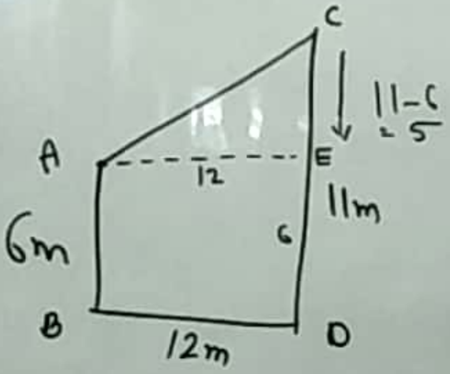
Pythagoras Theorem

12

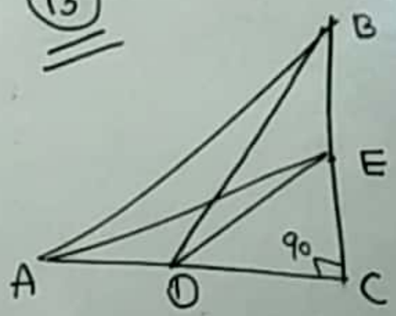


$\boxed{AC = 13}$

In ΔAEC by P.T

$$AC^2 = AE^2 + CE^2$$
$$= 12^2 + 5^2$$
$$= 144 + 25$$
$$= 169$$

13



by P.T

In ΔAEC $AE^2 = AC^2 + CE^2$ —(i)

In ΔBDC $BD^2 = BC^2 + CD^2$ —(ii)

In ΔABC $AB^2 = AC^2 + BC^2$ —(iii)

In ΔDEC $DE^2 = DC^2 + CE^2$ —(iv)

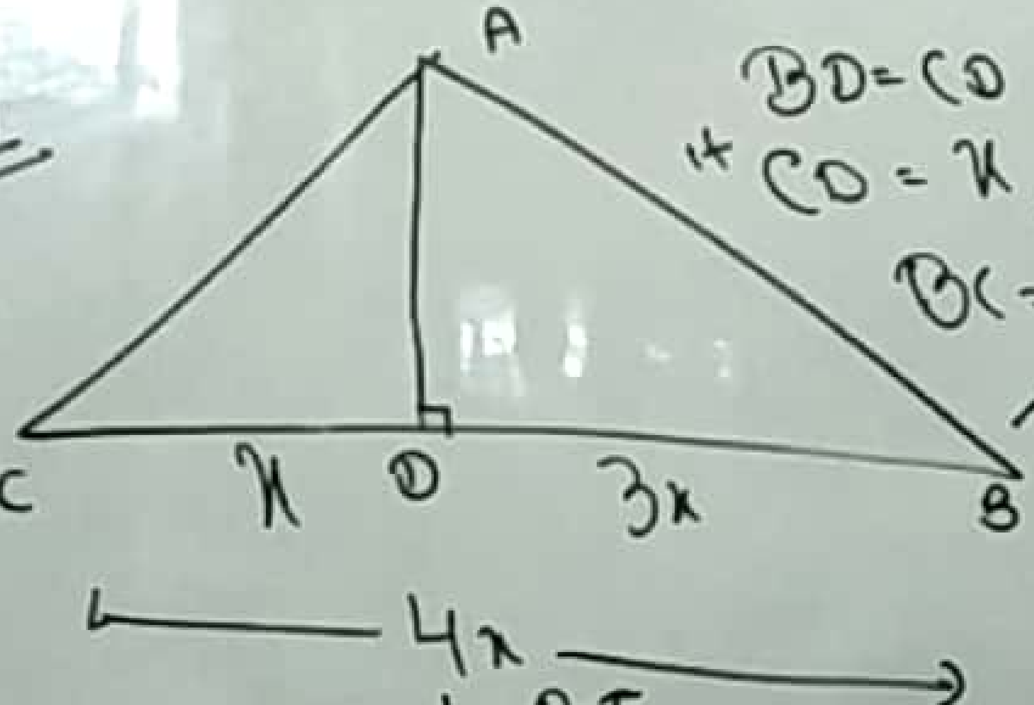
Eq(i) + (ii)

$$AE^2 + BD^2 = \boxed{AC^2} + CE^2 + \boxed{BC^2} + CD^2$$

$$AE^2 + BD^2 = AB^2 + DE^2$$

Proved

14



BD = CD

if CD = x, BD = $3x$

BC = $4x$

So

$x = \frac{BC}{4}$

by P-T

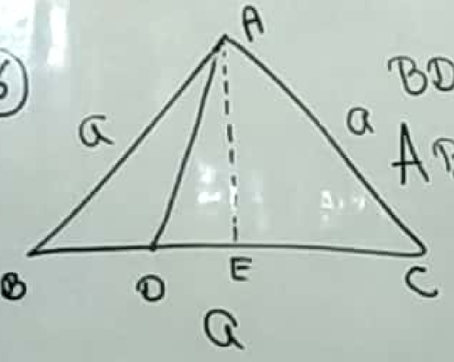
In ΔABD $\quad AB^2 = AD^2 + 9x^2$ —(i)

In ΔACD $\quad AC^2 = AD^2 + 1x^2$ —(ii)

Eq (i) − (ii)

$$AB^2 - AC^2 = 8x^2$$

(16)



$BD = \frac{1}{3} BC$

$AB = BC = CA = a$

$BD = \frac{a}{3}$

Draw $AE \perp BC$

$BE = \frac{BC}{2} = \frac{a}{2}$

In ΔABE

$$AB^2 = AE^2 + BE^2$$

$$a^2 = AE^2 + \left(\frac{a}{2}\right)^2$$

$$a^2 = AE^2 + \frac{a^2}{4}$$

$$a^2 - \frac{a^2}{4} = AE^2$$

$$\frac{3a^2}{4} = AE^2 \quad \text{---(1)}$$

Now

$$DE = BE - BD$$

$$= \frac{a}{2} - \frac{a}{3}$$

$$= \frac{3a - 2a}{6} = \frac{a}{6}$$

In ΔADE

$$AD^2 = AE^2 + DE^2$$

$$AD^2 = \frac{3a^2}{4} + \frac{a^2}{36}$$

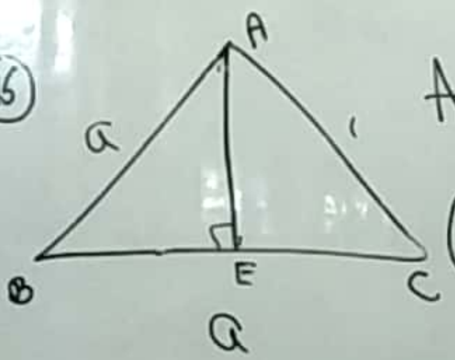
$$AD^2 = \frac{27a^2 + a^2}{36}$$

$$AD^2 = \frac{\cancel{28}^{\,7} a^2}{\cancel{36}_{\,9}}$$

$$\boxed{9AD^2 = 7a^2}$$

25

(15)



$AB = BC = CA = a$ (suppose)

$$\boxed{3AB^2 = 4AE^2}$$

① Draw $AE \perp BC$

$BE = \frac{BC}{2} = \frac{a}{2}$

In ΔABE $\quad AB^2 = AE^2 + BE^2$

$$a^2 = AE^2 + \left(\frac{a}{2}\right)^2$$

$$a^2 = AE^2 + \frac{a^2}{4}$$

$$a^2 - \frac{a^2}{4} = AE^2$$

$$\frac{3a^2}{4} = AE^2 \quad \text{—(1)}$$

$$3a^2 = 4AE^2$$

$$\boxed{3AB^2 = 4AE^2}$$