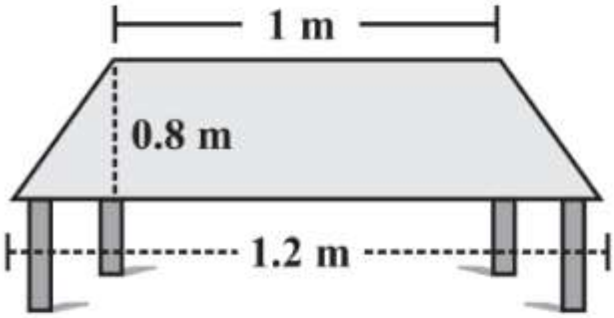
Mensuration: Exercise 11.2

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



***Sol.* Given:** Measurement of parallel sides of table = 1 m and 1.2 m
and perpendicular distance between them = 0.8 m
So,

Area of top surface of table = $\frac{1}{2}$ x (Sum of parallel sides) x (distance between parallel sides)

$$= \left[\frac{1}{2}\times(1+1.2)\times(0.8)\right]\text{m}^2$$

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

Thus, the area of the top surface of table = $0.88\ \text{m}^2$.

Q.2 The area of a trapezium is 34 cm² 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. Given: one parallel side of trapezium (a) = 10 cm and height (h) = 4 cm
Let x be the other parallel side.

Since, Area of trapezium = $\frac{1}{2}$ x (Sum of parallel sides) x (distance between parallel sides)

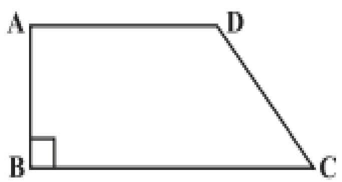
$$34 = \frac{1}{2} \times (10 + x) \times (4)$$

$$34 = 2 \times (10 + x)$$

$$17 = 10 + x$$

So, $x = 17 - 10 = 7$ cm
Thus, the length of the other parallel side = 7 cm

Q.3 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. Side AB is perpendicular to the parallel sides AD and BC.



Sol. Given: Dimension of trapezium field ABCD, BC = 48 m, CD = 17 m, AD = 40 m and the length or perimeter of trapezium ABCD = 120 m
Since, length of trapezium ABCD = AB + BC + CD + DA

120 m = AB + 48 m +17 m + 40 m
AB = 120 m – 105 m = 15 m

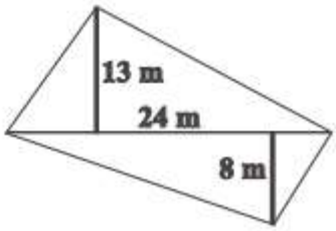
Now, area of trapezium field ABCD = $\frac{1}{2}$ x (Sum of parallel side) x Distance between them

$$= \left[\frac{1}{2}\times(40+48)\times(15)\right] m^2$$

$$= 660 \text{ m}^2$$

Thus, the area of the field = 660 m^2.

Q.4 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.* Given:** Diagonal length (d) = 24 m and perpendiculars dropped on it from the remaining opposite vertices are h_1 = 8 m and h_2 = 13 m

Now, area of quadrilateral =

$$\frac{1}{2} \textit{diagonal length (sum of perpendicular length on diagonal from oppsite vertex)}$$

$$= \frac{1}{2} d(h_1 + h_2)$$

$$= \frac{1}{2}(24)(8+13)$$

$$= \frac{1}{2}(24)(21)$$

$$= 252 \text{ m}^2$$

Thus, the area of the field = 252 m^2

Q.5 The diagonals of a rhombus are 7.5 cm and 12 cm. Find its area.

***Sol.* Given:** diagonals of rhombus, d_1 = 7.5 cm & d_2 = 12 cm.

Now, area of rhombus = $\frac{1}{2} \times d_1 x d_2$

$$= \frac{1}{2} \times 7.5 \text{ cm} \times 12 \text{ cm}$$

$$= 45 \text{ cm}^2$$

Thus, the area of rhombus = 45 cm^2

Q.6 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. Given: Base of rhombus = 6 cm, altitude = 4 cm and one diagonal d_1 = 8 cm.

