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CLASS – 9

MATHEMATICS

Chapter – 7

Triangles

Part –9

Exercise 7.2 (4 to 6)

Vikas Saini

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4. ABC is a triangle in which altitudes BE and CF to sides AC and AB are equal. Show that

(i) $\triangle ABE \cong \triangle ACF$

(ii) AB = AC, i.e., ABC is an isosceles triangle



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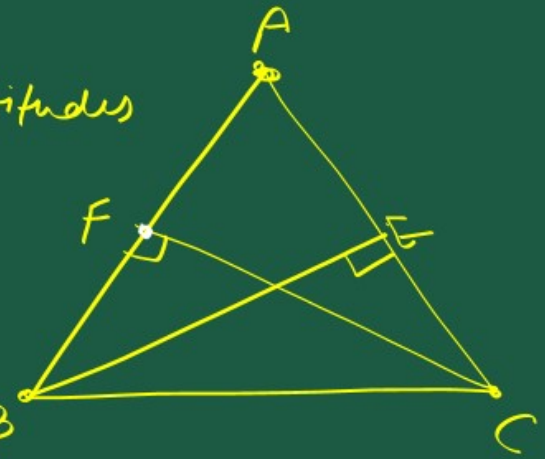
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Given:- ABC is triangle in which BE & CF are two altitudes on Side AC & AB Respt.

S.t BE = CF

BE ⊥ AC at E point

CF ⊥ AB at F point

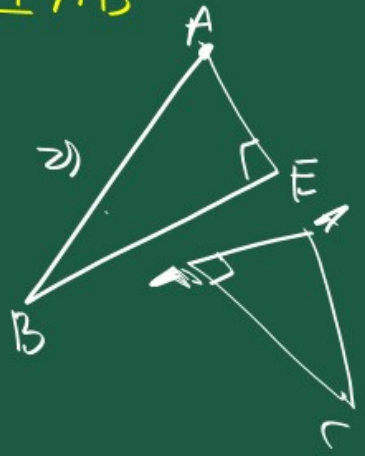


BE ⊥ AC

CF ⊥ AB

To prove :- ① $\triangle ABE \cong \triangle ACF$

② i.e. AB = AC



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Sol. → In $\triangle ABF$ & $\triangle ACF$

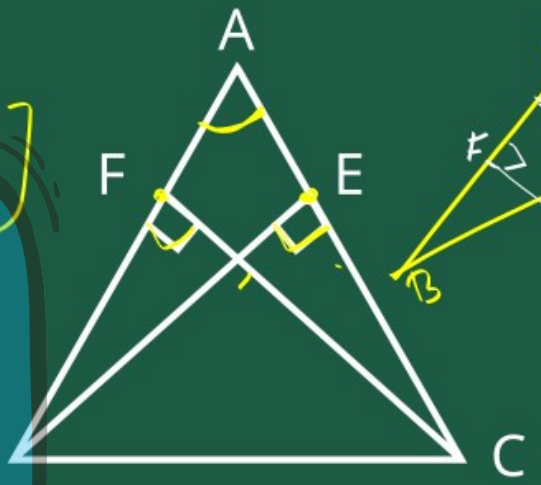
$\angle AEB = \angle AFC = 90^\circ$ [Given, $BE \perp AC$, $CF \perp AB$]

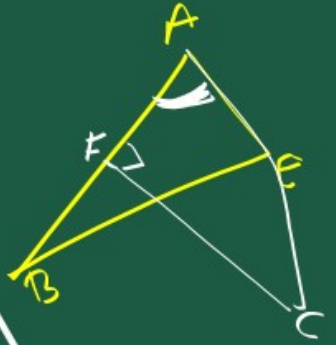
$\angle A = \angle A$ [common]

$BF = CF$ [Given]

$\therefore \triangle ABF \cong \triangle ACF$ By AAS Rule

$AB \cong AC$ By CPCT





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5. ABC and DBC are two isosceles triangles on the same base BC.

Show that

$\angle ABD = \angle ACD$.

