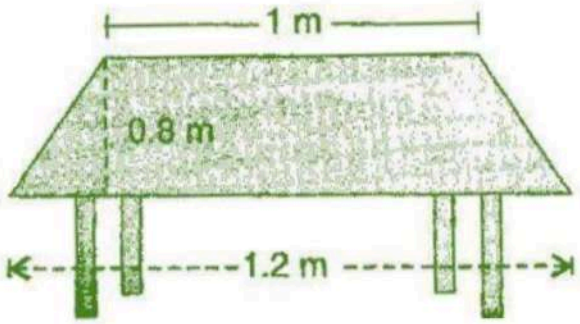
Exercise 11.2

Question 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.



Answer 1:

Here one parallel side of the trapezium (a) = 1 m

And second side (b) = 1.2 m and height (h) = 0.8 m

$\therefore$ Area of top surface of the table = $\frac{1}{2}(a+b)\times h$

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

$= \frac{1}{2}\times 2.2\times 0.8 = 0.88 \text{ m}^2$

Hence, the surface area of the table is 0.88 m^2.

Question 2:

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.

Answer 2:

Let the length of the other parallel side be b.

Length of one parallel side (a) = 10 am and height (h) = 4 cm

Area of trapezium = $\frac{1}{2}(a+b)\times h$

$\Rightarrow \quad 34 = \frac{1}{2}(10+b)\times 4$

$\Rightarrow \quad 34 = (10+b)\times 2$

$\Rightarrow \quad 34 = 20+2b$

$\Rightarrow \quad 34-20 = 2b$

$\Rightarrow \quad 14 = 2b$

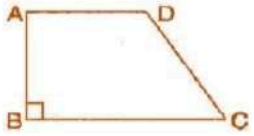
$\Rightarrow \quad 7 = b$

$\Rightarrow \quad b = 7$

Hence, the another required parallel side is 7 cm.

Question 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.



Answer 3:

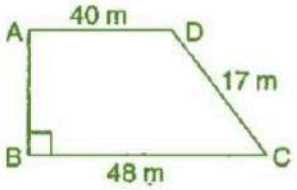
Given: BC = 48 m, CD = 17 m, AD = 40 m and perimeter = 120 m

$\because$ Perimeter of trapezium ABCD = AB + BC + CD + DA

$\Rightarrow$ 120 = AB + 48 + 17 + 40

$\Rightarrow$ 120 = AB = 105

$\Rightarrow$ AB = 120 – 105 = 15 m



Now Area of the field $= \frac{1}{2}\times(BC + AD)\times AB$

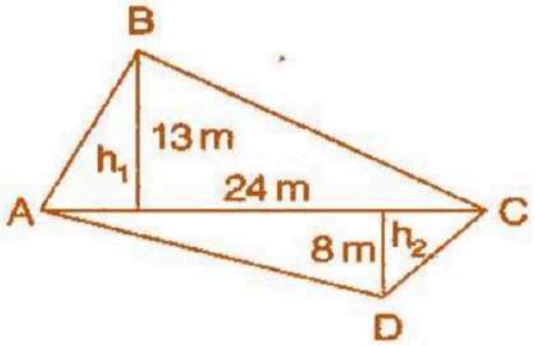
$= \frac{1}{2}\times(48+40)\times 15 = \frac{1}{2}\times 88\times 15$

$= 660\ m^2$

Hence, area of the field ABCD is 660 m^2.

Question 4:

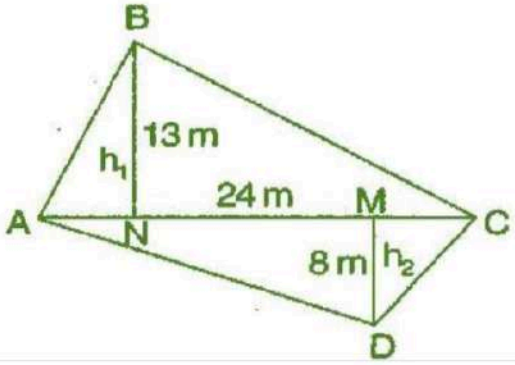
The diagonal of a quadrilateral shaped field is 24 m and the perpendiculars dropped on it from the remaining opposite vertices are 8 m and 13 m. Find the area of the field.



