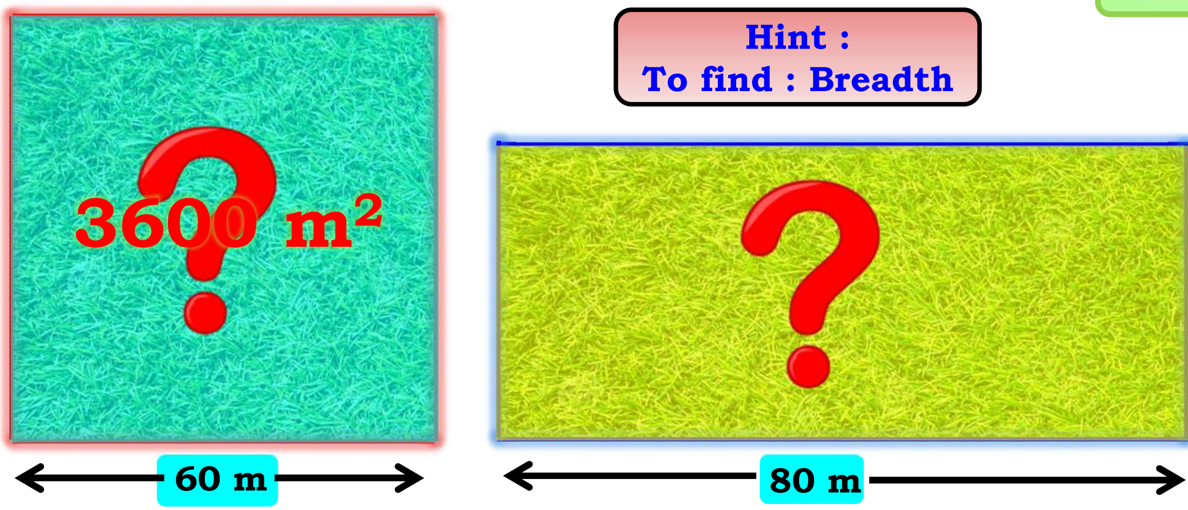
MENSURATION

Q. Square and a Rectangular field with measurements as given in the figure have the same perimeter. Which field has a larger area?

Sum of all sides

Hint :
To find : Breadth



Perimeter of Square = Perimeter of Rectangle

We know,
Area of Rectangle = $l \times b$

We know,
Area of Square = $(\text{side})^2$

Q. Square and a Rectangular field with measurements as given in the figure have the same perimeter. **Which field has a larger area?**


60 m


80 m

Sol.

Perimeter of Square = **Perimeter of Rectangle**

$4 \times \text{side} = 2\,(l + b)$

Hint :
To find : Breadth

$\therefore \quad 4 \times 60 = 2\,(80 + b)$

$\therefore \quad \dfrac{\cancel{240}^{\,120}}{\cancel{2}} = 80 + b$

$\therefore \quad 120 = 80 + b$

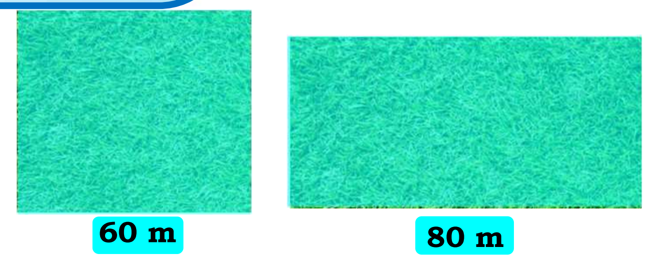
$\therefore \quad b = 120 - 80$

$b = 40$ m

We know,
Perimeter of Square = 4 × side

We know,
Perimeter of Rectangle = 2 (l + b)

Q. **Square and a Rectangular field with measurements as given in the figure have the same perimeter. Which field has a larger area?**



Sol. **Breadth of rectangle = 40 m**

Area of Rectangular field $= l \times b$

$= 80 \times 40$

$\therefore$ **Area of Rectangular field = $3200\ m^2$**

Area of Square field $= (\text{Side})^2$

$= (60)^2$

$\therefore$ **Area of Square field = $3600\ m^2$**

$\because\ 3600 > 3200$

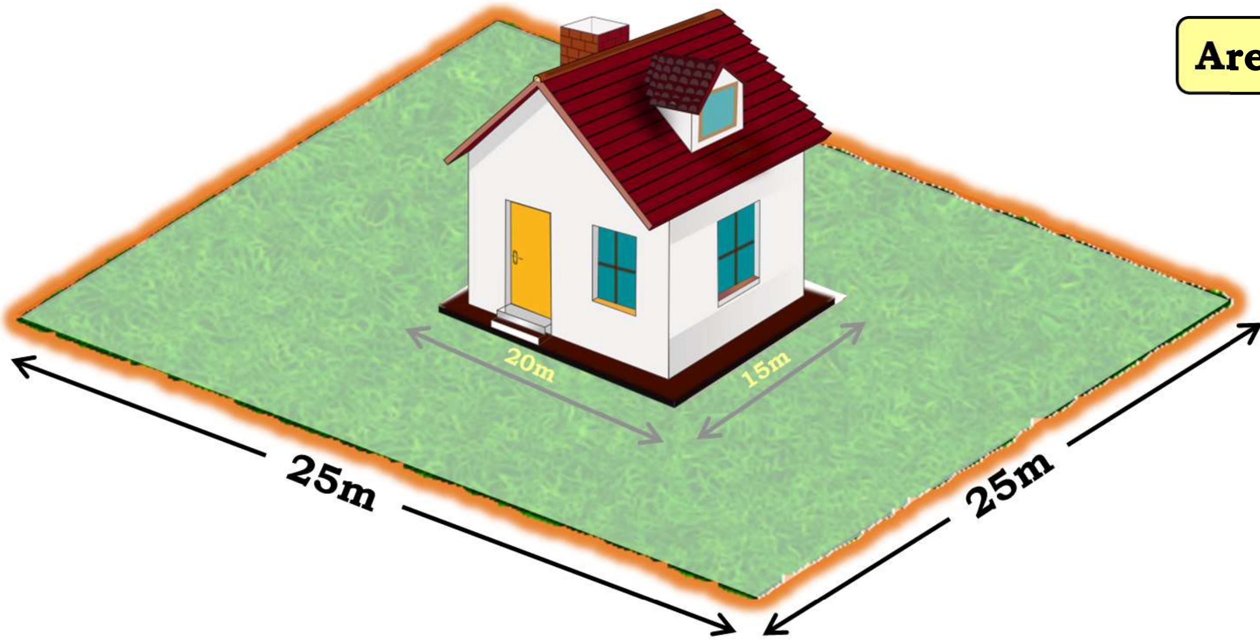
$\therefore$ **Area of square field is larger.**

Q.

Mrs. Kaushik has a square plot with the measurement as shown in the figure. She wants to construct a house in the middle of the plot. A garden is developed around the house. Find the total cost of developing a garden around the house at the rate of Rs. 55 per m^2.

Cost of developing garden = Rate × Area of garden

Area of plot – Base area of house



Q. Mrs. Kaushik has a square plot with the measurement as shown in the figure. She wants to construct a house in the middle of the plot. A garden is developed around the house. Find the total cost of developing a garden around the house at the rate of Rs. 55 per m^2.

Sol. Area of plot = $(\text{side})^2$

$= 25 \times 25$

$\therefore$ Area of plot $= 625\ m^2$

Base area of house = Length $\times$ Breadth

$= 20 \times 15$

$\therefore$ Base area of house $= 300\ m^2$

Area of garden = Ar... of plot – Base area of house

– 300

$\therefore$ Area of garden = 32... m^2

What is the formula for area of square?

$(\text{side})^2$

Area of garden = Area of plot – Base area of house

Q. Mrs. Kaushik has a square plot with the measurement as shown in the figure. She wants to construct a house in the middle of the plot. A garden is developed around the house. Find the total cost of developing a garden around the house at the rate of Rs. 55 per m^2.

Sol. $\therefore$ Area of garden = 325 m^2

Cost of developing garden = Rate $\times$ Area of garden

= 55 $\times$ 325

$\therefore$ Cost of developing garden = Rs. 17875

$\therefore$ Cost of developing garden is Rs. 17875

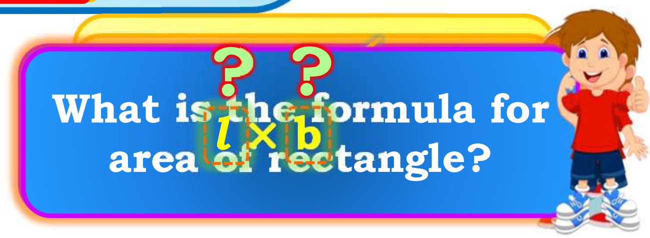
Cost of developing garden = Rate $\times$ Area of garden

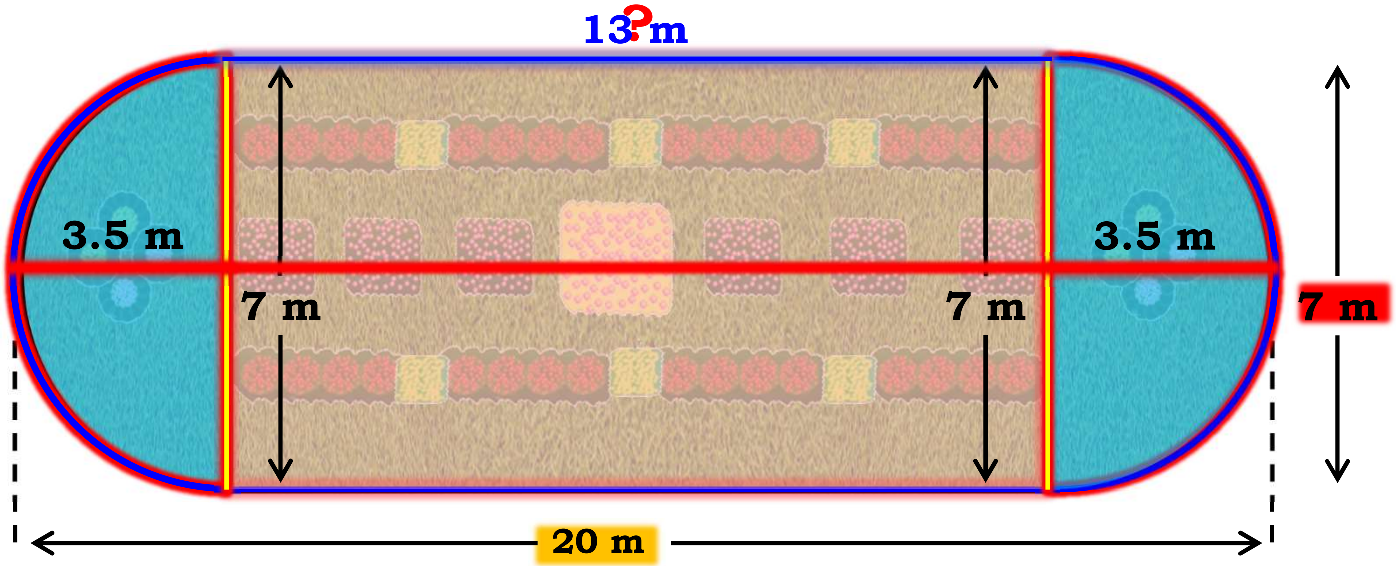
Q. The shape of a garden is rectangular in the middle and semi-circular at the ends as shown in the diagram. Find the area and the perimeter of this garden.

Sol. Radius of semicircle = $\frac{7}{2}$ = 3.5 m

Length of rectangle = 20 – 3.5 – 3.5 = 13 m

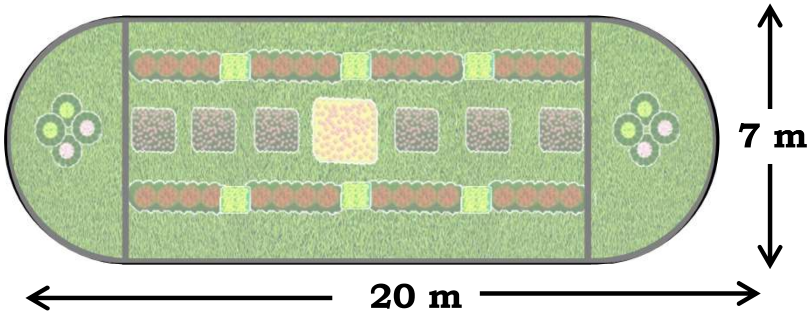
Breadth of rectangle = 7 m





ar(Garden) = 2 × ar(semicircle) + ar(rectangle)

Q. The shape of a garden is rectangular in the middle and semi-circular at the ends as shown in the diagram. Find the area and the perimeter of this garden.



Sol. Radius of semicircle = $\frac{7}{2}$ = 3.5 m

Length of rectangle = 20 – 3.5 – 3.5 = 13 m

Breadth of rectangle = 7 m

Area of two semicircles = $2 \times \frac{1}{2} \pi r^2$

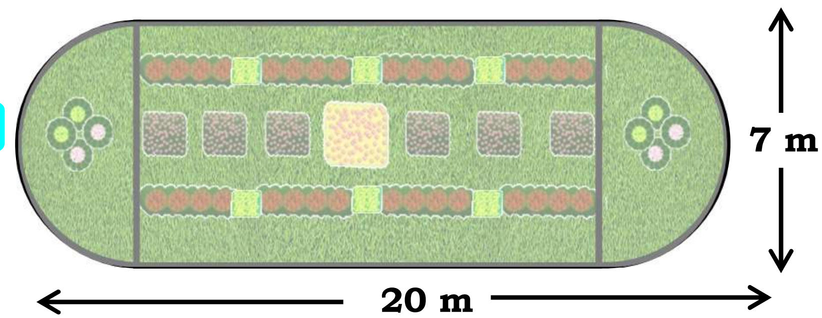
$$= \cancel{2} \times \frac{1}{\cancel{2}} \times \frac{\overset{11}{\cancel{22}}}{\cancel{7}} \times \frac{\cancel{7}}{\cancel{2}} \times \frac{7}{2}$$

$$= \frac{77}{2}$$

∴ Area of two semicircles = 38.5 m^2

ar(Garden) = 2 × ar(semicircle) + ar(rectangle)

Q. The shape of a garden is rectangular in the middle and semi-circular at the ends as shown in the diagram. Find the area and the perimeter of this garden.



Sol. Radius of semicircle $= \frac{7}{2} = 3.5$ m

Length of rectangle $= 20 - 3.5 - 3.5 = 13$ m

Breadth of rectangle $= 7$ m

Area of rectangular field $= l \times b$

$= 13 \times 7$

$\therefore$ Area of rectangular field $= 91\ m^2$

ar(Garden) = $2 \times$ ar(semicircle) + ar(rectangle)

$= 38.5 + 91$

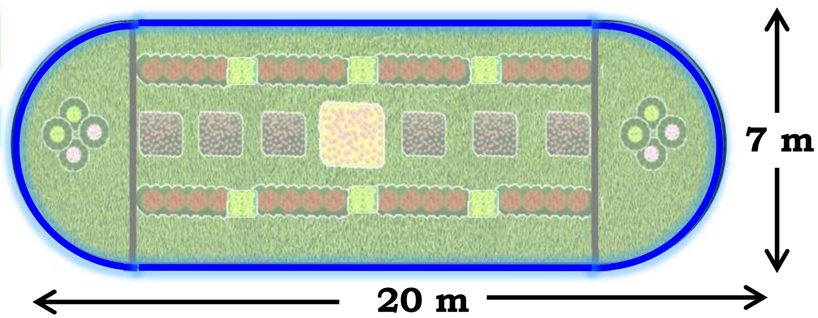
Area of garden $= 129.5\ m^2$

Area of two semicircles $= 38.5$ m

ar(Garden) = $2 \times$ ar(semicircle) + ar(rectangle)

Q. The shape of a garden is rectangular in the middle and semi-circular at the ends as shown in the diagram. Find the area and the perimeter of this garden.

Sum of all sides



Sol. Radius of semicircle $= \frac{7}{2}$ =

Length of rectangle $= 20 - 3.5 - 3.5 = 13$ m

Breadth of rectangle $= 7$ m

Perimeter of garden $= 2 \times$ Length of rectangle $+ 2 \times$ Length of semicircle

$$= 2 \times 13 + \left[2 \times \frac{\cancel{22}^{11}}{\cancel{7}} \times \frac{\cancel{7}}{\cancel{2}}\right]$$

Perimeter of garden = Length of rectangle +

semicircle

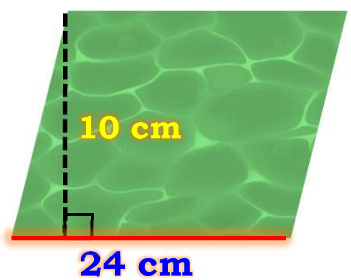
rectangle

semicircle

What is the formula for circumference of semicircle?

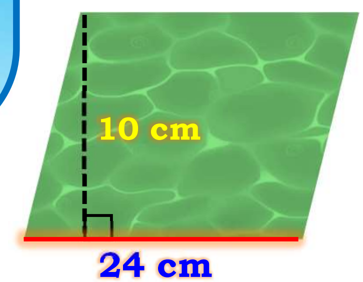
πr

Q. A flooring tile has the shape of a parallelogram whose base is 24 cm and the corresponding height is 10 cm. How many such tiles are required to cover a floor of area 1080 m^2 ?



$$\text{Number of tiles} = \frac{\text{Area of the floor}}{\text{Area of one Tile}}$$

Q. A flooring tile has the shape of a parallelogram whose base is 24 cm and the corresponding height is 10 cm. How many such tiles area required to cover a floor of area 1080 m^2 ?



Sol. Base (b) = 24 cm $= \dfrac{24}{100}$ = 0.24 m

Height (h) = 10 cm $= \dfrac{10}{100}$ = 0.1 m

Area of the floor = 1080 m^2

Area of one tile = Base × Height

$= 0.24 \times 0$

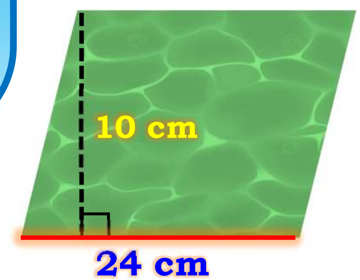
Area of one tile = 0.024 m^2

We know,

Area of parallelogram = base × height

Number of tiles $= \dfrac{\text{Area of the floor}}{\text{Area of one Tile}}$

Q. A flooring tile has the shape of a parallelogram whose base is 24 cm and the corresponding height is 10 cm. How many such tiles area required to cover a floor of area 1080 m^2 ?



Sol. Number of tiles $= \dfrac{\text{Area of the floor}}{\text{Area of one tile}}$

$$= \frac{1080 \times 1000}{0.024 \times 1000}$$

$$= \frac{\overset{90}{\cancel{1080}} \times \overset{500}{\cancel{1000}}}{\underset{\cancel{2}}{\cancel{24}}}$$

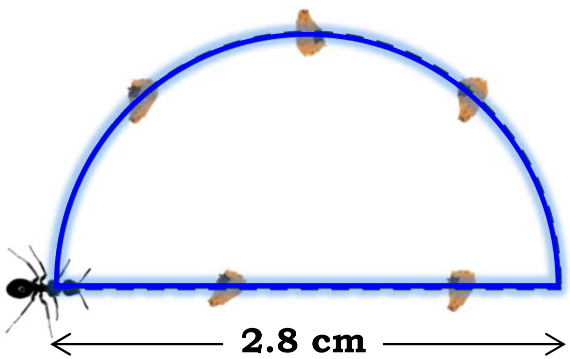
Area of the floor = 1080 m^2

Number of tiles = ...000

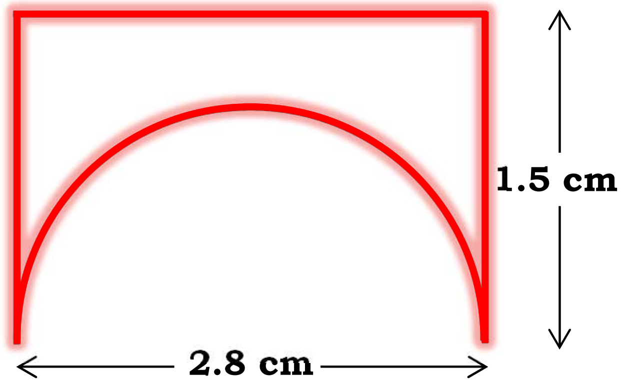
Area of one tile = 0.024 m^2

Number of tiles $= \dfrac{\text{Area of the floor}}{\text{Area of one tile}}$

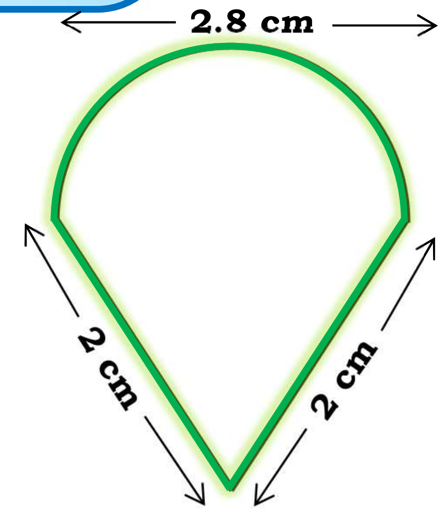
Q. An ant is moving around a few food pieces of different shapes scattered on the floor. For which food-piece would the ant have to take a longer round?



