SUB TOPIC: Meaning of Congruency ,Conditions

SUBJECT : MATHEMATICS
CHAPTER NUMBER:19
CHAPTER NAME :CONGRUENCY

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LEARNING OUTCOMES

- Students will be able to
- Apply various triangles congruence postulates and theorems.
- Know the ways in which you can prove parts of a triangle congruent.
- Find distances using congruent triangles.
- Use construction techniques to create congruent triangles.

PREVIOUS CONNECT

Name the shape of the face of a pyramid .

Are all triangles look the same?

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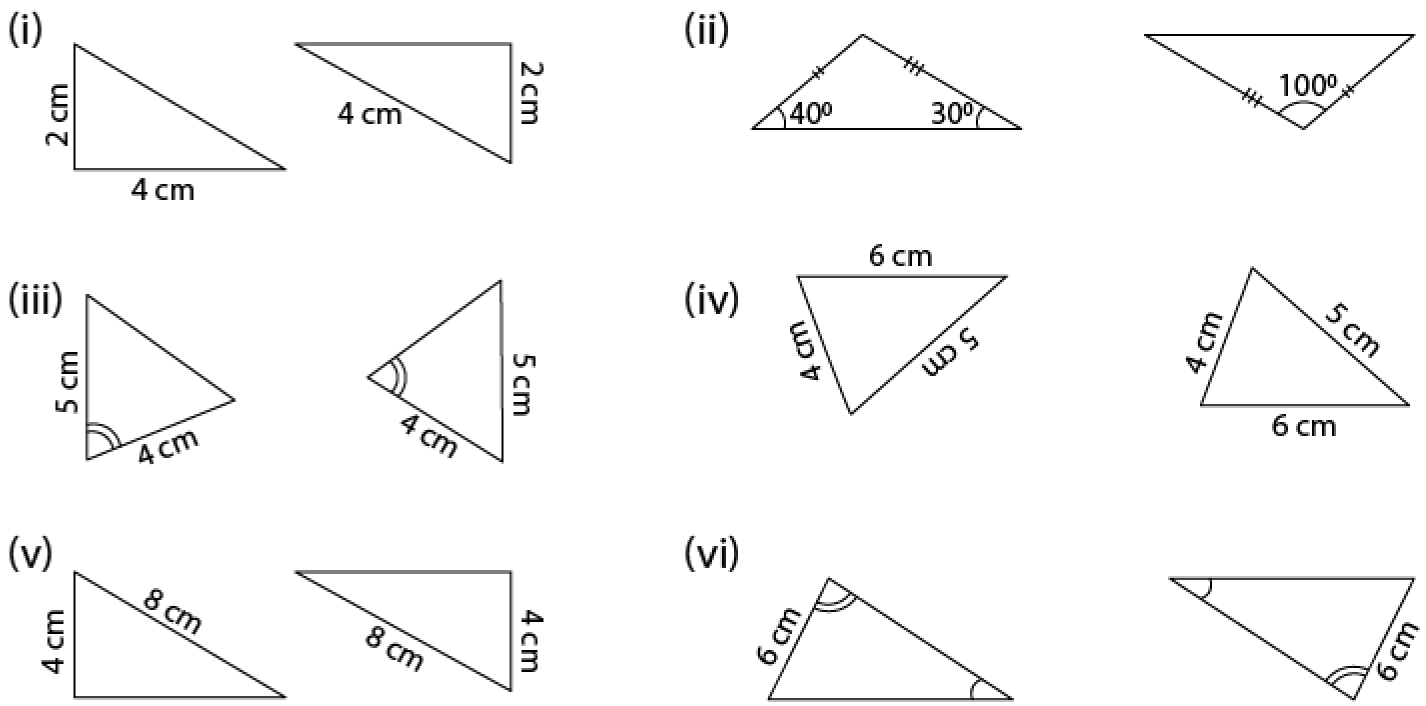
1. State, whether the pairs of triangles given in the following figures are congruent or not:



Solution:
(i) In the given figure, corresponding sides of the triangles are not equal.
Therefore, the given triangles are not congruent.