Answer 4:

Here h_1 = 13 m, h_2 = 8 m and AC = 24 m

Area of quadrilateral ABCD = Area of ΔABC + Area of ΔADC



$$= \frac{1}{2}b \times h_1 + \frac{1}{2}b \times h_2$$

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

$$= \frac{1}{2} \times 24 \times (13+8) = \frac{1}{2} \times 24 \times 21 = 252 \text{ m}^2$$

Hence, required area of the field is 252 m².

Question 5:

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

Answer 5:

Given: $d_1 = 7.5$ cm and $d_2 = 12$ cm

We know that,

$$\text{Area of rhombus} = \frac{1}{2} \times d_1 d_2 = \frac{1}{2} \times 7.5 \times 12 = 45 \text{ cm}^2$$

Hence, area of rhombus is 45 cm².

Question 6:

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

Answer 6:

Since rhombus is also a kind of parallelogram.

$\therefore$ Area of rhombus = Base x Altitude

= 6 x 4 = 24 cm²

Also $\text{Area of rhombus} = \frac{1}{2}d_1 d_2$

$\Rightarrow \quad 24 = \frac{1}{2} \times 8 \times d_2$

$\Rightarrow \quad 24 = 4d_2$

$\Rightarrow \quad d_2 = \frac{24}{4} = 6$ cm

Hence, the length of the other diagonal is 6 cm.

Question 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 ₹ 4.

Answer 7:

Here, $d_1 = 45$ cm and $d_2 = 30$ cm

$\because$ $\text{Area of one tile} = \frac{1}{2}d_1 d_2 = \frac{1}{2} \times 45 \times 30 = 675 \text{ cm}^2$

$\therefore$ Area of 3000 tiles = 675 x 3000 = 2025000 cm²

$$= \frac{2025000}{10000} = 202.50 \text{ m2} \qquad \left[\because \ 1 \text{ m}^2 = 10000 \text{ cm}^2\right]$$

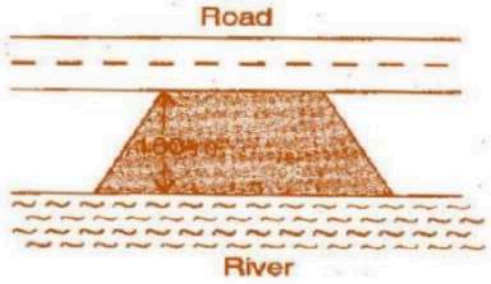
$\because$ Cost of polishing the floor per sq. meter = ₹ 4

$\therefore$ Cost of polishing the floor per 202.50 sq. meter = 4 x 202.50 = ₹ 810

Hence, the total cost of polishing the floor is ₹ 810.

Question 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 m^2 and the perpendicular distance between the two parallel sides is 100 m, find the length of the side along the river.



Answer 8:

Given: Perpendicular distance (h) = 100 m

Area of the trapezium shaped field = 10500 m^2

Let side along the road be x m and side along the river = $2x$ m

$\therefore$ Area of the trapezium field = $\frac{1}{2}(a+b)\times h$

$\Rightarrow$ $10500 = \frac{1}{2}(x+2x)\times 100$

$\Rightarrow$ $10500 = 3x\times 50$

$\Rightarrow$ $3x = \frac{10500}{50}$

$\Rightarrow$ $x = \frac{10500}{50\times 3}$

$\Rightarrow$ $x = 70$ m

Hence, the side along the river = $2x$ = 2 x 70 = 140 m.

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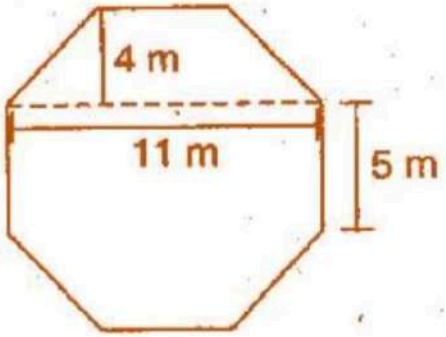
Question 9:

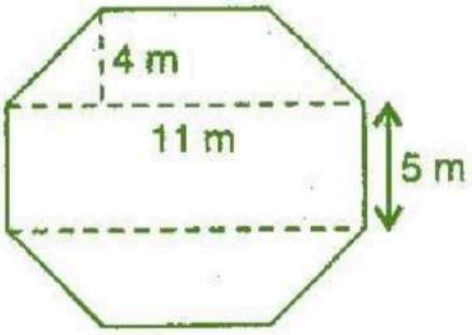
Top surface of a raised platform is in the shape of a regular octagon as shown in the figure. Find the area of the octagonal surface.



