

Mathematics

(Chapter – 7) (Congruence of Triangles)

(Class – VII)

Exercise 7.1

Question 1:

Complete the following statements:

- (a) Two line segments are congruent if _____.
- (b) Among two congruent angles, one has a measure of 70° , the measure of other angle is _____.
- (c) When we write $\angle A = \angle B$, we actually mean _____.

Answer 1:

- (a) they have the same length
- (b) 70°
- (c) $m\angle A = m\angle B$

Question 2:

Give any two real time examples for congruent shapes.

Answer 2:

- (i) Two footballs
- (ii) Two teacher's tables

Question 3:

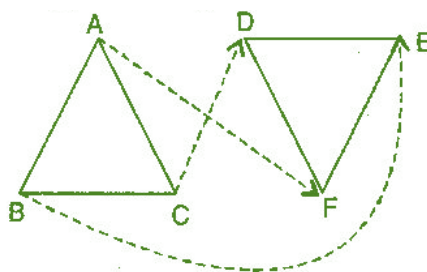
If $\triangle ABC \cong \triangle FED$ under the correspondence $ABC \leftrightarrow FED$, write all the corresponding congruent parts of the triangles.

Answer 3:

Given: $\triangle ABC \cong \triangle FED$.

The corresponding congruent parts of the triangles are:

- (i) $\angle A \leftrightarrow \angle F$
- (ii) $\angle B \leftrightarrow \angle E$
- (iii) $\angle C \leftrightarrow \angle D$
- (iv) $\overline{AB} \leftrightarrow \overline{FE}$
- (v) $\overline{BC} \leftrightarrow \overline{ED}$
- (vi) $\overline{AC} \leftrightarrow \overline{FD}$



Question 4:

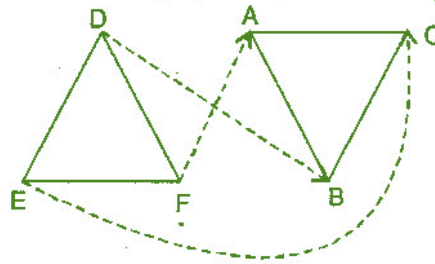
If $\triangle DEF \cong \triangle BCA$, write the part(s) of $\triangle BCA$ that correspond to:

- (i) $\angle E$
- (ii) \overline{EF}
- (iii) $\angle F$
- (iv) \overline{DF}

Answer 4:

Given: $\triangle DEF \cong \triangle BCA$.

- (i) $\angle E \leftrightarrow \angle C$
- (ii) $\overline{EF} \leftrightarrow \overline{CA}$
- (iii) $\angle F \leftrightarrow \angle A$
- (iv) $\overline{DF} \leftrightarrow \overline{BA}$



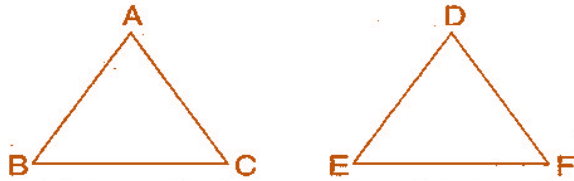
Exercise 7.2

Question 1:

Which congruence criterion do you use in the following?

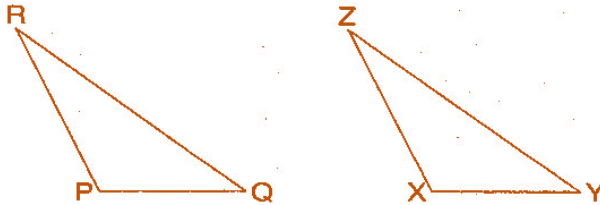
(a) Given: $AC = DF, AB = DE, BC = EF$

So $\triangle ABC \cong \triangle DEF$



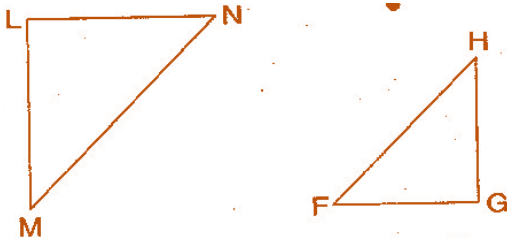
(b) Given: $RP = ZX, RQ = ZY, \angle PRQ = \angle XZY$