Given:

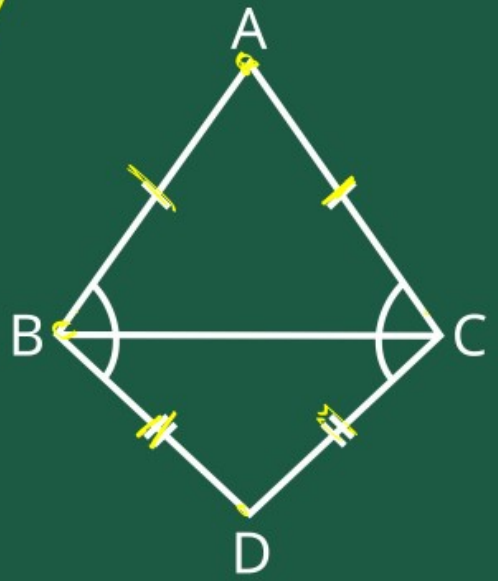
$\triangle ABC$ & $\triangle DBC$

are two isosceles $\triangle$s

with same base BC

S.t $AB = AC$

$DB = DC$



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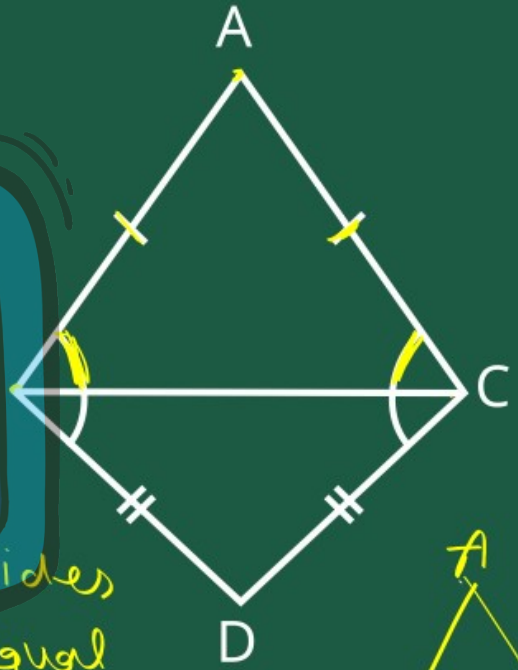
To prove :- $\angle ABD = \angle ACD$

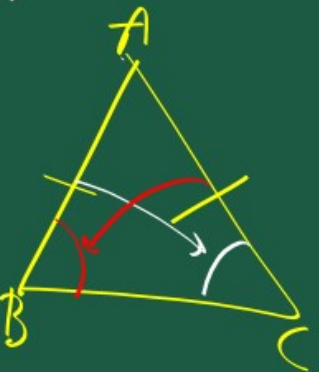
Soln :-

In $\triangle ABC$,

$AB = AC$ [Given]

$\angle ABC = \angle ACB$ [$\because$ If opp sides of $\triangle$ are equal then angle opp. to them are also equal]





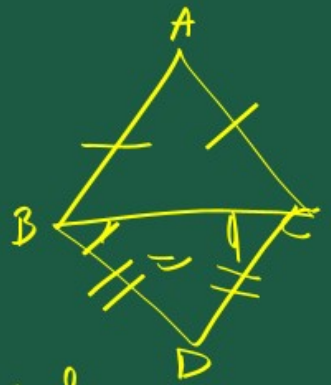
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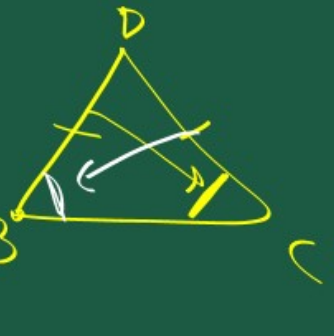
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In $\triangle DBC$,

$DB = DC$ [Given]

$\angle DBC = \angle DCB$ [If opp sides of $\triangle$ are equal then angle opp. to them are also equal]





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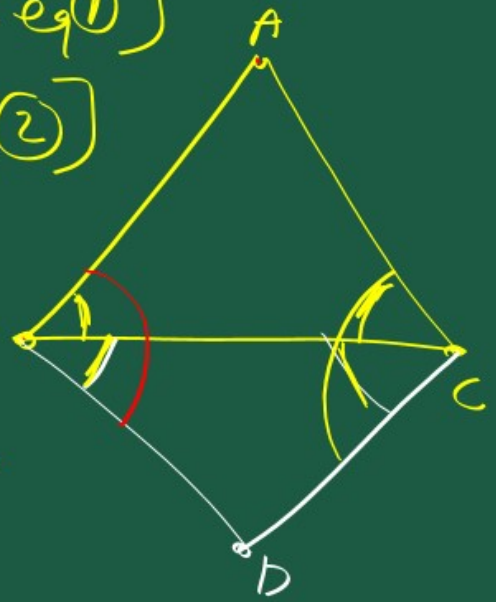
$\angle ABC = \angle ACB$ [from eq(1)]