Answer 9:

Given: Octagon having eight equal sides, each 5 m.

Construction: Divided the octagon in 3 figures, two trapeziums whose parallel and perpendicular sides are 11 m and 4 m respectively and third figure is rectangle having length and breadth 11 m and 5 m respectively.



Now Area of two trapeziums = $2 \times \frac{1}{2}(a+b)\times h$

$= 2 \times \frac{1}{2}(11+5)\times 4 = 4 \times 16 = 64\ m^2$

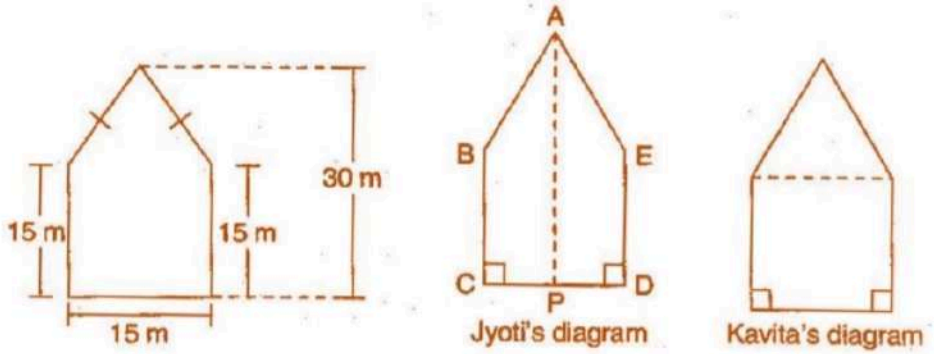
And Area of rectangle = length x breadth

$= 11 \times 5 = 55\ m^2$

$\therefore$ Total area of octagon = $64 + 55 = 119\ m^2$

Question 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?

Answer 10:

First way : By Jyoti's diagram,

Area of pentagon = Area of trapezium ABCP + Area of trapezium AEDP

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

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

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

$= \frac{1}{2}$ x 45 x CD

$= \frac{1}{2}$ x 45 x 15 = 337.5 m^2

Second way : By Kavita's diagram

Here, a perpendicular AM drawn to BE.

AM = 30 – 15 = 15 m

Area of pentagon = Area of ΔABE + Area of square BCDE

$= \frac{1}{2}$ x 15 x 15 + 15 x 15

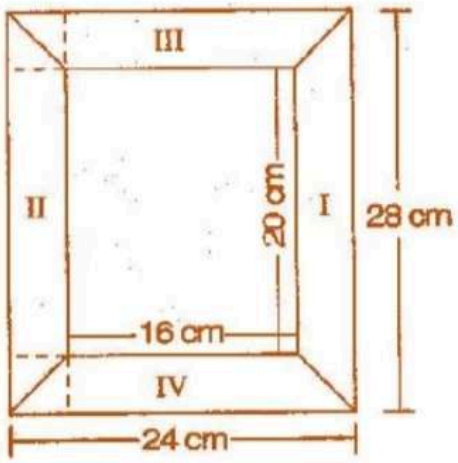
$= 112.5 + 225.0$

$= 337.5\ m^2$

Hence, total area of pentagon shaped park = 337.5 m^2.

Question 11:

Diagram of the adjacent picture frame has outer dimensions = 24 cm x 28 cm and inne dimensions 16 cm x 20 cm. Find the area of each section of the frame, if the width of eac section is same.



Answer 11:

Here two of given figures (I) and (II) are similar in dimensions.
And also figures (III) and (IV) are similar in dimensions.

$\therefore$ Area of figure (I) = Area of trapezium = $\frac{1}{2}(a+b)\times h$

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

$= \frac{1}{2}\times 48\times 4 = 96\ cm^2$

Also Area of figure (II) = 96 cm^2

Now Area of figure (III) = Area of trapezium = $\frac{1}{2}(a+b)\times h$

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

$= \frac{1}{2}\times 40\times 4 = 80\ cm^2$

Also Area of figure (IV) = 80 cm^2