Since, area of rhombus = base x altitude

= 6 cm x 4 cm

= 24 cm^2

Also, area of rhombus = $\frac{1}{2} \times d_1 x d_2$

Since, both are area of rhombus.

$$24\ cm^2 = \frac{1}{2} \times 8 \times d_2$$

$$d_2 = \frac{24 \times 2}{8}$$

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

Thus, the length of the other diagonal = 6 cm

Q.7 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 m² is Rs 4.

***Sol.* Given:** diagonals of rhombus, d_1 = 45 cm and d_2 = 30 cm.

Since, area of rhombus = $\frac{1}{2} \times d_1 x d_2$

$= \frac{1}{2} \times 45 \times 30$

$= 675\ cm^2$

Since, No of tiles = 3000 tiles

So, area of 3000 tiles = (675 x 30000) cm²

= 2025000 cm²

= 202.5 m²

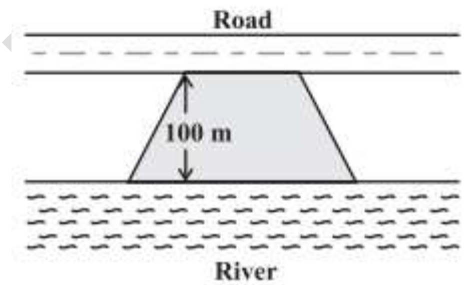
Since, the cost of polishing = Rs 4 per m².

So, cost of polishing area of 202.5 m² = Rs (4 x 202.5)

= Rs 810

Thus, the total cost of polishing the floor = Rs 810

Q.8 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 m² and the perpendicular distance between the two parallel sides is 100 m, find the length of the side along the river.



***Sol.* Given:** Area of trapezium shaped field = 10500 m² and perpendicular distance (h) = 100 m,

Now, let lm be the side along the river.

So, the other side along the road will be = 2l m.

Area of trapezium = $\frac{1}{2}$ x (Sum of parallel sides) x (perpendicular distance between parallel sides)

10500 m² = $\frac{1}{2}$ x (l + 2l) x (100 m)

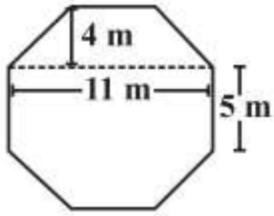
$3l = \left(\frac{2 \times 10500}{100}\right)$m = 210 m

l = 70m

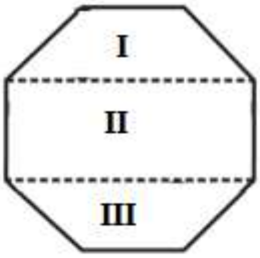
So, side along the river, l = 70m

And side along the road, 2l = 2x70 = 140 m

Q.9 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. Since, regular octagon has eight equal sides. So, given octagon can be divided into three parts:



Since in figure, area of part I & II will be same which are a trapezium shape. And part II is a rectangle.

So, Area of part I (Trapezium) = $\frac{1}{2}$ x (Sum of parallel sides) x (distance between parallel sides)

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

= 32 m^2.

Area of part II (Rectangle) = length x breadth

= 11 x 5 = 55 m^2.

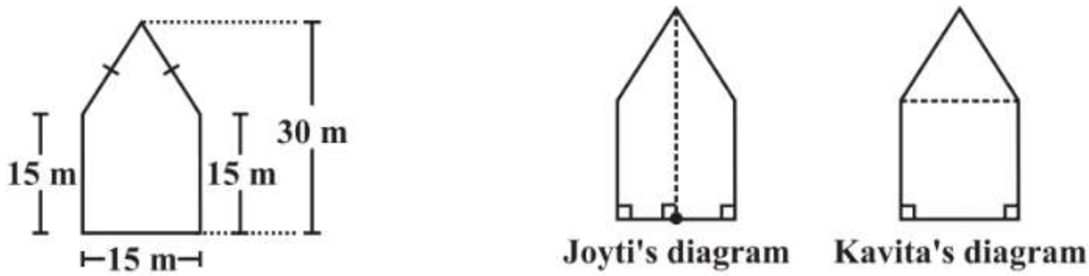
Now, area of Octagon = 2 x area of part A + area of part B

= 2 x 32 m^2 + 55 m^2

= 119 m^2.

