Chapter-7

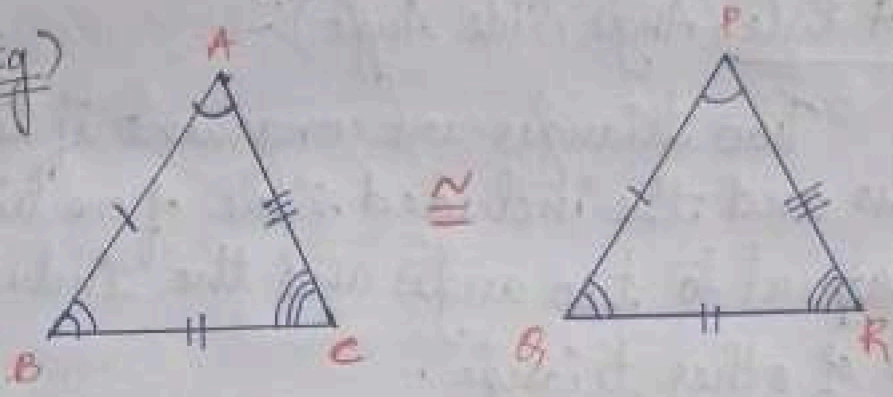
Triangles

→ Notes :-

* Two geometric figures are congruent if they have the same shape and same size.
* Two triangles are congruent if three sides of one triangle are equal to the three sides of other triangle.
* The symbol used for congruence is $\boxed{\cong}$.
* Two line segments are congruent if they have the same length.
* Two angles are congruent if they have equal measures.
* Two circles are congruent if they have equal radii.
* Two squares are congruent if they have equal sides.
* Two triangles are congruent if and only if 3 sides and angles of one triangle are congruent

to the corresponding sides and angles of another triangle.

(Eg)



In ΔABC and ΔPQR,

$A \longleftrightarrow P$

$B \longleftrightarrow Q$

$C \longleftrightarrow R$.

$\overline{AB} \longleftrightarrow \overline{PQ}$

$\overline{BC} \longleftrightarrow \overline{QR}$

$\overline{AC} \longleftrightarrow \overline{PR}$

$\times \begin{cases} \Delta ABC \cong \Delta QPR \\ \Delta BCA \cong \Delta PQR \end{cases}$

Hence $\Delta ABC \cong \Delta PQR$.

* The corresponding parts of congruent triangles (CPCT) are equal.

→ Congruent Criteria:-

1) SAS Rule (Side Angle Side):-

Two triangles are congruent if two sides and the included angle of one triangle are equal to the two sides and the included angle of the other triangle.

2) ASA Rule (Angle Side Angle):-

Two triangles are congruent if two angles and the included side of one triangle are equal to two angles and the included side of other triangle.

3) AAS Rule (Angle Angle Side):-

Two triangles are congruent if any two pairs of angles and one pair of corresponding sides are equal.

4) SSS Rule (Side Side Side):-

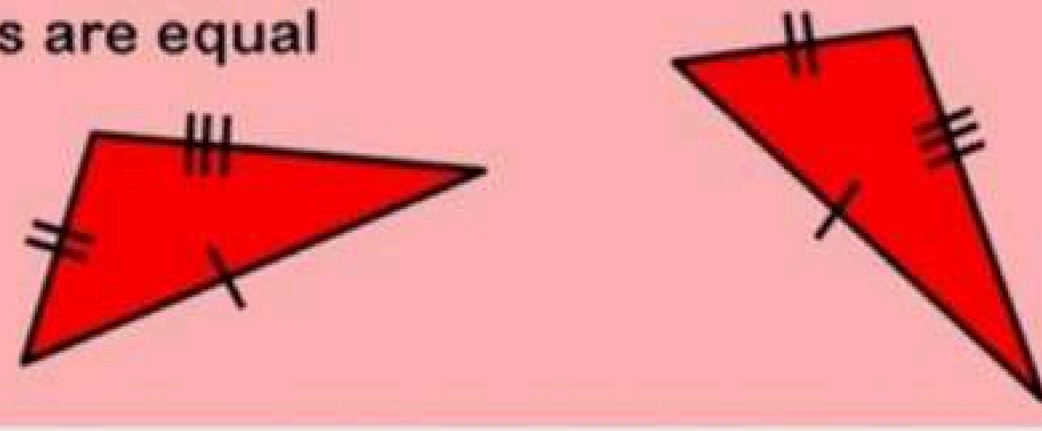
If three sides of one triangle are equal to the three sides of another triangle, then the two triangles are congruent

5) RHS Rule (Rightangle Hypotenuse Side):-

If in two right triangles, the hypotenuse and one side of one triangle are equal to the hypotenuse and one side of the other triangle, then the two triangles are congruent.

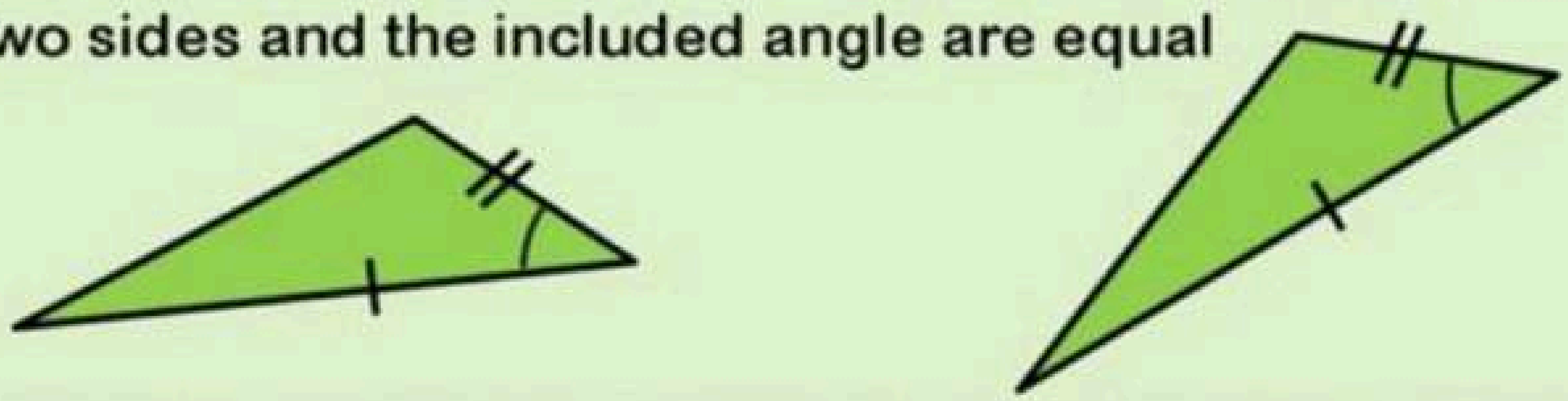
Two triangles are congruent if one of the following conditions is satisfied