(ii) In the first triangle
Third angle = $180^0 - (40^0 + 30^0)$
By further calculation
= $180^0 - 70^0$
So we get
= 110^0
In the two triangles, the sides and included angle of one are equal to the corresponding sides and included angle.
Therefore, the given triangles are congruent. (SAS axiom)

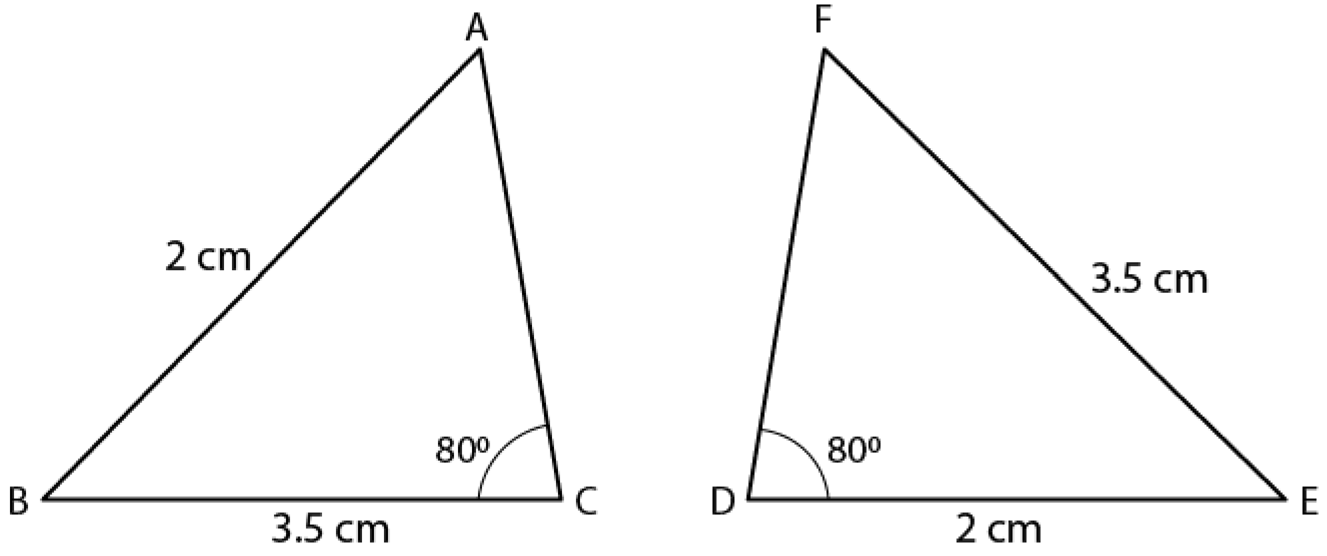
(iii) In the given figure, corresponding two sides are equal and the included angles are not equal.
Therefore, the given triangles are not congruent.

(iv) In the given figure, the corresponding three sides are equal.
Therefore, the given triangles are congruent. (SSS Axiom)

(v) In the right triangles, one side and diagonal of one triangle are equal to the corresponding side and diagonal of the other.
Therefore, the given triangles are congruent. (RHS Axiom)

(vi) In the given figure, two sides and one angle of one triangle are equal to the corresponding sides and one angle of the other.
Therefore, the given triangles are congruent. (SSA Axiom)

