



# Basic Mathematics\_22103\_U04.2

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MSBTE LEAD: Learning at your Doorstep





# Unit 4: Mensuration

Topic : Area and dimensions of plane figures



## Course Outcome:

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- ▶ **Co4 :** Solve the problems based on measurement of regular closed figures and regular solids.

- ▶ **Learning Objectives:**

Determine the area of given square, parallelogram, rhombus and trapezium.



# Contents

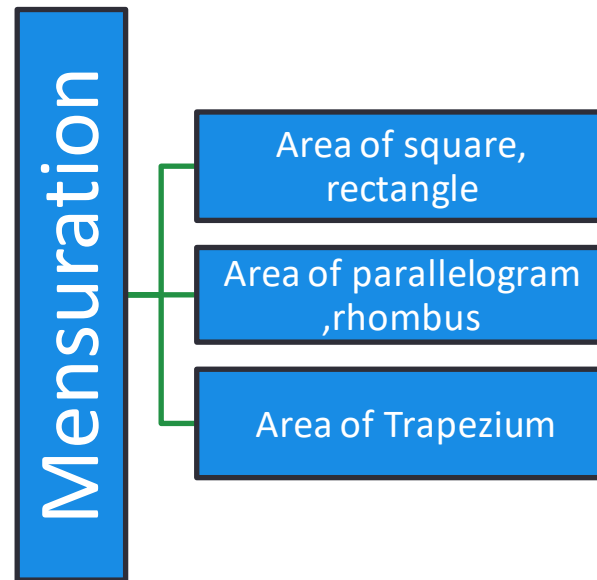
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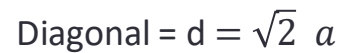
1. Different formulae for area of square, Rectangle, rhombus.
2. Area of Parallelogram , Trapezium.
3. Examples to compute area of regular closed figures.



# Concept Map



The area of a plane figure is a measure of the amount of space inside it.

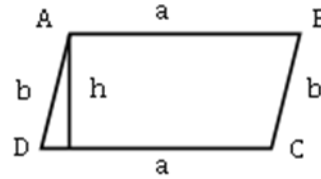
$$\text{Diagonal} = d = \sqrt{l^2 + b^2}$$


# Area of Parallelogram ,Rhombus and Trapezium

## 3)Parallelogram:

$$\text{Area} = \text{base} \times \text{altitude} = ah$$

$$\text{Perimeter} = 2(a + b)$$



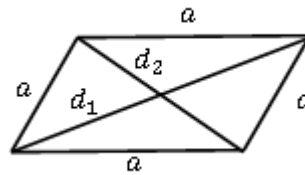
## 4)Rhombus:

$$\text{Area} = \frac{1}{2} \text{product of diagonals}$$

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

$$\text{Perimeter} = 4a$$

$$\text{Side of rhombus} = a = \frac{1}{2} \sqrt{d_1^2 + d_2^2}$$

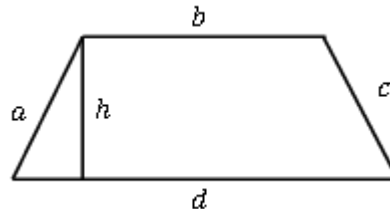


## 5)Trapezium:

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

$$A = \frac{1}{2} (b + d) \times h$$

$$\text{Perimeter} = a + b + c + d$$



## Examples:

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1. Find the area of rhombus whose diagonals are 6 cm and 9 cm.

Ans: Given: diagonals  $d_1$  and  $d_2$  are 6 cm and 9 cm.

We know, area of rhombus  $= \frac{1}{2}(d_1 \times d_2)$

$$\Rightarrow \text{Area of rhombus} = \frac{1}{2}(6 \times 9) = 27 \text{ cm}^2$$

2. The two parallel sides of a trapezium measures 50 m & 20 m respectively. Its altitude is 50m. Find its area.

Ans: We know,

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

$$\Rightarrow \text{Area} = \frac{1}{2}(50 + 20) \times 50$$

$$\Rightarrow \text{Area} = \frac{1}{2}(70) \times 50$$

$$\text{Area} = 1750 \text{ m}^2$$





3. In exchange for a square plot of land, one of whose side is 25 metres, a man want to buy a rectangular plot 50 metres wide and of the same area as the square plot. Determine the length of the rectangular plot.

