

⇒ R = 3.5 cm

There is a quadrant of each of four circles that is present inside the square,

$$\text{Area of quadrant, } A_Q = \frac{1}{4} \times \pi \times R^2$$

$$A_Q = \frac{1}{4} \times \frac{22}{7} \times (3.5)^2$$

⇒ A_Q = 9.625 sq.cm

Shaded area = Area(square) – [4 × area(quadrant)]

⇒ Shaded area = A_S – [4 × A_Q]

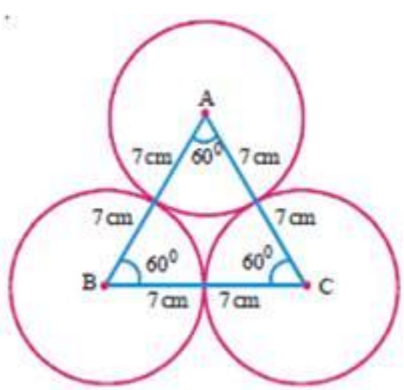
⇒ 49 – (4 × 9.625)

⇒ 49 – 38.5

⇒ 10.5 sq.cm

∴ Area of shaded region is 10.5 sq.cm

Q. 7. The area of an equilateral triangle is 49√3 cm^2. Taking each angular point as centre, a circle is described with radius equal to half the length of the side of the triangle as shown in the figure. Find the area of the portion in the triangle not included in the circles.



Answer : Let the side of the triangle be ‘a’

As we know that,

Area of equilateral triangle, $A_T = \frac{\sqrt{3}}{4} \times a^2$

$\Rightarrow 49\sqrt{3} = \frac{\sqrt{3}}{4} \times a^2$

⇒ a = 14 cm

Radius of each circle, r = a ÷ 2

⇒ r = 7 cm

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

Here, θ = 60°

$\Rightarrow A_S = \frac{60}{360} \times \frac{22}{7} \times 7^2$

⇒ A_S = 25.67 sq.cm

Required area = Area(Δ ABC) – 3× area of sector

⇒ Req. area = 49√3 – [3× 25.67]

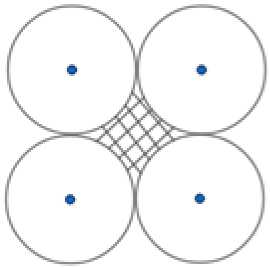
⇒ 84.87 – 77.01

⇒ 7.86 sq.cm

∴ Area of the portion in the triangle not included in the circles is 7.86 sq.cm

Q. 8. A. Four equal circles, each of radius ‘a’ touch one another. Find the area between them.

Answer : Radius of each circle, r = a



We need to find the shaded area,

If we connect the four centers we will get a square of side 2a.

Area of square, $A_S = (2a)^2 = 4a^2$

Area of each quadrant, $A_Q = \frac{1}{4}\pi \times a^2$

$\Rightarrow A_Q = \frac{1}{4} \times \frac{22}{7} \times a^2$

Area of shaded region = $A_S - [4 \times A_Q]$

$\Rightarrow \text{Req. area} = 4a^2 - [4 \times \frac{1}{4} \times \frac{22}{7} \times a^2]$

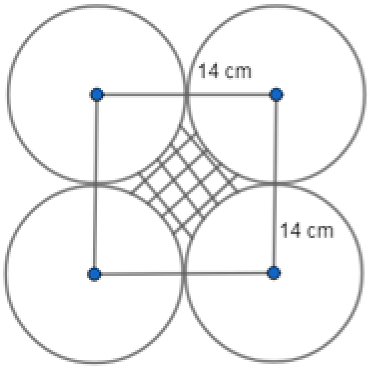
$\Rightarrow \text{Req. area} = 4a^2 - \frac{22}{7}a^2$

$\Rightarrow \text{Req. area} = \frac{6}{7}a^2$

Q. 8. B. Four equal circles are described about the four corners of a square so that each circle touches two of the others. Find the area of the space enclosed between the circumferences of the circles, each side of the square measuring 14 cm.