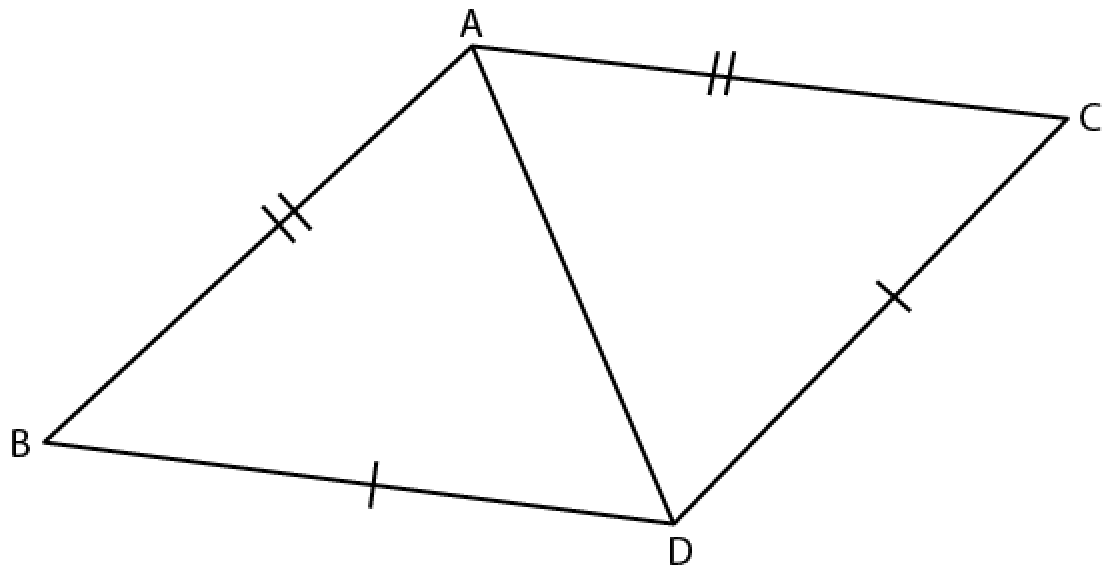
vii) In Δ ABC,
It is given that
AB = 2cm, BC = 3.5 cm, ∠C = 80^0
In Δ DEF,
It is given that
DE = 2 cm, DF = 3.5 cm and ∠D = 8



We get to know that two corresponding sides are equal but the included angles are not equal.
Therefore, the triangles are not congruent.

2. In the given figure, prove that:

$\Delta ABD \cong \Delta ACD$



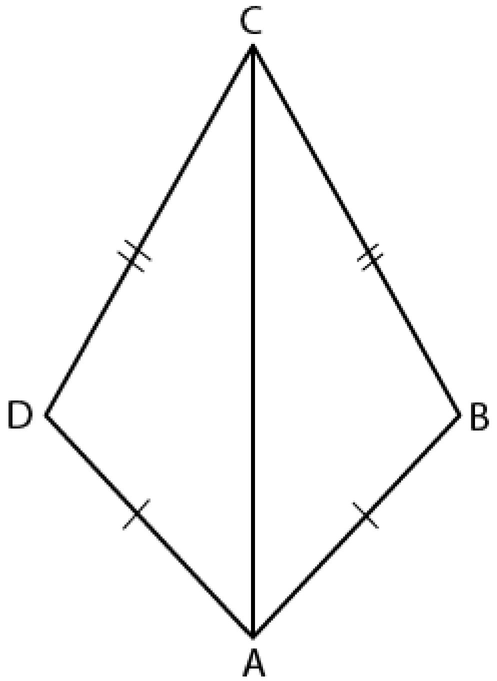
Solution:
In Δ ABD and Δ ACD
AD = AD is common
It is given that
AB = AC and BD = DC
Here Δ ABD ≅ Δ ACD (SSS Axiom)
Therefore, it is proved.

3. Prove that:

(i) $\Delta\ ABC \cong \Delta\ ADC$

(ii) $\angle B = \angle D$

(iii) AC bisects angle DCB.



Solution:

In the figure

AB = AD and CB = CD

In Δ ABC and Δ ADC

AC = AC is common

It is given that

AB = AD and CB = CD

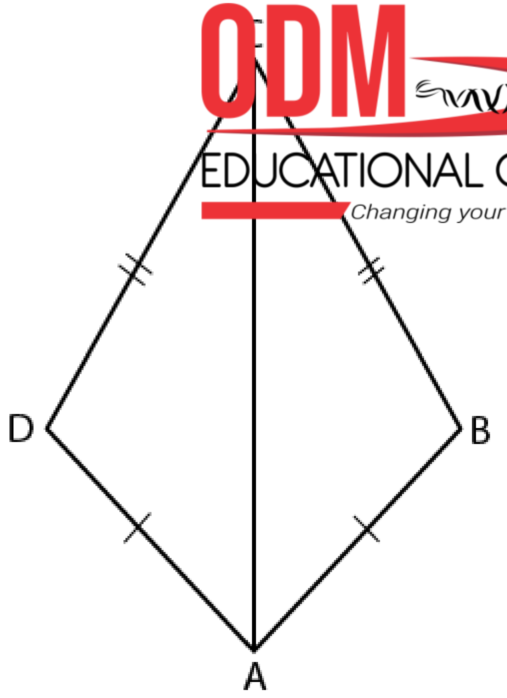
Here Δ ABC ≅ Δ ADC (SSS Axiom)

∠B = ∠D (c. p. c. t)

So we get

∠BCA = ∠DCA

Therefore, AC bisects ∠DCB.