Ans:            Given that side of square is 25 metres.

$$\therefore \quad \text{Area of square} = a^2 = (25)^2 = 625 \text{ m}^2$$

Also given that, area of square = area of rectangular plot

Now area of rectangular plot =  $l \times b$

$$\Rightarrow \quad 625 = l \times 50$$

$$\Rightarrow \quad l = \frac{625}{50}$$

$$\Rightarrow \quad l = 12.5 \text{ metre}$$



4) Area of rhombus is  **$336 \text{ cm}^2$**  & one diagonal is 14 cm. Find the length of the side.

Ans: We know, area of rhombus  $= \frac{1}{2} (d_1 \times d_2)$

$$\Rightarrow 336 = \frac{1}{2} (14 \times d_2)$$

$$\Rightarrow d_2 = \frac{2 \times 336}{14} = 48 \text{ cm}$$

$$\text{Now side of rhombus} = \frac{1}{2} \sqrt{d_1^2 + d_2^2}$$

$$\Rightarrow a = \frac{1}{2} \sqrt{(14)^2 + (48)^2}$$

$$\Rightarrow a = 25 \text{ cm}$$

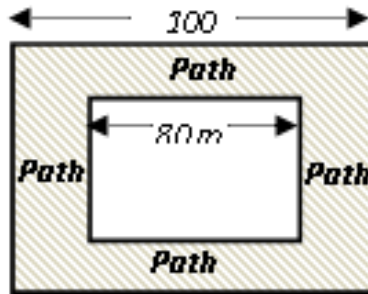


5.) A square grassy plot is of side 100 metre. It has a gravel path 10 metres wide all round it on the inside. Find the area of the path.

Ans:

Given that side of square grassy plot is 100 metres.

The gravel path is of 10 metres wide on the inside



∴ From fig.

Area of path = Area of square grassy plot – Area of inner square grassy plot

$$\Rightarrow \text{Area of path} = (100)^2 - (80)^2$$

$$\Rightarrow \text{Area of path} = 3600 \text{ m}^2$$



# Application of Concept/ Examples in real life:

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- ▶ In engineering applications and in daily life ,often one needs to estimate the cost of various aspects ,the amount of production which indirectly deals with mensuration.
- ▶ Calculating areas is an important skill used by many people in their daily work.
- ▶ Builders and tradespeople often need to work out the areas and dimensions of the structures they are building, and so do architects, designers and engineers.



# Summary:

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So today we learned....

- ▶ Formulae for Area of Rectangle, Square and, Rhombus.
- ▶ Formulae to find area of Parallelogram and Trapezium.
- ▶ To solve different problems related to area of regular closed figures.



## Now take this quiz.....

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1) The two parallel sides of a trapezium measures 50 m & 20 m respectively. Its altitude is 50m. Find its area.

- a)  $1650 \text{ m}^2$
- b)  $1700 \text{ m}^2$
- c)  $1650 \text{ m}^2$
- d)  $1750 \text{ m}^2$

2) The adjacent sides of a parallelogram are 12 cm and 10 cm. One diagonal is 8 cm. Find the area of the parallelogram.

- a)  $80 \text{ cm}^2$
- b)  $79 \text{ cm}^2$
- c)  $79.37 \text{ cm}^2$
- d)  $78 \text{ cm}^2$

3) Diagonals of a kite are 12cm and 13 cm in length. Find the area of the kite.

- a)  $75 \text{ cm}^2$
- b)  $78 \text{ cm}^2$
- c)  $80 \text{ cm}^2$
- d)  $73 \text{ cm}^2$

**Ans: 1) d 2) c 3) b**



**Thank you**

