

EXERCISE 16.4

1. Which of the following pairs of triangle are congruent by ASA condition?

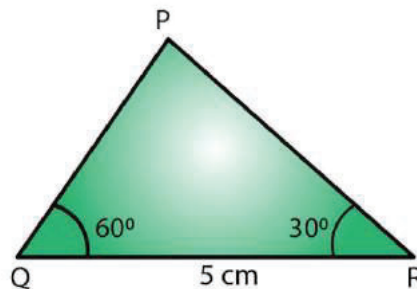
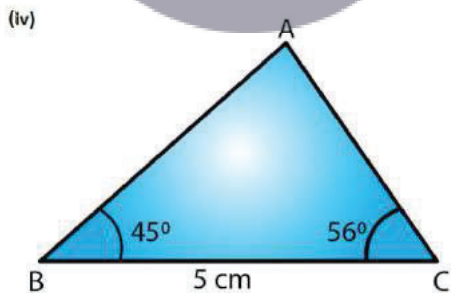
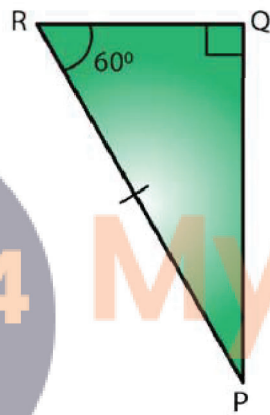
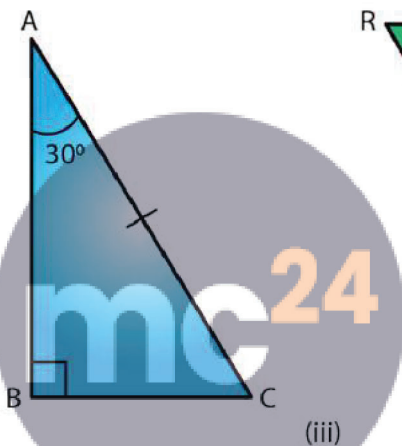
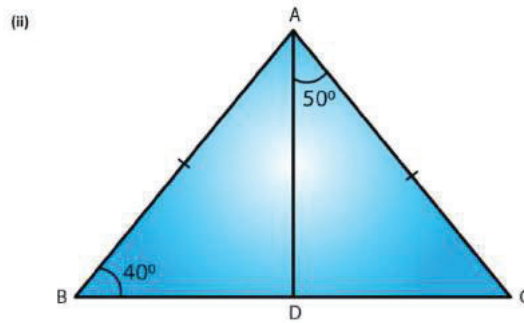
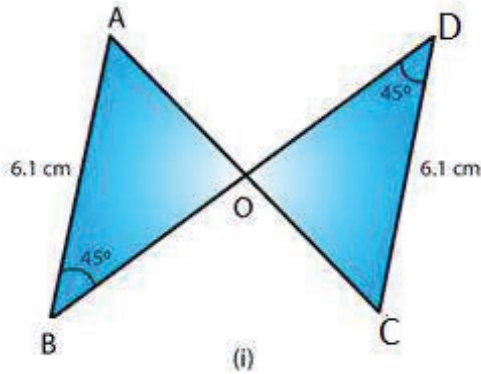


Fig. 36

Solution:

(i) We have,

Since $\angle ABO = \angle CDO = 45^\circ$ and both are alternate angles, AB parallel to DC, $\angle BAO = \angle DCO$ (alternate angle, AB parallel to CD and AC is a transversal line)

$\angle ABO = \angle CDO = 45^\circ$ (given in the figure) Also,

AB = DC (Given in the figure)

Therefore, by ASA $\triangle AOB \cong \triangle DOC$

(ii) In $\triangle ABC$,

Now $AB = AC$ (Given)

$\angle ABD = \angle ACD = 40^\circ$ (Angles opposite to equal sides)

$\angle ABD + \angle ACD + \angle BAC = 180^\circ$ (Angle sum property)