SSS: Three sides are equal

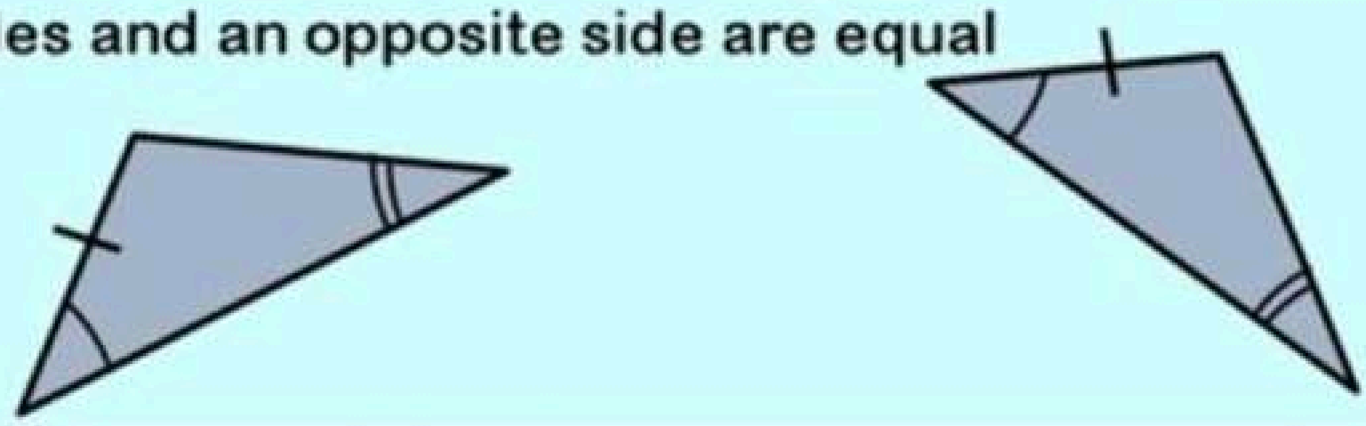


ASA: Two angles and the included side are equal

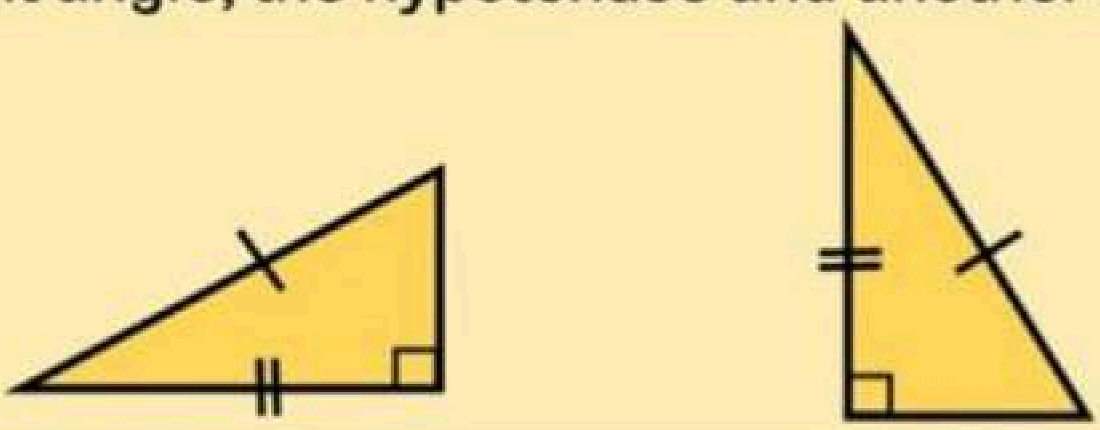
SAS: Two sides and the included angle are equal



AAS: Two angles and an opposite side are equal



RHS: A right angle, the hypotenuse and another side are equal



Exercise 7.1 [Pg 118-120]

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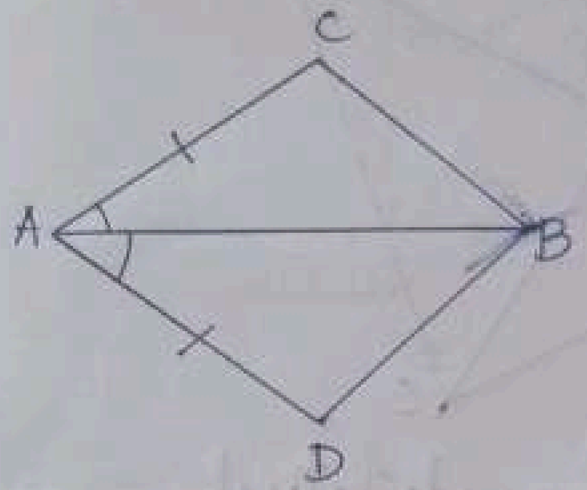


Given :-

$AC = AD$

AB bisects $\angle A$.

To prove :-

$\triangle ABC \cong \triangle ABD$.

Solution :-

In $\triangle ABC$ and $\triangle ABD$,

$AC = AD$ (Given)

$\because$ AB bisects $\angle A$,

$\angle CAB = \angle BAD$.

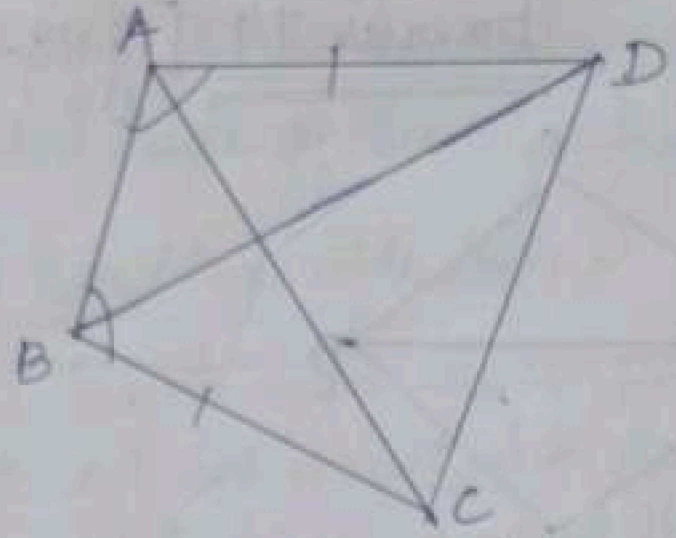
$AB = BA$ (Common Side)

$\therefore \triangle ABC \cong \triangle ABD$ (SAS Rule)

Hence Proved.

Ans :- $\Rightarrow BC = BA$ (By CPCT)

2)



Given:- ABCD - quadrilateral

$AD = BC$

$\angle DAB = \angle CBA$

To prove:- i) $\triangle ABD \cong \triangle BAC$

ii) $BD = AC$

iii) $\angle ABD = \angle BAC$

Solution:-

i) In $\triangle ABD$ and $\triangle BAC$,

$AD = BC$ (Given)

$\angle DAB = \angle CBA$ (Given)

$AB = BA$ (Common)

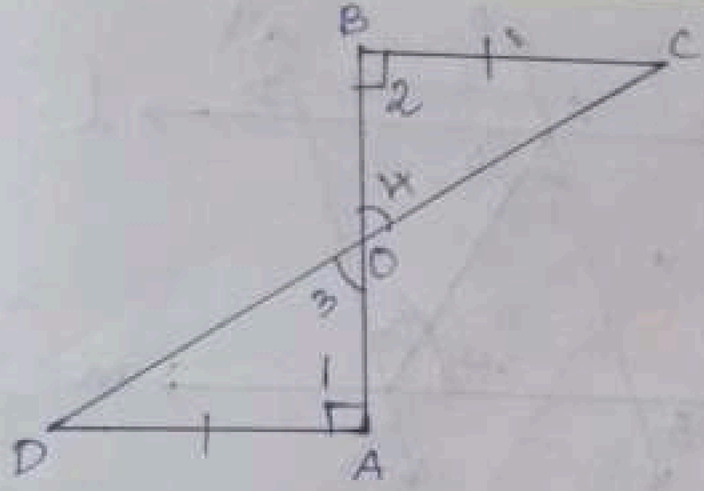
$\Rightarrow \triangle ABD \cong \triangle BAC$ (By SAS rule)

$\Rightarrow$ ii) $BD = AC$ (By CPCT)

$\Rightarrow$ iii) $\angle ABD = \angle BAC$ (By CPCT)

Ans:- Hence Proved

3)



Given:-

AD ⊥ AB and BC ⊥ AB.

To prove:-

CD bisects AB.

Solution:-

$AD \perp AB \Rightarrow \angle DAB = 90^\circ \Rightarrow \angle OAD = 90^\circ$

$BC \perp AB \Rightarrow \angle CBA = 90^\circ \Rightarrow \angle OBC = 90^\circ$.

$\therefore \angle 1 = \angle 2 = 90^\circ$ —— (1)

In $\triangle OBC$, and $\triangle OAD$,

$\angle 1 = \angle 2$ (from (1))

$\angle 3 = \angle 4$ (Vertically Opposite angles)

$BC = DA$ (Given)

$\therefore \triangle OBC \cong \triangle OAD$ (By AAS Rule)

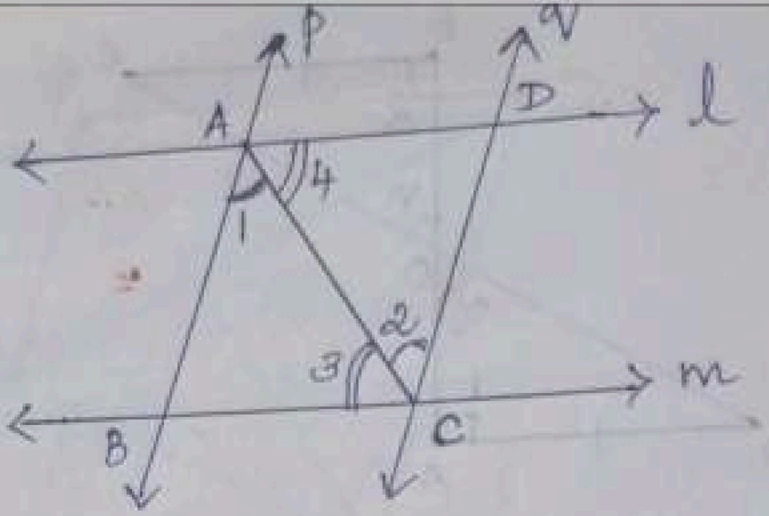
$CO = DO$, $BO = AO$. } (By CPCT)

$\therefore$ O is the midpoint of BA and CD.

Ans:- Thus, CD bisects AB

Hence Proved.

A2



Given:-
l and m are 2 parallel lines.
p and q are 2 parallel lines.

To prove:-
$\Delta ABC \cong \Delta CDA$.