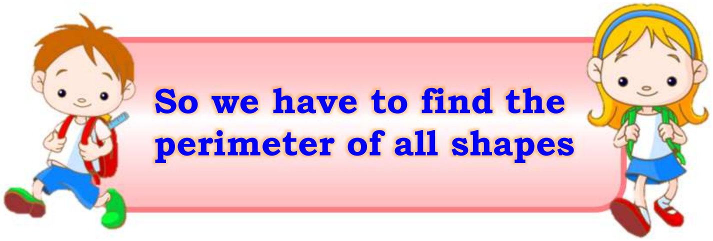
(a)



(b)

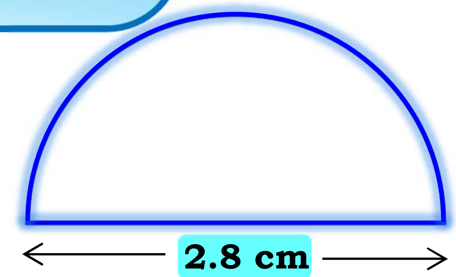


(c)



Q. An ant is moving around a few food pieces of different shapes scattered on the floor. For which food-piece would the ant have to take a longer round?

Perimeter of shape (a) = Diameter + circumference of semicircle



(a)

Sol. Diameter = 2.8 cm

$\therefore$ Radius $= \dfrac{\text{Diameter}}{2} = \dfrac{2.8}{2} = 1.4$ cm

Circumference of semicircle = πr

$$= \frac{22}{\cancel{7}} \times \overset{0.2}{\cancel{1.4}}$$

$\therefore$ Circumference of semicircle = 4.4 cm

Perimeter of shape (a) = Diameter + circumference of semicircle

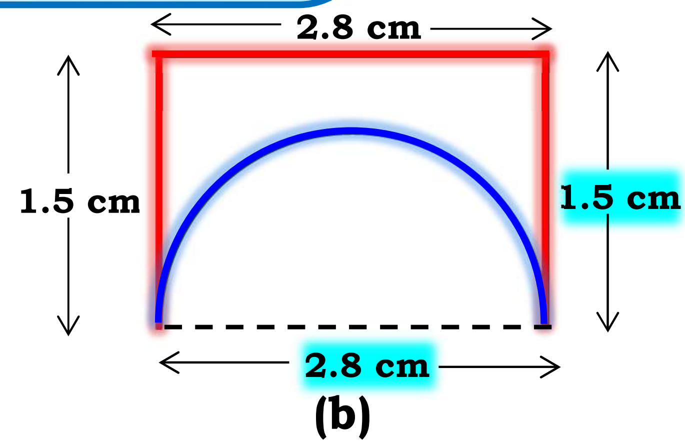
+ 4.4

$\therefore$ cm

What is the formula for circumference of semicircle?

πr

Q. An ant is moving around a few food pieces of different shapes scattered on the floor. **For which food-piece would the ant have to take a longer round?**



Sol. Diameter = 2.8 cm

$\therefore$ Radius $= \dfrac{\text{Diameter}}{2} = \dfrac{2.8}{2} = 1.4$ cm

Circumference of semicircle $= \pi r$

$= \dfrac{22}{\cancel{7}} \times \overset{0.2}{\cancel{1.4}}$

$\therefore$ ... = 4.4 cm

What is the formula for circumference of semicircle?

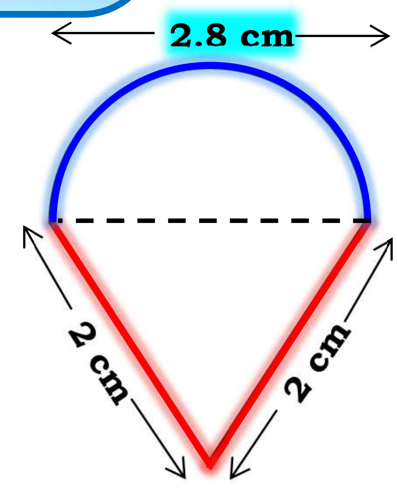
πr

... + 2.8 + 1.5 + 4.4

$\therefore$ Perimeter of shape (b) = 10.2 cm

Perimeter of shape (a) = 7.2 cm

Q. An ant is moving around a few food pieces of different shapes scattered on the floor. **For which food-piece would the ant have to take a longer round?**



(c)

Sol. Diameter = 2.8 cm

$\therefore$ Radius $= \dfrac{\text{Diameter}}{2} = \dfrac{2.8}{2} = 1.4$ cm

Circumference of semicircle $= \pi r$

$= \dfrac{22}{\cancel{7}} \times \overset{0.2}{\cancel{1.4}}$

$\therefore$ What is the formula for circumference of semicircle? πr

$= 4.4$ cm

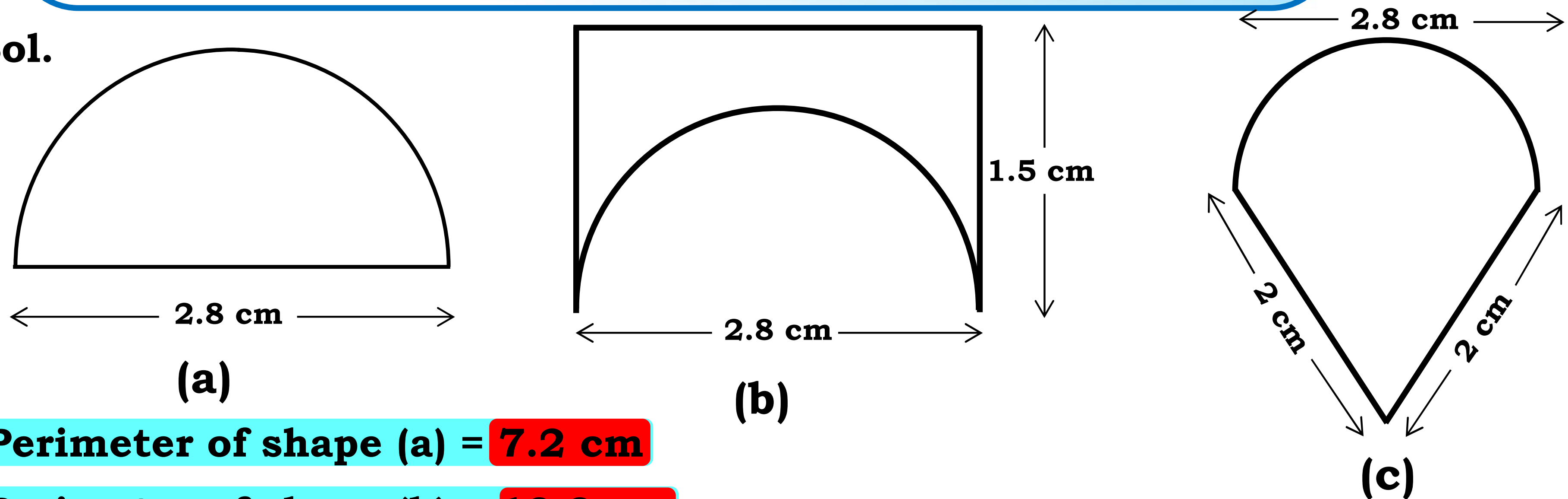
$4.4 + 2$

$\therefore$ Perimeter of shape (c) = 8.4 cm

Perimeter of shape (a) = 7.2 cm
Perimeter of shape (b) = 10.2 cm

Q. An ant is moving around a few food pieces of different shapes scattered on the floor. For which food-piece would the ant have to take a longer round?

Sol.



Perimeter of shape (a) = 7.2 cm

Perimeter of shape (b) = 10.2 cm

Perimeter of shape (c) = 8.4 cm

$\therefore$ 10.2 > 8.4 > 7.2

Hence for shape (b) food piece, the ant would take a longer round.

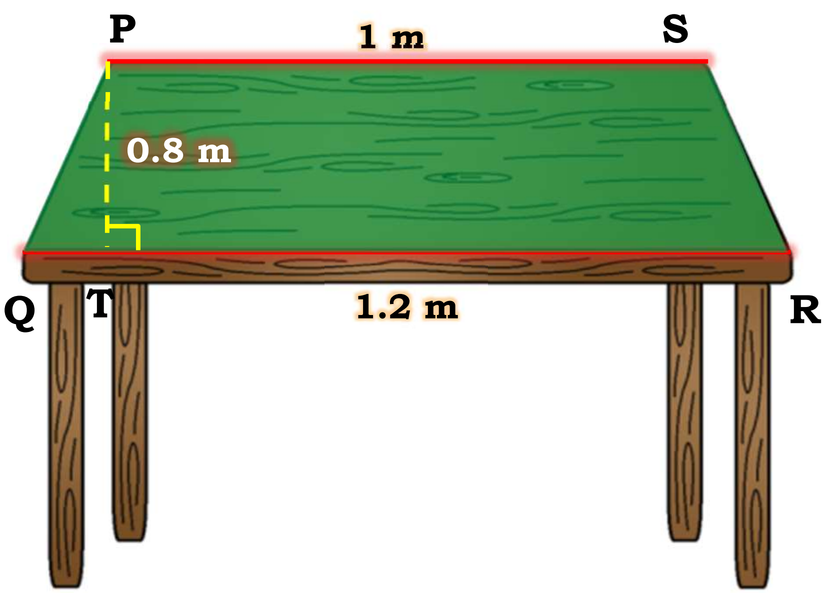
Q. The shape of the top surface of a table is a trapezium. Find its area of its parallel sides are 1 m and 1.2 m and perpendicular distance between them is 0.8 m.

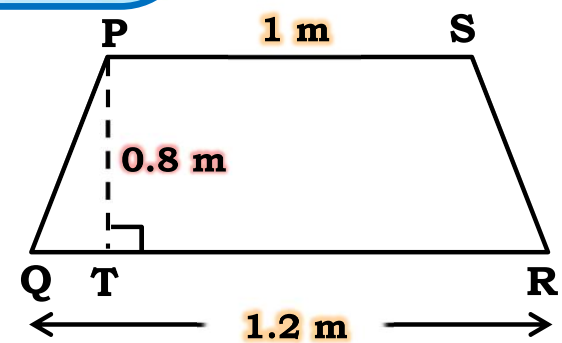
Sol. Let □PQRS be a trapezium

PS = 1 m

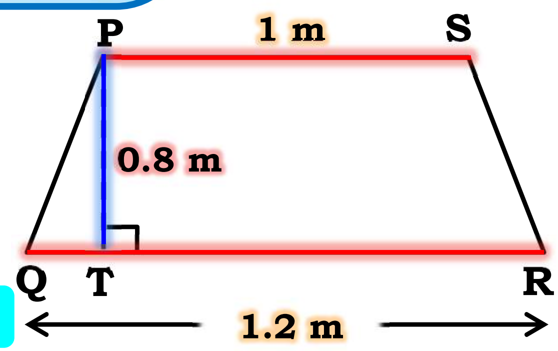
QR = 1.2 m

PT = 0.8 m





Q. The shape of the top surface of a table is a trapezium. **Find its area** of its parallel sides are 1 m and 1.2 m and perpendicular distance between them is 0.8 m.



Sol. Let □PQRS be a trapezium

PS = 1 m

QR = 1.2 m

PT = 0.8 m

$$\text{Area of the trapezium} = \frac{1}{2} \times \left[\begin{array}{c}\text{Sum of lengths} \\ \text{of parallel sides}\end{array}\right] \times \text{Height}$$

$$= \frac{1}{2} \times (PS + QR) \times PT$$

$$= \frac{1}{2} \times (1 + 1.2) \times 0.8$$

$$= \frac{1}{2} \times 2.2 \times 0.8$$

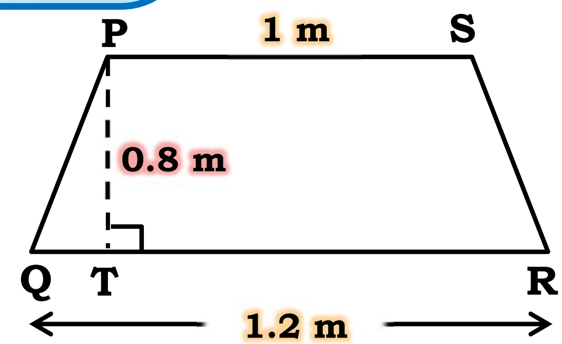
$$= \frac{1}{2} \times \frac{22}{10} \times \frac{8}{10}$$

What is the formula for area of trapezium?

$$\frac{1}{2} \times \left\{\begin{array}{c}\text{sum of lengths of} \\ \text{parallel sides}\end{array}\right\} \times h$$

Q. The shape of the top surface of a table is a trapezium. **Find its area** of its parallel sides are 1 m and 1.2 m and perpendicular distance between them is 0.8 m.

Sol. Let □PQRS be a trapezium



PS = 1 m

QR = 1.2 m

PT = 0.8 m

$$\text{Area of the trapezium} = \frac{1}{\cancel{2}} \times \frac{\overset{11}{\cancel{22}}}{10} \times \frac{8}{10}$$

$$= \frac{88}{100}$$

$$= 0.88 \text{ m}^2$$

$\therefore$ **Area of the trapezium is 0.88 m²**

Q. The area of a trapezium is 34 cm^2 and the length of one of the parallel sides is 10 cm and its height is 4 cm. Find the length of the other parallel side.

Sol. Let □PQRS be a trapezium

PS ∥ QR

Area = 34 cm^2

Length one parallel side = 10 cm

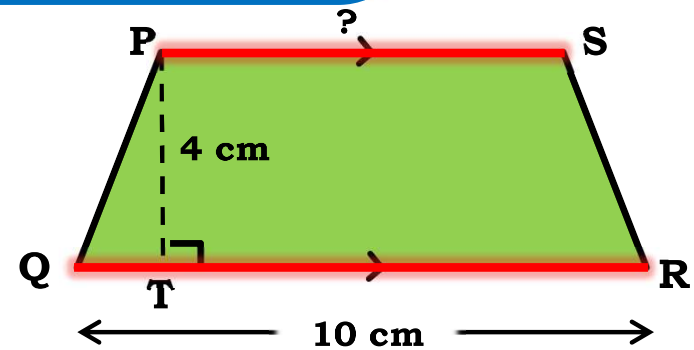
QR = 10 cm

Height = 4 cm

PT = 4 cm

PS = ?

Consider trapezium PQRS



Area of the trapezium = $\frac{1}{2} \times$ [Sum of lengths of parallel sides] $\times$ Height

[Sum of lengths of parallel sides] $\times \cancel{4}^{2}$

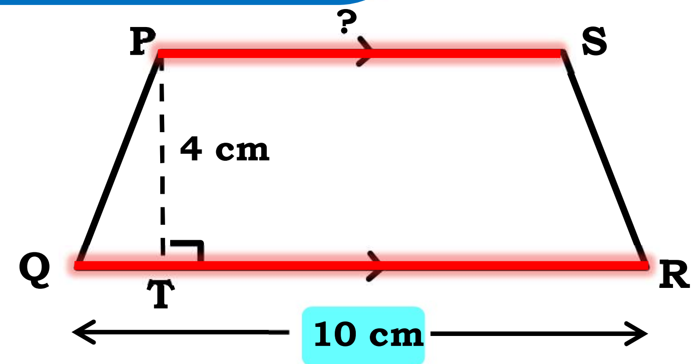
What is the formula for area of trapezium?

$\frac{1}{2} \times$ [sum of lengths of parallel sides] $\times h$

$\therefore \quad \frac{\cancel{34}}{\cancel{2}}$ = Sum of lengths of parallel sides

Q. The area of a trapezium is 34 cm^2 and the length of one of the parallel sides is 10 cm and its height is 4 cm.
Find the length of the other parallel side.

Sol. Sum of lengths of parallel sides = 17 cm



$PS + QR = 17$

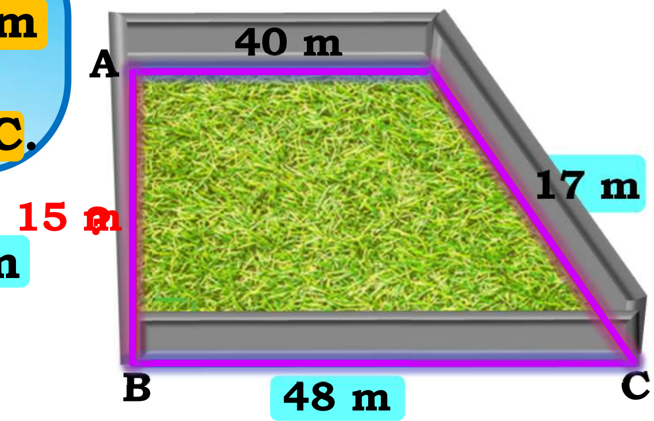
$\therefore \quad PS + 10 = 17$

$\therefore \quad PS = 17 - 10$

$\therefore \quad PS = 7$ cm

$\therefore$ Length of the other side is 7 cm.

Q. Length of the fence of a trapezium shaped field ABCD is 120 m. If BC = 48 m, CD = 17 m and AD = 40 m, find the area of this field. AB is perpendicular to parallel sides AD & BC.



Sol.

Length of fence = Perimeter of trapezium = 120 m

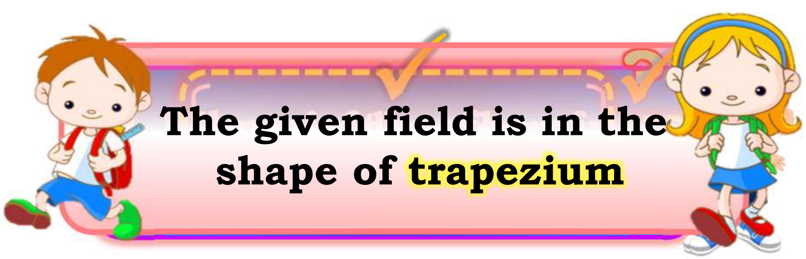
$$AB + BC + CD + AD = 120$$

$$\therefore \quad AB + \underline{48 + 17 + 40} = 120$$

$$\therefore \quad AB + 105 = 120$$

$$\therefore \quad AB = 120 - 105$$

$$\therefore \quad AB = 15 \text{ m}$$



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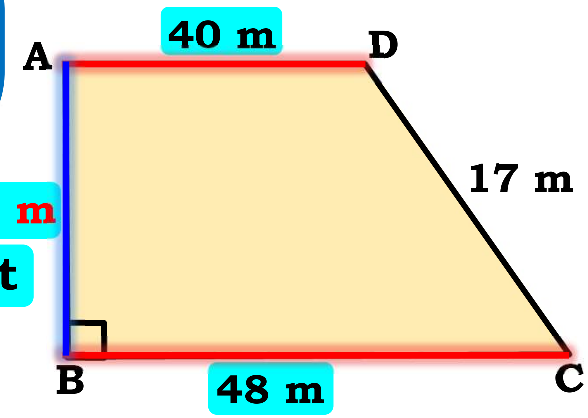


Sol.

$$\text{Area of the trapezium} = \frac{1}{2} \times \left[\begin{array}{l}\text{Sum of lengths}\\ \text{of parallel sides}\end{array}\right] \times \text{Height}$$

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

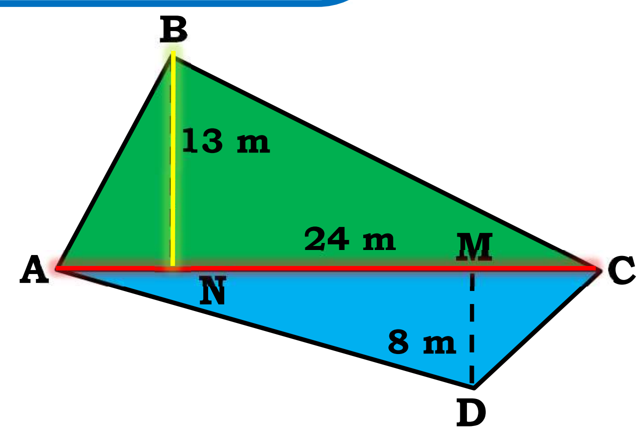
$$= \frac{1}{2} \times (40 + 48) \times 15$$

$$= \frac{1}{2} \times 88 \times 15$$

$$\frac{1}{2} \times \left[\begin{array}{l}\text{sum of lengths of}\\ \text{parallel sides}\end{array}\right] \times h$$

He ... CD is 660 m^2.

Q. The diagonal of a quadrilateral shaped field is 24 m and the perpendiculars dropped on it from the remaining opposite vertices are 8 m and 13 m. Find the area of the field.



