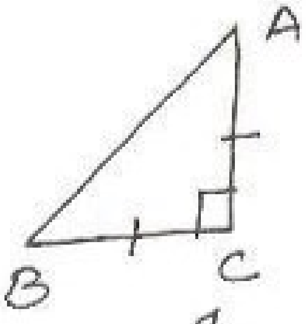
(4)



given - In fig. $\angle C = 90°$, $AC = BC$

To Prove $AB^2 = 2AC^2$

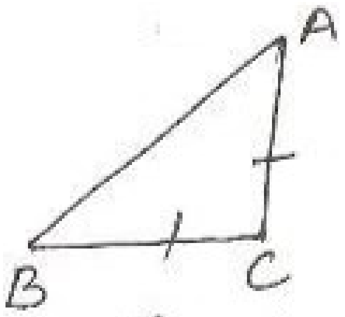
Proof In rt $\triangle BCA$

$AB^2 = AC^2 + BC^2$ **[Pythagoras Theorem]**

$= AC^2 + AC^2$ $(\because AC = BC)$

$AB^2 = 2AC^2$

(5)



given - In fig. $AC = BC$

$AB^2 = 2AC^2$

to prove - ABC is a right $\triangle$

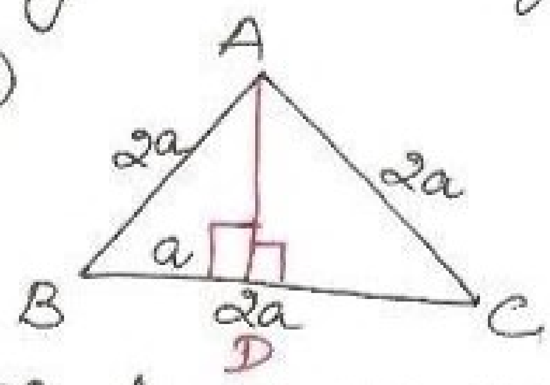
Proof - $AB^2 = 2AC^2$ (given)

$AB^2 = AC^2 + AC^2$

$\Rightarrow AB^2 = AC^2 + BC^2$ $(\because AC = BC)$

$\Rightarrow \triangle ABC$ is a right $\triangle$ by converse of pyth. th.

(6)



To find AD, BE, CF

Solution In $\triangle ABC$

$AD \perp BC$

$\therefore BD = CD$ **[In an equilateral triangle altitude is also median]**

$BD = CD = \frac{1}{2} BC$

$= \frac{1}{2} \times 2a$

$= a$

In rt $\triangle BDA$

$AD^2 = AB^2 - BD^2$ **[Pythagoras Theorem]**

$= (2a)^2 - a^2$

$= 4a^2 - a^2$

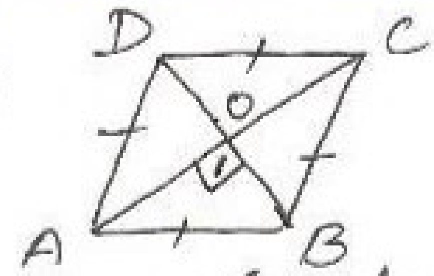
$= 3a^2$

$\Rightarrow AD = \sqrt{3}a$ units

$\therefore BE = CF = \sqrt{3}a$

[In an equilateral triangle altitudes are equal to each other]

(7)



given - In fig. ABCD is a rhombus

To Show $AB^2 + BC^2 + CD^2 + DA^2 = AC^2 + BD^2$

Proof $\angle 1 = 90°$

$OA = OC$

$OB = OD$

[Diagonals of a rhombus are perpendicular bisectors of each other]

In rt $\triangle AOB$

$AB^2 = OA^2 + OB^2$ (Pyth. th)

$(\times 4)$ $4AB^2 = 4OA^2 + 4OB^2$

$\Rightarrow AB^2 + BC^2 + CD^2 + DA^2 = (2OA)^2 + (2OB)^2$

$= AC^2 + BD^2$ (*)

* $AB = BC = CD = DA$ (sides of rh.)
$OA = OC$, $OB = OD$ (proved)