Solution:-
Since l and m are 2 parallel lines, and let AC is a transversal.

$\therefore \angle 1 = \angle 2$ — ① (Alternate Interior
and $\angle 3 = \angle 4$ — ② Angles)

In ΔABC and ΔCDA,

$\angle 1 = \angle 2$ (from ①)

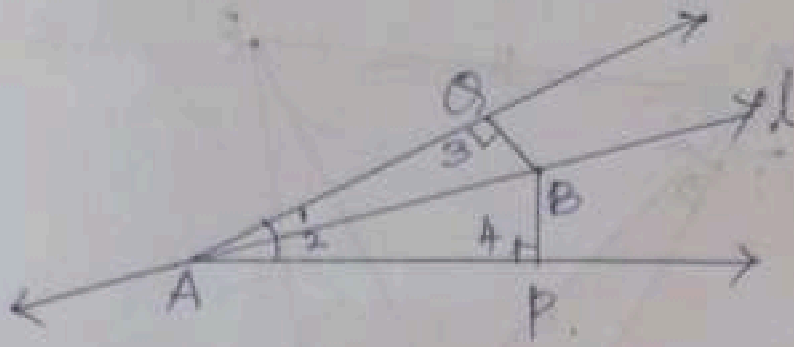
$\angle 3 = \angle 4$ (from ②)

$AC = CA$ (Common)

$\therefore \Delta ABC \cong \Delta CDA$ (By ASA Rule)

Ans:- Hence Proved.

3)



Given :-

* l is the bisector of $\angle A$.
* BP and BQ are ⊥r from B to $\angle A$.

To prove:-

i) $\Delta APB \cong \Delta AQB$

ii) $BP = BQ$ (or) B is equidistant from the arms of $\angle A$.

Solution :-

i) In ΔAPB and ΔAQB,

$\angle 1 = \angle 2$ ($\because$ l is the bisector of $\angle A$ $\Rightarrow \angle QAB = \angle BAP$)

$\angle 3 = \angle 4$ ($\because \angle AQB = \angle APB = 90°$)

$AB = AB$ (Common)

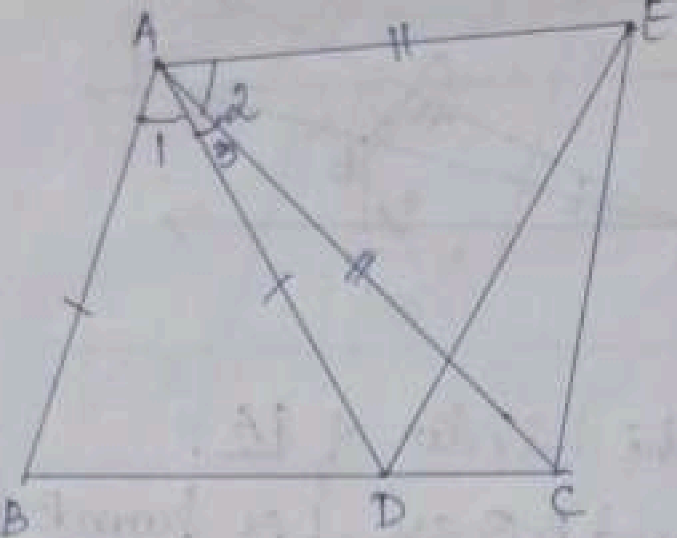
$\Rightarrow \therefore \Delta APB \cong \Delta AQB$ (AAS Rule).

ii) $BP = BQ$ (By CPCT)

$\Rightarrow$ i.e., B is equidistant from the arms of $\angle A$

Ans :- Hence Proved.

6)



Given :-

$AC = AE$

$AB = AD$

$\angle BAD = \angle EAC$

To prove:-

$BC = DE$

Solution :-

Let $\angle BAC = \angle 1$, $\angle EAC = \angle 2$ and $\angle CAD = \angle 3$

$\therefore \angle 1 = \angle 2$ (Given)

adding $\angle 3$ on both sides,

$\angle 1 + \angle 3 = \angle 2 + \angle 3$

$\angle CAB = \angle EAD$ —— (1)

In ΔABC and ΔADE,

$AB = AD$ (Given)

$AC = AE$ (Given)

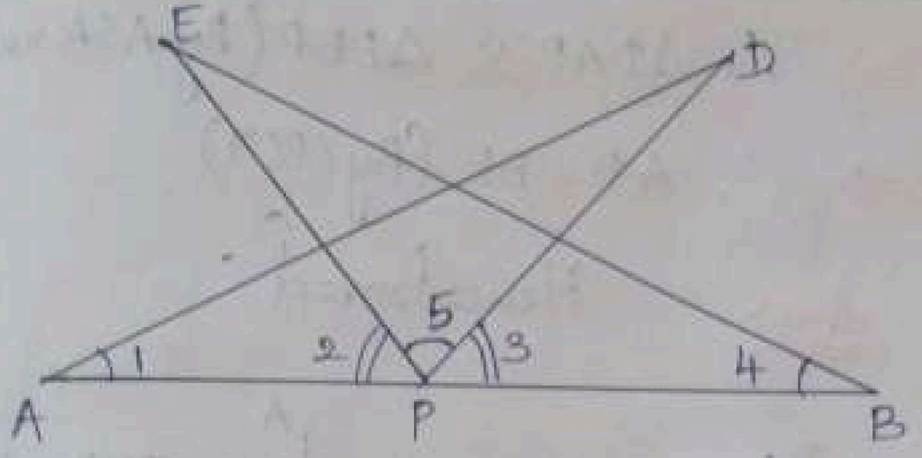
$\angle BAC = \angle DAE$ (from (1))

$\Rightarrow \therefore \Delta ABC \cong \Delta ADE$ (By SAS Rule)

$\Rightarrow \therefore BC = DE$ (By CPCT)

Ans: Hence Proved

i)



Given :-

P is the midpoint.

$\angle BAD = \angle ABE$

$\angle EPA = \angle DPB$.

To prove :-

i) $\triangle DAP \cong \triangle EBP$.

ii) $AD = BE$

Solution :-

Let $\angle BAD = \angle 1$, $\angle ABE = \angle 4$, $\angle EPA = \angle 2$, $\angle EPD = \angle 5$ and $\angle DPB = \angle 3$.

$\because$ P is the midpoint, $AP = PB$. (Given) — (1)

Also, $\angle 1 = \angle 4$ and $\angle 2 = \angle 3$. (Given)

$\angle 2 = \angle 3$.

Adding $\angle 5$ on both sides,

$\angle 2 + \angle 5 = \angle 3 + \angle 5$,

$\angle DPA = \angle EPB$. — (2)

In $\triangle DAP$ and $\triangle EBP$,

$AP = BP$ (from (1))

$\angle DPA = \angle EPB$. (from (2))

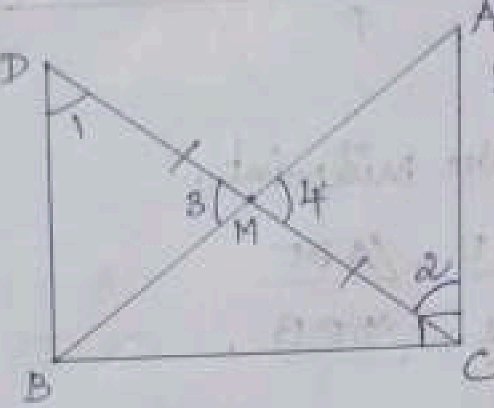
$\angle 1 = \angle 4$ (Given)

$\Rightarrow \therefore \Delta DAP \cong \Delta EBP$ (By ASA rule)

$\Rightarrow \therefore AD = BE$ (By CPCT)

Ans: Hence Proved

8)



Let $\angle DMB = \angle 3$
$\angle AMC = \angle 4$
$\angle BDM = \angle 1$
$\angle ACM = \angle 2$.

Given:-

ABC is right triangle right angled at C

$\Rightarrow \angle ACB = 90°$ —— (1)

M is the midpoint of hypotenuse AB

$\Rightarrow AM = BM$ —— (2)

$DM = CM$ —— (3)

To prove :-

i) $\Delta AMC \cong \Delta BMD$

ii) $\angle DBC$ is right angle

iii) $\Delta DBC \cong \Delta ACB$

iv) $CM = \frac{1}{2} AB$.

Solution:-

i) In ΔAMC and ΔBMD,

$CM = DM$ (from (3))

$AM = BM$ (from (2))

$\angle 3 = \angle 4$ (Vertically opposite angles)

$\Rightarrow \therefore \triangle AMC \cong \triangle BMD$ (By SAS rule).

