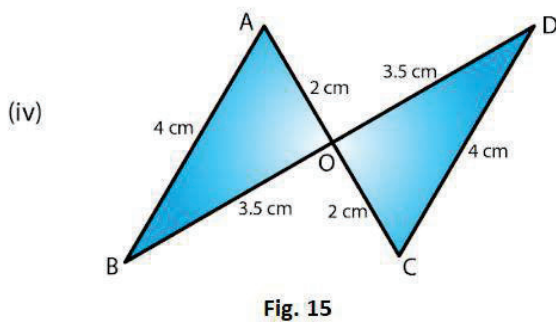
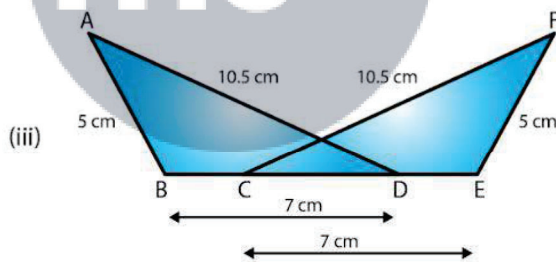
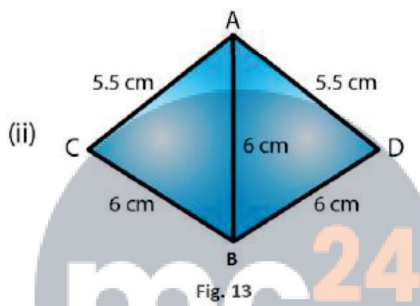
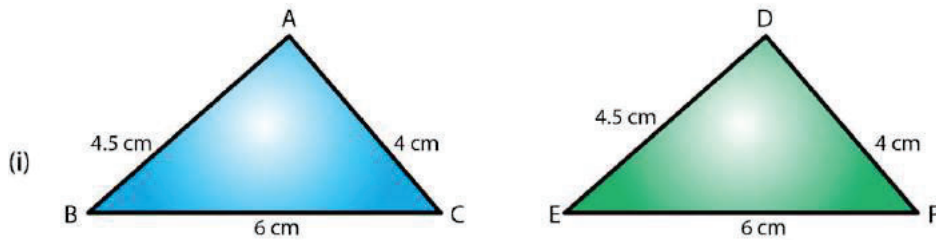


EXERCISE 16.2

1. In the following pairs of triangle (Fig. 12 to 15), the lengths of the sides are indicated along sides. By applying SSS condition, determine which are congruent. State the result in symbolic form.



Solution:

(i) In ΔABC and ΔDEF

$AB = DE = 4.5$ cm (Side)

$BC = EF = 6$ cm (Side) and

$AC = DF = 4$ cm (Side)

SSS criterion is two triangles are congruent, if the three sides of triangle are respectively equal to the three sides of the other triangle.

Therefore, by SSS criterion of congruence, $\Delta ABC \cong \Delta DEF$

(ii) In ΔACB and ΔADB

$AC = AD = 5.5$ cm (Side)

$BC = BD = 5$ cm (Side) and

$AB = AB = 6$ cm (Side)

SSS criterion is two triangles are congruent, if the three sides of triangle are respectively equal to the three sides of the other triangle.

Therefore, by SSS criterion of congruence, $\Delta ACB \cong \Delta ADB$

(iii) In ΔABD and ΔFEC ,

$AB = FE = 5$ cm (Side)

$AD = FC = 10.5$ cm (Side)

$BD = CE = 7$ cm (Side)

SSS criterion is two triangles are congruent, if the three sides of triangle are respectively equal to the three sides of the other triangle.

Therefore, by SSS criterion of congruence, $\Delta ABD \cong \Delta FEC$

(iv) In ΔABO and ΔDOC ,

$AB = DC = 4$ cm (Side)

$AO = OC = 2$ cm (Side)

$BO = OD = 3.5$ cm (Side)

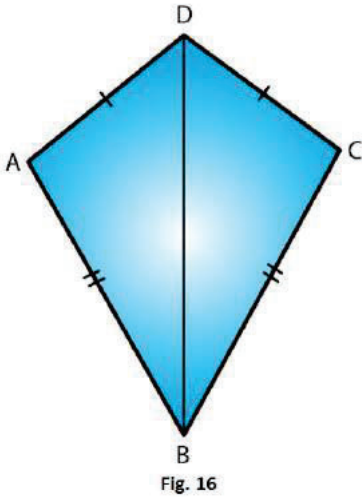
SSS criterion is two triangles are congruent, if the three sides of triangle are respectively equal to the three sides of the other triangle.

Therefore, by SSS criterion of congruence, $\Delta ABO \cong \Delta ODC$

2. In fig.16, $AD = DC$ and $AB = BC$

(i) Is $\Delta ABD \cong \Delta CBD$?

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



Solution:

(i) Yes $\triangle ABD \cong \triangle CBD$ by the SSS criterion.