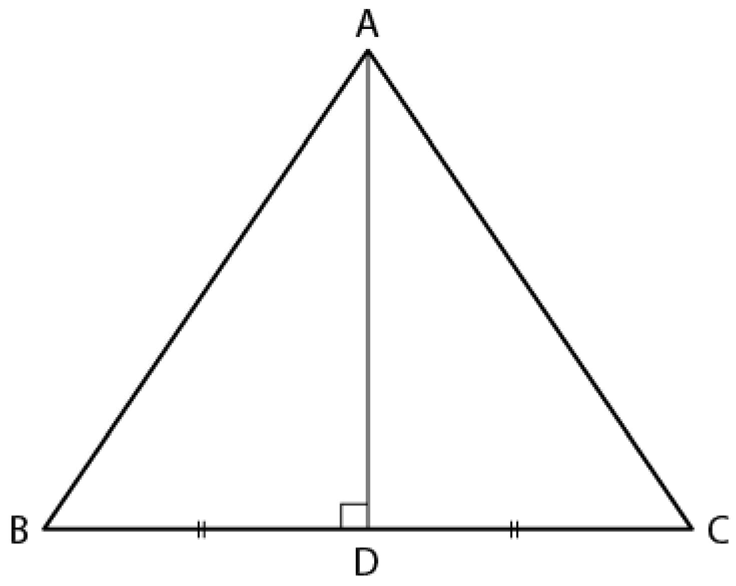
4. Prove that:

(i) $\Delta ABD \equiv \Delta ACD$

(ii) $\angle B = \angle C$

(iii) $\angle ADB = \angle ADC$

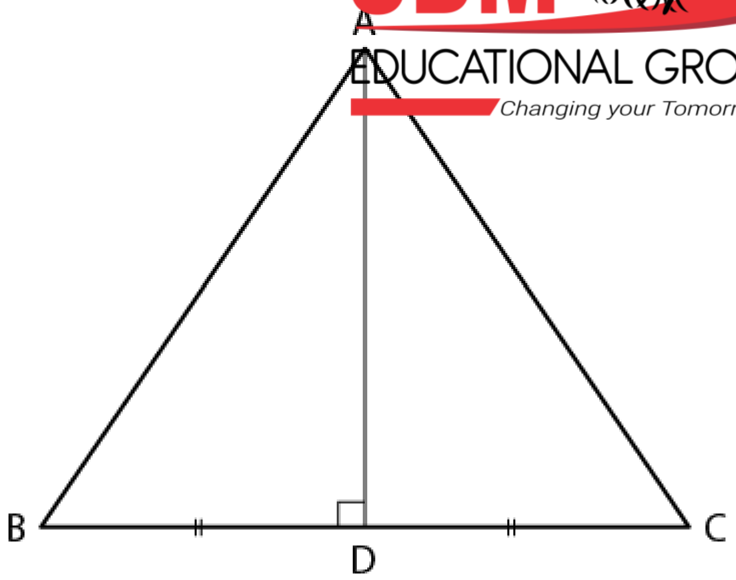
(iv) $\angle ADB = 90°$



Solution:

From the figure

AD = AC and BD = CD



In ΔABD and ΔACD

AD = AD is common

(i) ΔABD ≡ ΔACD (SSS Axiom)

(ii) ∠B = ∠C (c. p. c. t)

(iii) ∠ADB = ∠ADC (c. p. c. t)