Hence Proved.

from this,

$$\left.\begin{array}{l} AC = BD \\ \angle 1 = \angle 2 \end{array}\right\} \text{(By CPCT)} \quad \text{(a)}$$

Considering AC and BD as equal lines, $\angle 1$ and $\angle 2$ as alternate interior angles and CD as transversal,

$$BD \parallel AC \quad \text{— (4)}$$

ii) $\angle ACB + \angle DBC = 180°$ (Co interior Angles from (4)).

$$90° + \angle DBC = 180° \quad \text{(from (1))}$$

$$\angle DBC = 180° - 90°$$

$$\angle DBC = 90°$$

$\Rightarrow \therefore \angle DBC$ is a right angle

Hence Proved

iii) In $\triangle DBC$ and $\triangle ACB$,

$$BC = CB \quad \text{(common)}$$

$$AC = BD. \quad \text{(from (a))}$$

$$\angle ACB = \angle DBC \quad (= 90°)$$

$\Rightarrow \therefore \triangle DBC \cong \triangle ACB$

Hence Proved.

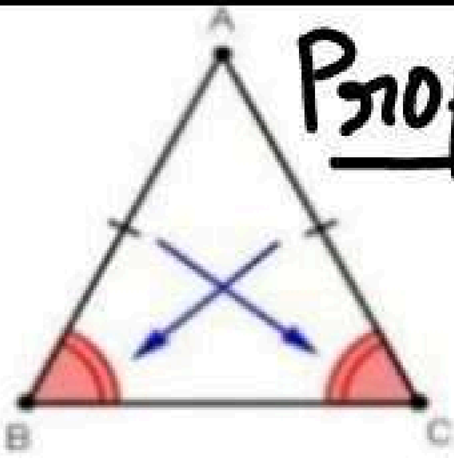
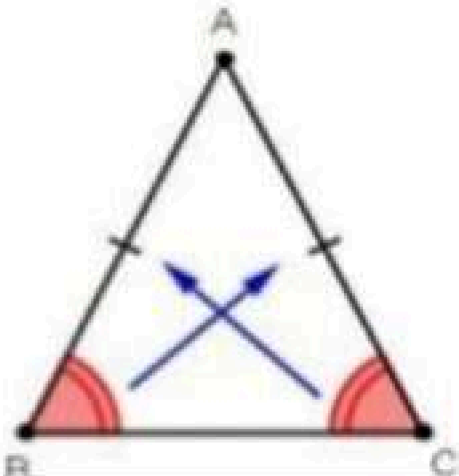
$AB = CD$ (By CPCT) —— (5)

$\therefore$ Multiply (5) by $\frac{1}{2}$,

(5) $\Rightarrow \frac{1}{2} \times AB = \frac{1}{2} \times CD$.

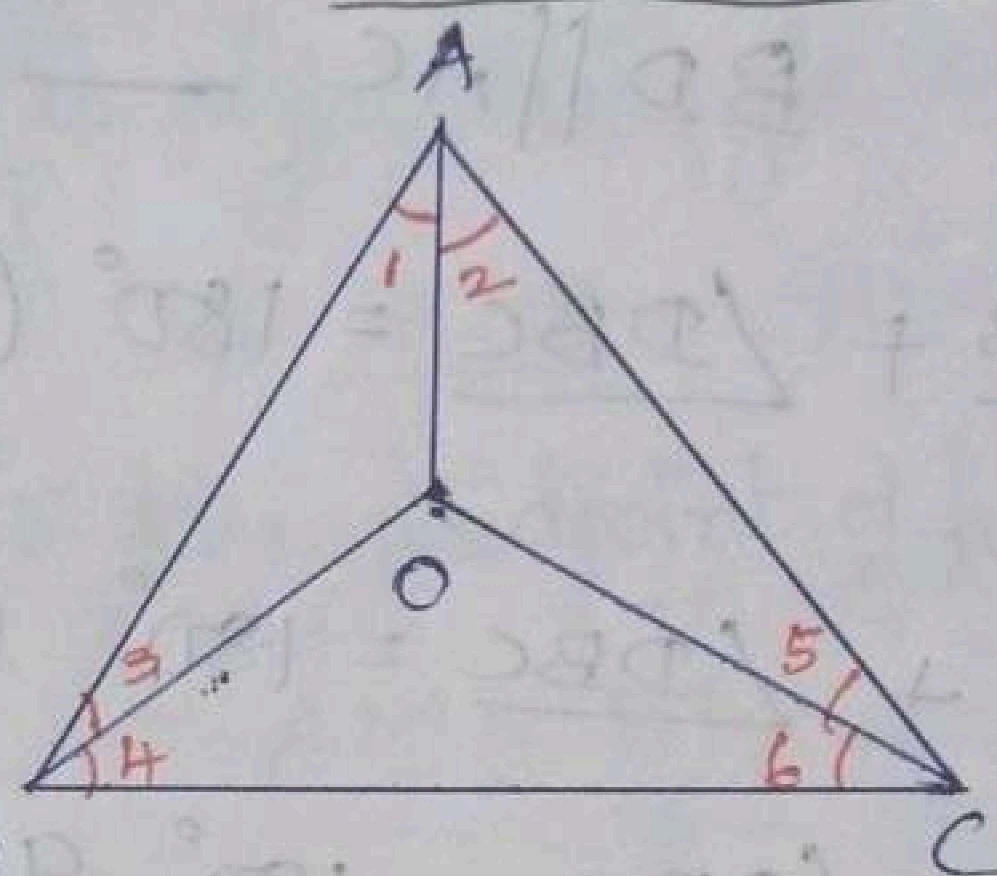
$CM = \frac{1}{2} AB$. [$\because$ M is the midpoint of CD also]

$\Longrightarrow$ Hence Proved.

If two sides of a triangle are equal in measure, then the angles opposite those sides are equal in measure	✓	 Properties:-
If two angles of a triangle are equal in measure, then the sides opposite those angles are equal in measure	✓	

Exercise 7.2 (Pg 123-124)

1)



Given:-

Isoceles $\triangle ABC \rightarrow AB = AC$

Bisectors of $\angle B$ and $\angle C$ intersect at O.

$\Rightarrow$ In $\angle ABC$, $\angle 3 = \angle 4$

In $\angle ACB$, $\angle 5 = \angle 6$.

To prove:-

i) $OB = OC$

ii) AO bisects $\angle A$.

Solution:-

i) In $\triangle ABC$,

$AB = AC$. (Given)

$\Rightarrow \angle ACB = \angle ABC$ [$\because$ Angles opposite to equal sides are equal)

$\frac{1}{2}\angle ACB = \frac{1}{2}\angle ABC$ ($\because$ OB and OC are bisectors)

$\angle OBC = \angle OCB$

ie., $\angle 4 = \angle 6$. [$\because \angle OBC = \angle 4$ and $\angle OCB = \angle 6$]. — (1)

$\Rightarrow OC = OB$ [$\because$ Sides opposite to equal angles are equal] — (2)

$\Rightarrow$ Hence Proved

ii) In ΔAOB and ΔAOC,

$OB = OC$ (from (2))

$AB = AC$ (Given)

$\angle 3 = \angle 5$. [$\because$ $\angle 3 = \angle 4$ and $\angle 5 = \angle 6$. } (Given)

Also $\angle 4 = \angle 6$ (from (1))]

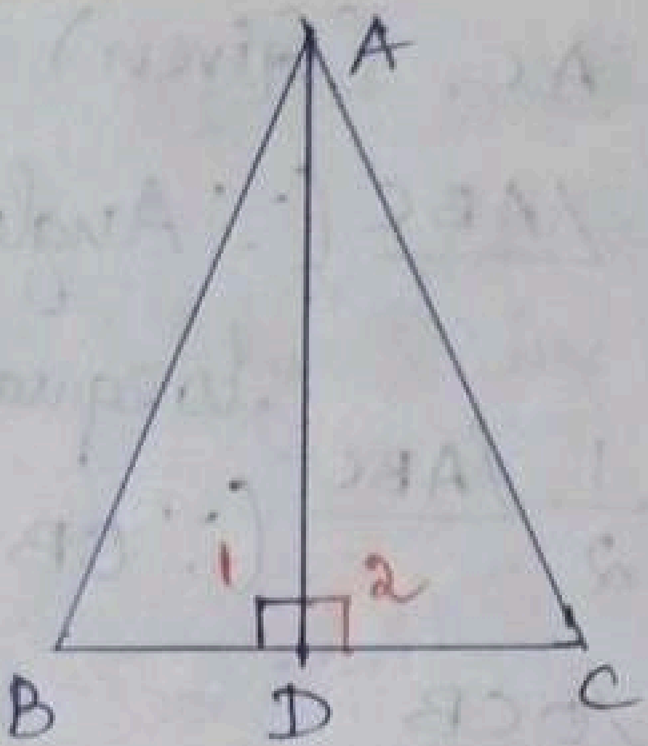
$\therefore \Delta AOB \cong \Delta AOC$. (By SAS Rule)

$\Rightarrow \angle 1 = \angle 2$ (By CPCT)

ie., AO bisects $\angle A$

$\Rightarrow$ Hence Proved

2)