$40^\circ + 40^\circ + \angle BAC = 180^\circ$

$\angle BAC = 180^\circ - 80^\circ = 100^\circ$

$\angle BAD + \angle DAC = \angle BAC$

$\angle BAD = \angle BAC - \angle DAC = 100^\circ - 50^\circ = 50^\circ$

$\angle BAD = \angle CAD = 50^\circ$

Therefore, by ASA, $\triangle ABD \cong \triangle ACD$

(iii) In $\triangle ABC$,

$\angle A + \angle B + \angle C = 180^\circ$ (Angle sum property)

$\angle C = 180^\circ - \angle A - \angle B$

$\angle C = 180^\circ - 30^\circ - 90^\circ = 60^\circ$

In $\triangle PQR$,

$\angle P + \angle Q + \angle R = 180^\circ$ (Angle sum property)

$\angle P = 180^\circ - \angle R - \angle Q$

$\angle P = 180^\circ - 60^\circ - 90^\circ = 30^\circ$

$\angle BAC = \angle QPR = 30^\circ$

$\angle BCA = \angle PRQ = 60^\circ$ and $AC = PR$ (Given)

Therefore, by ASA, $\triangle ABC \cong \triangle PQR$

(iv) We have only

$BC = QR$ but none of the angles of $\triangle ABC$ and $\triangle PQR$ are equal.

Therefore, $\triangle ABC$ is not congruent to $\triangle PQR$

2. In fig. 37, AD bisects A and $AD \perp BC$.

(i) Is $\triangle ADB \cong \triangle ADC$?

(ii) State the three pairs of matching parts you have used in (i)

(iii) Is it true to say that $BD = DC$?

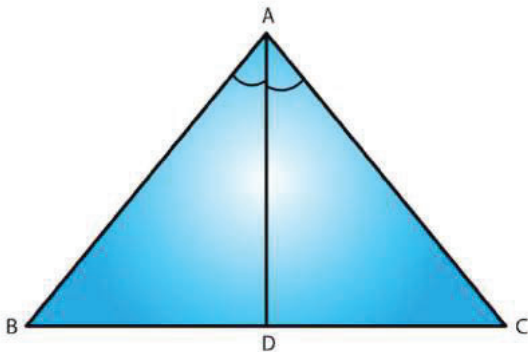


Fig. 37

Solution:

(i) Yes, $\triangle ADB \cong \triangle ADC$, by ASA criterion of congruency.

(ii) We have used $\angle BAD = \angle CAD$ $\angle ADB = \angle ADC = 90^\circ$

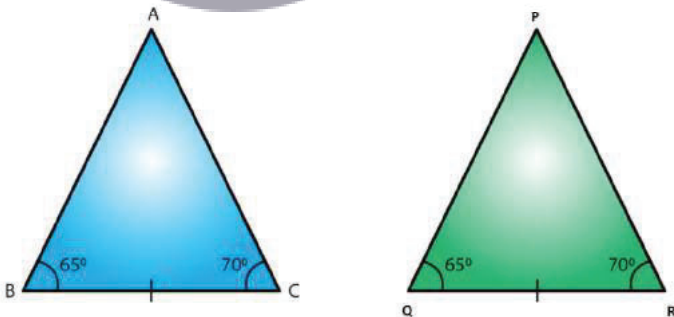
Since, $AD \perp BC$ and $AD = DA$

$\triangle ADB = \triangle ADC$

(iii) Yes, $BD = DC$ since, $\triangle ADB \cong \triangle ADC$

3. Draw any triangle ABC. Use ASA condition to construct other triangle congruent to it.

Solution:



We have drawn

$\triangle ABC$ with $\angle ABC = 65^\circ$ and $\angle ACB = 70^\circ$

We now construct $\triangle PQR \cong \triangle ABC$ where $\angle PQR = 65^\circ$ and $\angle PRQ = 70^\circ$