$\angle DBC = \angle DCB$ [from eq(2)]

Add eq(1) + eq(2)

$\angle ABC + \angle DBC = \angle ACB + \angle DCB$

$\angle ABD = \angle ACD$

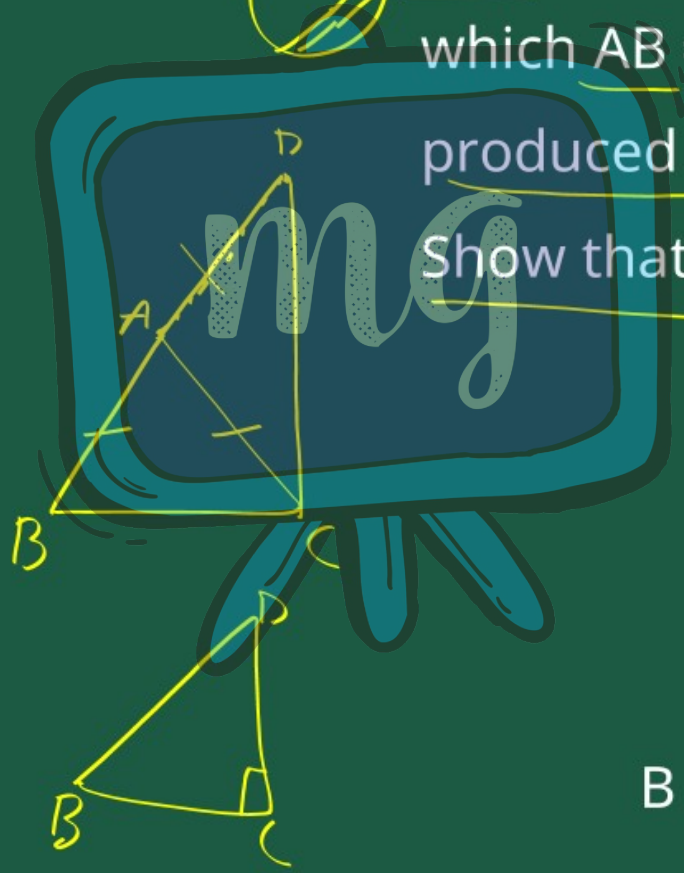


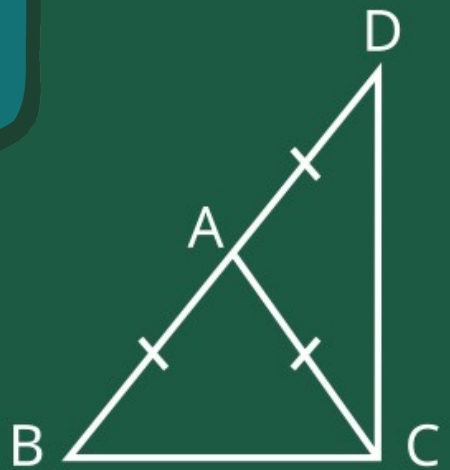
H.P

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6. ΔABC is an isosceles triangle in which AB = AC. Side BA is produced to D such that AD = AB. Show that $\angle BCD$ is a right angle





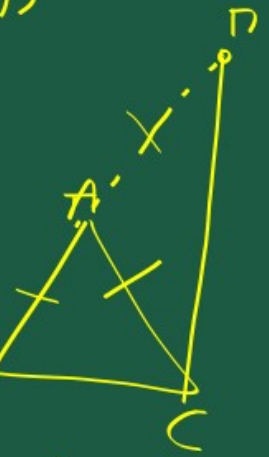
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Given :- ABC is isosceles Δ in which

$AB = AC$

If BA is produced point D



So that $AD = AC$

$\therefore AB = AC = AD$

To prove :- ΔBCD is right Angle Δ.