SSS criterion is two triangles are congruent, if the three sides of triangle are respectively equal to the three sides of the other triangle.

Hence $\triangle ABD \cong \triangle CBD$

(ii) We have used the three conditions in the SSS criterion as follows:

$AD = DC$

$AB = BC$ and

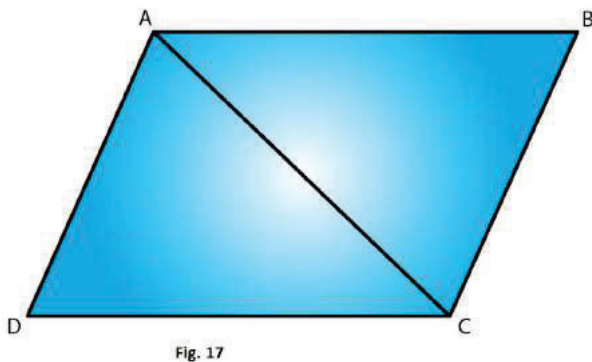
$DB = BD$

3. In Fig. 17, $AB = DC$ and $BC = AD$.

(i) Is $\triangle ABC \cong \triangle CDA$?

(ii) What congruence condition have you used?

(iii) You have used some fact, not given in the question, what is that?



Solution:

(i) From the figure we have $AB = DC$

$BC = AD$

And $AC = CA$

SSS criterion is two triangles are congruent, if the three sides of triangle are respectively equal to the three sides of the other triangle.

Therefore by SSS criterion $\triangle ABC \cong \triangle CDA$

(ii) We have used Side Side Side congruence condition with one side common in both the triangles.

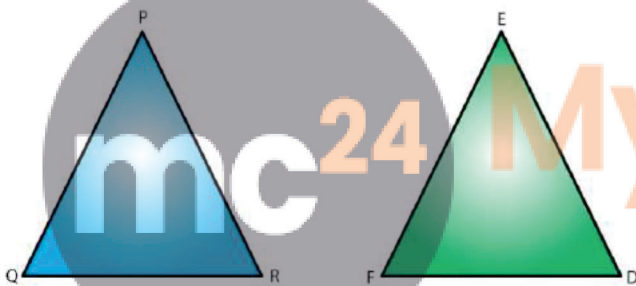
(iii) Yes, we have used the fact that $AC = CA$.

4. In $\triangle PQR \cong \triangle EFD$,

(i) Which side of $\triangle PQR$ equals ED ?

(ii) Which angle of $\triangle PQR$ equals angle E ?

Solution:



(i) $PR = ED$

Since the corresponding sides of congruent triangles are equal.

(ii) $\angle QPR = \angle FED$

Since the corresponding angles of congruent triangles are equal.

5. Triangles ABC and PQR are both isosceles with $AB = AC$ and $PQ = PR$ respectively. If also, $AB = PQ$ and $BC = QR$, are the two triangles congruent? Which condition do you use?

It $\angle B = 50^\circ$, what is the measure of $\angle R$?

Solution:

Given that $AB = AC$ in isosceles $\triangle ABC$

And $PQ = PR$ in isosceles $\triangle PQR$.

Also given that $AB = PQ$ and $QR = BC$.

Therefore, $AC = PR$ ($AB = AC$, $PQ = PR$ and $AB = PQ$)

Hence, $\triangle ABC \cong \triangle PQR$

Now

$\angle ABC = \angle PQR$ (Since triangles are congruent)

However, $\triangle PQR$ is isosceles.

Therefore, $\angle PRQ = \angle PQR = \angle ABC = 50^\circ$

6. ABC and DBC are both isosceles triangles on a common base BC such that A and D lie on the same side of BC. Are triangles ADB and ADC congruent? Which condition do you use? If $\angle BAC = 40^\circ$ and $\angle BDC = 100^\circ$, then find $\angle ADB$.

Solution:

Given ABC and DBC are both isosceles triangles on a common base BC

$\angle BAD = \angle CAD$ (corresponding parts of congruent triangles)

$\angle BAD + \angle CAD = 40^\circ / 2$

$\angle BAD = 40^\circ / 2 = 20^\circ$

$\angle ABC + \angle BCA + \angle BAC = 180^\circ$ (Angle sum property)

Since $\triangle ABC$ is an isosceles triangle,

$\angle ABC = \angle BCA$

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

$2 \angle ABC = 180^\circ - 40^\circ = 140^\circ$

$\angle ABC = 140^\circ / 2 = 70^\circ$

$\angle DBC + \angle BCD + \angle BDC = 180^\circ$ (Angle sum property)

Since $\triangle DBC$ is an isosceles triangle, $\angle DBC = \angle BCD$

$\angle DBC + \angle DBC + 100^\circ = 180^\circ$

$2 \angle DBC = 180^\circ - 100^\circ = 80^\circ$

$\angle DBC = 80^\circ / 2 = 40^\circ$

In $\triangle BAD$,

$\angle ABD + \angle BAD + \angle ADB = 180^\circ$ (Angle sum property)

$30^\circ + 20^\circ + \angle ADB = 180^\circ$ ($\angle ABD = \angle ABC - \angle DBC$),

$\angle ADB = 180^\circ - 20^\circ - 30^\circ$

$\angle ADB = 130^\circ$

7. $\triangle ABC$ and $\triangle ABD$ are on a common base AB, and $AC = BD$ and $BC = AD$ as shown in Fig. 18. Which of the following statements is true?

