EXERCISE 16.4 PAGE NO: 16.19

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

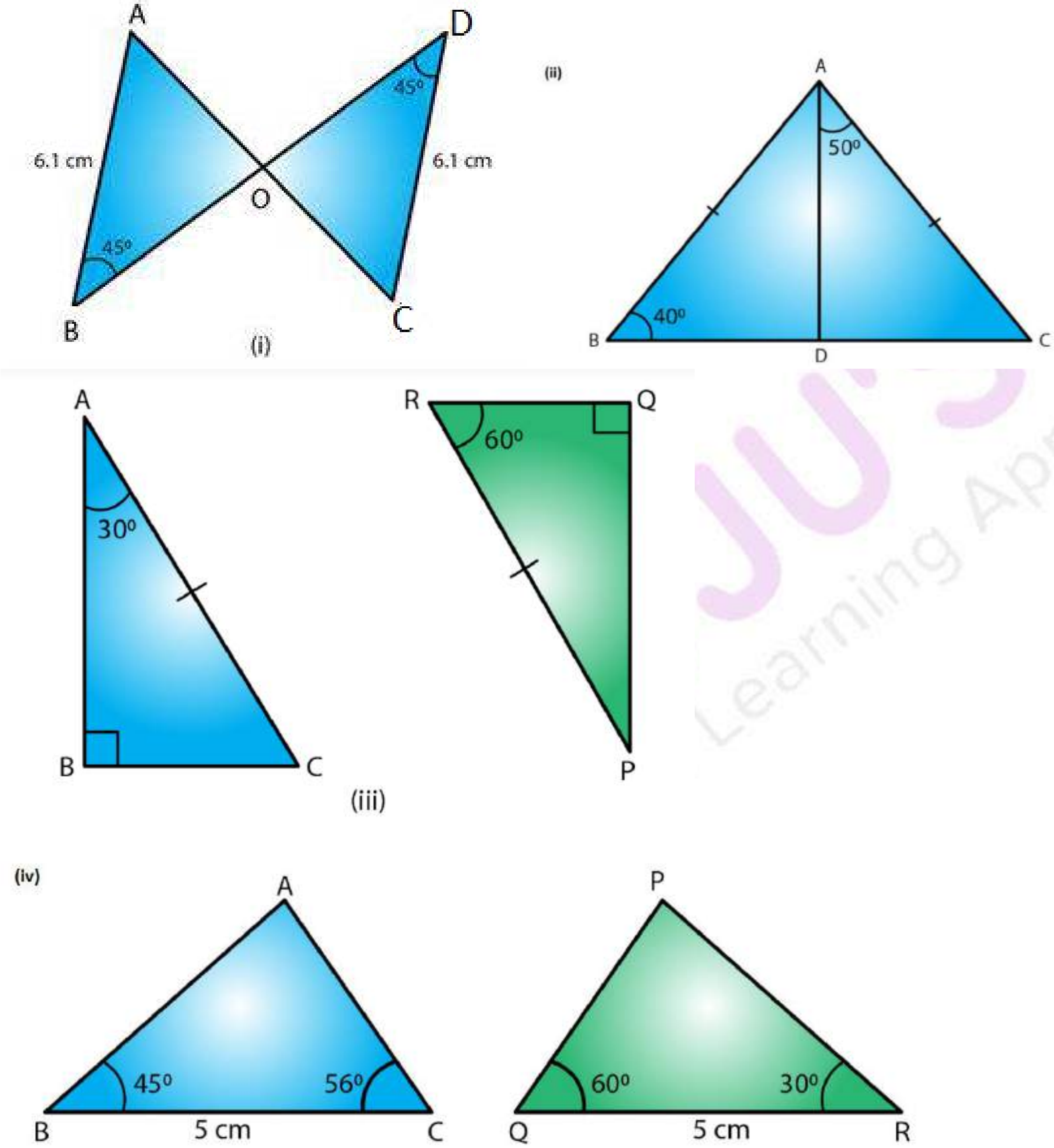


Fig. 36

Solution:

(i) We have,

Since ∠ABO = ∠CDO = 45^{o} and both are alternate angles, AB parallel to DC, ∠BAO = ∠DCO (alternate angle, AB parallel to CD and AC is a transversal line)

∠ABO = ∠CDO = 45^{o} (given in the figure) Also,

AB = DC (Given in the figure)

Therefore, by ASA ΔAOB ≅ ΔDOC

(ii) In ABC,
Now AB =AC (Given)
$\angle ABD = \angle ACD = 40^o$ (Angles opposite to equal sides)
$\angle ABD + \angle ACD + \angle BAC = 180^o$ (Angle sum property)
$40^o + 40^o + \angle BAC = 180^o$
$\angle BAC = 180^o - 80^o = 100^o$
$\angle BAD + \angle DAC = \angle BAC$
$\angle BAD = \angle BAC - \angle DAC = 100^o - 50^o = 50^o$
$\angle BAD = \angle CAD = 50°$
Therefore, by ASA, ΔABD ≅ ΔACD

(iii) In Δ ABC,
$\angle A + \angle B + \angle C = 180^o$ (Angle sum property)
$\angle C = 180^o - \angle A - \angle B$
$\angle C = 180^o - 30^o - 90^o = 60^o$
In PQR,
$\angle P + \angle Q + \angle R = 180^o$ (Angle sum property)
$\angle P = 180^o - \angle R - \angle Q$
$\angle P = 180^o - 60^o - 90^o = 30^o$
$\angle BAC = \angle QPR = 30^o$
$\angle BCA = \angle PRQ = 60^o$ and AC = PR (Given)
Therefore, by ASA, ΔABC ≅ ΔPQR

(iv) We have only
BC = QR but none of the angles of ΔABC and ΔPQR are equal.
Therefore, ΔABC is not congruent to ΔPQR

2. In fig. 37, AD bisects A and AD ⊥ BC.
(i) Is ΔADB ≅ ΔADC?
(ii) State the three pairs of matching parts you have used in (i)
(iii) Is it true to say that BD = DC?

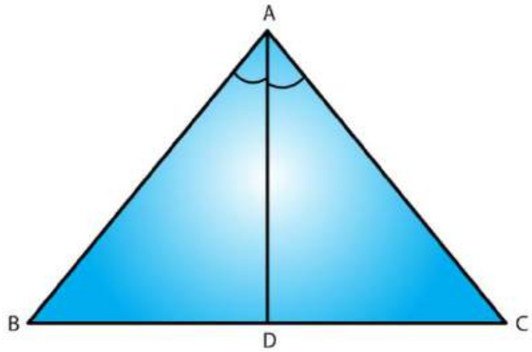


Fig. 37

Solution:

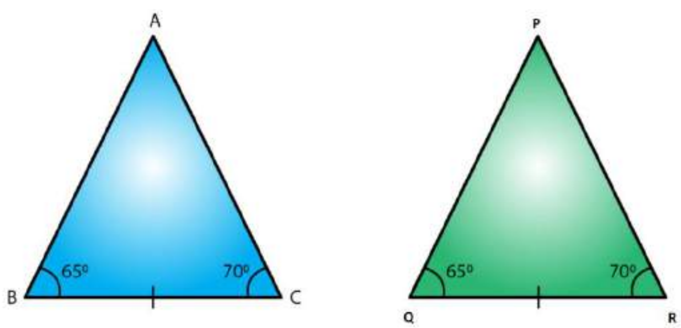
(i) Yes, ΔADB≅ΔADC, by ASA criterion of congruency.