(iv) We know that

∠ADB + ∠ADC = 180^0 is a linear pair

Here ∠ADB = ∠ADC

So we get

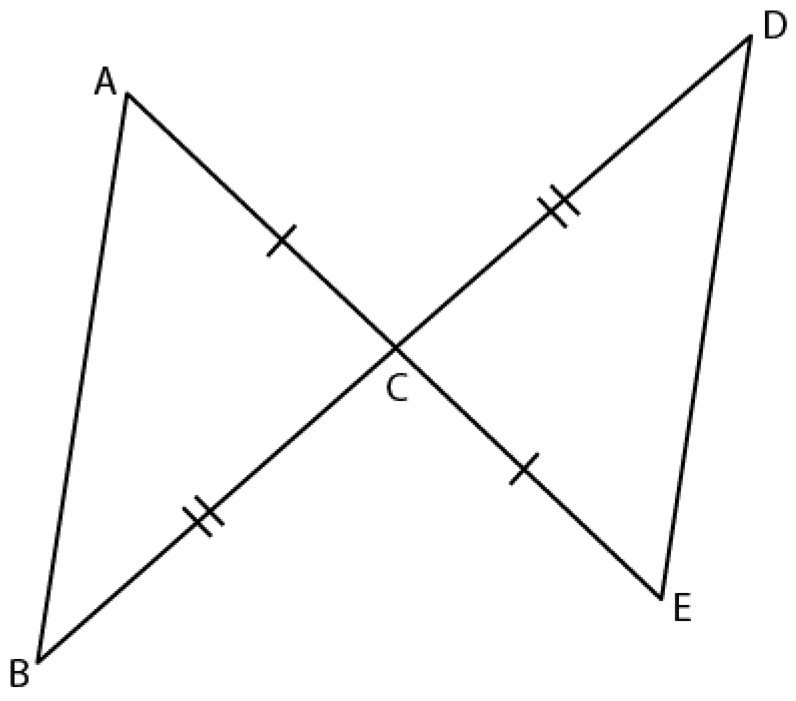
∠ADB = $180^0/2$

∠ADB = 90°

5. In the given figure, prove that:

(i) Δ ACB ≅ Δ ECD

(ii) AB = ED



Solution:

(i) In Δ ACB and Δ ECD

It is given that AC = CE and BC = CD

∠ACB = ∠DCE are vertically opposite angles

Hence, Δ ACB ≅ Δ ECD (SAS Axiom)

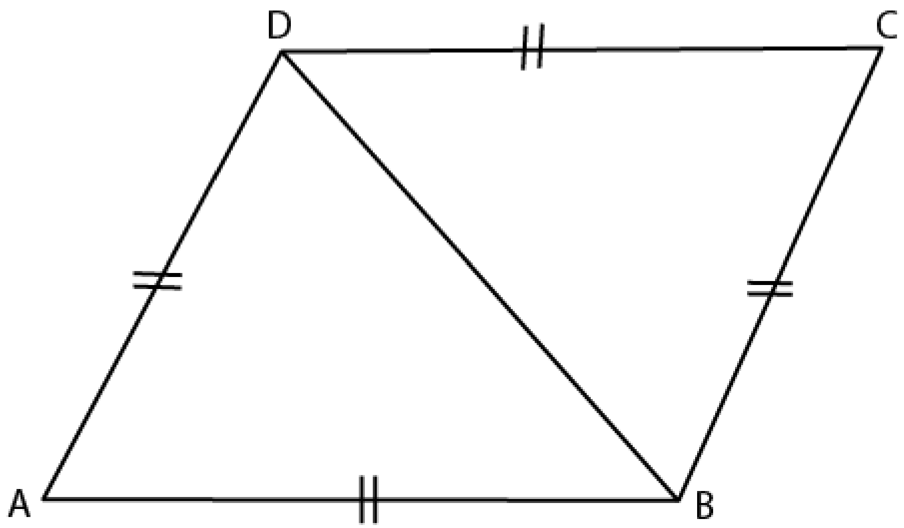
(ii) Here AB = ED (c. p. c. t)

Therefore, it is proved.

6. Prove that

(i) Δ ABC ≅ Δ ADC

(ii) ∠B = ∠D



Solution:
(i) In Δ ABC and Δ ADC
It is given that
AB = DC and BC = AD
AC = AC is common
Hence, **Δ ABC ≅ Δ ADC (SSS Axiom)**
(ii) Here ∠B = ∠D (c. p. c. t)
Therefore, it is proved.