Given:-

∵ AD is the perpendicular bisector of BC

[$\Rightarrow \angle 1 = \angle 2 = 90^\circ$ —— (1)

$\Rightarrow BD = DC$ —— (2)]

To prove:-

ΔABC is isoceles Δ ∵ $AB = AC$

Solution:-

In ΔABD and ΔACD,

$AD = AD$ (Common)

$BD = DC$ (from (2))

$\angle 1 = \angle 2$ (from (1))

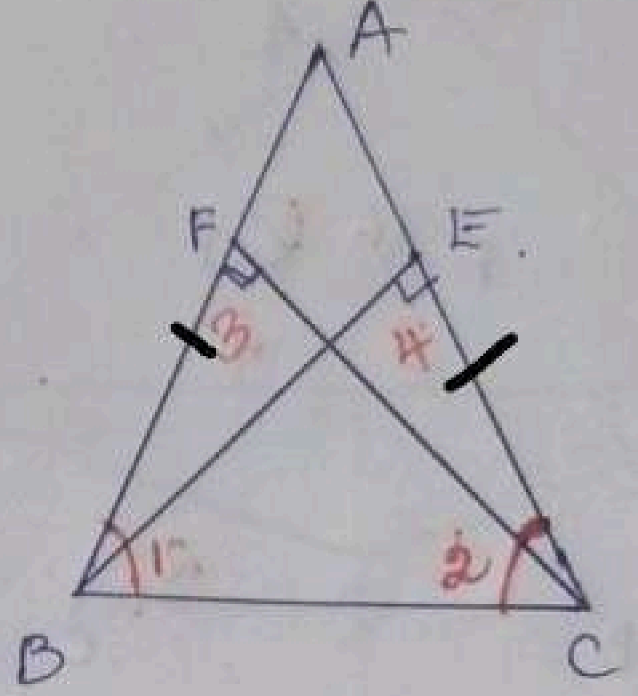
$\therefore \Delta ABD \cong \Delta ACD$ (By SAS rule)

$\Rightarrow AB = AC$ (By CPCT)

Ans:- i.e, ΔABC is an isoceles triangle

Hence Proved.

37)



Given:-

ΔABC is an isoceles triangle

$\Rightarrow AB = AC$ —— (1)

CF and BE are altitudes drawn at AB and AC respectively

$\Rightarrow \angle BFC = \angle CEB = 90°$.

$\Rightarrow \angle 3 = \angle 4 = 90°$.

To prove:-

Altitudes are equal

$\Rightarrow CF = BE$.

Solution:-

In ΔABC,

$\angle 1 = \angle 2$. [from (1) and angles opposite sides are equal]

$\angle$ (2)

In ΔBFC and ΔCEB,

$BC = CB$ (Common)

$\angle 1 = \angle 2$ (from (2))

$\angle 3 = \angle 4 = 90°$

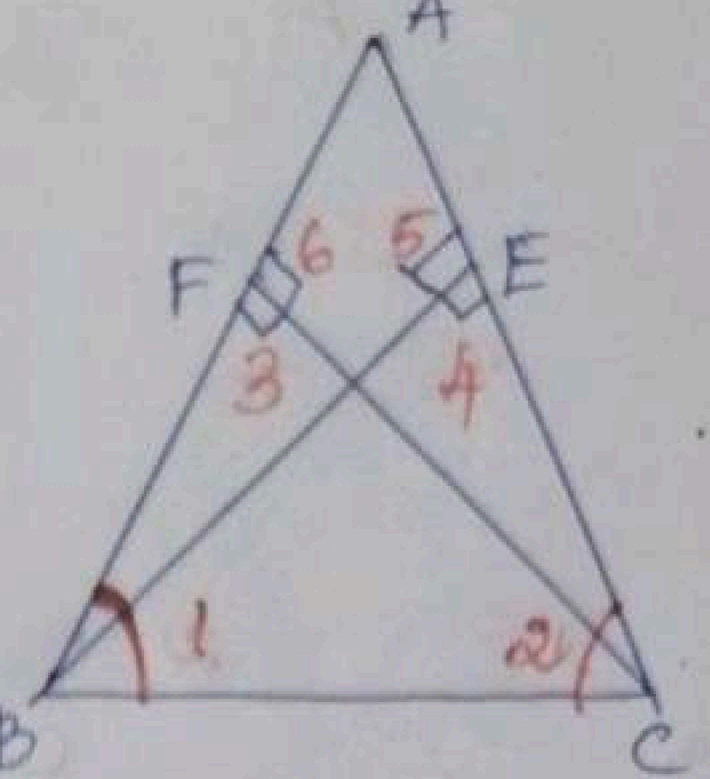
~~BF = CE (∵ AB = BC)~~.

$\therefore \Delta BFC \cong \Delta CEB$ (By AAS Rule)

$\Rightarrow \therefore CF = BE$ (By CPCT)

Ans:- Hence Proved

4)



Given :-

CF and BE are altitudes to AB and AC respectively and CF = BE

$\Rightarrow \angle 3 = \angle 4 = 90°$. — (1) (Since angles opposite to equal sides are equal)

To prove :-

i) $\Delta ABE \cong \Delta ACF$

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

Solution :-

from (1),

$\angle 5 = \angle 6 = 90°$ — (2)

In ΔABE and ΔACF,

BE = CF (Given)

$\angle 5 = \angle 6$ (from (2))

$\angle A = \angle A$ (Common).

$\Rightarrow \therefore \Delta ABE \cong \Delta ACF$ (By AAS Rule)

$\Rightarrow$ AB = AC (By CPCT)

Ans :- Hence Proved.

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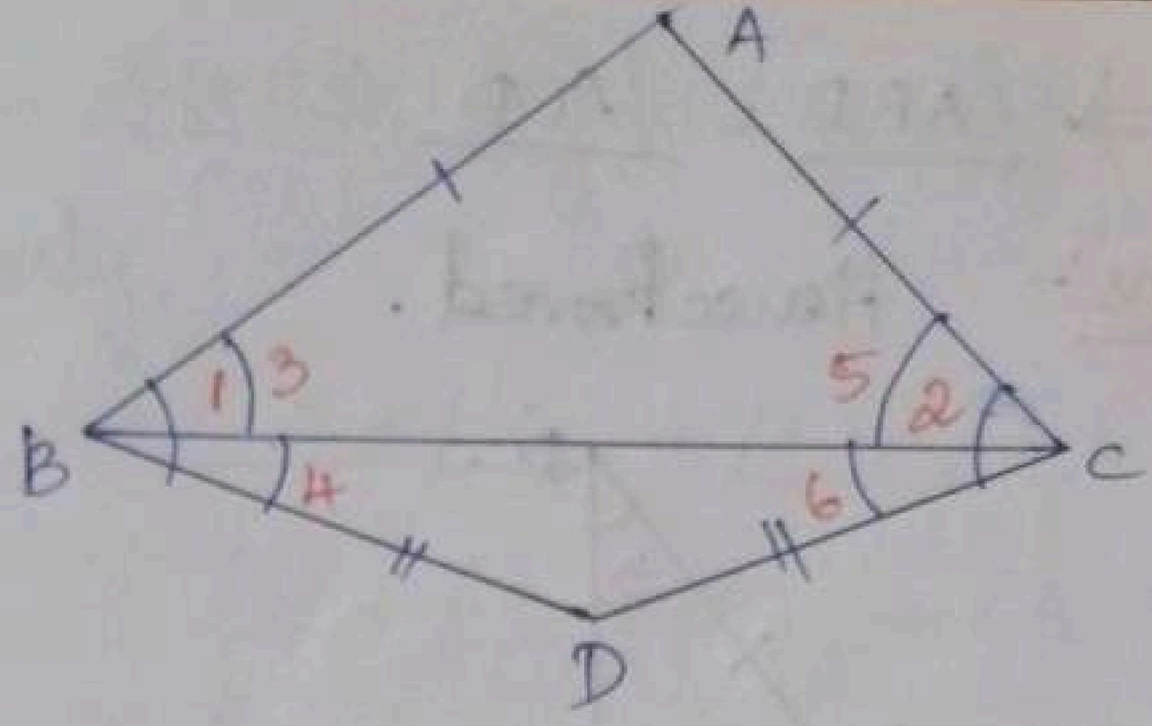


Given :-

ΔABC and ΔDBC are isosceles triangles on the same BC.

$\Rightarrow AB = AC$ — (1)

$\Rightarrow DB = DC$ — (2).

To prove :-

$\angle ABD = \angle ACD$.

Solution :-

In ΔABD,

$\angle 3 = \angle 5$ [from (1) $\Rightarrow AB = AC$ and

(3) Angles opposite to equal sides are equal].

In ΔACD,

$\angle 4 = \angle 6$ [from (2) $\Rightarrow DB = DC$ and

(4) Angles opposite to equal sides are equal].