Sol. Let □ABCD be a quadrilateral

AC = 24 m

MD = 8 m

BN = 13 m

Consider □ABCD

Area of $\Delta ABC = \frac{1}{2} \times \text{Base} \times \text{Height}$

$= \frac{1}{2} \times AC \times BN$

$= \frac{1}{2} \times 24 \times 13$

What is the formula for area of triangle ?

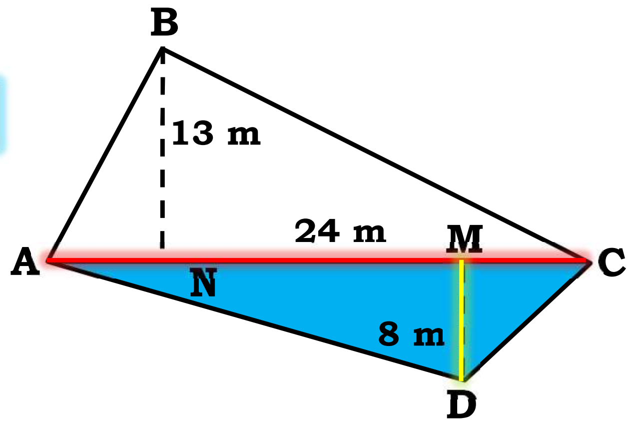
$\frac{1}{2} \times$ Base $\times$ Height

$= 12 \times 13$

$\therefore$ Area of $\Delta ABC = 156$ m

Ar(□ABCD) = Ar(ΔABC) + Ar(ΔADC)

Q. **The diagonal of a quadrilateral shaped field is 24 m and the perpendiculars dropped on it from the remaining opposite vertices are 8 m and 13 m. Find the area of the field.**



Sol. Let □ABCD be a quadrilateral

AC = 24 m

MD = 8 m

BN = 13 m

Area of ΔABC = 156 m

Area of ΔADC $= \frac{1}{2} \times \text{Base} \times \text{Height}$

$= \frac{1}{2} \times AC \times MD$

What is the formula for area of triangle ?

$\frac{1}{2} \times$ Base $\times$ Height

$= \frac{1}{\cancel{2}} \times \cancel{24}^{12} \times 8$

$= 12 \times 8$

∴ Area of ΔADC = 96 m

Ar(□ABCD) = Ar(ΔABC) + Ar(ΔADC)

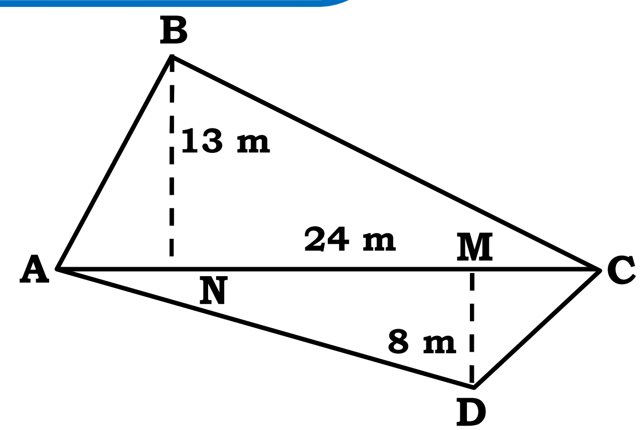
Q. **The diagonal of a quadrilateral shaped field is 24 m and the perpendiculars dropped on it from the remaining opposite vertices are 8 m and 13 m. Find the area of the field.**

Sol. $Ar(\square ABCD) = Ar(\Delta ABC) + Ar(\Delta ADC)$

$= 156 + 96$

$\therefore Ar(\square ABCD) = 252\ m^2$

$\therefore$ **Area of the field is 252 m^2**



Area of ΔABC = 156 m

Area of ΔADC = 96 m

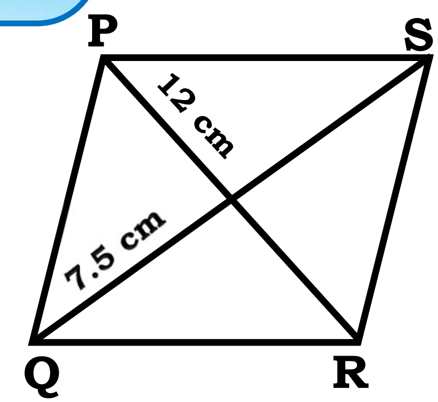
$Ar(\square ABCD) = Ar(\Delta ABC) + Ar(\Delta ADC)$

Q. The diagonals of a rhombus are 7.5cm and 12cm long. Find its area.

Sol. $d_1 = 7.5$ cm

$d_2 = 12$ cm

Consider rhombus PQRS



Area of the Rhombus $= \frac{1}{2} \times d_1 \times d_2$

What is the formula for area of rhombus?

$\frac{1}{2} \times d_1 \times d_2$

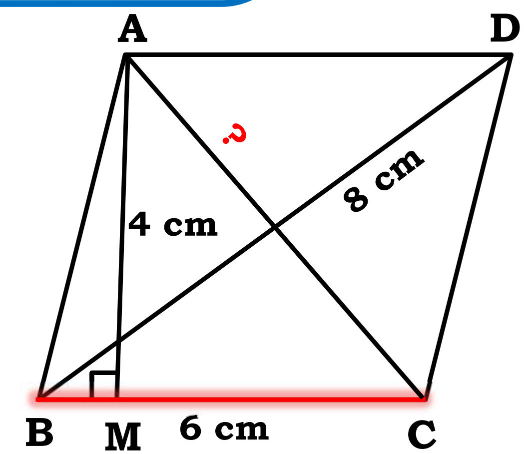
$= \frac{1}{\cancel{2}_{1}} \times 7.5 \times \overset{6}{\cancel{12}}$

$= 7.5 \times 6$

$= 45 \text{ cm}^2$

$\therefore$ Area of a rhombus is 45 cm^2

Q. Find the area of a rhombus whose side is 6 cm and whose altitude is 4 cm. If one of its diagonals is 8 cm long, find the length of the other diagonal.



Sol. Let □ABCD be a rhombus

Let □ABCD be a parallelogram

BC = 6 cm

AM = 4 cm

BD = 8 cm

Area of the parallelogram = Base × Height

= 6 × 4

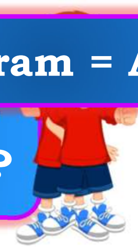
∴ Area of the parallelogram = 24 cm

∴ Area of the rhombus = 24 cm

Area of parallelogram = Area of rhombus

What is the formula for area of a parallelogram ?

Base × Height



Q. **Find the area of a rhombus whose side is 6 cm and whose altitude is 4 cm. If one of its diagonals is 8 cm long, find the length of the other diagonal.**

Sol. Let □ABCD be a rhombus

Area of the rhombus = 24 cm

BC = 6 cm

AM = 4 cm

BD = 8 cm

Area of the Rhombus $= \frac{1}{2} \times d_1 \times d_2$

$\therefore \quad 24 = \frac{1}{\cancel{2}} \times \cancel{8}^{4} \times d_2$

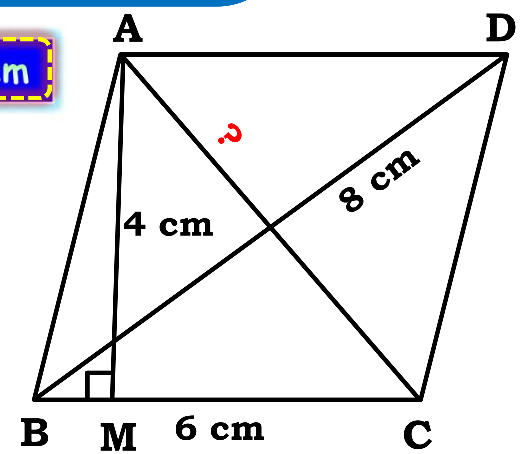
$= 4 \times d_2$

$= \frac{\cancel{24}^{6}}{\cancel{4}_{1}}$

$\therefore \quad d_2 = 6 \text{ cm}$

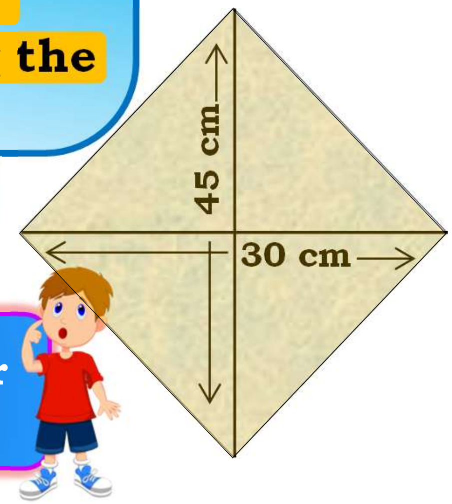
What is the formula for area of rhombus ?

$\frac{1}{2} \times d_1 \times d_2$



$\therefore$ **The length of the other diagonal is 6 cm.**

Q. The floor of a building consists of 3000 tiles which are rhombus shaped and each of its diagonals are 45 cm and 30 cm in length. Find the total cost of polishing the floor, if the cost per m^2 is Rs 4.



Sol.

Cost of polishing = Rate × Area(3000 tiles)

$d_1 = 30 \text{ cm} = \frac{3\cancel{0}}{10\cancel{0}} \text{ m} = \frac{3}{10} \text{ m}$

$d_2 = 45 \text{ cm} = \frac{\cancel{45}^{9}}{\cancel{100}_{20}} \text{ m} = \frac{9}{20} \text{ m}$

$\text{Area(3000 tiles)} = 3000 \times \frac{1}{2} \times d_1 \times d_2$

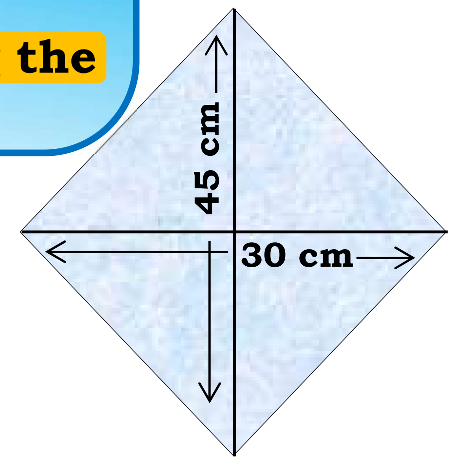
$\frac{1}{2} \times d_1 \times d_2$

$\times \frac{1}{\cancel{2}} \times \frac{3}{1\cancel{0}} \times \frac{9}{2\cancel{0}}$

$= \frac{\ldots 3 \times 9}{2} = \frac{405}{2}$

$\therefore$ Area(3000 tiles) $= 202.5 \text{ m}^2$

Q. The floor of a building consists of 3000 tiles which are rhombus shaped and each of its diagonals are 45 cm and 30 cm in length. Find the total cost of polishing the floor, if the cost per m^2 is Rs 4.



Sol.

Cost of polishing= Rate × Area(3000 tiles)

Cost of polishing = Rate × Area(3000 tiles)

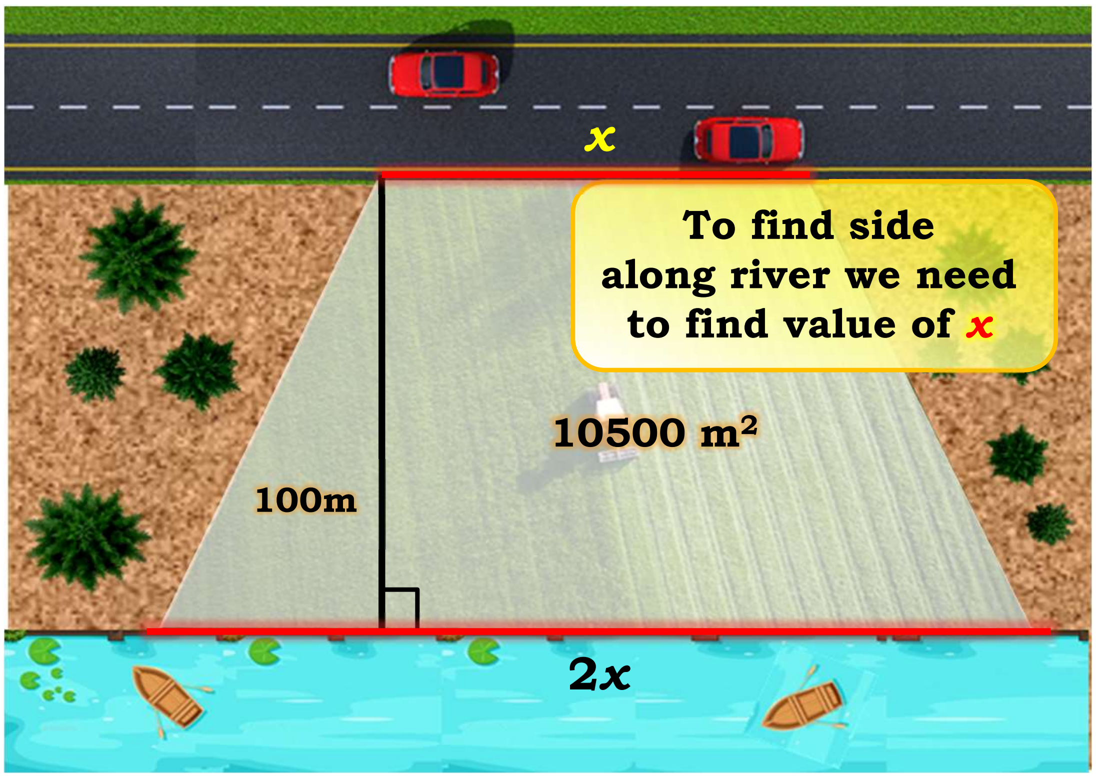
$= 4 \times 202.5$

= Rs. 810

Total cost of polishing the floor is Rs. 810

Area of 3000 tiles = 202.5 m^2

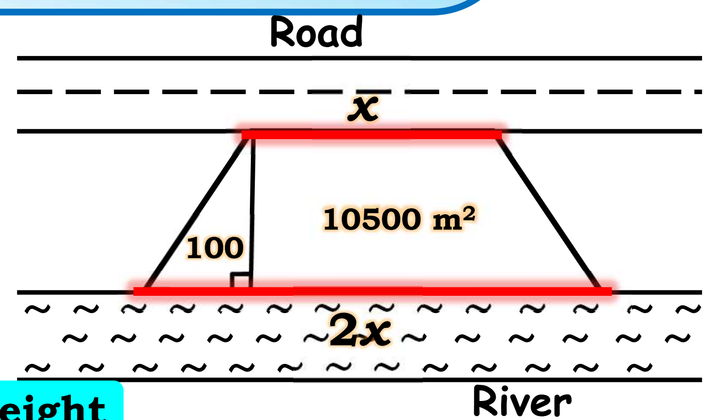
Q. Mohan wants to buy a trapezium shaped field. Its side along the river is parallel to and twice the side along the road. If the area of this field is 10500 m^2 and the perpendicular distance between the two parallel sides is 100 m, find the length of the side along the river.



Hint : To find : x

e, side along
ver be $2x$

Q. Mohan wants to buy a trapezium shaped field. Its side along the river is parallel to and twice the side along the road. If the area of this field is 10500 m^2 and the perpendicular distance between the two parallel sides is 100 m, find the length of the side along the river.



Sol. Let side along the road be x

Hint : To find : x

$\therefore$ Side along the river $2x$

Height = 100 m

Area of trapezium = 10500m^2

Area of the trapezium $= \frac{1}{2} \times$ [Sum of lengths of parallel sides] $\times$ Height

$1 \ldots x + 2x) \times 100$

$\ldots 3x \times 100$

What is the formula for area of trapezium?

$\frac{1}{2} \times$ [sum of lengths of parallel sides] $\times$ h

$$\therefore \quad \frac{\overset{35}{\cancel{10500}} \times 2}{\cancel{3} \times 1\cancel{00}} = x$$

Q. Mohan wants to buy a trapezium shaped field. Its side along the river is parallel to and twice the side along the road. If the area of this field is 10500 m^2 and the perpendicular distance between the two parallel sides is 100 m, find the length of the side along the river.

Sol. $\therefore\ x = 35 \times 2$

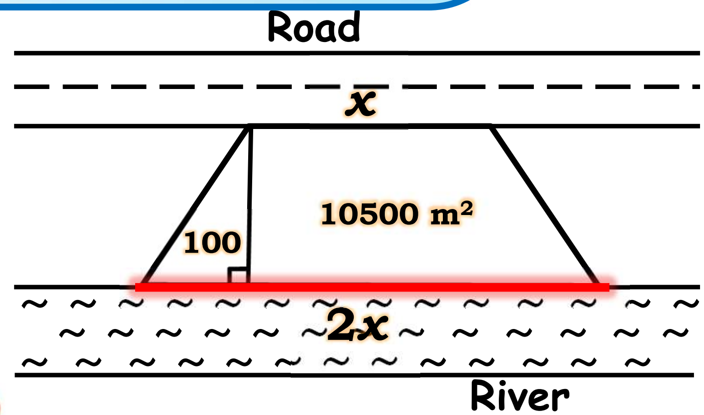
Hint : To find : x

$\therefore\ x = 70$

Side along the river $= 2x$

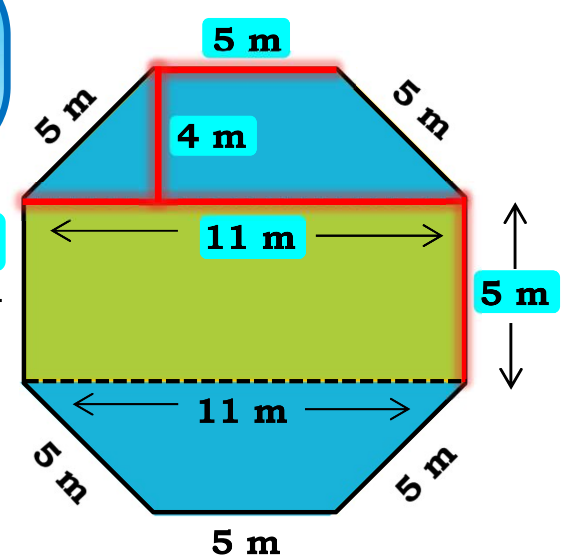
$= 2 \times 70$

$\therefore$ Side along the river $= 140$ m



Hence, length of side along the river is 140 m

Q. Top surface of a raised platform is in the shape of a regular octagon as shown in the figure. Find the area of the octagonal surface.



Sol.

Area of 2 trapezium = $2 \times \frac{1}{2} \times$ [Sum of lengths of parallel sides] $\times$ Height

= $\frac{1}{2} \times (5 + 11) \times 4$

$\times 4$

What is the formula for area of rectangle?

Length × breadth

$\therefore$ Area of 2 trapezium = $64\ m^2$

Area of rectangle = Length × Breadth

= 11 ×

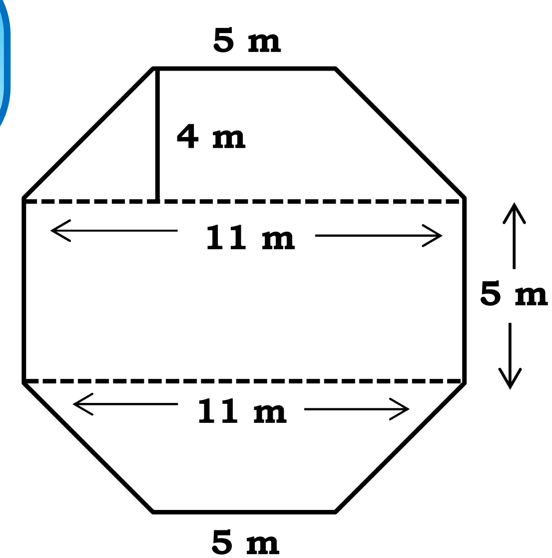
$\therefore$

What is the formula for area of trapezium?

