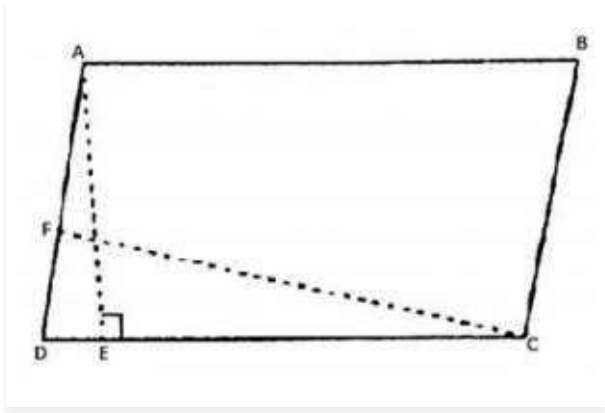


Q 1. If figure, ABCD is a parallelogram, $AE \perp DC$ and $CF \perp AD$. If $AB = 16$ cm, $AE = 8$ cm, and $CF = 10$ cm, Find AD.



Solution:

Given that,

In parallelogram ABCD, $CD = AB = 16$ cm

[$\because$ Opposite side of a parallelogram are equal]

We know that,

Area of parallelogram = Base $\times$ Corresponding altitude

Area of parallelogram ABCD = $CD \times AE = AD \times CF$

$16 \text{ cm} \times 8 \text{ cm} = AD \times 10 \text{ cm}$

$AD = \frac{16 \times 8}{10} \text{ cm} = 12.8 \text{ cm}$

Thus, The length of AD is 12.8 cm.

Q 2. In Q 1, if $AD = 6$ cm, $CF = 10$ cm, and $AE = 8$ cm, Find AB.

Solution:

We know that,

Area of a parallelogram ABCD = $AD \times CF \dots \dots \dots (1)$

Again area of parallelogram ABCD = $CD \times AE \dots \dots \dots (2)$

Compare equation(1) and equation(2)

$AD \times CF = CD \times AE$

$\Rightarrow 6 \times 10 = D \times 8$

$\Rightarrow D = \frac{60}{8} = 7.5 \text{ cm}$

$\therefore AB = DC = 7.5 \text{ cm}$ [$\because$ Opposite side of a parallelogram are equal]

Q 3. Let ABCD be a parallelogram of area 124 cm^2 . If E and F are the mid-points of sides AB and CD respectively, then find the area of parallelogram AEFD.

Solution:

Given,

Area of a parallelogram ABCD = 124 cm^2

Construction: Draw $AP \perp DC$

Proof:-

$$\text{Area of a parallelogram AFED} = DF \times AP \dots\dots\dots (1)$$

$$\text{And area of parallelogram EBCF} = FC \times AP \dots\dots\dots (2)$$

$$\text{And } DF = FC \dots\dots\dots (3) \quad [F \text{ is the midpoint of } DC]$$

Compare equation (1), (2) and (3)

$$\text{Area of parallelogram AEFD} = \text{Area of parallelogram EBCF}$$

$$\therefore \text{Area of parallelogram AEFD} = \frac{\text{Area of parallelogram ABCD}}{2} = \frac{124}{2} = 62 \text{ cm}^2$$

Q 4. If ABCD is a parallelogram, then prove that

$$Ar(\triangle ABD) = Ar(\triangle BCD) = Ar(\triangle ABC) = Ar(\triangle ACD) = \frac{1}{2} Ar(\text{//}^{\text{gm}} \text{ABCD}).$$

Solution:

Given:-

ABCD is a parallelogram,

$$\text{To prove : - } Ar(\triangle ABD) = Ar(\triangle BCD) = Ar(\triangle ABC) = Ar(\triangle ACD) = \frac{1}{2} Ar(\text{//}^{\text{gm}} \text{ABCD}).$$

Proof:- We know that diagonal of a parallelogram divides it into two equilaterals .

Since, AC is the diagonal.

$$\text{Then, } Ar(\triangle ABC) = Ar(\triangle ACD) = \frac{1}{2} Ar(\text{//}^{\text{gm}} \text{ABCD}) \dots\dots\dots (1)$$

Since, BD is the diagonal.

$$\text{Then , } Ar(\triangle ABD) = Ar(\triangle BCD) = \frac{1}{2} Ar(\text{//}^{\text{gm}} \text{ABCD}) \dots\dots\dots (2)$$

Compare equation (1) and (2)

$$\therefore Ar(\triangle ABC) = Ar(\triangle ACD) = Ar(\triangle ABD) = Ar(\triangle BCD) = \frac{1}{2} Ar(\text{//}^{\text{gm}} \text{ABCD})$$