Also, from the figure,

$\angle 1 = \angle 3 + \angle 4$ — (5)

and. $\angle 2 = \angle 5 + \angle 6$ — (6)

(5) $\Rightarrow \angle 1 = \angle 3 + \angle 4$

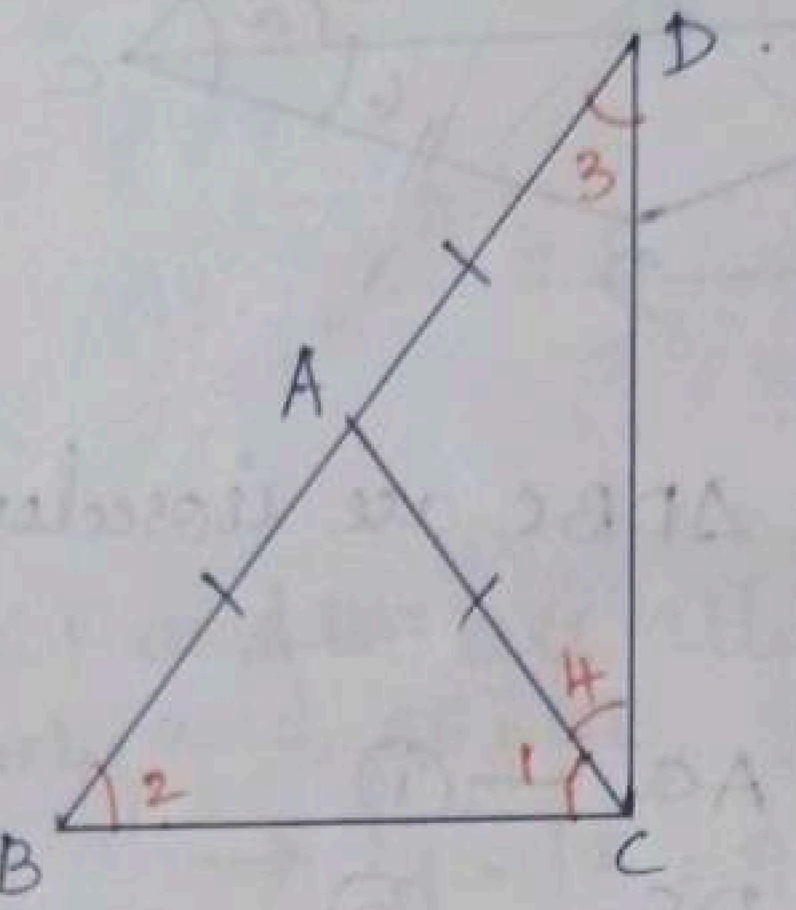
$\angle 1 = \angle 5 + \angle 6$ (from (3) and (4))

$\angle 1 = \angle 2$ (from (6))

$\therefore \Rightarrow \angle ABD = \angle ACD$

Ans:- Hence Proved.

6)



Given:-

$\triangle ABC$ is isoceles triangle.

$\Rightarrow AB = AC$ — (1)

Also, $AB = AD$ — (2)

So, $AC = AD$ — (3) (from (1) and (2))

To prove:-

$\angle BCD = 90°$.

Solution:-

In $\triangle ABC$,

$\angle 1 = \angle 2$ [from (1) and angles opposite to equal sides are equal]. — (4)

In $\triangle ACD$,

$\angle 3 = \angle 4$ [from (3) and angles opposite to equal sides are equal] — (5)

In ΔBCD, by using angle sum property,

$$\angle 3 + \angle 2 + \angle 1 + \angle 4 = 180^\circ$$

$$\angle 4 + \angle 1 + \angle 1 + \angle 4 = 180^\circ \text{ (from (4) and (5))}$$

$$2\angle 1 + 2\angle 4 = 180^\circ$$

$$2(\angle 1 + \angle 4) = 180^\circ$$

$$\angle 1 + \angle 4 = \frac{180^\circ}{2}$$

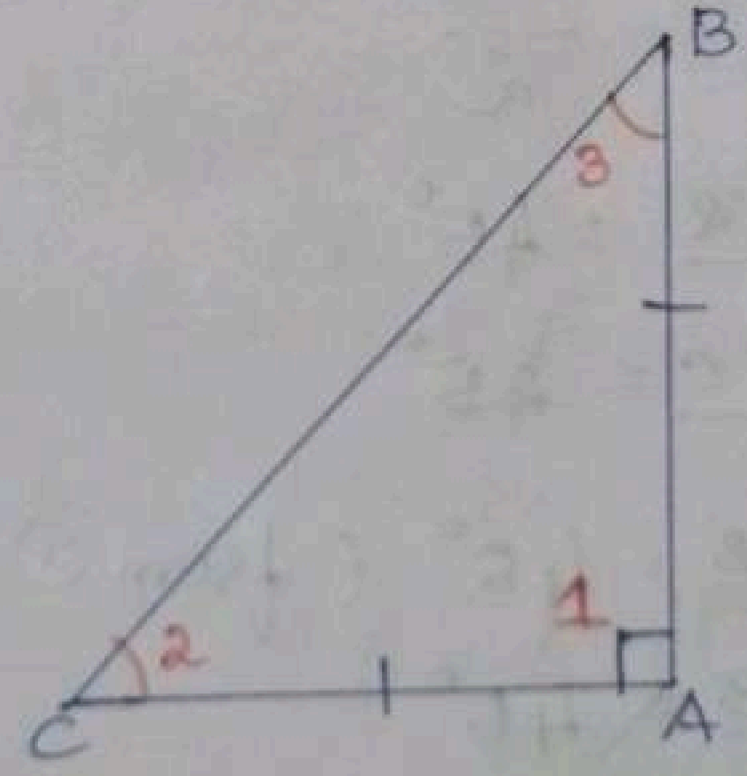
$$\angle 1 + \angle 4 = 90^\circ$$

$$\Rightarrow \angle BCD = 90^\circ$$

$\Rightarrow \angle BCD$ is a right angle

Ans:- Hence Proved

7)



Let $\angle A = \angle 1$,
$\angle B = \angle 3$ and
$\angle C = \angle 2$.

Given:-

$\angle A = 90^\circ$ ($\angle 1 = 90^\circ$)

$AB = AC$.

To find:-

$\angle B$ and $\angle C$ ($\angle 2$ and $\angle 3$)

Solution:-

In ΔABC,

$AB = AC$ (Given)

$\Rightarrow \angle 2 = \angle 3$ (Angles opposite to equal sides are equal) — (1)

In ΔABC, by using Angle sum property,

$$\angle 1 + \angle 2 + \angle 3 = 180^\circ.$$

$$\angle 1 + 2\angle 2 = 180^\circ. \quad (\because \angle 2 = \angle 3 \text{ from } (1))$$

$$90^\circ + 2\angle 2 = 180^\circ \quad (\because \text{Given } \angle 1 = 90^\circ).$$

$$2\angle 2 = 180^\circ - 90^\circ$$

$$2\angle 2 = 90^\circ$$

$$\angle 2 = \frac{90^\circ}{2}$$

$$\angle 2 = 45^\circ.$$

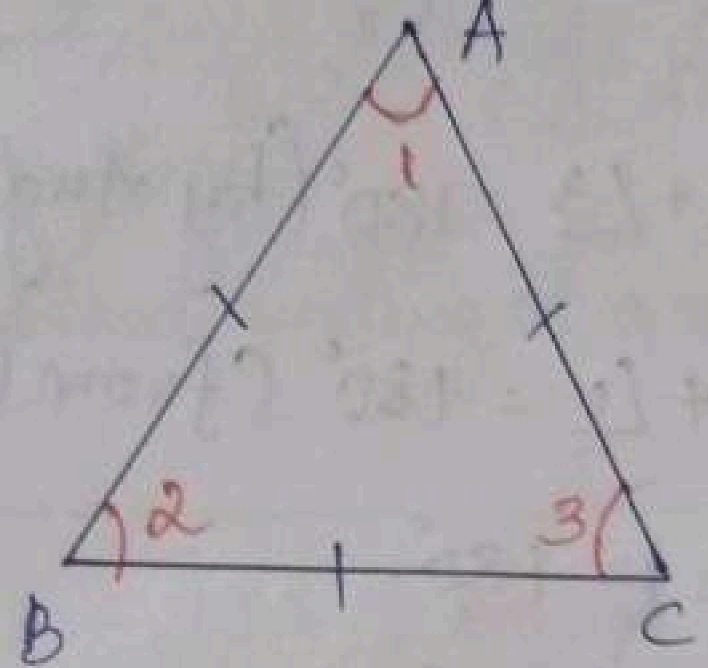
$$\Rightarrow \angle C = 45^\circ$$

$$\therefore \angle 3 = 45^\circ \quad (\text{from } (1)\ \angle 2 = \angle 3).$$

$$\Rightarrow \angle B = 45^\circ$$

Ans:- $\angle B = \angle C = 45^\circ$

8)



Given :-

An equilateral triangle, ΔABC

$\Rightarrow AB = AC = BC$.