$\frac{1}{2} \times$ [sum of lengths of parallel sides] $\times h$

ar(Regular octagon) = 2 × ar(trapezium) + ar(rectangle)

Q. **Top surface of a raised platform is in the shape of a regular octagon as shown in the figure. Find the area of the octagonal surface.**



Sol. ar(Regular octagon) = 2 × ar(trapezium) + ar(rectangle)

= 64 + 55

∴ ar(Regular octagon) = 119 m^2

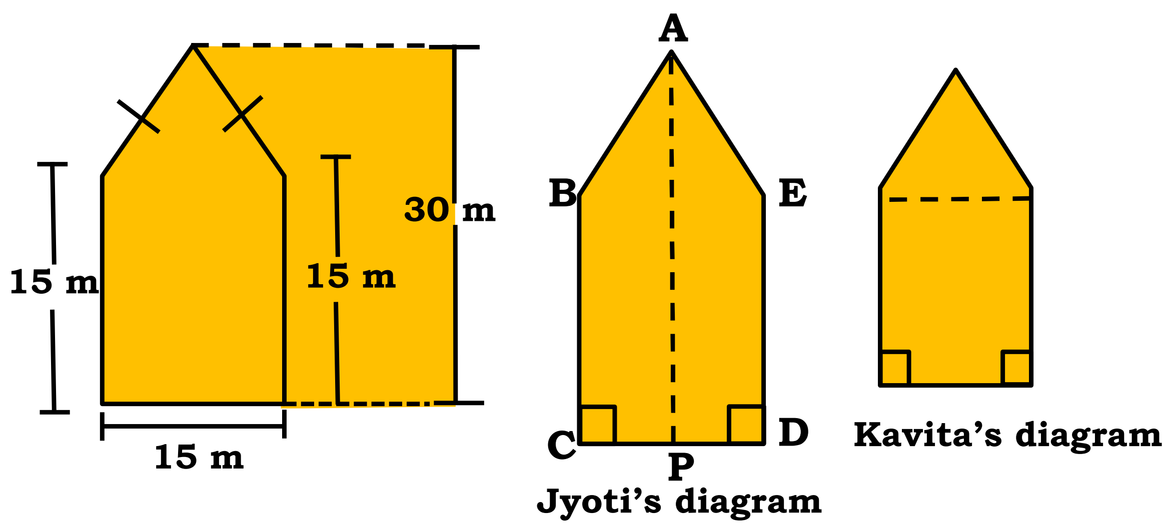
Hence, area of the octagonal surface is 119 m^2

2 ar(trapezium) = 64 m^2

ar(rectangle) = 55 m^2

ar(Regular octagon) = 2 × ar(trapezium) + ar(rectangle)

Q. There is a pentagonal shaped park as shown in the figure. For finding its area Jyoti and Kavita divided it in two different ways. Find the area of this park using both ways.



The given figure is a pentagon

$\therefore$ We need to find the area of pentagonal park

Q. There is a pentagonal shaped park as shown in the figure.
For finding its area Jyoti and Kavita divided it in two different ways.
Find the area of this park using both ways.

Sol. first way : By Jyoti's diagram,

Area of pentagon ABCDE = Area of trapezium ABCP

+ Area of trapezium AEDP

$= \frac{1}{2}(AP + BC) \times CP + \frac{1}{2}(ED + AP) \times DP$

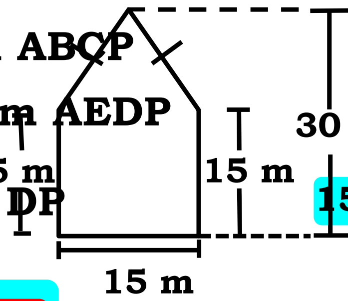
$= \frac{1}{2}(30 + 15) \times CP + \frac{1}{2}(15 + 30) \times DP$

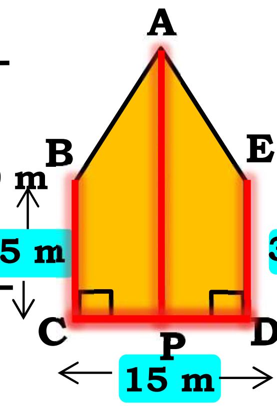
What is the formula for finding area of a Trapezium?

$\frac{1}{2} \times$ (sum of parallel side) $\times$ height

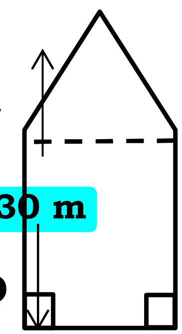
$= \frac{1}{2} \times 45 \times 15 = 337.75\ m^2$

$\therefore$ Area of park is $337.75\ m^2$





Jyoti's diagram



Kavita's diagram

Q. There is a pentagonal shaped park as shown in the figure. For finding its area Jyoti and Kavita divided it in two different ways. Find the area of this park using both ways.

Sol. Second way : By Kavita's diagram

Here, a perpendicular AM is drawn to BE

AM = 30 – 15 = 15m

Area of pentagon ABCDE = Area of Δ ABE + Area of square BCDE

$$= \frac{1}{2} \times BE \times AM + (Side)^2$$

$$\times 15 \times 15 + 15 \times 15$$

$$\times \overset{112.5}{\cancel{225}} + 225$$

.5 + 225

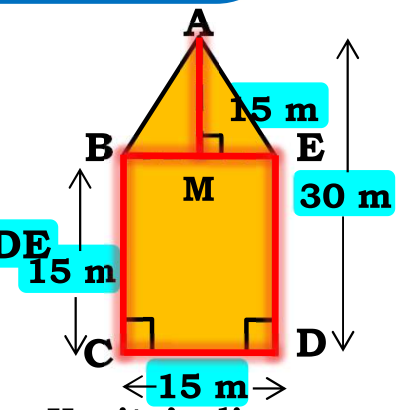
$$= 337.5 \text{ m}^2$$

What is the formula for

$\frac{1}{2}$ × base × height

What is the formula for finding area of a square.

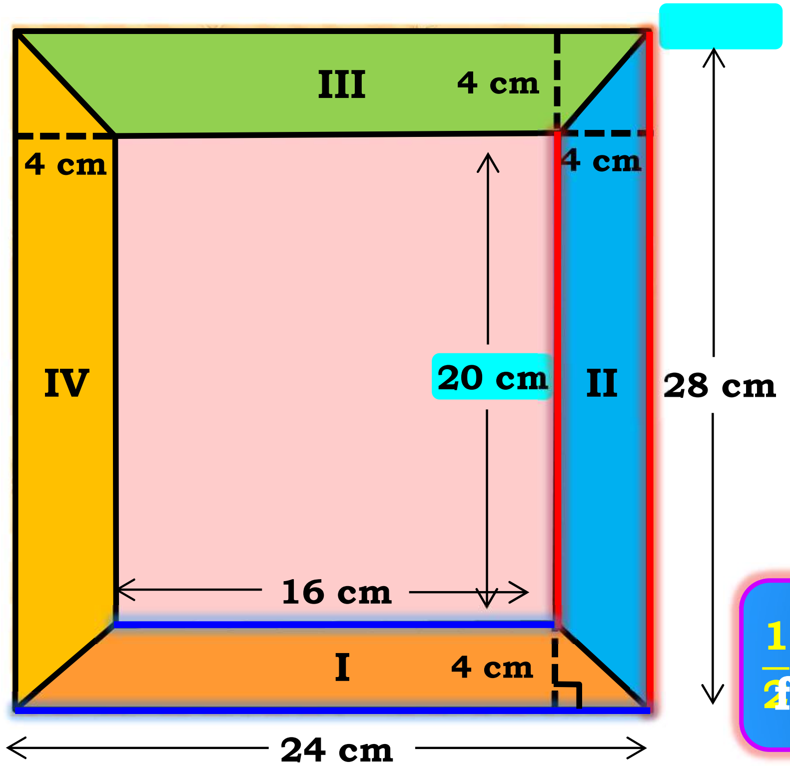
$(Side)^2$

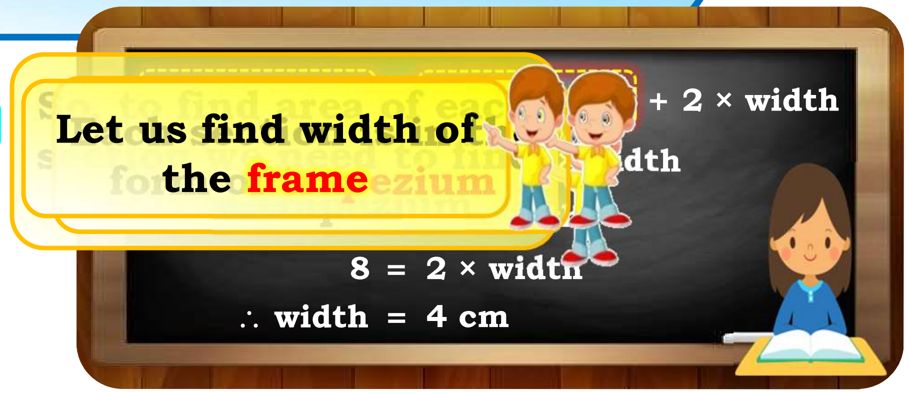


Kavita's diagram

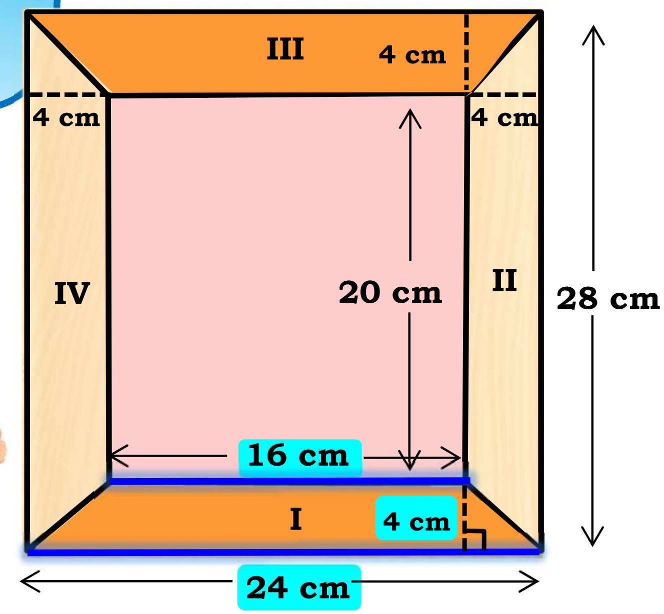
Hence, total area of pentagon shaped park is 337.5 m².

Q. Diagram of the adjacent picture frame has outer dimensions 24 cm × 28 cm and the inner dimensions 16 cm × 20 cm. Find the area of each section of the frame, if the width of each section is same.





Q. Diagram of the adjacent picture frame has outer dimensions 24 cm × 28 cm and the inner dimensions 16 cm × 20 cm. **Find the area of each section** of the frame, if the width of each section is same.



Sol. Area of section I $= \frac{1}{2} \times \left[\text{Sum of lengths of parallel sides}\right] \times \text{Height}$

$= \frac{1}{\cancel{2}} \times (24 + 16) \times \overset{2}{\cancel{4}}$

$= 4$

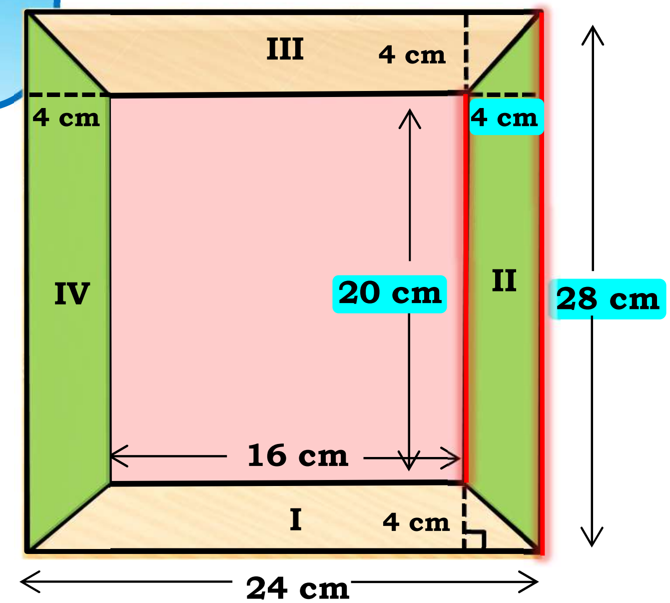
$\therefore$ Area of section I $= 8$

$\frac{1}{2} \times \left[\text{sum of lengths of parallel sides}\right] \times h$

Area of section I is 80 cm^2

Hence, Area of section III is 80 cm^2

Q. Diagram of the adjacent picture frame has outer dimensions 24 cm × 28 cm and the inner dimensions 16 cm × 20 cm. **Find the area of each section** of the frame, if the width of each section is same.



Sol. Area of section II = $\frac{1}{2} \times \left\{ \text{Sum of lengths of parallel sides} \right\} \times \text{Height}$

$= \frac{1}{2} \times (8 + 20) \times \cancel{4}^{2}$

What is the formula for area of trapezium?

$\frac{1}{2} \times \left\{ \text{sum of lengths of parallel sides} \right\} \times h$

Consider section II

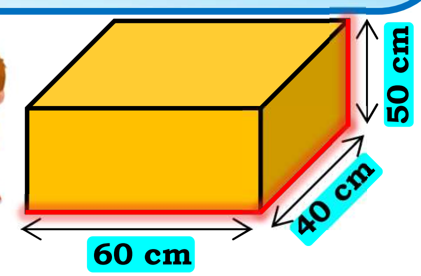
Area of section II is 96 cm^2

Hence, Area of section IV is 96 cm^2

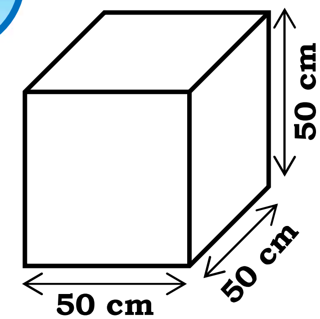
Q. There are two cuboidal boxes as shown in the adjoining figure. Which box requires the lesser amount of material to make?

Sol. l = 60 cm,
b = 40 cm,
h = 50 cm

So we are suppose to find total surface area of both the cuboids



(a)



(b)

Total surface area of the cuboid (a) $= 2\,[(l \times b) + (b \times h) + (l \times h)]$

$= 2\,[(60 \times 4$ … $(40 \times 50) + (60 \times 50)]$

What is the formula for total surface area of cuboid ?

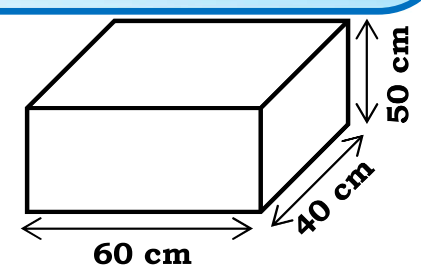
$2\,(lb + bh + lh)$

… 00 + 3000]

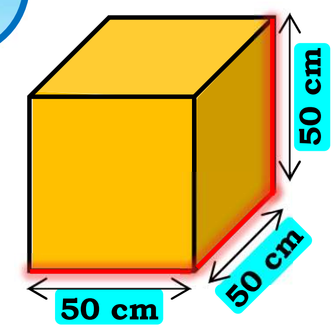
$= 2 \times 7400$

$\therefore$ Total surface area of the cuboid (a) = 14800 cm^2

Q. There are two cuboidal boxes as shown in the adjoining figure. **Which box requires the lesser amount of material to make?**



(a)



(b)

Sol. Total surface area of the cuboid (a) = 14800 cm^2

$l = 50$ cm

Total surface area of the cube (b) $= 6 \times l^2$

Since, Dimensions of cuboid are equal

Therefore it is a cube

$= 6 \times (50)^2$

$= 6 \times 2500$

$\therefore$ Total surface area of the cube (b) = 15000 cm^2

$14800 < 15000$

$\therefore$ Surface area of box (a) is less th[…] that of box (b)

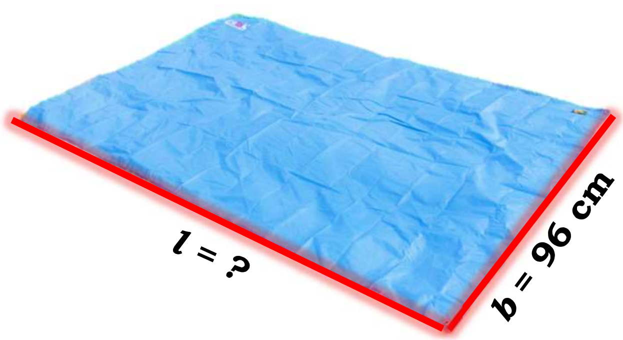
$\therefore$ Box (a) […] material to make.

What is the formula for total surface area of cube ?

$6l^2$

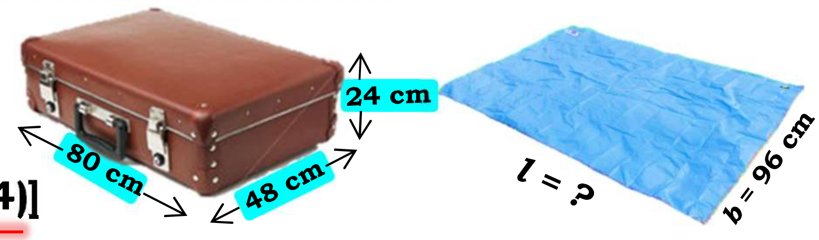
Q. A suitcase with measures 80 cm × 48 cm × 24 cm is to be covered with a tarpaulin cloth. How many metres of tarpaulin of width 96 cm is required to cover 100 such suitcases ?

Sol. Total area of tarpaulin required = Total surface area of suitcase × 100



Q. A suitcase with measures 80 cm × 48 cm × 24 cm is to be covered with a tarpaulin cloth. **How many metres of tarpaulin of width 96 cm is required to cover 100 such suitcases ?**

Sol. Total area of tarpaulin required = $\boxed{\text{Total surface area of suitcase}}$ × 100



Total surface area of the suitcase $= 2\,[(l \times b) + (b \times h) + (l \times h)]$

$= 2\,[(80 \times 48) + (48 \times 24) + (80 \times 24)]$

$= 2\,[3840 + 1152 + 1920]$

$= 2 \times 6912$

$= 13824 \text{ cm}^2$

∴ Total surface area of the suitcase $= 13824 \text{ cm}^2$

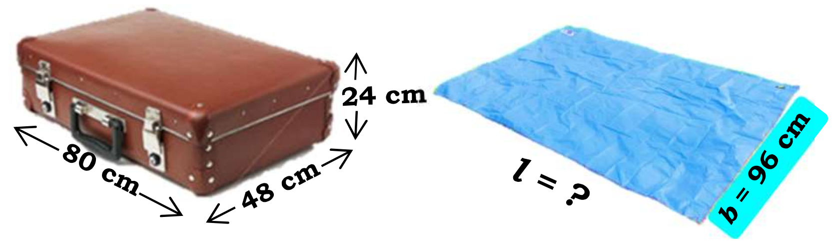
What is the formula for total surface area of cuboid ?

$2\,(lb + bh + lh)$

Q. A suitcase with measures 80 cm × 48 cm × 24 cm is to be covered with a tarpaulin cloth. How many metres of tarpaulin of width 96 cm is required to cover 100 such suitcases ?

Sol. Total area of tarpaulin required = Total surface area of suitcase × 100

Total surface area of the suitcase = 13824 cm^2



Total area of tarpaulin required = Total surface area of suitcase × 100

$\therefore \quad l \times \boxed{b} = 13824 \times 100$

$\therefore \quad l \times 96 = 13824 \times 100$

Tarpaulin is in the form of rectangle

$l = \dfrac{\cancel{13824}^{\cancel{152}\,4} \times 100}{\cancel{96}_{\cancel{8}}}$

Area of tarpaulin = $l \times b$

× 100

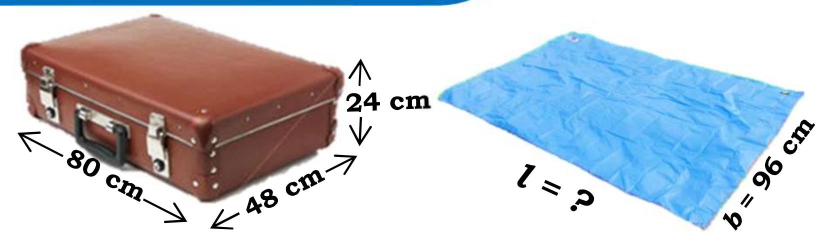
cm

Q. A suitcase with measures 80 cm × 48 cm × 24 cm is to be covered with a tarpaulin cloth. How many metres of tarpaulin of width 96 cm is required to cover 100 such suitcases ?

Sol. The tarpaulin cloth required to cover 100 suitcases $= 14400$ cm

$$= \frac{14400}{100} \text{ m}$$

$$= 144 \text{ m}$$



∴ The tarpaulin cloth required to cover 100 suitcases is 144 m.

