

NCERT SOLUTIONS OF Mensuration

Exercise 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:

Area of Trapezium is given by

$$= (1/2) \times (\text{Sum of parallel sides}) \times \text{Perpendicular distance}$$

Here in this question, Perpendicular distance = 0.8 m

Parallel sides are 1m and 1.2 m

So Area of Trapezium

$$= (1/2) \times (1+1.2) \times 0.8$$

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

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:

Area of Trapezium

$$= 1/2 \times \text{sum of parallel sides} \times \text{perpendicular distance}$$

Here the givens are

$$\text{Area of a trapezium} = 34 \text{ cm}^2$$

$$\text{Length of one parallel side} = 10 \text{ cm}$$

Height=4 cm

Let a be the other parallel side, then

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

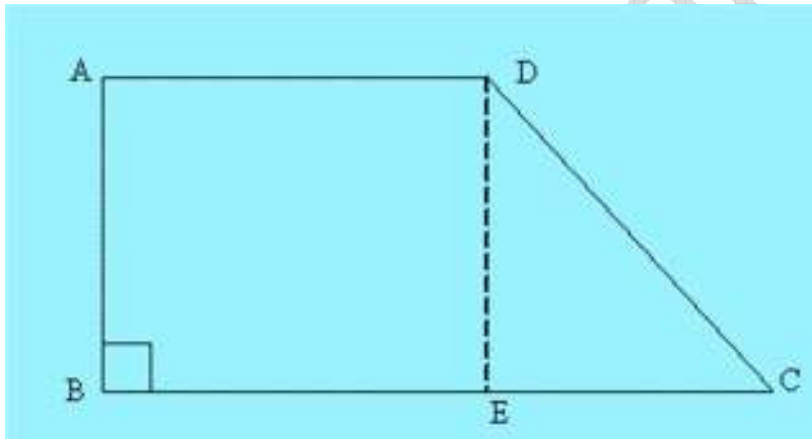
$$34 = 2(10+a)$$

$$10+a=17$$

$$a=17-10=7 \text{ cm}$$

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:

Area of Trapezium

$$= \frac{1}{2} \times \text{sum of parallel sides} \times \text{perpendicular distance}$$

Given

Parallel sides are given but height is missing

If a perpendicular from D to BC is drawn then it will be equal to AB,

Then $EC = 48 - 40 = 8$ m.

In $\triangle DEC$, By Pythagoras theorem

$$DE^2 + EC^2 = DC^2$$

Or

$$DE^2 = DC^2 - EC^2$$

$$= 17^2 - 8^2 = 289 - 64 = 225$$

Or, $DE = 15$ m

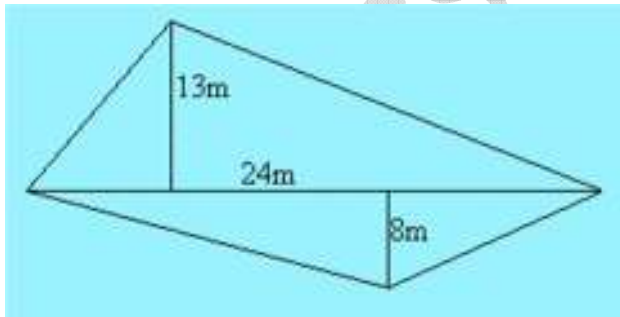
Area of Trapezium

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

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

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

Area of quadrilateral

= Area of Upper Triangle + Area of Lower Triangle

Area of Triangle is given by

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

So Area of Upper Triangle

$$= \frac{1}{2} \times 13 \times 24 = 156 \text{ m}^2$$

Area of Lower Triangle

$$=(1/2) \times 8 \times 24 = 96 \text{ m}^2$$

So

$$\text{Area of the field} = 156 + 96 = 252 \text{ m}^2$$

Question 5

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

Answer

$$\text{Area of Rhombus} = (1/2) \times D_1 \times D_2$$

Here

$$D_1 = 7.5 \text{ cm}$$

$$D_2 = 12 \text{ cm}$$

So Area of rhombus

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

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.

Answer:

A rhombus is special case of parallelogram

$$\text{So Area of rhombus} = \text{Altitude} \times \text{side} = 24 \text{ cm}^2$$

Let d be the other diagonal, then

$$\text{Area of Rhombus} = (1/2) \times D_1 \times D_2$$

$$24 = (1/2) \times 8 \times a$$

$$\text{Or } a = 6 \text{ cm}$$

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 Rs 4

Answer

$$\text{Area of Rhombus} = (1/2) \times D_1 \times D_2$$

$$= (1/2) \times 45 \times 30 = 675$$

Now cost of Polishing the floor

$$= \text{Total Area} \times \text{rate}$$

$$= 3000 \times 675 \times 4 / 10000$$

$$= \text{Rs } 810$$

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

Answer

Let a be the length of along the road, the length of the side along river will be 2a

Area of Trapezium is given by

$$= (1/2) \times (\text{Sum of parallel sides}) \times \text{Perpendicular distance}$$

$$= (1/2) \times (a+2a) \times 100 = 150a$$

$$\text{Now Area of Trapezium} = 10500 \text{ m}^2$$

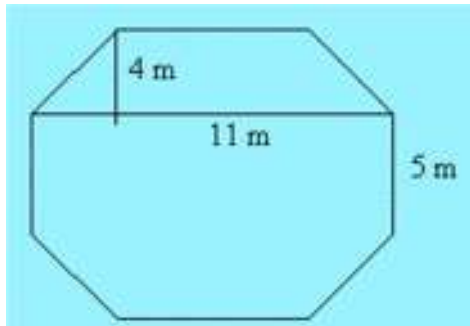
$$10500 = 150a$$

$a=70$

So sides are 70 and 140 m

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

Upper part is in the shape of a trapezium. This is mirrored in the lower part as well. So area of two trapeziums added to the area of middle rectangular portion will be equal to the area of the octagon.