To prove :-

Each angle in ΔABC (equilateral triangle) $= 60^\circ$

i.e., $\angle 1 = \angle 2 = \angle 3 = 60^\circ$.

Solution :-

In ΔABC,

$AB = AC$ (Given)

$\angle 3 = \angle 2$ (Angles opposite to equal sides are equal). — (1)

Also, $AC = BC$ (Given)

$\angle 2 = \angle 1$ (Angles opposite to equal sides are equal). — (2)

And, $AB = BC$ (Given)

$\angle 3 = \angle 1$ (Angles opposite to equal sides are equal) — (3)

from (1), (2) and (3),

$\angle 1 = \angle 2 = \angle 3$ —— (4)

In ΔABC,

$\angle 1 + \angle 2 + \angle 3 = 180^\circ$ (By Angle Sum Property)

$\angle 1 + \angle 1 + \angle 1 = 180^\circ$ (from (4))

$3\angle 1 = 180^\circ$

$\angle 1 = \frac{180^\circ}{3}$

$\angle 1 = 60^\circ$

$\Rightarrow \angle 1 = \angle 2 = \angle 3 = 60^\circ$ (from (4))

$\Rightarrow$ Each angle in an equilateral triangle $= 60^\circ$

Ans:- Hence Proved.

⇒ Median:-

* A line segment joining the vertex of the triangle to the midpoint of the opposite side of the triangle is called the median of the triangle.

* The medians of an equilateral triangle are equal.

* In a triangle, sum of any 2 sides is greater than the third side.

* In a triangle, side opposite to greater angle is longer

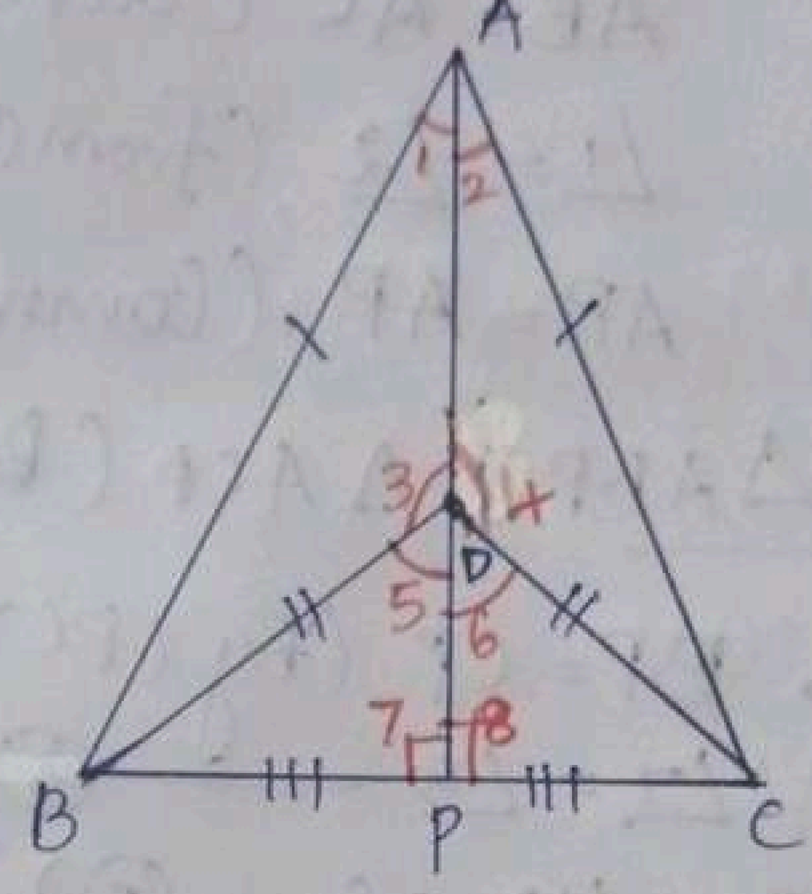
* In a right angle triangle, the hypotenuse is the longest side.

* The perimeter of a triangle is greater than the sum of its medians. 67

* Three medians meeting at a common point is called centroid.

Exercise 7.3 (Pg 128)

1)



Given:-

ΔABC is an isoceles triangle

$\Rightarrow AB = AC$.

ΔBDC is an isoceles triangle

$\Rightarrow BD = CD$.

To prove:-

i) $\Delta ABD \cong \Delta ACD$

ii) $\Delta ABP \cong \Delta ACP$

iii) AP bisects $\angle A$ as well as $\angle D$.

iv) AP is the perpendicular bisector of BC.

Solution:-

i) In ΔABD and ΔACD,

$AB = AC$. (Given)

$BD = CD$. (Given)

$AD = AD$. (Common)

$\Rightarrow \therefore \Delta ABD \cong \Delta ACD$ (By SSS Rule)

So, $\angle 1 = \angle 2$ — ① (By CPCT)

$\angle 3 = \angle 4$ — ② (By CPCT)

ii) In ΔABP and ΔACP,

$AB = AC$ (Given)

$\angle 1 = \angle 2$ (from ①)

$AP = AP$ (Common)

$\therefore \Delta ABP \cong \Delta ACP$ (By SAS Rule)

$\Rightarrow$ So, $BP = CP$ (By CPCT).

$\angle 7 = \angle 8$ — ③ (By CPCT).

iii) $\angle 3 = \angle 4$ (from ②)

$180^\circ - \angle 3 = 180^\circ - \angle 4$ [Using linear pair angles, $\angle 3 + \angle 5 = 180^\circ$ and $\angle 4 + \angle 6 = 180^\circ$]

$\angle 5 = \angle 6$

$\Rightarrow \therefore$ AP bisects $\angle D$

$\because \angle 1 = \angle 2$ (from ①)

$\rightarrow$ AP bisects $\angle A$ also.

iv) $\angle 7 = \angle 8$ (from ③)

$\angle 7 + \angle 8 = 180^\circ$

$\angle 7 + \angle 7 = 180^\circ$ ($\because \angle 7 = \angle 8$)

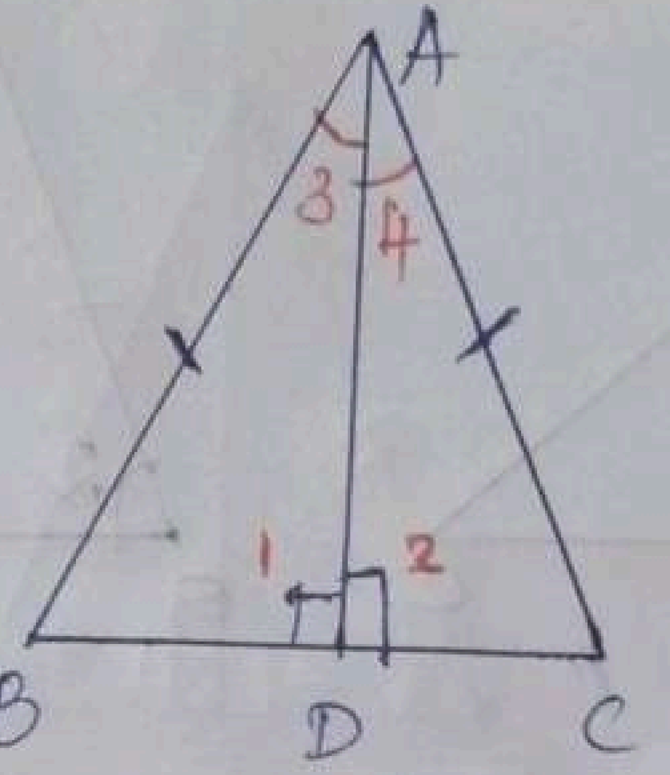
$2\angle 7 = 180^\circ$

$\angle 7 = \frac{180^\circ}{2} = 90^\circ$.

Ans: $\angle 7 = \angle 8 = 90^\circ$

$\Rightarrow$ AP is the perpendicular bisector of BC

2)



Given:-

AD - altitude

$\Rightarrow \angle 1 = \angle 2 = 90^\circ$ ——— (1)

ΔABC - isoceles triangle

$\Rightarrow AB = AC$ ——— (2).

To prove:-

i) AD bisects BC

ii) AD bisects $\angle A$.