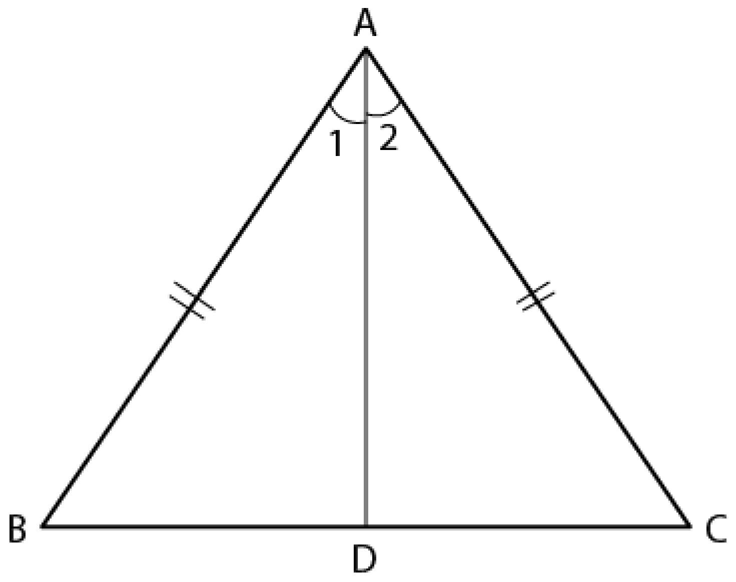
8. In the given figure, $\angle 1 = \angle 2$ and AB = AC.

Prove that:

(i) $\angle B = \angle C$

(ii) BD = DC

(iii) AD is perpendicular to BC.



Solution:

In Δ ADB and Δ ADC

It is given that

AB = AC and ∠1 = ∠2

AD = AD is common

Hence, Δ ADB ≅ Δ ADC (SAS Axiom)

(i) ∠B = ∠C (c. p. c. t)

(ii) BD = DC (c. p. c. t)

(iii) ∠ADB = ∠ADC (c. p. c. t)

We know that

$\angle ADB + \angle ADC = 180^0$ is a linear pair

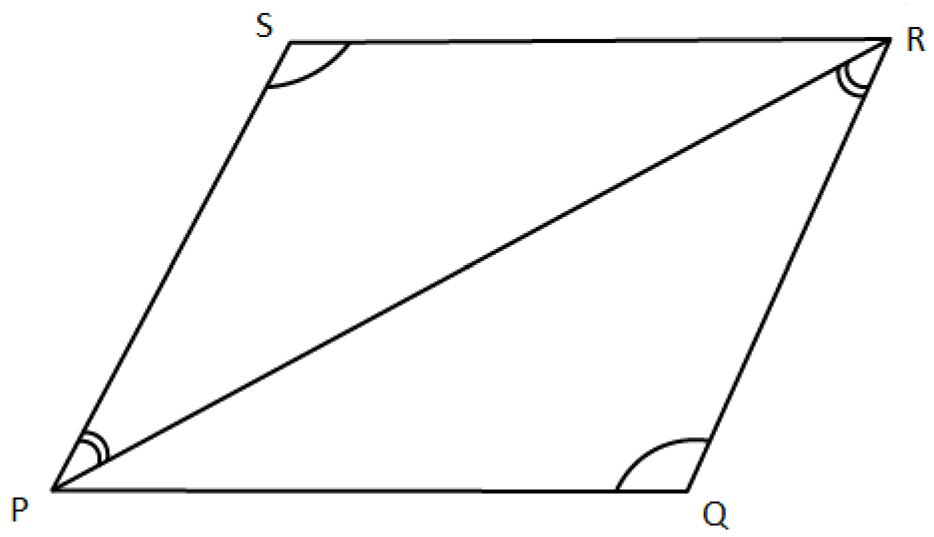
So we get

$\angle ADB = \angle ADC = 90^0$

Here, AD is perpendicular to BC

Therefore, it is proved.