Also we construct $\triangle PQR$ such that $BC = QR$

Therefore by ASA the two triangles are congruent

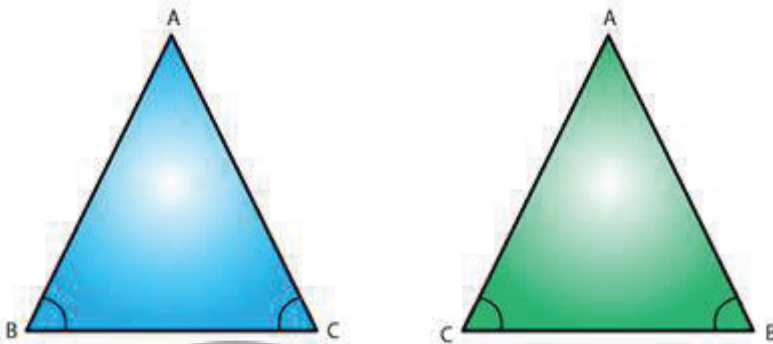
4. In ΔABC , it is known that $\angle B = \angle C$. Imagine you have another copy of ΔABC

(i) Is $\Delta ABC \cong \Delta ACB$

(ii) State the three pairs of matching parts you have used to answer (i).

(iii) Is it true to say that $AB = AC$?

Solution:



(i) Yes $\Delta ABC \cong \Delta ACB$

(ii) We have used $\angle ABC = \angle ACB$ and $\angle ACB = \angle ABC$ again.
Also $BC = CB$

(iii) Yes it is true to say that $AB = AC$ since $\angle ABC = \angle ACB$.

5. In Fig. 38, AX bisects $\angle BAC$ as well as $\angle BDC$. State the three facts needed to ensure that $\Delta ACD \cong \Delta ABD$

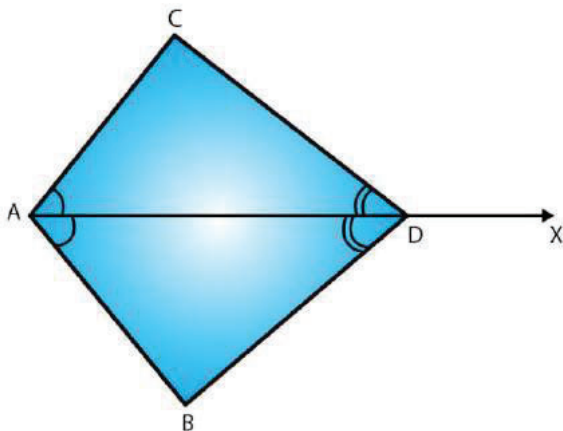


Fig. 38

Solution:

As per the given conditions,

$\angle CAD = \angle BAD$ and $\angle CDA = \angle BDA$ (because AX bisects $\angle BAC$)

$AD = DA$ (common)

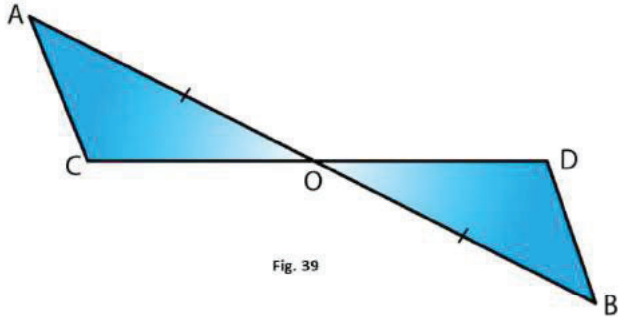
Therefore, by ASA, $\triangle ACD \cong \triangle ABD$

6. In Fig. 39, $AO = OB$ and $\angle A = \angle B$.

(i) Is $\triangle AOC \cong \triangle BOD$

(ii) State the matching pair you have used, which is not given in the question.

(iii) Is it true to say that $\angle ACO = \angle BDO$?



Solution:

We have

$\angle OAC = \angle OBD$,

$AO = OB$

Also, $\angle AOC = \angle BOD$ (Opposite angles on same vertex)

Therefore, by ASA $\triangle AOC \cong \triangle BOD$

(ii) $AC \parallel BD$ (by C.P.C.T)

(iii) $\angle ACO = \angle BDO$ (by C.P.C.T)