Solution:-

In ΔABD and ΔACD,

$AB = AC$ (from (2))

$AD = AD$. (common)

$\angle 1 = \angle 2$ (from (1))

$\therefore \Delta ABD \cong \Delta ACD$ (By RHS rule)

$BD = CD$ (By CPCT)

$\Rightarrow \therefore$ AD bisects BC

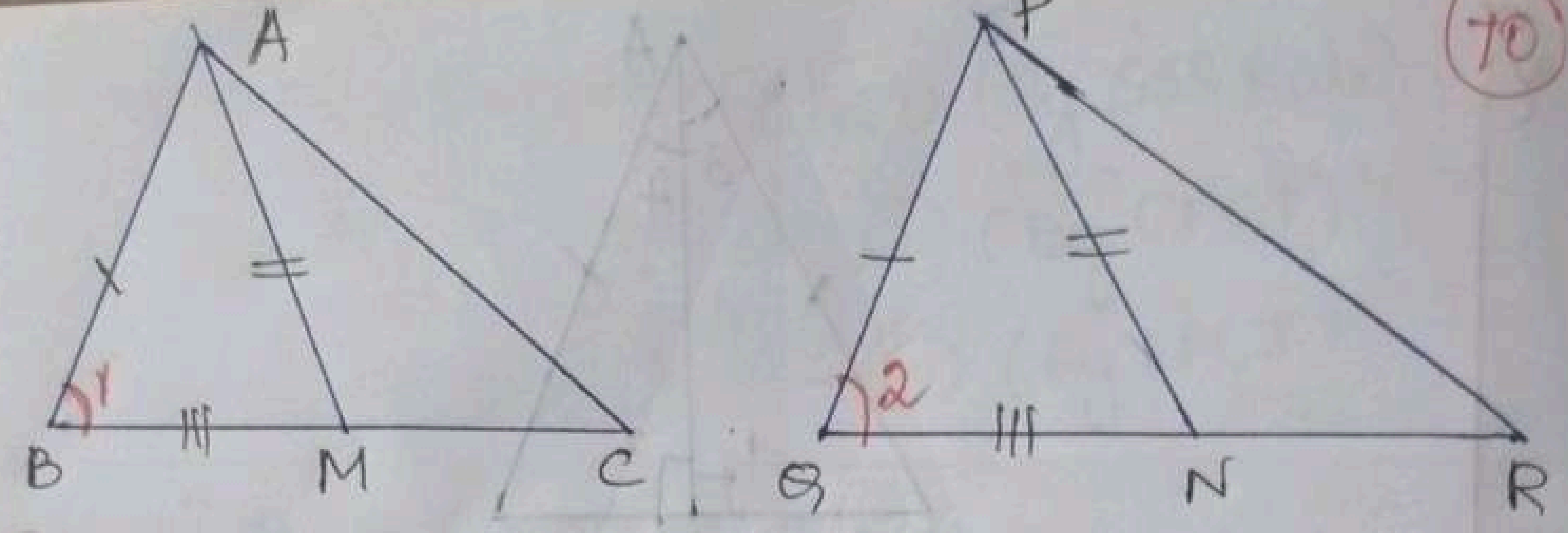
Hence Proved.

Also, $\angle 3 = \angle 4$ (By CPCT)

$\Rightarrow \therefore$ AD bisects $\angle A$

Ans:- Hence Proved.

3)



Given:-

$AB = PQ$

$BC = QR$.

Median AM = Median PN.

To prove:-

i) $\triangle ABM \cong \triangle PQN$

ii) $\triangle ABC \cong \triangle PQR$

Solution:-

i) In $\triangle ABM$ and $\triangle PQN$,

$AB = PQ$ (Given)

$BC = QR$ (Given)

$\therefore \frac{1}{2} BC = \frac{1}{2} QR$

$\Rightarrow BM = QN$.

$AM = PN$ (Given)

$\therefore \triangle ABM \cong \triangle PQN$ (By SSS Rule)

$\Rightarrow \angle 1 = \angle 2$ (By CPCT) —— (1)

ii) In $\triangle ABC$ and $\triangle PQR$,

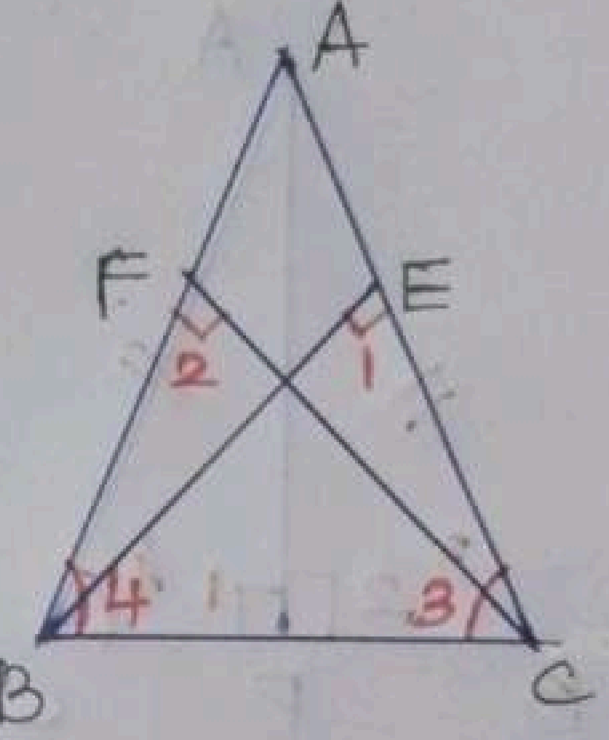
$AB = PQ$ (Given)

$\angle 1 = \angle 2$ (from (1))

$BC = QR$ (Given)

$\Rightarrow \therefore \triangle ABC \cong \triangle PQR$ (By SAS Rule)

Ans:- Hence Proved



Given :-

BE = CF ; BE and CF are altitudes.

$\Rightarrow \angle 1 = \angle 2 = 90°$.

To prove :-

ΔABC is isoceles.

Solution :-

In ΔBFC and ΔCEB,

$BC = CB$ (common) (Hypotenuse)

$\angle 1 = \angle 2 = 90°$ (Given)

$CF = BE$. (Given)

$\therefore \Delta BFC \cong \Delta CEB$ (By RHS Rule)

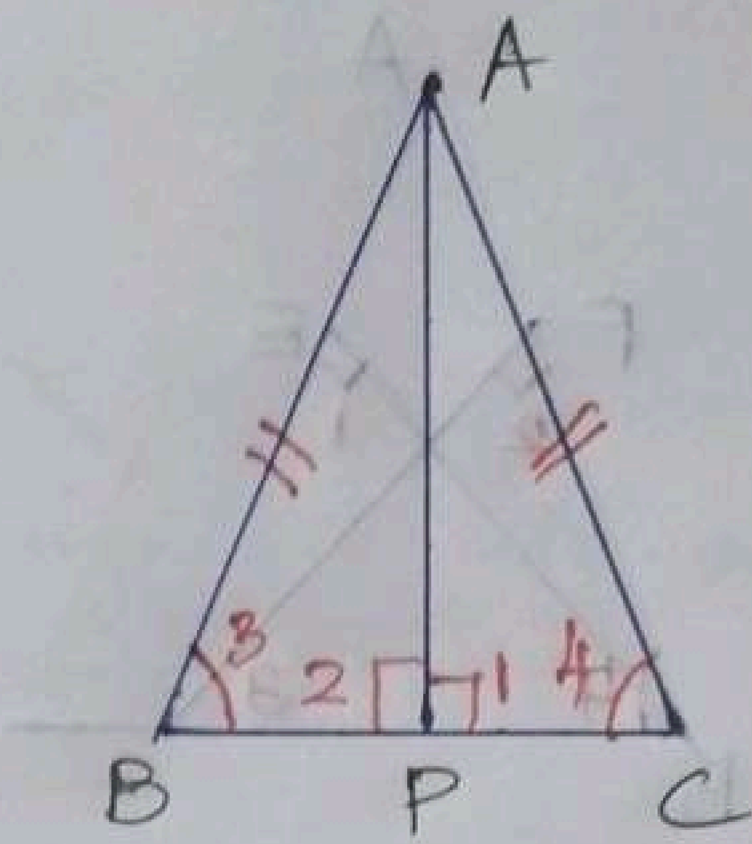
$\Rightarrow \angle 3 = \angle 4$ (By CPCT)

This gives, $AB = AC$ (Sides opposite to equal angles are equal).

$\Rightarrow \therefore \Delta ABC$ is isoceles triangle

Ans:- Hence Proved

5)



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Given :-

ΔABC is isoceles triangle

$\Rightarrow AB = AC$.

$AP \perp BC$

$\Rightarrow \angle 1 = \angle 2 = 90^\circ$.

To prove :-

$\angle B = \angle C$ ($\angle 3 = \angle 4$)

Solution :-

In ΔABP and ΔACP,

$AB = AC$ (Given)

$\angle 1 = \angle 2 = 90^\circ$ (Given)

$AP = AP$ (Common)

$\therefore \Delta ABP \cong \Delta ACP$ (By RHS rule)

$\Rightarrow \angle 3 = \angle 4$ (By CPCT)

$\Rightarrow \angle B = \angle C$

Ans:- Hence Proved