Q. Find the side of a cube whose surface area is 600 cm^2.

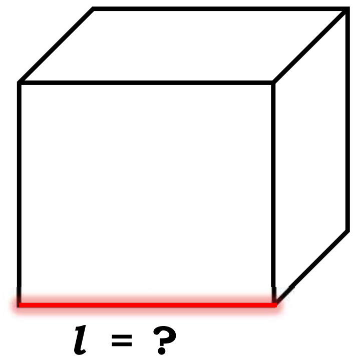
Sol. Surface area of cube $= 600\ cm^2$

$$6l^2 = 600$$

$$\therefore \quad l^2 = \frac{\cancel{600}^{\,100}}{\cancel{6}}$$

$$\therefore \quad l^2 = 100$$

$$\therefore \quad l = 10$$



$\therefore$ **The required side of the cube is 10cm**

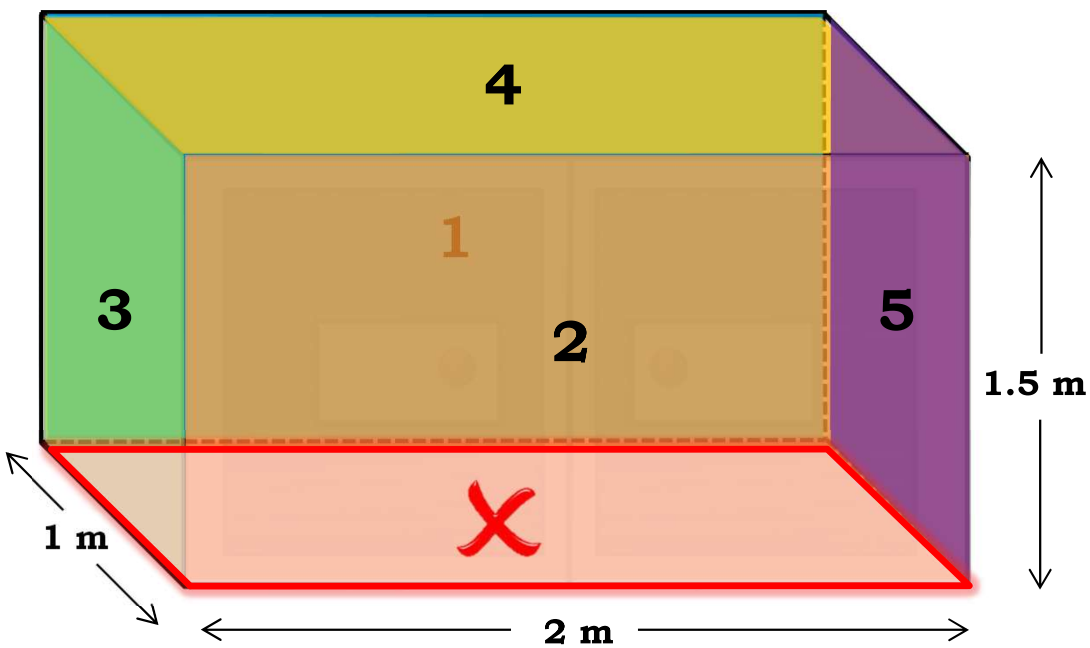
What is the formula for total surface area of cube ?

$6l^2$

Q. Rukhsar painted the outside of the cabinet of measure 1 m × 2 m × 1.5m. How much surface area did she cover if she painted all except bottom of the cabinet?

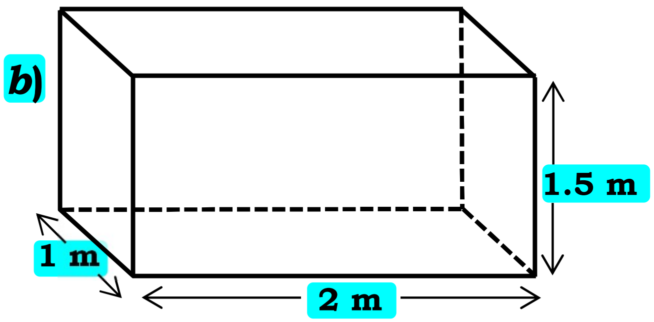
Total area to be painted = Total surface area of cuboid − Base area

$= 2[(l \times h) + (b \times h) + (l \times b)] - (l \times b)$



Q. Rukhsar painted the outside of the cabinet of measure 1 m × 2 m × 1.5m. How much surface area did she cover if she painted all except bottom of the cabinet?

Sol.



Total area to be painted $= 2\,[(l \times b) + (b \times h) + (l \times h)] - (l \times b)$

$= 2\,[(2 \times 1) + (1 \times 1.5) + (2 \times 1.5)] - (2 \times 1)$

$= 2 \times [2 + 1.5 + 3] - 2$

$= 2 \times [6.5] - 2$

$= 13 - 2$

$= 11$

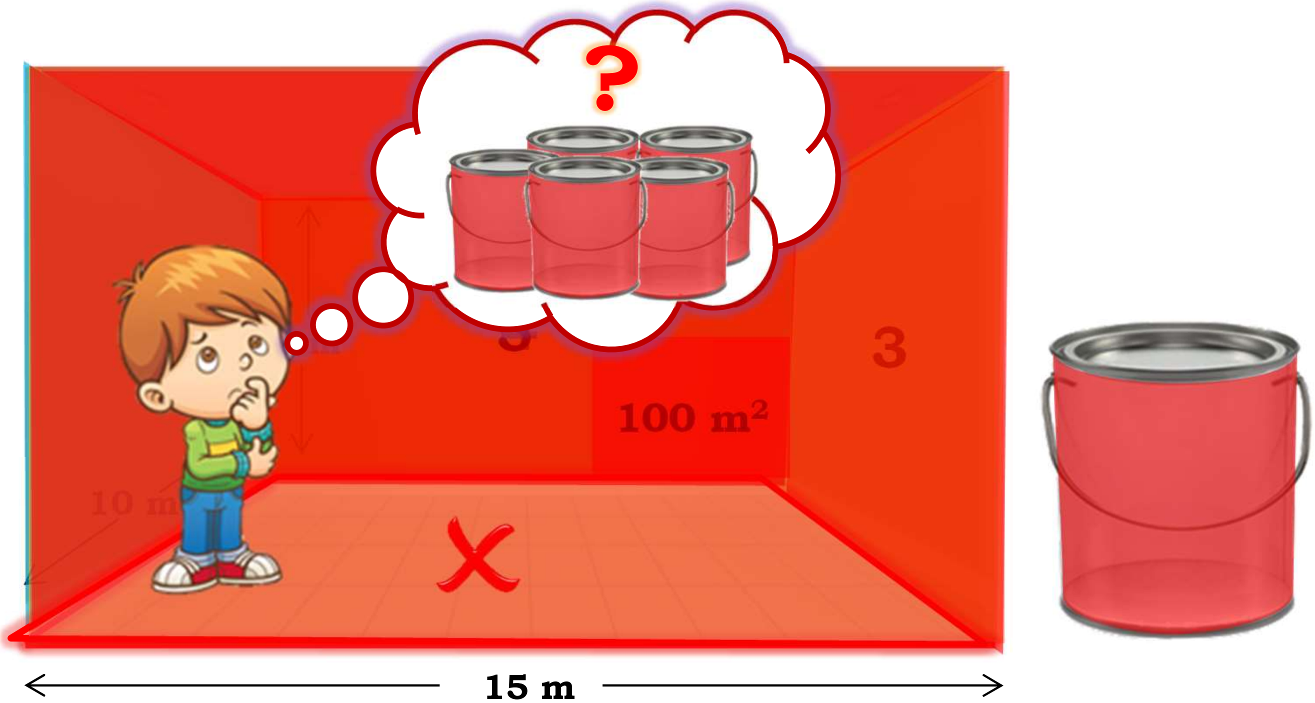
∴ Total area to be painted $= 11\ m^2$

∴ The total surface area rukhsar painted is $11\ m^2$.

Q. Daniel is painting the walls and ceiling of a cuboidal hall with length, breadth and height of 15 m, 10 m and 7 m respectively. From each can of paint $100\ m^2$ of area is painted. How many cans of paint will she need to paint the room?

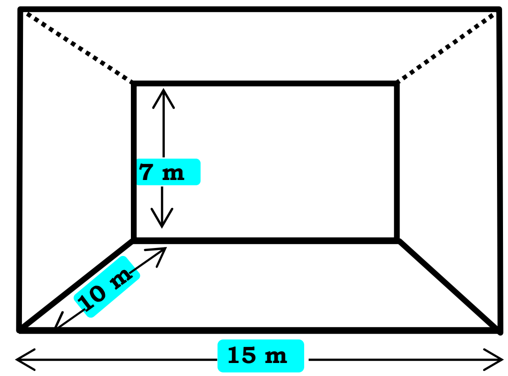
Total area to be painted = Total surface area of cuboid − Base area

$= 2[(l \times b) + (b \times h) + (l \times h)] - (l \times b)$



Q. **Daniel is painting the walls and ceiling of a cuboidal hall with length, breadth and height of 15 m, 10 m and 7 m respectively. From each can of paint 100 m² of area is painted. How many cans of paint will she need to paint the room?**

Sol.



Total area to be painted $= 2\,[(l \times b) + (b \times h) + (l \times h)] - (l \times b)$

$= 2\,[(15 \times 10) + (10 \times 7) + (15 \times 7)] - (15 \times 10)$

$= 2 \times [150 + 70 + 105] - 150$

$= 2 \times [325] - 150$

$= 650 - 150$

$\therefore$ **Total area to be painted = 500 m²**

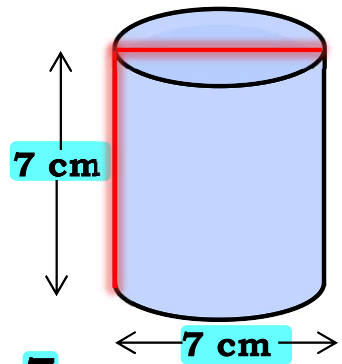
$N \times 100 = 500 \times 1$

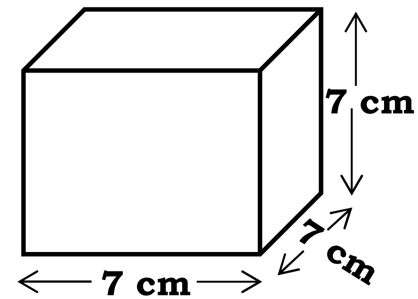
$\therefore$ N

Area to be painted	Number of cans
100 m²	1
500 m²	N

$\therefore$ ... room

Q. Describe how the two figures below are alike and how they are different. Which box has larger lateral surface area?





Sol. Diameter of cylinder = 7 cm

$\therefore$ Radius of cylinder $= \dfrac{\text{Diameter}}{2} = \dfrac{7}{2}$ cm

Height of cylinder = 7 cm

Curved surface area of cylinder = $2\pi rh$

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

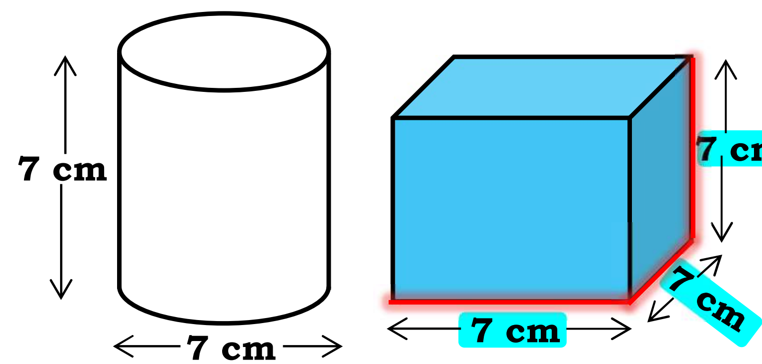
$$= 22 \times 7$$

$$= 154 \text{ cm}^2$$

Curved surface area of cylinder
Vertical surface area of cube

$\therefore$ Curved surface area of cylinder = 154 cm^2

Q. Describe how the two figures below are alike and how they are different. **Which box has larger lateral surface area?**



Sol. surface area of cylinder = 154 cm^2

side of a cube (l) = 7 cm

surface area of cube = $4 \times l^2$

$= 4 \times (7)^2$

Let us find the surface area of cube

$= 4 \times 49$

$\therefore$ surface area of cube = 196 cm^2

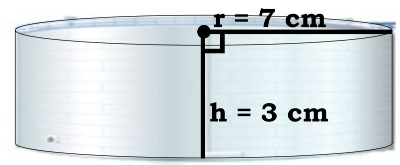
$154 < 196$

$\therefore$ Hence, the cube has larger lateral surface area.

What is the formula for total surface area of cube ?

$4l^2$

Q. A closed cylindrical tank of radius 7 m and height 3 m is made from a sheet of metal. How much sheet of metal is required?



Sol. radius = 7 m

height = 3 m

Total surface area Of cylindrical tank $= 2\pi r\,(h + r)$

$= 2 \times \frac{22}{7} \times 7\,(3 + 7)$

$= 2 \times \frac{22}{\cancel{7}} \times \cancel{7}\,(10)$

$= 2 \times 22 \times 10$

$= 44 \times 10$

What is the formula for total surface area of cylinder?

$2\pi r\,(h + r)$

Metal sheet required = total surface of cylinder

Hence, 440 m^2 metal sheet is required.

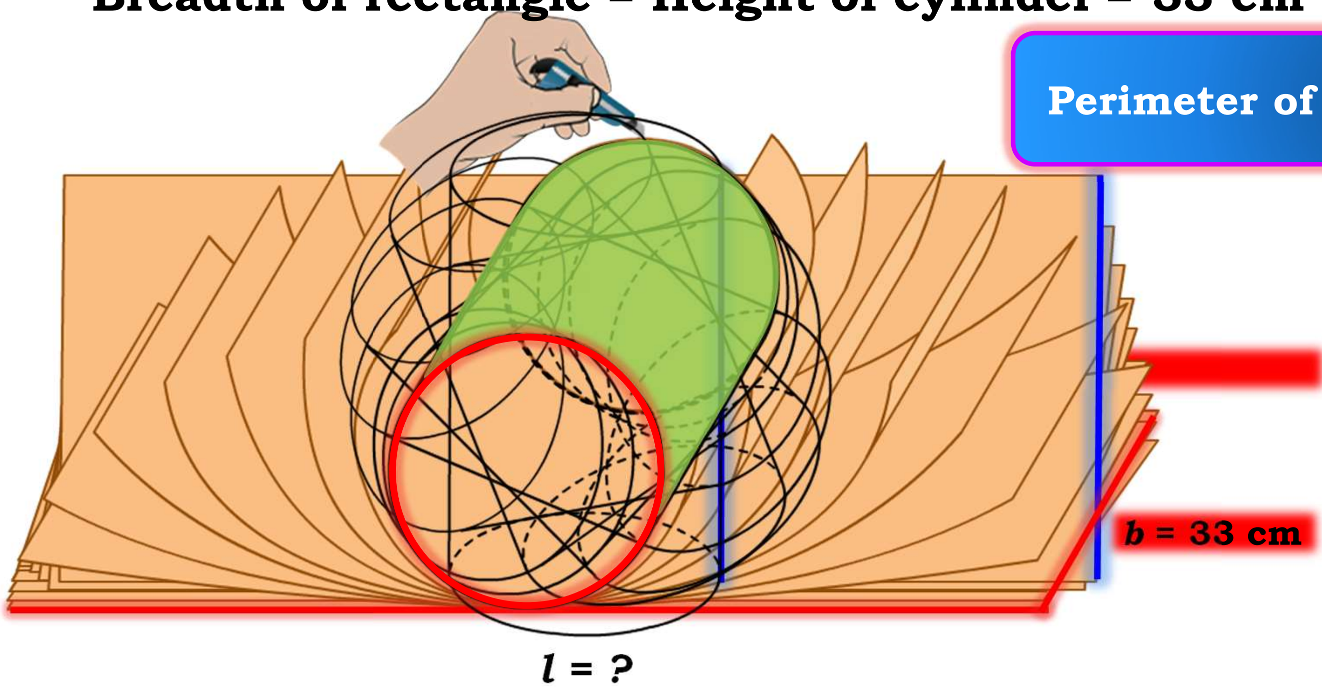
Q. **The lateral surface area of a hollow cylinder is $4224\ cm^2$. It is cut along its height and formed a rectangular sheet of width 33 cm. Find the perimeter of rectangular sheet?**

Sol. Lateral surface area of hollow cylinder = $4224\ cm^2$

Length of rectangle = Circumference of base of cylinder

Breadth of rectangle = Height of cylinder = 33 cm

Perimeter of rectangle = $2(l + b)$



Q. The lateral surface area of a hollow cylinder is $4224\ cm^2$. It is cut along its height and formed a rectangular sheet of width 33 cm. **Find the perimeter of rectangular sheet?**

Sol. Length of rectangle = Circumference of base of cylinder

$2\pi\boxed{r}$

Breadth of rectangle = Height of cylinder = 33 cm

Lateral surface area of hollow cylinder = $4224\ cm^2$

Perimeter of rectangle = $2(\boxed{l} + \boxed{b})$

$$2\pi rh = 4224$$

$$\therefore \quad 2 \times \frac{22}{7} \times r \times 33 = 4224$$

$$\therefore \quad r = \frac{\cancel{\cancel{4224}}^{\cancel{2112}\ 1056} \times 7}{\cancel{2} \times \cancel{22}_{11} \times 33}$$

Curved surface area of cylinder = $2\pi rh$

$$\therefore \quad r = \frac{\cancel{\cancel{1056}}^{\cancel{96}\ 32} \times 7}{\cancel{11} \times \cancel{33}_{11}}$$

Lateral surface area is Curved surface area of cylinder

$$\therefore \quad r = \frac{32 \times 7}{11}\ cm$$

Q. The lateral surface area of a hollow cylinder is 4224 cm^2. It is cut along its height and formed a rectangular sheet of width 33 cm. Find the perimeter of rectangular sheet?

Sol. Length of rectangle = Circumference of base of cylinder

$2\pi r$

Breadth of rectangle = Height of cylinder = 33 cm

Lateral surface area of hollow cylinder = 4224 cm^2

$$r = \frac{32 \times 7}{11} \text{ cm}$$

Perimeter of rectangle = $2(l + b)$

Length of rectangle = $2\pi r$

$$= 2 \times \frac{\cancel{22}^{\,2}}{\cancel{7}} \times \frac{32 \times \cancel{7}}{\cancel{11}}$$

$$= 2 \times 2 \times 32$$

$\therefore$ Length of rectangle = 128 cm

Q. The lateral surface area of a hollow cylinder is 4224 cm^2. It is cut along its height and formed a rectangular sheet of width 33 cm. **Find the perimeter of rectangular sheet?**

Sol. Length of rectangle = Circumference of base of cylinder

Breadth of rectangle = Height of cylinder = 33 cm

Lateral surface area of hollow cylinder = 4224 cm^2

Length of rectangle = 128 cm

Perimeter of rectangle = $2\,(l + b)$

Perimeter of rectangle = $2\,(l + b)$

$= 2\,(128 + 33)$

$= 2\,(161)$

$\therefore$ Perimeter of rectangle = 322 cm

$\therefore$ The perimeter of rectangular sheet is 322 cm.

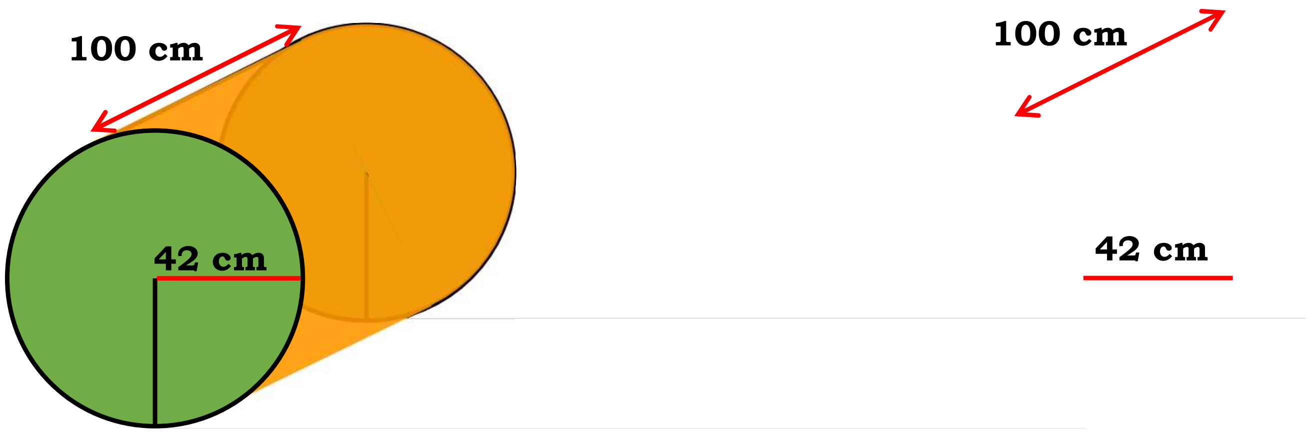
Q. A road roller takes 750 complete revolutions to move once over to level a road. Find the area of the road if the diameter of a road roller is 84 cm and length 1 m.

Sol. Radius $= \dfrac{\text{diameter}}{2} = \dfrac{84}{2} = 42$ cm

What is shape of roller?

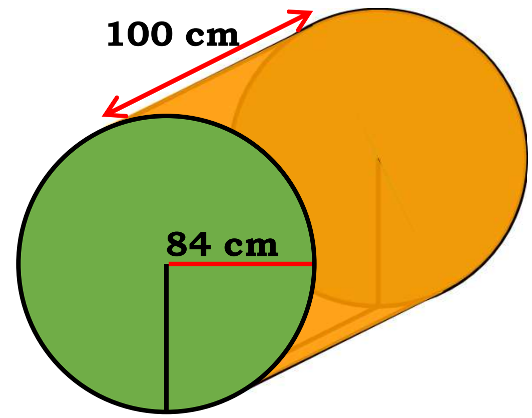
Cylinder

Length = 1 m = 100 cm



Area of ground pressed in 1 rev = CSA of roller

Q. A road roller takes 750 complete revolutions to move once over to level a road. **Find the area of the road** if the diameter of a road roller is 84 cm and length 1 m.