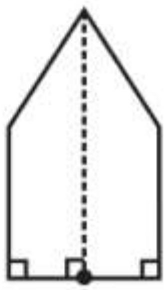
Thus, the area of the octagonal surface = 119 m^2

Q.10 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. Can you suggest some other way of finding its area?

Sol. Firstly area by Jyoti's diagram:



Joyti's diagram

In this figure, the pentagonal park is divided into two trapeziums shape. Where,

Sides of trapezium, a = 15 m and b = 30 m, Distance between two sides = $\frac{15}{2} = 7.5$ m

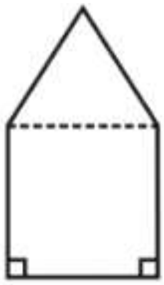
So, area of pentagon = 2 x (Area of trapezium)

$= 2 \times [\frac{1}{2} \times (\text{Sum of parallel sides}) \times (\text{distance between them})]$

$= 2 \times \frac{1}{2} \times (15 + 20) \times \frac{15}{2}$

$= 337.5\ m^2$

Now, area by Kavita's diagram:



Kavita's diagram

In this figure, the pentagonal park is divided into one triangle and one square.
So, area of pentagon = area of triangle + area of square

$= [\frac{1}{2} \times \text{base} \times \text{height}] + [(\text{side})^2]$

$= [\frac{1}{2} \times 15 \times (30 - 15)] + [(15)^2]$

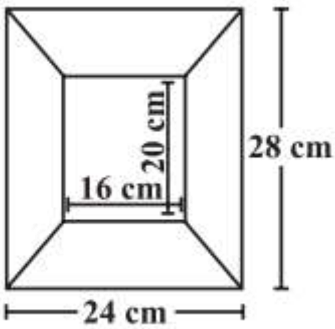
$= [\frac{1}{2} \times 15 \times 15 + 225]$

$= [112.5 + 225]$

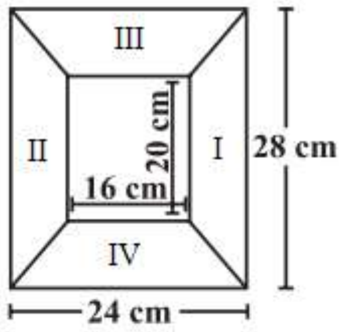
$= 337.5\ m^2$

Thus, the area of pentagonal shaped park = $337.5\ m^2$

Q.11 Diagram of the adjacent picture frame has outer dimensions =24 cm × 28 cm and inner dimensions 16 cm × 20 cm. Find the area of each section of the frame, if the width of each section is same.



Sol. Firstly, given figure is labelled as shown in figure.



Since, width of sections I & II and section III & IV are same.
So, area (figure I) = area (figure II)
And area (figure III) = area (figure IV)

Now, area of figure I = $\frac{1}{2}$ x (Sum of parallel sides) x (distance between parallel sides)

$= [\frac{1}{2} \times (20 + 28) \times (4)]$

$= [\frac{1}{2} \times (48) \times (4)]$

$= 96 \text{ cm}^2$

So, Area of figure II = area of figure I = 96 cm^2

Now, area of figure III = $\frac{1}{2}$ x (Sum of parallel sides) x (distance between parallel sides)

$= [\frac{1}{2} \times (24 + 16) \times (4)]$

$= [\frac{1}{2} \times (40) \times (4)]$

$= 80 \text{ cm}^2$

So, Area of figure III = area of figure IV = 80 cm^2