9. In the given figure, prove that:
(i) PQ = RS
(ii) PS = QR



Solution:

In **Δ PQR and Δ PSR**

PR = PR is common

It is given that

∠PRQ = ∠RPS and ∠PQR = ∠PSR

Δ PQR ≅ Δ PSR (AAS Axiom)

(i) PQ = RS (c. p. c. t)

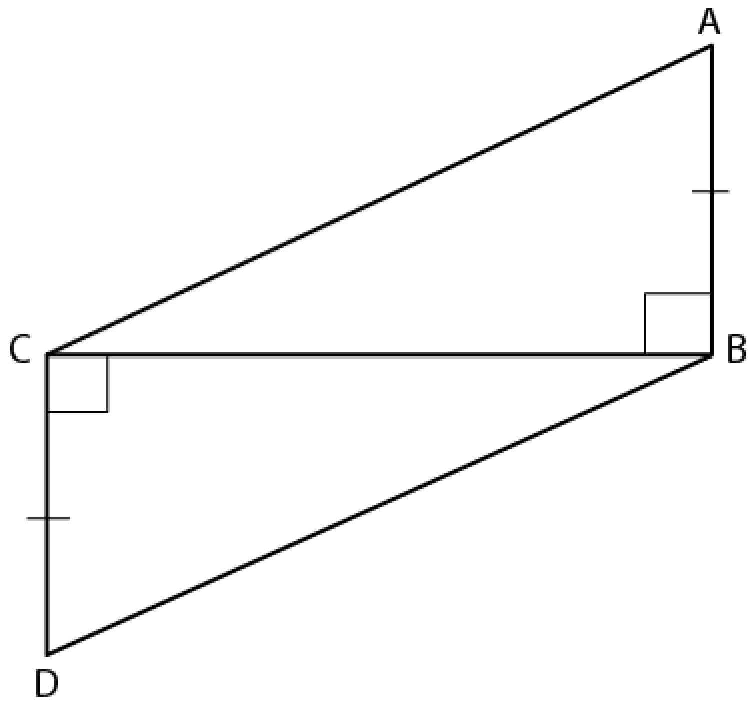
(ii) QR = PS or PS = QR (c. p. c. t)

Therefore, it is proved.

11. In the given figure, prove that:

(i) Δ ABC ≅ Δ DCB

(ii) AC = DB



Solution:

In Δ ABC and Δ DCB

CB = CB is common

∠ABC = ∠BCD = 90^0

It is given that

AB = CD

(i) Δ ABC ≅ Δ DCB (SAS Axiom)

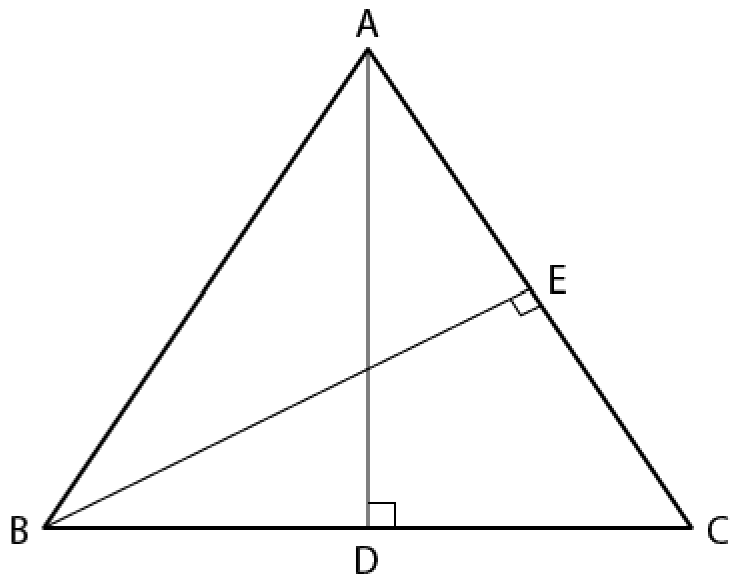
(ii) AC = DB (c. p. c. t)

Therefore, it is proved.

13. ABC is an equilateral triangle, AD and BE are perpendiculars to BC and AC respectively. Prove that:

(i) AD = BE

(ii)BD = CE



Solution:

In Δ **ABC**

AB = BC = CA

We know that

AD is perpendicular to BC and BE is perpendicular to AC

In **Δ ADC and Δ BEC**

∠ADC = ∠BEC = 90^0

∠ACD = ∠BCE is common

AC = BC are the sides of an equilateral triangle

Δ ADC ≅ Δ BEC (AAS Axiom)

(i) AD = BE (c. p. c. t)

(ii) BD = CE (c. p. c. t)

Therefore, it is proved.

HOME ASSIGNMENT

EX 19

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