Sol. Radius = 42 cm

Length = Height = 100 cm

Area of ground pressed in 1 rev = CSA of roller

$= 2\pi rh$

$= 2 \times \frac{22}{\cancel{7}} \times \overset{6}{\cancel{42}} \times 100$

$= 44 \times 600$

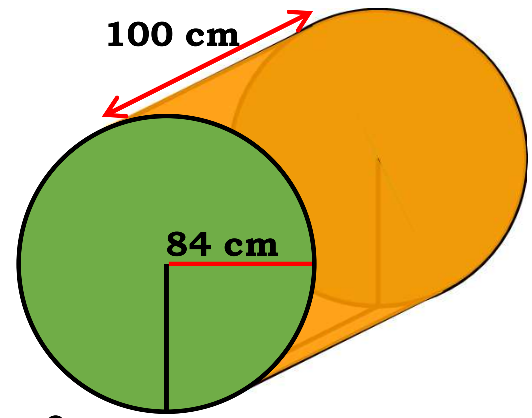
$= 26400 \text{ cm}^2$

What is the formula for curved surface area of cylinder?

$2\pi rh$

$\therefore$ Area of ground pressed in 1 rev $= 26400 \text{ cm}^2$

Q. A road roller takes 750 complete revolutions to move once over to level a road. Find the area of the road if the diameter of a road roller is 84 cm and length 1 m.



Sol. $\therefore$ Area of ground pressed in 1 rev = 26400 cm^2

Area of ground pressed in 750 revolutions

$= 750 \times$ Area of ground pressed in 1 rev

$= 750 \times 26400$

$= 19800000$ cm^2

$\therefore$ Area of ground pressed in 750 revolutions is 19800000 cm^2

Area of the road $= \dfrac{1980\cancel{0000}}{1\cancel{0000}}$

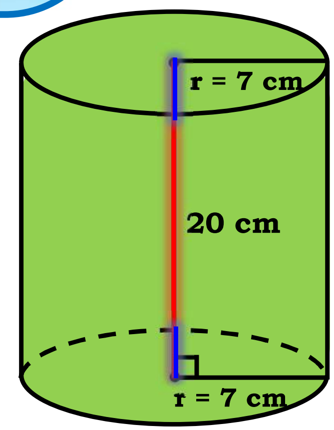
$= 1980$ m^3

1 m = 100 cm

$\therefore$ 1 m^2 = 10000 cm^2

the road is 1980 m^2.

Q. A company packages its milk powder in cylindrical container Whose base has a diameter of 14 cm and height 20 cm. Company places a label around the surface of the container (as shown in figure). If the label is placed 2 cm from top and bottom, what is the area of the label?



Sol. Diameter of cylindrical container = 14 cm

$$\text{Radius} = \frac{\text{daimeter}}{2} = \frac{\overset{7}{\cancel{14}}}{\cancel{2}} = 7 \text{ cm}$$

Height of cylindrical container = 20 cm

Height of label of container = 20 – 2 – 2

$\therefore$ Height of label of container = 16cm

Curved surface area of label = $2\pi rh$

What is the formula for curved surface area of cylinder?

$2\pi rh$

$$= 2 \times \frac{22}{\cancel{7}} \times \cancel{7} \times 16$$

$$= 2 \times 22 \times 16$$

Hence, the area of the label is 704 cm^2.

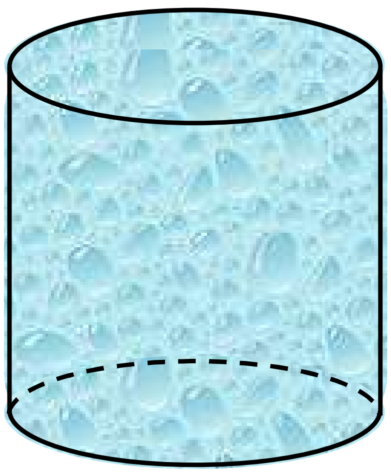
Q. Given a cylindrical tank, in which situation will you find surface area and in which situation volume.

a. To find how much it can hold.

b. Number of cement bags required to plaster it

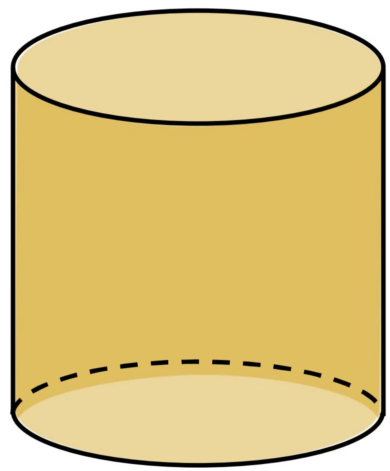
c. To find the number of smaller tanks that can be filled with water from it.

Sol. For this situation volume is to be measured.



Q. Given a cylindrical tank, in which situation will you find surface area and in which situation volume.
a. To find how much it can hold.
b. Number of cement bags required to plaster it
c. To find the number of smaller tanks that can be filled with water from it.

Sol. To find number of cement bags required to plaster the cylindrical tank we need to find the surface area of the tank.



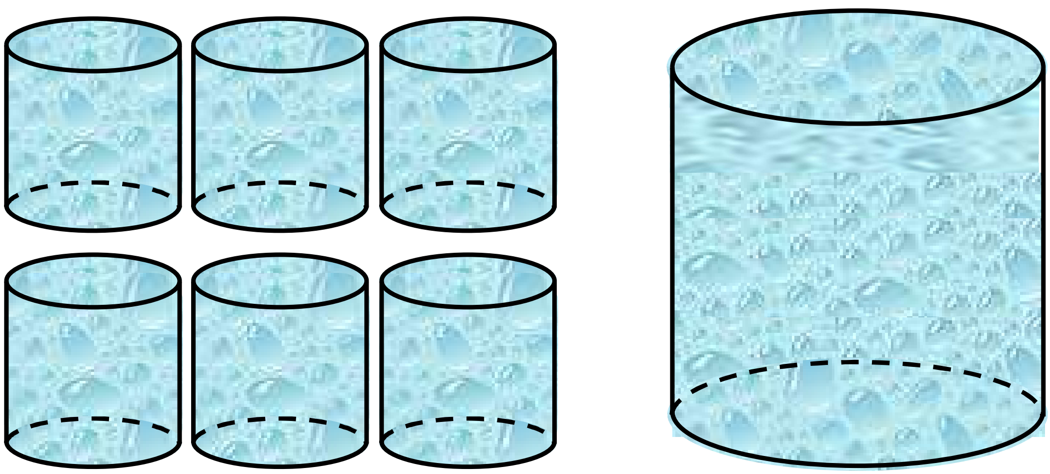
Q. **Given a cylindrical tank, in which situation will you find surface area and in which situation volume.**

a. To find how much it can hold.

b. Number of cement bags required to plaster it

c. To find the number of smaller tanks that can be filled with water from it.

Sol. **To find number of smaller tanks required to filled water we need to find the volume of the tank.**

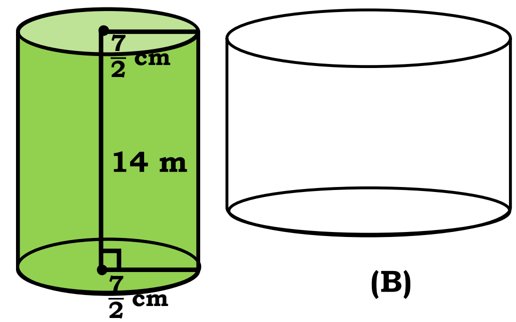


Q. Diameter of cylinder A is 7 cm, and the height is 14 cm. Diameter of cylinder B is 14 cm and height is 7 cm. Without doing any calculations can you suggest whose volume is greater? Verify it by finding the volume of both the cylinders. Check whether the cylinder with greater volume also has greater surface area?

Sol. Diameter of cylinder (A) = 7 cm

$\therefore$ Radius of cylinder (A) $= \dfrac{\text{Diameter}}{2} = \dfrac{7}{2}$ cm

$\therefore$ Height (A) = 14 cm



(A) (B)

Volume of cylinder (A) $= \pi r^2 h$

What is the formula for volume of cylinder?

$\pi r^2 h$

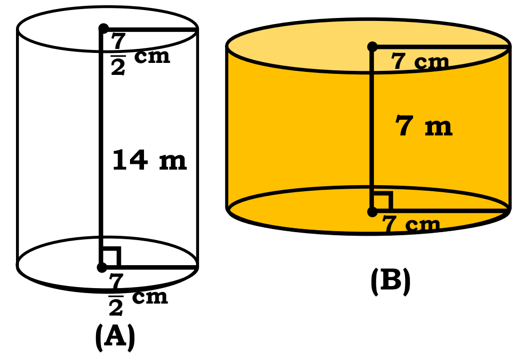
$$= \frac{\cancelto{11}{22}}{\cancel{7}} \times \frac{7}{\cancel{2}} \times \frac{\cancel{7}}{\cancel{2}} \times \cancelto{7}{14}$$

$$= 11 \times 7 \times 7$$

$$= 539 \text{ cm}^3$$

$\therefore$ Volume of cylinder (A) $= 539 \text{ cm}^3$

Q. Diameter of cylinder A is 7 cm, and the height is 14 cm. Diameter of cylinder B is 14 cm and height is 7 cm. Without doing any calculations can you suggest whose volume is greater? Verify it by finding the volume of both the cylinders. Check whether the cylinder with greater volume also has greater surface area?



Sol. Volume of cylinder (A) = 539 cm^2

Diameter of cylinder (B) = 14 cm

$\therefore$ Radius of cylinder (B) $= \dfrac{\text{Diameter}}{2} = \dfrac{\cancel{14}^{7}}{\cancel{2}} = 7 \text{ cm}$

$\therefore$ Height (B) = 7cm

Volume of cylinder (B) = $\pi r^2 h$

What is the formula for volume of cylinder?

$\pi r^2 h$

$= \dfrac{22}{\cancel{7}} \times \cancel{7} \times 7 \times 7$

$= 22 \times 7 \times 7$

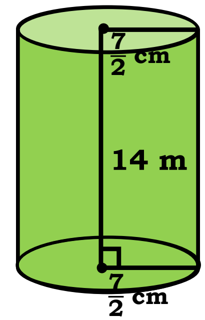
$= 1078 \text{ cm}^2$

$\therefore$ Volume of cylinder (B) = 1078 cm^2

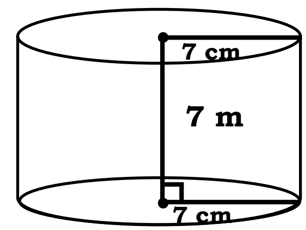
$539 < 1078$

$\therefore$ Cylinder B has greater volume.

Q. Diameter of cylinder A is 7 cm, and the height is 14 cm. Diameter of cylinder B is 14 cm and height is 7 cm. Without doing any calculations can you suggest whose volume is greater? Verify it by finding the volume of both the cylinders. Check whether the cylinder with greater volume also has greater surface area?



(A)



(B)

Sol. Radius of cylinder (A) $= \frac{7}{2}$ cm

$\therefore$ Height (A) = 14 cm

Surface area of cylinder (A) $= 2\pi r\,(h + r)$

What is the formula for surface area of cylinder ?

$\pi r\,(2h + r)$

$$= 2 \times \frac{\overset{11}{\cancel{22}}}{\cancel{7}} \times \frac{\cancel{7}}{\cancel{2}} \times \boxed{14 + \frac{7}{2}}$$

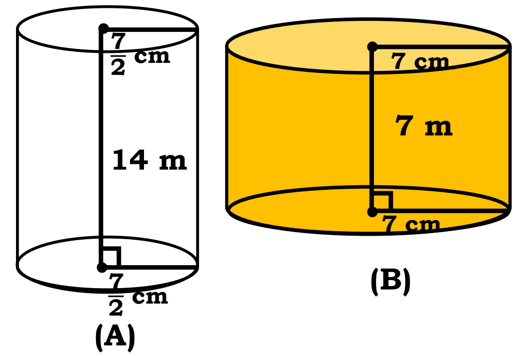
$$= 2 \times 11 \times \frac{28 + 7}{2}$$

$$= \overset{11}{\cancel{22}} \times \frac{35}{\cancel{2}}$$

$$= 11 \times 35$$

$\therefore$ Surface area of cylinder (A) $= 385\ cm^2$

Q. Diameter of cylinder A is 7 cm, and the height is 14 cm. Diameter of cylinder B is 14 cm and height is 7 cm. Without doing any calculations can you suggest whose volume is greater? Verify it by finding the volume of both the cylinders. Check whether the cylinder with greater volume also has greater surface area?



Sol. Surface area of cylinder (A) = 346.5 cm^2

Radius of cylinder (B) = 7cm

$\therefore$ Height (B) = 7 cm

Surface area of cylinder (B) = $2\pi r\,(h + r)$

What is the formula for surface area of cylinder ?

$2\pi r\,(h + r)$

$$= 2 \times \frac{22}{\cancel{7}} \times \cancel{7} \times [7 + 7]$$

$$= 2 \times 22 \times 14$$

$$= 44 \times 14$$

$\therefore$ Surface area of cylinder (B) = 616 cm^2

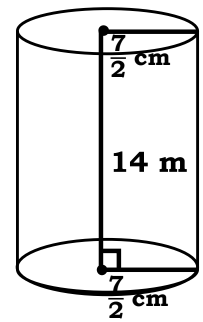
Q. Diameter of cylinder A is 7 cm, and the height is 14 cm. Diameter of cylinder B is 14 cm and height is 7 cm. Without doing any calculations can you suggest whose volume is greater? Verify it by finding the volume of both the cylinders. Check whether the cylinder with greater volume also has greater surface area?

Sol. Surface area of cylinder (A) = $385\ cm^2$

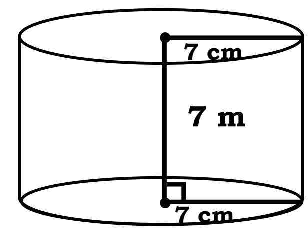
$\therefore$ Surface area of cylinder (B) = $616\ cm^2$

$385 < 616$

$\therefore$ Cylinder B has greater surface area.



(A)



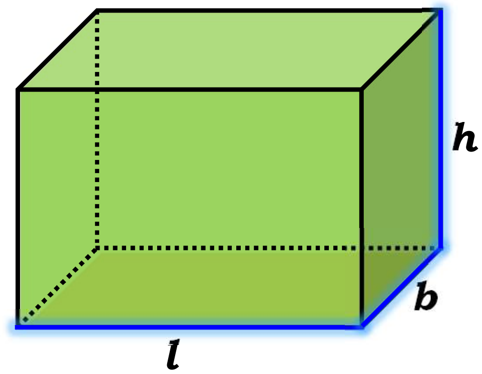
(B)

Q. Find the height of a cuboid whose base area is 180 cm² and volume is 900 cm³?

Sol. Base area of cuboid = 180 cm²

$l \times b = 180 \text{ cm}^2$

Volume of cuboid = 900 cm³



Volume of cuboid = $l \times b \times h$

$\therefore$ $900 = 180 \times h$

5

What is the formula for volume of cuboid ?

$l \times b \times h$

$\therefore$ $h = 5$

Hence, the height of cuboid is 5 cm

Q. A cuboid is of dimensions 60 cm $\times$ 54 cm $\times$ 30 cm. How many small cubes with side 6 cm can be placed in the given cuboid?

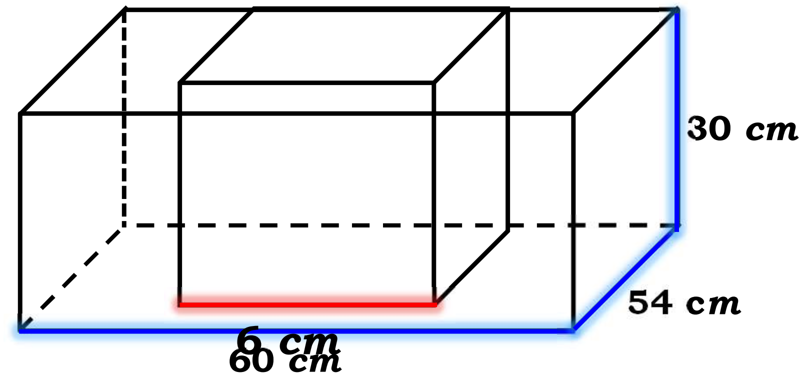
Sol. Length of cuboid (l) = 60m,

Breadth of cuboid (b) = 54m,

Height of cuboid (h) = 30m

Volume of cuboid = $l \times b \times h$

$\therefore$ Volume of cuboid = $60 \times 54 \times 30 \text{ cm}^3$



What is the formula for volume of cuboid ?

$l \times b \times h$

What is the formula for volume of cube?

$(\text{side})^3$

$\times$ 6 cm

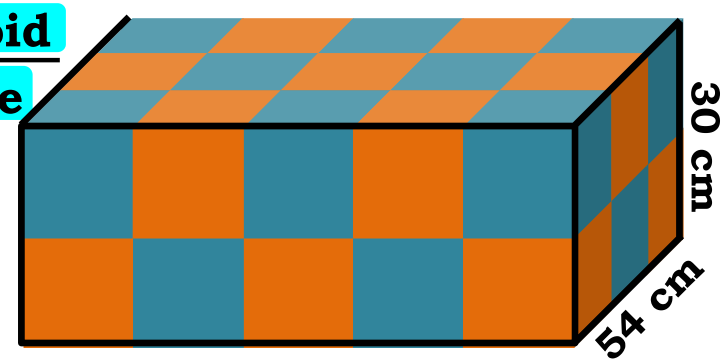
Q. A cuboid is of dimensions 60 cm × 54 cm × 30 cm. How many small cubes with side 6 cm can be placed in the given cuboid?

Sol. Number of small cubes $= \dfrac{\text{Volume of cuboid}}{\text{Volume of cube}}$

$$= \frac{\overset{10}{\cancel{60}} \times \overset{9}{\cancel{54}} \times \overset{5}{\cancel{30}}}{\cancel{6} \times \cancel{6} \times \cancel{6}}$$

$$= 10 \times 9 \times 5$$

$$= 450$$

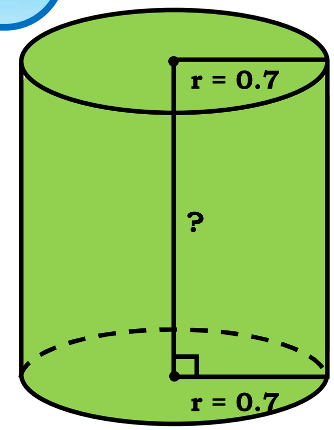


Hence, 450 cubes are required.

Volume of cuboid = 60 × 54 × 30 cm^3

Volume of cube = 6 × 6 × 6 × cm^3

Q. Find the height of the cylinder whose volume if 1.54 m^3 and diameter of the base is 140cm.



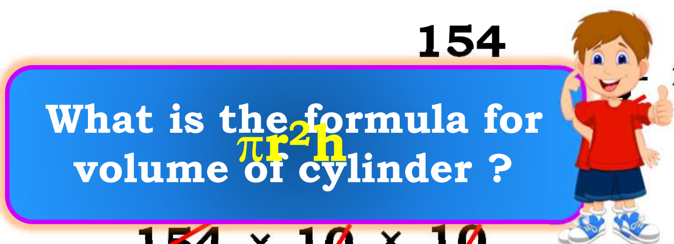
Sol. Volume of cylinder = 1.54 m^3

$$\text{Radius} = \frac{\text{daimeter}}{2} = \frac{140}{2} = 70 \text{ cm} = \frac{70}{100} = 0.7 \text{ m}$$

$$\text{Volume of cylinder} = \pi r^2 h$$

$$\therefore \quad 1.54 = \frac{22}{7} \times 0.7 \times 0.7 \times h$$

$$\therefore \quad 154 \ldots \times \frac{\cancel{7}}{10} \times \frac{7}{10} \times h$$

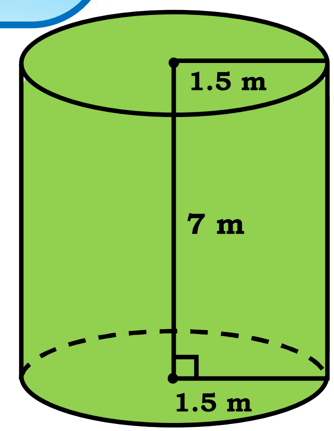


$$\therefore \quad \frac{\cancel{154} \times 1\cancel{0} \times 1\cancel{0}}{1\cancel{0}\cancel{0} \times \underset{\cancel{2}}{\cancel{22}} \times \cancel{7}} = h$$

$$\therefore \quad h = 1\text{m}$$

Hence, height of cylinder is 1 m.