(i) $\triangle ABC \cong \triangle ABD$

(ii) $\triangle ABC \cong \triangle ADB$

(iii) $\triangle ABC \cong \triangle BAD$

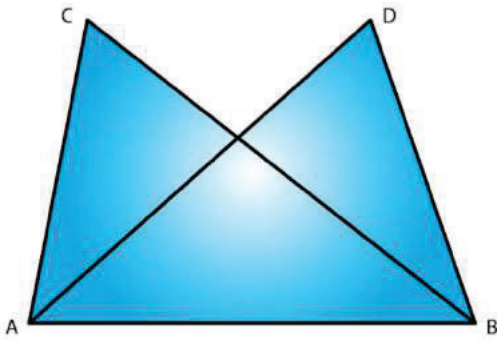


Fig. 18

Solution:

In $\triangle ABC$ and $\triangle BAD$ we have,

$AC = BD$ (given)

$BC = AD$ (given)

And $AB = BA$ (corresponding parts of congruent triangles)

Therefore by SSS criterion of congruency, $\triangle ABC \cong \triangle BAD$

Therefore option (iii) is true.

8. In Fig. 19, $\triangle ABC$ is isosceles with $AB = AC$, D is the mid-point of base BC.

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

(ii) State the three pairs of matching parts you use to arrive at your answer.

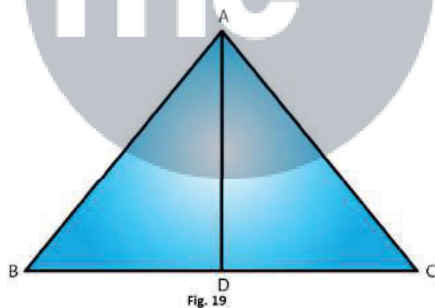


Fig. 19

Solution:

(i) Given that $AB = AC$.

Also since D is the midpoint of BC, $BD = DC$

Also, $AD = DA$

Therefore by SSS condition,

$\triangle ADB \cong \triangle ADC$

(ii) We have used AB, AC ; BD, DC and AD, DA

9. In fig. 20, $\triangle ABC$ is isosceles with $AB = AC$. State if $\triangle ABC \cong \triangle ACB$. If yes, state three

relations that you use to arrive at your answer.

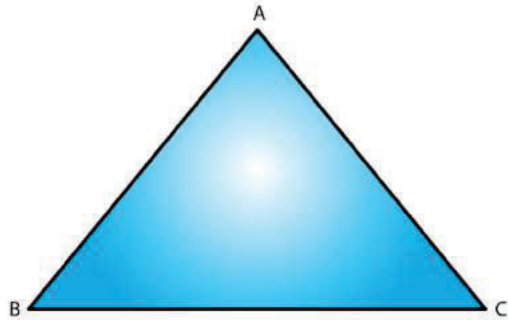


Fig. 20

Solution:

Given that $\triangle ABC$ is isosceles with $AB = AC$

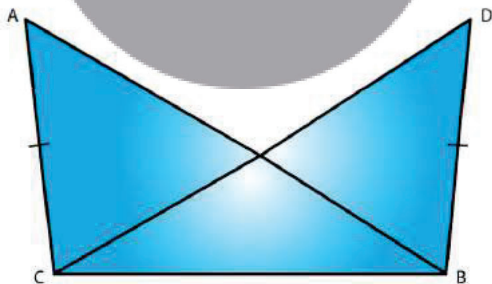
SSS criterion is two triangles are congruent, if the three sides of triangle are respectively equal to the three sides of the other triangle.

$\triangle ABC \cong \triangle ACB$ by SSS condition.

Since, $\triangle ABC$ is an isosceles triangle, $AB = AC$ and $BC = CB$

10. Triangles ABC and DBC have side BC common, $AB = BD$ and $AC = CD$. Are the two triangles congruent? State in symbolic form, which congruence do you use? Does $\angle ABD$ equal $\angle ACD$? Why or why not?

Solution:



Yes, the two triangles are congruent because given that $\triangle ABC$ and $\triangle DBC$ have side BC common, $AB = BD$ and $AC = CD$

Also from the above data we can say

By SSS criterion of congruency, $\triangle ABC \cong \triangle DBC$

No, $\angle ABD$ and $\angle ACD$ are not equal because AB not equal to AC