(ii) We have used ∠BAD = ∠CAD ∠ADB = ∠ADC = 90^o
Since, AD ⊥ BC and AD = DA
ADB = ADC

(iii) Yes, BD = DC since, ΔADB ≅ ΔADC

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

Solution:

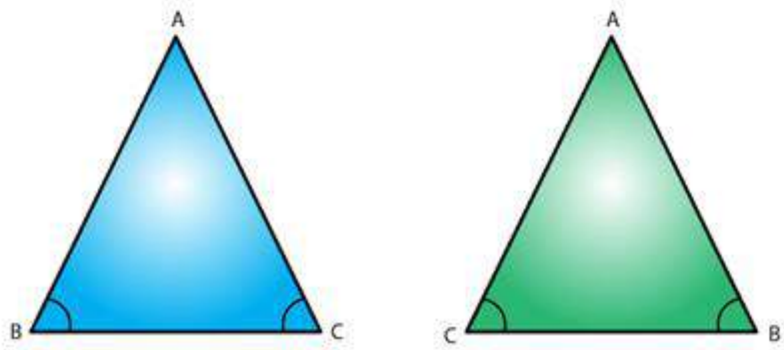


We have drawn
Δ ABC with ∠ABC = 65^o and ∠ACB = 70^o
We now construct ΔPQR ≅ ΔABC where ∠PQR = 65^o and ∠PRQ = 70^o
Also we construct ΔPQR such that BC = QR
Therefore by ASA the two triangles are congruent

4. In Δ ABC, it is known that ∠B = C. Imagine you have another copy of Δ ABC

(i) Is ΔABC ≅ ΔACB
(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 ΔABC ≅ ΔACB

(ii) We have used ∠ABC = ∠ACB and ∠ACB = ∠ABC again.
Also BC = CB

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

5. In Fig. 38, AX bisects ∠BAC as well as ∠BDC. State the three facts needed to ensure that ΔACD ≅ ΔABD

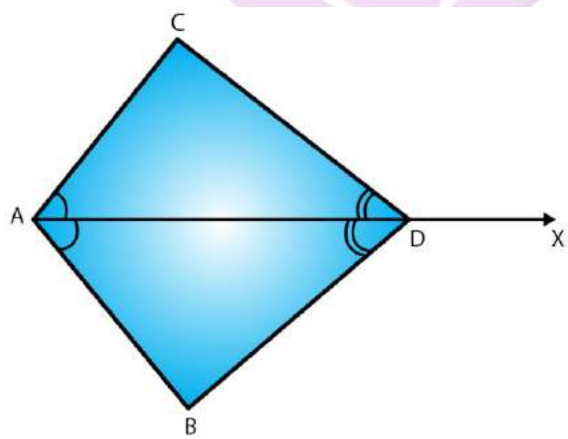


Fig. 38

Solution:
As per the given conditions,
∠CAD = ∠BAD and ∠CDA = ∠BDA (because AX bisects ∠BAC)

AD = DA (common)
Therefore, by ASA, ΔACD ≅ ΔABD

6. In Fig. 39, AO = OB and ∠A = ∠B.
(i) Is ΔAOC ≅ ΔBOD
(ii) State the matching pair you have used, which is not given in the question.
(iii) Is it true to say that ∠ACO = ∠BDO?

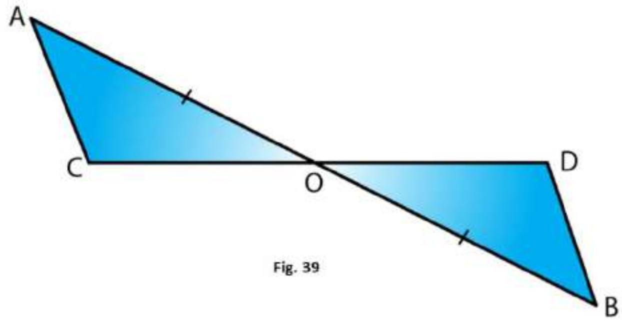


Fig. 39

Solution:
We have
∠OAC = ∠OBD,
AO = OB
Also, ∠AOC = ∠BOD (Opposite angles on same vertex)
Therefore, by ASA ΔAOC ≅ ΔBOD
(ii) AC || BD (by C.P.C.T)
(iii) ∠ACO = ∠BDO (by C.P.C.T)