Q. A milk tank is in the form of cylinder whose radius is 1.5 m and length is 7 m. Find the quantity of milk in liters that can be stored in the tank.



Sol. Radius = 1.5 m

$\therefore$ Height (h) = 7 m

Volume of the cylinder $= \pi r^2 h$

Now let us put decimal point

$$= \frac{22}{7} \times 1.5 \times 1.5 \times 7$$

$$= \frac{22}{\cancel{7}} \times \frac{15}{10} \times \frac{15}{10} \times \cancel{7}$$

What is the formula for volume of cylinder ?

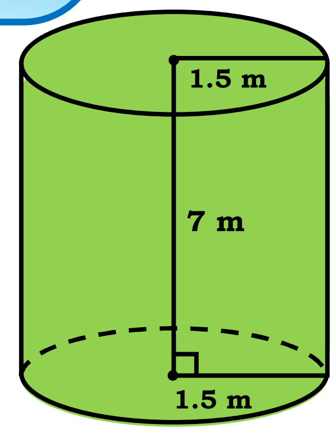
$\pi r^2 h$

$$= \frac{22 \times 225}{100}$$

$$= \frac{49\boxed{5}\boxed{0}}{100}$$

$\therefore$ Volume of the cylinder = 49.50 m

Q. A milk tank is in the form of cylinder whose radius is 1.5 m and length is 7 m. Find the quantity of milk in liters that can be stored in the tank.



Sol. Volume of the cylinder $= 49.50\ m^3$

We know,

$$1\ m^3 = 1000 \text{ litres}$$

$$\text{Volume of the cylinder} = 49.50 \times 1000$$

$$= 49500 \text{ litres}$$

Volume of the cylinder is 49500 litres.

Q. If each of a cube is doubled,

(i) How many times will its surface area increase?

(ii) How many times will its volume increase?

Sol. Let the original edge = x

$\therefore$ Increased edge = $2x$

Original surface area $= 6l^2 = 6x^2$

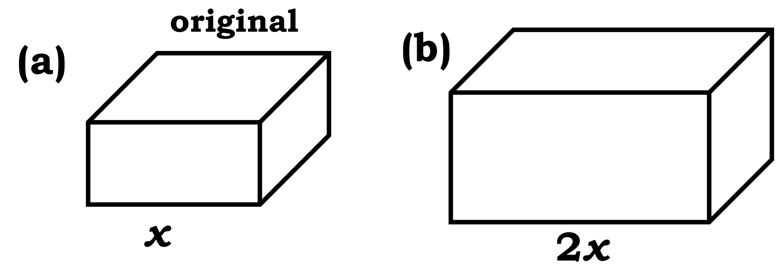
Increased surface area $= 6(2x)^2$

$= 6(4x^2)$

$= 24x^2$

What is the formula for surface area of the cube?

Surface area a of cube = $6l^2$



Increase in surface area = $\dfrac{\text{Increased surface area}}{\text{Original surface area}}$

$$= \frac{\cancelto{4}{24}\cancel{x^2}}{\cancel{6}\cancel{x^2}} = 4$$

$\therefore$ **Surface area is increased by 4 times.**

Q. If each of a cube is doubled,
(i) How many times will its surface area increase?
(ii) How many times will its volume increase?

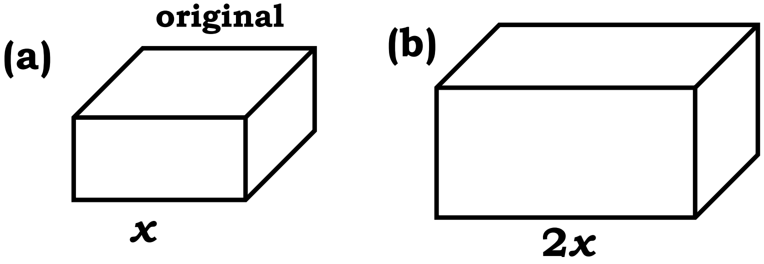
Sol. Let the original edge = x

$\therefore$ Increased edge = $2x$

Original volume = l^3 = x^3

Increased volume = $(2x)^3$

= $8x^3$



Increase in volume = $\dfrac{\text{Increased volume}}{\text{Original volume}}$

What is the formula for volume of the cube?

Volume a of cube = l^3

= 8

$\therefore$ volume is increased by 8 times.

Q. Water is pouring into a cuboidal reservoir at the rate of 60 liters per minute. If the volume of reservoir is 108 m^3, find the number of hours it will take to fill the reservoir.

Sol. Volume of reservoir = 108 m^3

= 108×1000 litres [$\because$ $1 m^3 = 1000$ litres]

$\therefore$ Volume of reservoir = 108000 litres

Water is poured at the rate of 60 litres per minutes.

$$\text{Time taken} = \frac{\text{Volume of reservoir}}{\text{Time taken (in minutes)}}$$

$$= \frac{\overset{1800}{\cancel{10800}\cancel{0}}}{\cancel{6}\cancel{0}}$$

= 1800 minutes

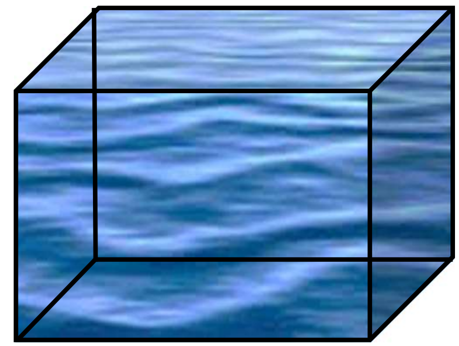
Q. **Water is pouring into a cuboidal reservoir at the rate of 60 liters per minute. If the volume of reservoir is 108 m^3, find the number of hours it will take to fill the reservoir.**

Sol. **Time taken** $=$ **1800 minutes**

$$= \frac{\overset{30}{\cancel{1800}}}{\cancel{60}} \text{ hours}$$

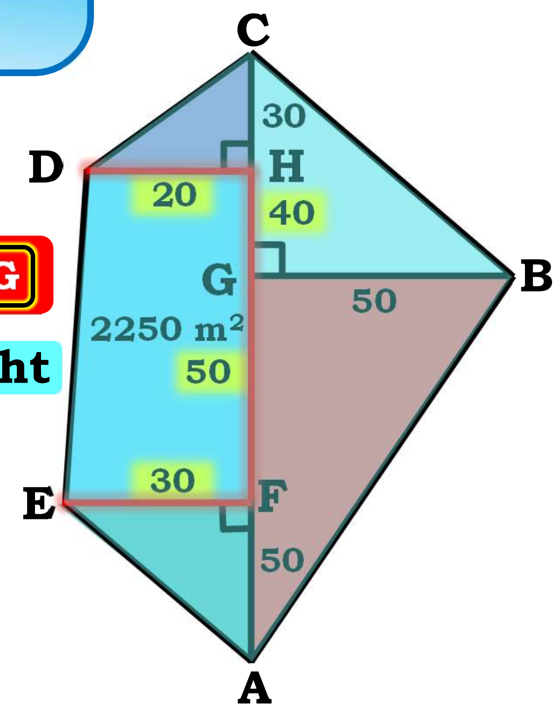
$$= 30 \text{ hours}$$

1 minute = $\frac{1}{60}$ **hours**



$\therefore$ **volume is increased by 8 times.**

Q. Find the area of the pentagonal field shown in the given figure. All dimensions are in meters.



Sol. The pentagonal field is divided into

(i) Trapezium DEFH and (ii) Four triangles

Area of trapezium DEFH

HF = HG + FG

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

$= \frac{1}{2} \times [DH + EF] \times HF$

$= \frac{1}{2} \times [20 + 30] \times (40 + 50)$

What is the formula for area of trapezium?

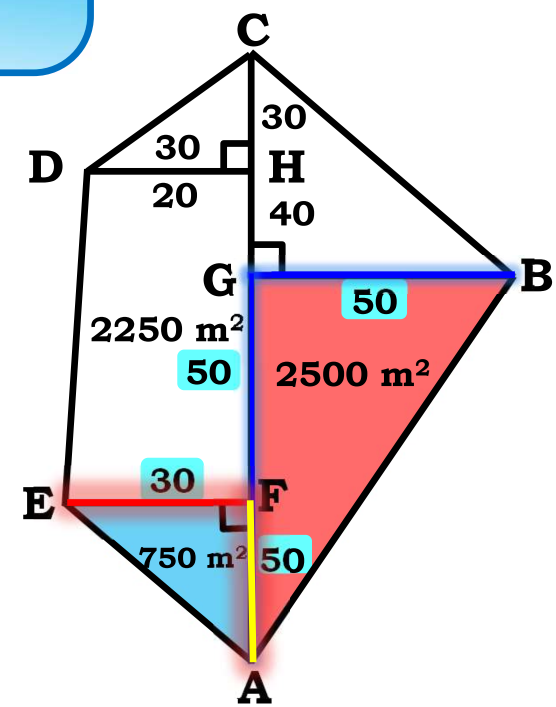
$\frac{1}{2} \times \left\{ \text{sum of lengths of parallel sides} \right\} \times h$

$= \frac{1}{\cancel{2}} \times \cancel{50}^{25} \times 90$

$= 25 \times 90$

$\therefore$ Area of trapezium $= 2250 \text{ m}^2$

Q. **Find the area of the pentagonal field shown in the given figure. All dimensions are in meters.**



Sol. $A(\Delta AEF) = \frac{1}{2} \times \text{base} \times \text{height}$

$= \frac{1}{2} \times EF \times AF$

$= \frac{1}{\cancel{2}} \times \overset{15}{\cancel{30}} \times 50$

$\therefore A(\Delta AEF) = 750 \text{ m}^2$

$AG = \boxed{AF} + \boxed{FG}$

consider ΔABG

$A(\Delta ABG) = \frac{1}{2} \times \text{base} \times \text{height}$

$= \frac{1}{2} \times BG \times AG$

$= \frac{1}{\cancel{2}} \times \overset{25}{\cancel{50}} \times (50 + 50)$

$\therefore A(\Delta ABG) = 25 \times 100 = 2500 \text{ m}^2$

Q. Find the area of the pentagonal field shown in the given figure. All dimensions are in meters.

Sol. $A(\triangle BGC) = \frac{1}{2} \times \text{base} \times \text{height}$ $\quad CG = \boxed{CH} + \boxed{GH}$

$= \frac{1}{2} \times BG \times CG$

$= \frac{1}{\cancel{2}} \times \overset{25}{\cancel{50}} \times (30 + 40)$

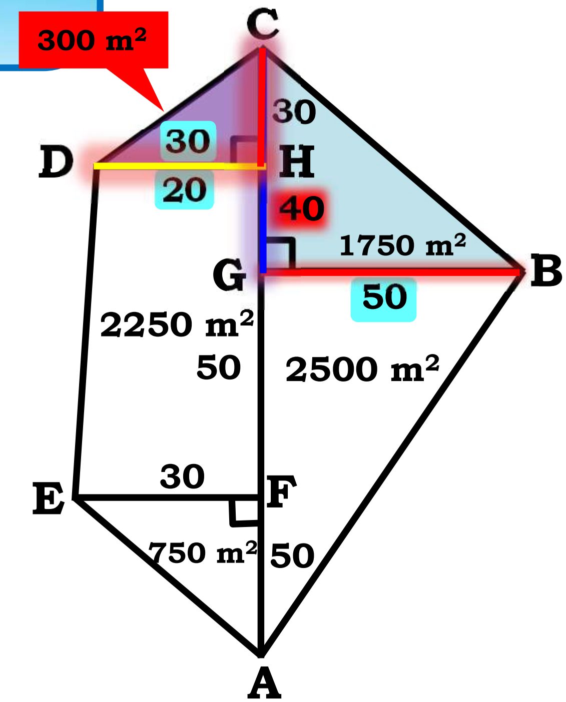
$= 25 \times 70$

$= 1750\ m^2$

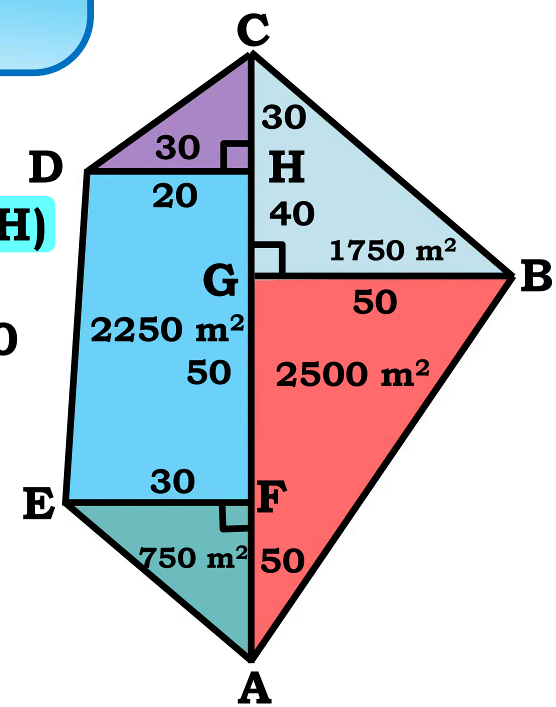
$A(\triangle CDH) = \frac{1}{2} \times \text{base} \times \text{height}$

$= \frac{1}{2} \times DH \times CH$

$= \frac{1}{\cancel{2}} \times \overset{10}{\cancel{20}} \times 30 = 300\ m^2$



Q. Find the area of the pentagonal field shown in the given figure. All dimensions are in meters.



Sol. The pentagonal field = A(trapezium) + A (ΔAEF) + A (ΔABG) + A (ΔBGC) + A (ΔCDH)

= 2250 + 750 + 2500 + 1750 + 300

= 7550 m^2

$\therefore$ The area of the pentagonal field is 7550 m^2

A(trapezium) = 2250

A (ΔAEF) = 750

A (ΔABG) = 2500

A (ΔBGC) = 1750

A (ΔCDH) = 300

Q. **A fish tank is in the form of a cuboid whose external measures are 80 cm × 40 cm × 30 cm. The base, side faces and back face are to be covered with a coloured paper. Find the area of the paper needed.**

Sol. **Area of the paper needed = Area of base + Area of two side faces + Area of back face**

For cuboid fish tank,

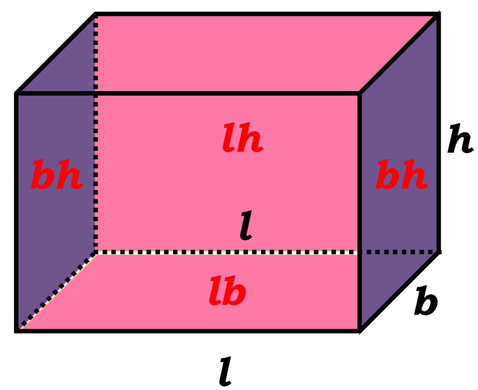
length (l) = 80 cm

breadth (b) = 40 cm

height (h) = 30 cm

What is the formula for area of rectangle?

$l \times b$



$$\text{Area of base} = l \times b = 80 \times 40 = 3200 \text{ cm}^2$$

$$\text{Area of two side faces} = 2 \times b \times h = 2 \times 40 \times 30 = 2400 \text{ cm}^2$$

$$\text{Area of back face} = l \times h = 80 \times 30 = 2400 \text{ cm}^2$$

Q. A fish tank is in the form of a cuboid whose external measures are 80 cm × 40 cm × 30 cm. The base, side faces and back face are to be covered with a coloured paper. Find the area of the paper needed.

Sol. Area of the paper needed = Area of base + Area of two side faces + Area of back face

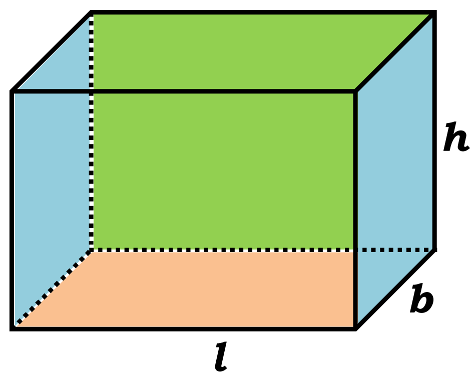
Area of the paper needed = Area of base

+ Area of two side faces

+ Area of back face

= 3200 + 2400 + 2400

= 8000 cm²



∴ Area of the paper needed is 8000 cm².

Area of base = 3200 cm²

Area of two side faces = 2400 cm²

Area of back face = 2400 cm²

Q. A solid cube is cut into two cuboids exactly at middle. Find the ratio of the total surface area of the given cube and that of the cuboid.

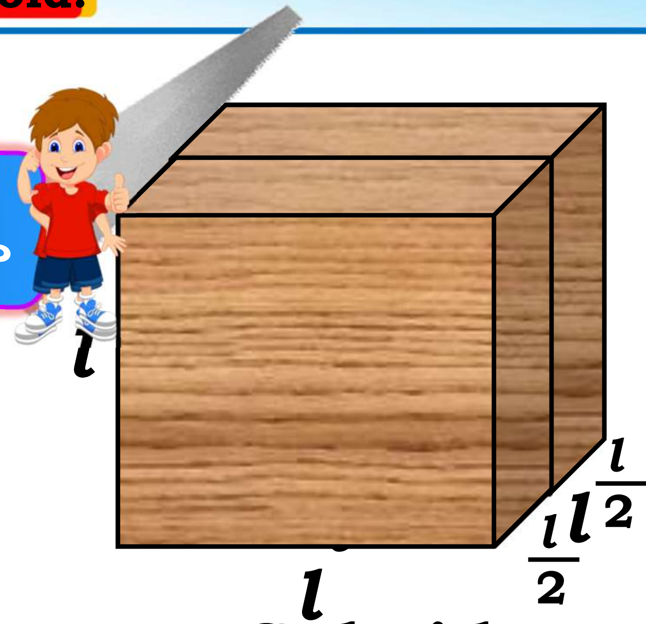
Sol.

What is the formula for total surface area of cube ?

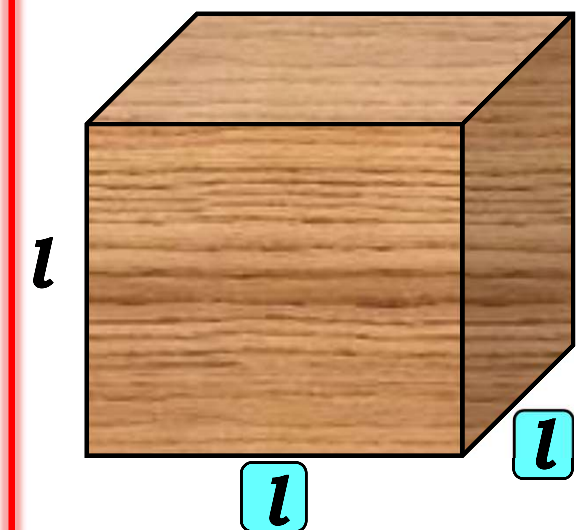
$6l^2$

To Find: $\dfrac{\text{TSA (Cube)}}{\text{TSA (Cuboid)}}$

Cuboid



Cuboid



Cube

Side of a cube = l

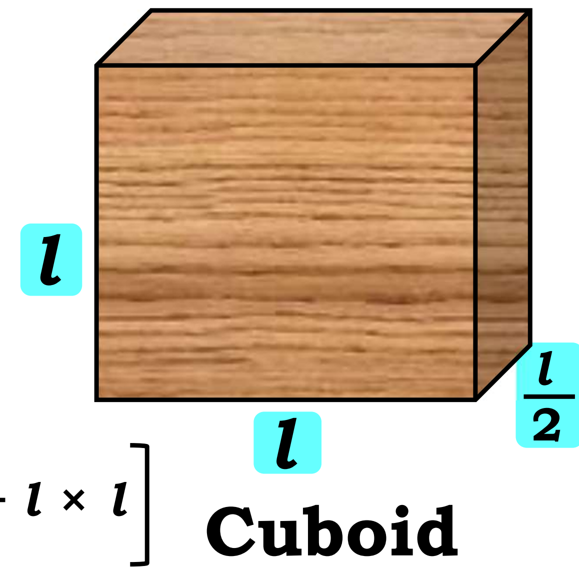
$\therefore$ Total surface of a cube = $6l^2$

Q. A solid cube is cut into two cuboids exactly at middle. Find the ratio of the total surface area of the given cube and that of the cuboid.

Sol. Length of cuboid = Side of a cube = l

Its breadth $= \dfrac{l}{2}$

Its height $= l$



Total surface area of a cuboid $= 2\,(l\,b + b\,h + l\,h)$

To Find: $\dfrac{\text{TSA (Cube)}}{\text{TSA (Cuboid)}}$

$$= 2\left[l \times \frac{l}{2} + \frac{l}{2} \times l + l \times l\right]$$

What is the formula for total surface area of cuboid ?