Answer : Since each side of square measures 14 cm, so the radius of each circle is half of the side.

Therefore, radius of circle, R = 7 cm



We need to find the area of the shaded region,

There is a quadrant of each of four circles that is present inside the square,

$$\text{Area of quadrant, } A_Q = \frac{1}{4} \times \pi \times R^2$$

$$A_Q = \frac{1}{4} \times \frac{22}{7} \times (7)^2$$

⇒ A_Q = 38.5 sq.cm

Also, area of square, $A_S = 14^2 = 196$ sq.cm

Area of shaded region = A_S – [4 × A_Q]

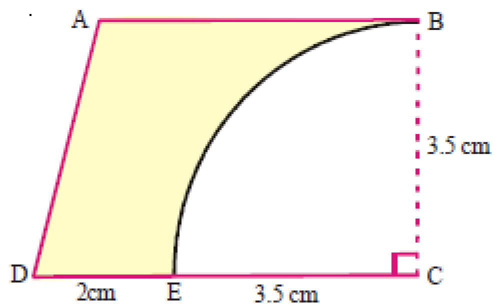
⇒ 196 – [4 × 38.5]

⇒ 196 – 154

⇒ 42 sq.cm

∴ area of shaded region is 42 sq. cm

Q. 9. From a piece of cardboard, in the shape of a trapezium ABCD, and AB||CD and ∠BCD = 90^0, quarter circle is removed. Given AB = BC = 3.5cm and DE = 2cm. Calculate the area of the remaining piece of the cardboard. (Take π to be $\frac{22}{7}$)



Answer : AB = BC = 3.5 cm and DE = 2cm

⇒ DC = DE + EC = 2 + 3.5 = 5.5 cm

As we know that,

$$\text{Area of trapezium, } A_T = \frac{1}{2} \times (\text{Sum of parallel sides}) \times \text{height}$$

Height of trapezium here, BC = 3.5 cm

$$A_T = \frac{1}{2} \times (AB + DC) \times BC$$

$$\Rightarrow A_T = \frac{1}{2} \times (3.5 + 5.5) \times 3.5$$

$$\Rightarrow A_T = \frac{1}{2} \times 9 \times 3.5$$

⇒ A_T = 15.75 sq.cm

Now, area of quarter circle = A_Q

$$A_Q = \frac{1}{4} \times \pi \times BC^2$$

$$\Rightarrow A_Q = \frac{1}{4} \times \frac{22}{7} \times (3.5)^2$$

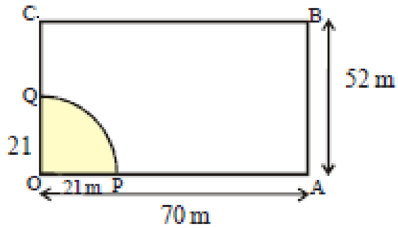
⇒ A_Q = 9.625 sq.cm

Required area = A_T – A_Q

⇒ Req. area = 15.75 – 9.625 = 6.125 sq.cm

∴ Area of remaining piece of cardboard is 6.125 sq.cm

Q. 10. A horse is placed for grazing inside a rectangular field 70m by 52 m and is tethered to one corner by a rope 21 m long. How much area can it graze?



Answer : The length of rope to which horse is tied will be equal to the radius of the quarter circle that the horse grazes.

⇒ Radius, r = 21m

As we know that,

$$\text{Area of quarter circle} = \frac{1}{4} \times \pi \times r^2$$

$$\Rightarrow \text{Req. area} = \frac{1}{4} \times \frac{22}{7} \times OP^2$$

$$\Rightarrow \text{Req. area} = \frac{1}{4} \times \frac{22}{7} \times 21^2$$

⇒ Area = 346.5 sq. m

∴ The area that horse can graze is 346.5 m^2