CHAPTER 09

Areas of Parallelogram and Triangles

Example 1:

The diagonals of quadrilateral ABCD, AC and BD intersects at ‘O’. Prove that if BO = OD then the triangles ABC and ADC are equal in area.

Sol.

Given that,

A quadrilateral ABCD in which its diagonals AC and BD intersects at ‘O’ such that BO = OD.

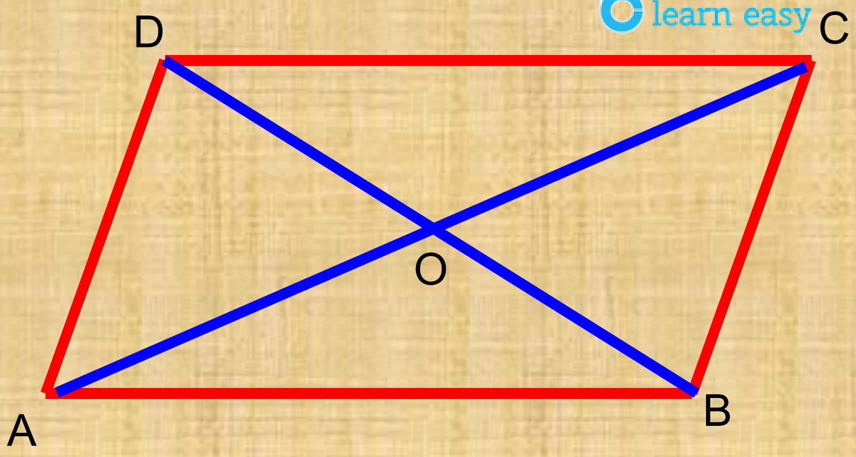
To prove that Area (ΔABC)= Area (ΔADC)

Proof:

In ΔABD, we have BO = OD

$\Rightarrow$ O is the midpoint of BD

$\Rightarrow$ AO is median



Since median of a triangle divides it into two triangles of equal area.

$\therefore$ Area (ΔADB)= Area (ΔAOD)…………… (1)

In (ΔCOD), 'O' is the midpoint of BD.

OC is the median.

$\Rightarrow$Area (ΔCOB) = Area (ΔCOD)……………… (2)

By adding (1) & (2) we get,

Area (ΔAOB) + Area (ΔCOD) = Area (ΔAOD) + Area (ΔCOD)

$\Rightarrow$Area (ΔABC) = Area (ΔADC)

Example 2:

The area of trapezium is half the product of the sum of its parallel sides and the perpendicular distance between them.

Sol.

Given that,

ABCD be a trapezium in which

AB || DC

AL || DC

CN $\perp$ AB

Let AL = CN = h; AB = a; DC = b

To prove that Area (Trapezium ABCD) = $\frac{1}{2}$(a + b) x h

Proof:

Area (Trapezium ABCD) = Area (ΔABC) + Area (ΔACD)

$$= \frac{1}{2} \text{ x h x a} + \frac{1}{2} \text{ x h x b}$$

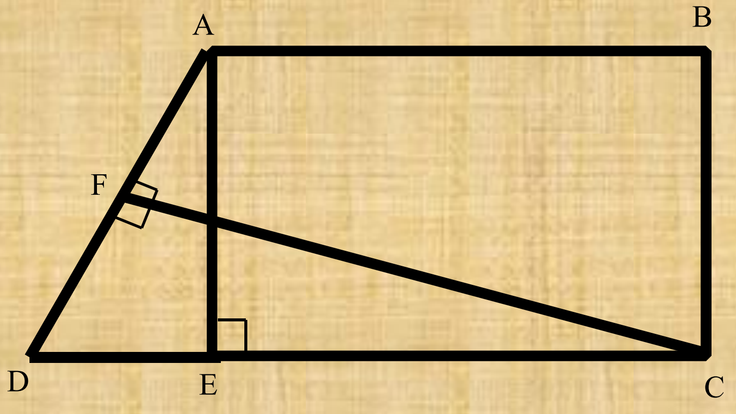
$\therefore$ Area of trapezium ABCD = $\frac{1}{2}$ x h (a + b) Sq. units

Example 3:

In the given figure ABCD, is a parallelogram, $AE \perp DC$ and $CF \perp AD$. If AB = 16 cm; AE = 8 cm; CF = 10 cm. Find AD.

Sol.

We have $AE \perp DC$.



AB = 16 cm; AC = 8 cm and CF = 10 cm

$\therefore$ AB = CD [Opposite sides of parallelogram]

CD = 16 cm

Now, Area of parallelogram ABCD = Base x Height

= DC x AE

= 16 x 8

= 128 cm^2

$\therefore$ Area of parallelogram ABCD = 128 cm^2

Since, $CF \perp AD$

$\therefore$ Area of parallelogram ABCD = AD x CF

128 = AD x 10

$$\Rightarrow AD = \frac{128}{10} = 12.8 \text{ cm}$$