Area of Trapezium

$$= (1/2) \times (\text{Sum of parallel sides}) \times \text{Perpendicular distance}$$

$$= (1/2) (11+5)4 = 32\text{m}^2$$

$$\text{So, Area of 2 trapeziums} = 64 \text{ m}^2$$

Now, Area of Rectangle = Length x Breadth

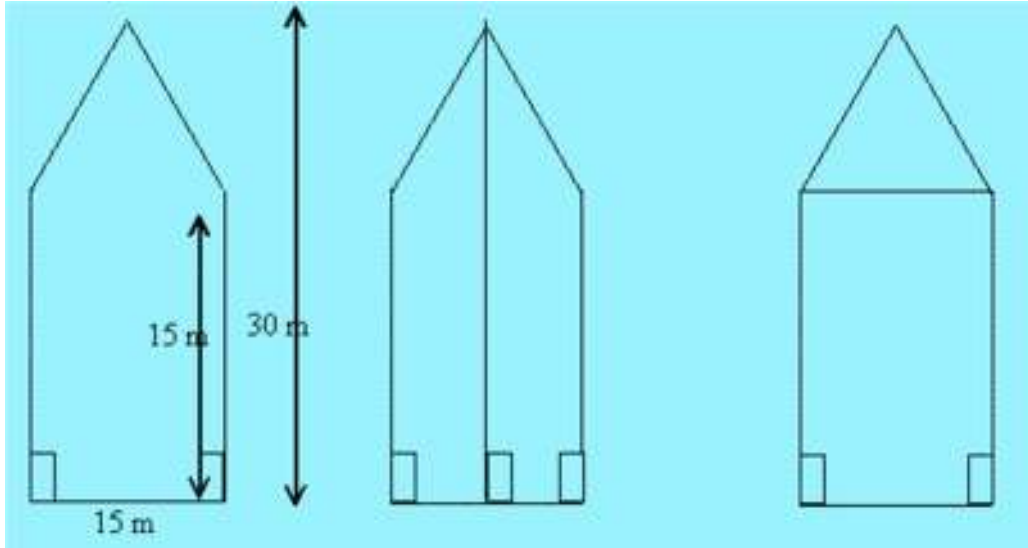
$$= 11 \times 5 = 55$$

$$\text{Hence, Area of the platform} = 64+55 = 119 \text{ m}^2$$

Question 10

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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

Jyoti has divided the park in to congruent trapeziums. The parallel sides of the trapezium are measuring 15 m and 30 m and the perpendicular distance is 7.5 m

Area of Trapezium=

$$= (1/2) \times (\text{Sum of parallel sides}) \times \text{Perpendicular distance}$$

$$= (1/2)(30+15) 7.5= 337 \text{ m}^2$$

Kavita divided the park into upper triangular portion and lower rectangular portion. Sides of rectangle are 15 m each. Base and height of triangle are 15 m each.

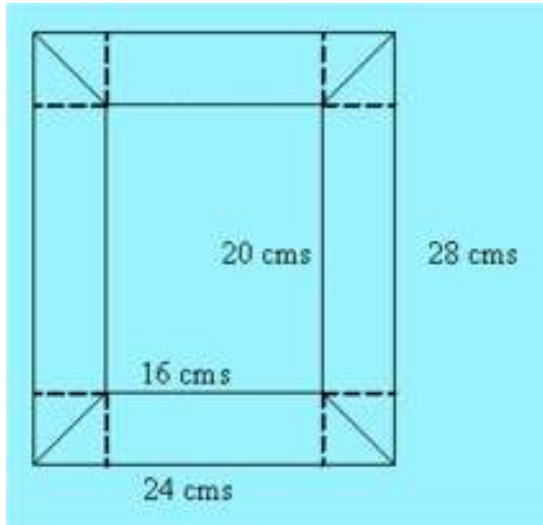
$$\text{Area of square} = 15 \times 15 = 225 \text{ m}^2$$

$$\text{Area of Triangle} = (1/2) \times 15 \times 15 = 112.5$$

$$\text{Total Area} = 225 + 112.5 = 337.5 \text{ m}^2$$

Question 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.



Answer: Let us draw a perpendicular from any side of the inner rectangle to the side of the outer rectangle as shown above. This will give us 4 congruent triangles as $24 - 16 = 8$ and $28 - 20 = 8$ and width of each section is same

So Height and Base of each triangle are 4 cm each

Sides of Both Horizontal Rectangles = 4 cm and 16 cm

Sides of Both vertical Rectangles = 4 cm and 20 cm

Now of the each Triangle = $(1/2) \times 4 \times 4 = 8 \text{ cm}^2$

Area of the horizontal rectangle = $4 \times 16 = 64$

Hence, Area of lower horizontal section of the frame = $64 + 8 + 8 = 80 \text{ cm}^2$

Area of the vertical rectangle = $4 \times 20 = 80$

Hence, Area of One Vertical Section of the frame = $80 + 8 + 8 = 96 \text{ cm}^2$