$2(lb + bh + hl)$

$$= 2\left[\frac{l^2}{2} + \frac{l^2}{2} + l^2\right]$$

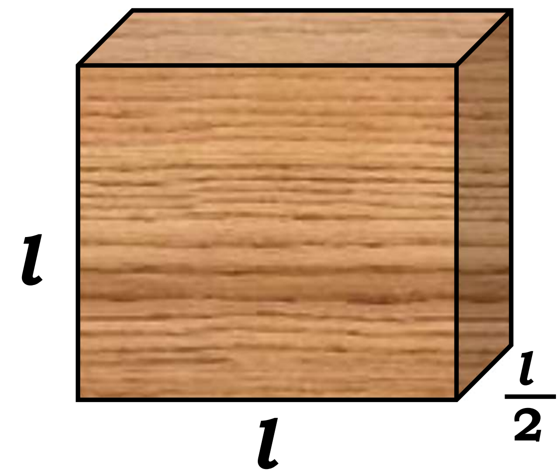
Q. **A solid cube is cut into two cuboids exactly at middle. Find the ratio of the total surface area of the given cube and that of the cuboid.**

Sol. TSA (Cuboid) $= 2\left[\dfrac{l^2}{2} + \dfrac{l^2}{2} + l^2\right]$

$$= \cancel{2}\left[\dfrac{l^2 + l^2 + 2l^2}{\cancel{2}}\right]$$

$\therefore$ TSA (Cuboid) $= 4l^2$

To Find: $\dfrac{\text{TSA (Cube)}}{\text{TSA (Cuboid)}}$



Cuboid

Q. A solid cube is cut into two cuboids exactly at middle. Find the ratio of the total surface area of the given cube and that of the cuboid.

Sol. Total surface area of a cuboid $= 4l^2$

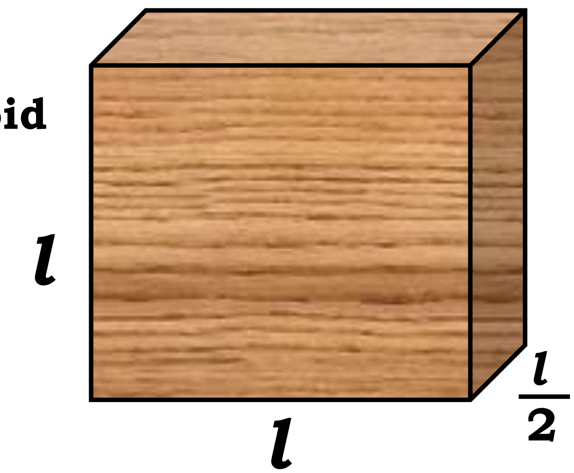
Ratio of the total surface area of a cube and cuboid

$$= \frac{\text{T.S.A of a cube}}{\text{T.S.A of a cuboid}}$$

$$= \frac{\overset{3}{\cancel{6}}l^2}{\underset{2}{\cancel{4}}l^2}$$

3

To Find: $\frac{\text{TSA (Cube)}}{\text{TSA (Cuboid)}}$



Cuboid

Total surface of cube = $6l^2$

...rface area of the given cube and that of the cuboid is 3 : 2.

Q. The width of a circular road is 28 m. The area of the inner circle is 39424 m². Find the diameter of the outer circle.

	2	1792
16	2	896
	2	448
	2	224
	2	112
16	2	56
	2	28
	2	14
7	7	7
		1

s of the inner circle be ‘r’ m

circle = 39424 m²

circle = πr^2

$\pi r^2 = 39424$

$\frac{22}{7} \times r^2 = 39424$

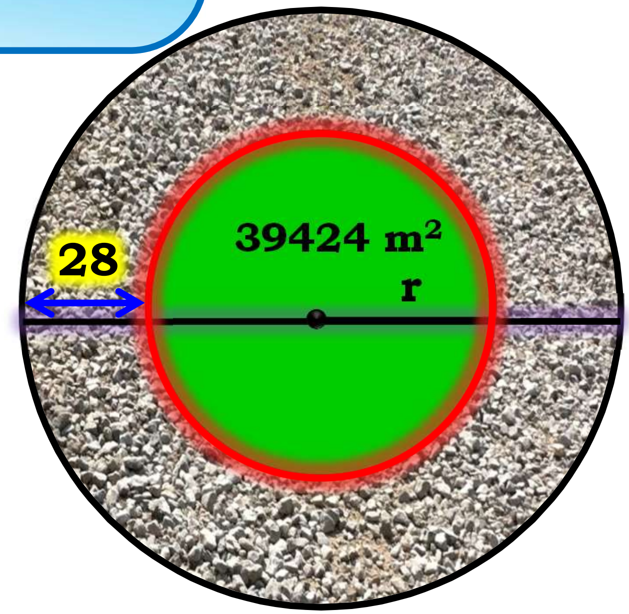
$\overset{19762}{\cancel{39424}} \times \frac{7}{\underset{11}{\cancel{22}}}$

a for

$= \overset{1792}{\cancel{19762}} \times \frac{7}{\underset{1}{\cancel{11}}}$

∴ $r^2 = 1792 \times 7$

∴ $r^2 = 16 \times 16 \times 7 \times 7$



Q. **The width of a circular road is 28 m. The area of the inner circle is 39424 m². Find the diameter of the outer circle.**

Sol. $r^2 = \underline{16 \times 16} \times \underline{7 \times 7}$

Taking square roots on both sides

$\therefore \quad r = 16 \times 7$

$\therefore \quad r = 112$ m

Width of the road is 28 m

$\therefore$ Let the radius of outer circle be 'R'

$R = r +$ Width of the road

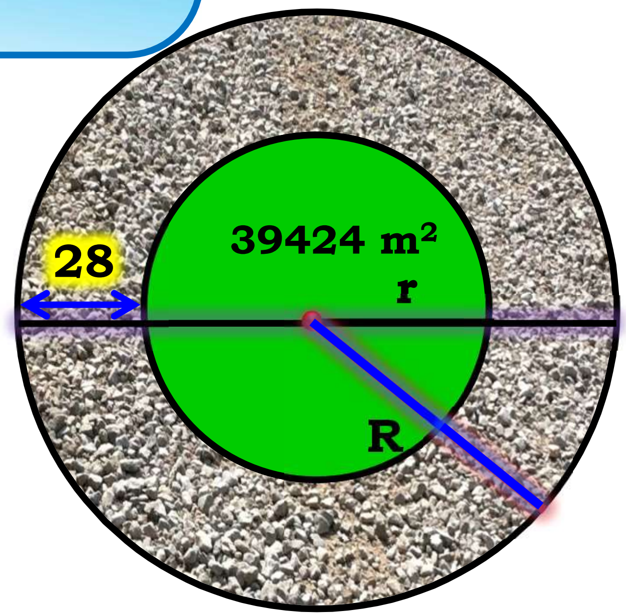
$= \underline{112 + 28}$

$\therefore \quad R = 140$

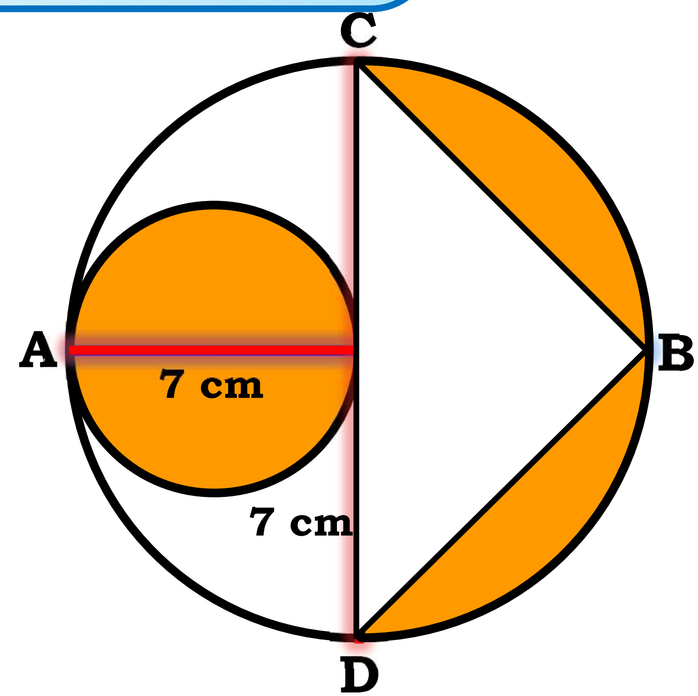
Its Diameter $= 2 \times 140$

$= 280$ m

$\therefore$ **Diameter of outer circle is 280 m.**



Q. seg AB and seg CD are perpendicular diameters of a circle with radius 7 cm. Find the area of the shaded region.



Sol. Diameter of smaller circle = 7 cm

$\therefore$ its radius (r) = 3.5 cm

A (smaller circle) = πr^2

What is the formula for area of circle?

πr^2

$= \frac{22}{7} \times 3.5 \times 3.5$

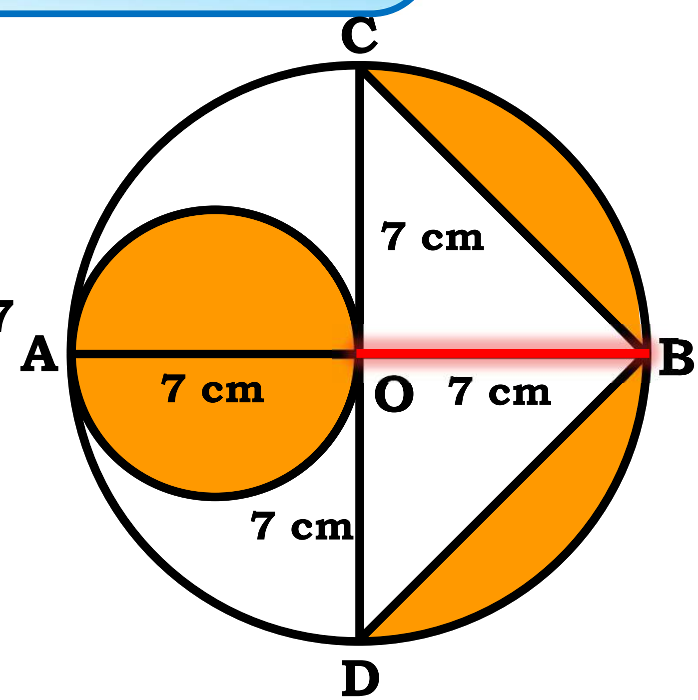
$= \frac{\cancel{22}}{\cancel{7}} \times \frac{\cancel{35}^{5}}{\cancel{10}_{2}} \times \frac{35}{10}$

$= \frac{38\boxed{5}}{10}$

$\therefore$ A (smaller circle) = 38.5 cm^2

Area of remaining shaded region = Area of semi-circle CBD − Area of $\triangle$CBD

Q. seg AB and seg CD are perpendicular diameters of a circle with radius 7 cm. **Find the area of the shaded region.**



Sol. Radius of semicircle CBD (R) = 7 cm

Area of the semicircle CBD $= \frac{1}{2} \times \pi r^2$

What is the formula for area of semi-circle?

$\frac{1}{2} \times \pi\ r^2$

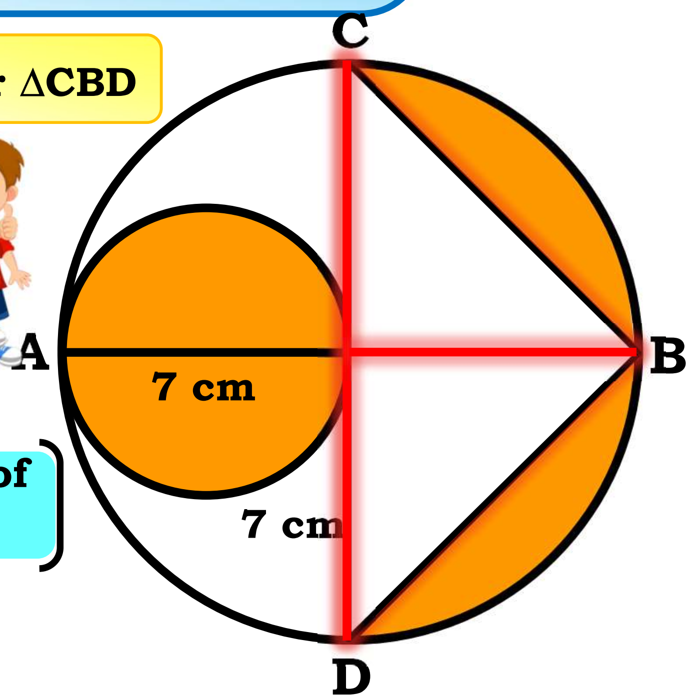
$= \frac{1}{\cancel{2}} \times \frac{\overset{11}{\cancel{22}}}{\cancel{7}} \times \cancel{7} \times 7$

$= 11 \times 7$

$\therefore$ Area of the semicircle CBD $= 77\ cm^2$

Area of remaining shaded region	=	Area of semi-circle CBD	−	Area of ΔCBD

Q. seg AB and seg CD are perpendicular diameters of a circle with radius 7 cm. **Find the area of the shaded region.**



Consider ΔCBD

Sol. $A(\Delta CBD) = \frac{1}{2} \times$ base $\times$ height

$= \frac{1}{2} \times$ CD × OB

$= \frac{1}{\cancel{2}} \times$ 1

What is the formula for area of triangle?

$\frac{1}{2} \times$ base $\times$ height

$A(\Delta CBD) = 49\ cm^2$

A (shaded region) = A(smaller circle) + (Area of semi-circle CBD − Area of ΔCBD)

$= 38.5 + (77 - 49)$

Area of the semicircle CBD = 77 cm^2

A(Circle with OA as diameter) = 38.5 cm^2

Area of shaded region is 66.5 cm^2

Area of shaded region = ... semi-circle CBD − Area of ΔCBD

Q. If the wheel of the bus with 90cm diameter makes 210 revolutions per minute, find the speed of bus in km/hr.

Sol. Diameter of the wheel of bus = 90 cm

$\therefore$ Circumference (C) $= \pi d$

$= \frac{22}{7} \times 90$

$= \frac{1980}{7}$ cm

We have to calculate the distance covered ... of the bus in 210 revolutions

Circumference = πd

one revolution

Speed $= \frac{\text{distance}}{\text{time}}$?

$\therefore$ Distance covered in 1 revolution $= \frac{1980}{7}$ cm

$\therefore$ Distance covered in 210 revolutions $= \cancel{210}^{30} \times \frac{1980}{\cancel{7}_{1}}$

$= 30 \times 1980$

$= 59400$ cm

Now, let us calculate the distance in 210 revolutions

This is distance covered in 1 minute

$\therefore$ Distance covered in 1 minute $= 59400$ cm

Q. **If the wheel of the bus with 90cm diameter makes 210 revolutions per minute, find the speed of bus in km/hr.**

Sol. $\therefore$ Distance covered in 1 minute = 59400 cm

$\therefore$ Distance covered in 1 hour = 59400×60

$= 3564000$ cm

$= \frac{35640\cancel{00}}{1\cancel{00}}$ m

1 hour = 60 minutes

$\therefore$ 1 m = $\frac{1}{1000}$ km

$= 35640$ m

$= \frac{3564\cancel{0}}{100\cancel{0}}$ km

$\therefore$ Distance covered in 1 hour = 35.64 km

Q. **If the wheel of the bus with 90cm diameter makes 210 revolutions per minute, find the speed of bus in km/hr.**

Sol. Distance covered in 1 hour = 35.64 km

$$\text{Speed} = \frac{\text{distance}}{\text{time}}$$

$$= \frac{35.64 \text{ km}}{1 \text{ hr.}}$$

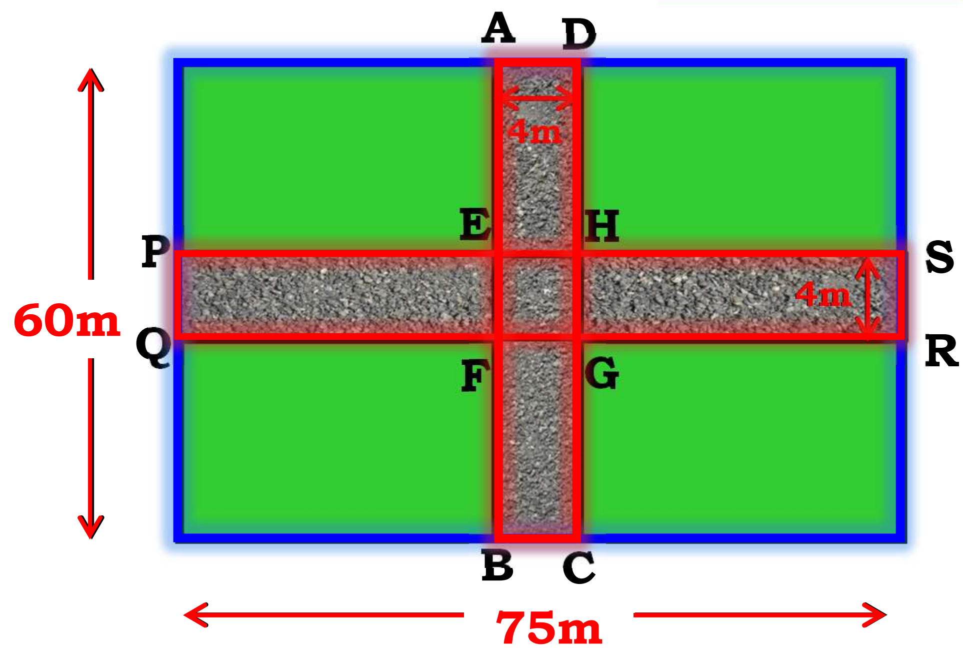
$$= 35.64 \text{ km/ hr.}$$

$$\text{Speed} = \frac{\text{distance}}{\text{time}}$$

$\therefore$ **Speed of the bus is 35.64 km/hr.**

Q. A rectangular lawn 75m × 60m has two roads, each 4m wide running through the middle of the lawn one parallel to the length and the other parallel to the breadth as shown in the figure. Find the cost of gravelling the road at the rate of Rs. 4.50 per m^2.

Cost = Area × Rate



Sol. A(□PQRS) = $l \times b$

= 75 × 4

= 300m^2

A(□ABCD) = $l \times b$

= 60 × 4

= 240m^2

What is the formula for area of rectangle?

$l \times b$

Q. A rectangular lawn 75m × 60m has two roads, each 4m wide running through the middle of the lawn one parallel to the length and the other parallel to the breadth as shown in the figure. Find the cost of gravelling the road at the rate of Rs. 4.50 per m².

Cost = Area × Rate

Sol. A(□EFGH) = (side)²

= 4 × 4

= 16m²

A(2 roads) = A(□PQRS) + A(□ABCD)

= 300 + 240

= 540 – 16 = 524 m²

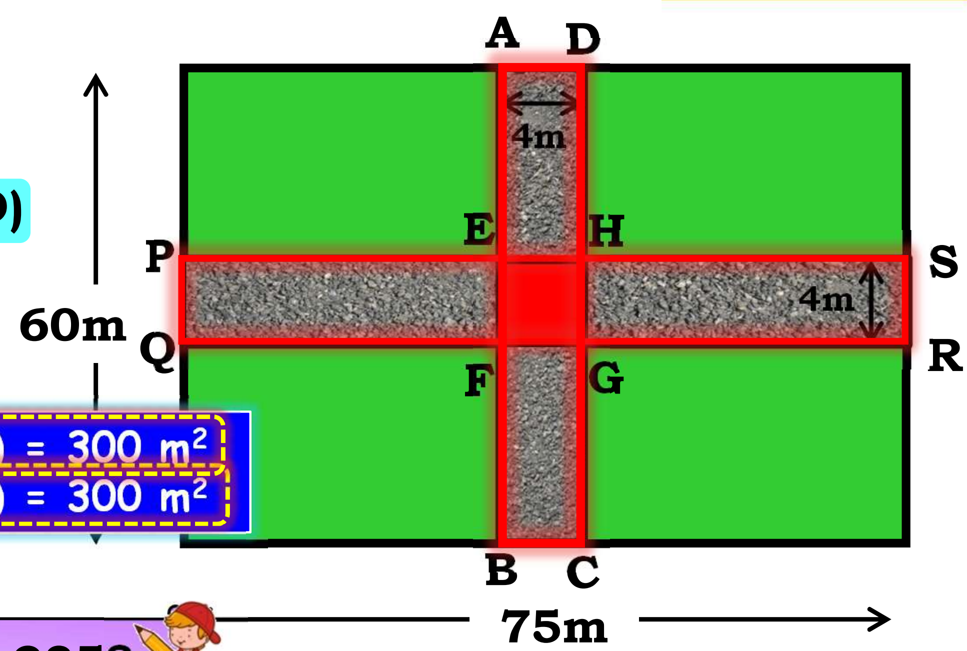
Cost = Area × Rate

What is the formula for area of square?

Side²

A (□PQRS) = 300 m²

A (□PQRS) = 300 m²



∴ Cost of gravelling the road is Rs. 2358.