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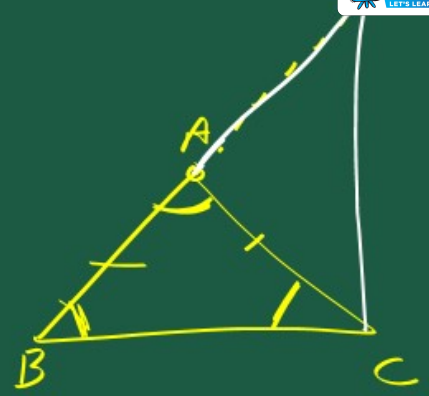
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Sol: In $\triangle ABC$,

$AB = AC$ [Given]

$\angle B = \angle C$

$\angle ABC = \angle ACB$ [∵ opp. sides are equal, then angles opp. to them are also equal]



Now

In $\triangle ABC$,

$\angle ABC + \angle ACB + \angle BAC = 180^\circ$ [A.S.P]

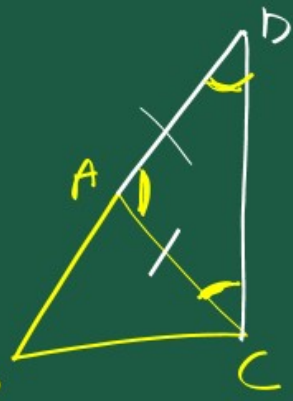
(1)

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In $\triangle ACD$

$AC = AD$ [Given]



$\angle ACD = \angle ADC$ [$\because$ Opp sides of $\triangle$ are equal then angles opp to them are also equal]

(3)

None

In $\triangle ACD$

$\angle ACD + \angle ADC + \angle CAD = 180$ [A.S.P]

(4)

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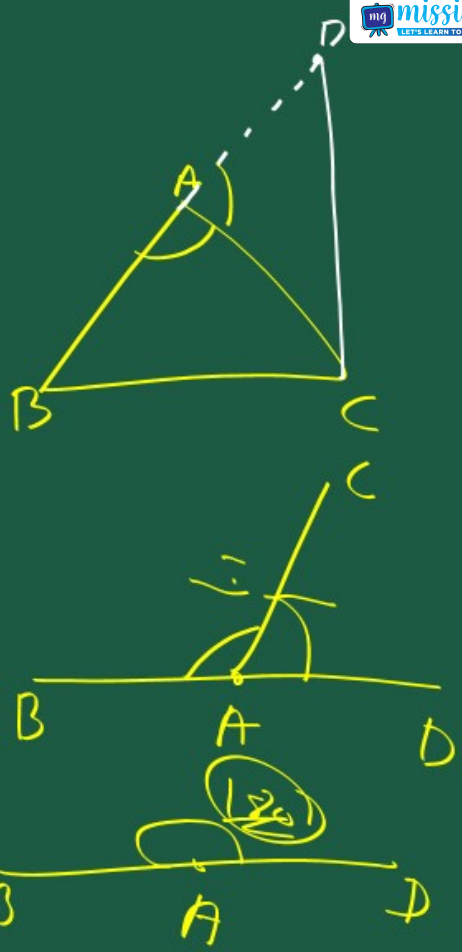
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BA is produced to D

BD is Straight.

$\angle BAC + \angle CAD = 180^\circ$ [Linear Pair]





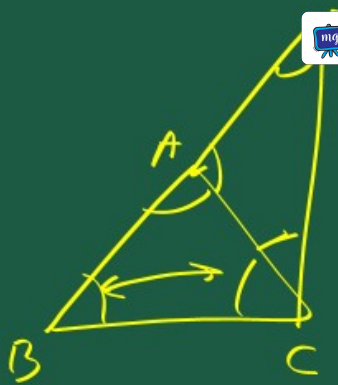
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from eq (2) & (4)

$\angle ABC + \angle ACB + \angle BAC = 180^\circ$

$\angle ACD + \angle ADC + \angle CAD = 180^\circ$



eq (2) + eq (4)

$\Rightarrow \angle ABC + \angle ACB + \angle BAC + \angle ACD + \angle ADC + \angle CAD = 180 + 180$

$\Rightarrow \angle ACB + \angle ACB + \angle BAC + \angle ACD + \angle ACD + \angle CAD = 360$

$\Rightarrow 2\angle ACB + 2\angle ACD + \angle BAC + \angle CAD = 360$

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$\Rightarrow 2\angle ACB + 2\angle ACD + \angle BAC + \angle CAD = 360$

$\Rightarrow 2\angle ACB + 2\angle ACD + 180 = 360$ (Linear)

$\Rightarrow 2\angle ACB + 2\angle ACD = 360 - 180$

$\Rightarrow 2\angle ACB + 2\angle ACD = 180$

$\Rightarrow 2(\angle ACB + \angle ACD) = 180$

$\Rightarrow \angle ACB + \angle ACD = \frac{180}{2} = 90^\circ$

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$\angle ACB + \angle ACD = 90^\circ$

$\angle BCD = 90^\circ$

In $\triangle BCD$, $\angle BCD = 90^\circ$