So $\triangle PQR \cong \triangle XYZ$



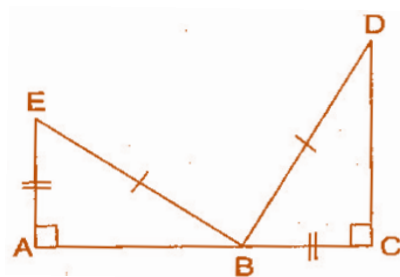
(c) Given: $\angle MLN = \angle FGH, \angle NML = \angle HFG, ML = FG$

So $\triangle LMN \cong \triangle GFH$



(d) Given: $EB = BD, AE = CB, \angle A = \angle C = 90^\circ$

So $\triangle ABE \cong \triangle CDB$



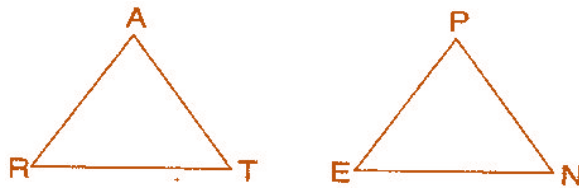
Answer 1:

- (a) By SSS congruence criterion,
since it is given that $AC = DF$, $AB = DE$, $BC = EF$
The three sides of one triangle are equal to the three corresponding sides of another triangle.
Therefore, $\triangle ABC \cong \triangle DEF$
- (b) By SAS congruence criterion,
since it is given that $RP = ZX$, $RQ = ZY$ and $\angle PRQ = \angle XZY$
The two sides and one angle in one of the triangle are equal to the corresponding sides and the angle of other triangle.
Therefore, $\triangle PQR \cong \triangle XYZ$
- (c) By ASA congruence criterion,
since it is given that $\angle MLN = \angle FGH$, $\angle NML = \angle HFG$, $ML = FG$.
The two angles and one side in one of the triangle are equal to the corresponding angles and side of other triangle.
Therefore, $\triangle LMN \cong \triangle GFH$
- (d) By RHS congruence criterion,
since it is given that $EB = BD$, $AE = CB$, $\angle A = \angle C = 90^\circ$
Hypotenuse and one side of a right angled triangle are respectively equal to the hypotenuse and one side of another right angled triangle.
Therefore, $\triangle ABE \cong \triangle CDB$

Question 2:

You want to show that $\triangle ART \cong \triangle PEN$:

- (a) If you have to use SSS criterion, then you need to show:
(i) $AR =$ (ii) $RT =$ (iii) $AT =$
- (b) If it is given that $\angle T = \angle N$ and you are to use SAS criterion, you need to have:
(i) $RT =$ and (ii) $PN =$
- (c) If it is given that $AT = PN$ and you are to use ASA criterion, you need to have:
(i) ? (ii) ?



Answer 2:

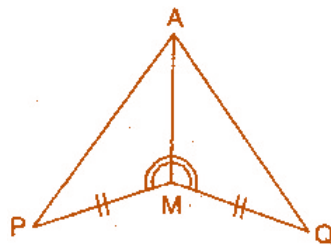
(a) Using SSS criterion, $\Delta ART \cong \Delta PEN$
 (i) $AR = PE$ (ii) $RT = EN$ (iii) $AT = PN$

(b) Given: $\angle T = \angle N$
 Using SAS criterion, $\Delta ART \cong \Delta PEN$
 (i) $RT = EN$ (ii) $PN = AT$

(c) Given: $AT = PN$
 Using ASA criterion, $\Delta ART \cong \Delta PEN$
 (i) $\angle RAT = \angle EPN$ (ii) $\angle RTA = \angle ENP$

Question 3:

You have to show that $\Delta AMP \cong \Delta AMQ$. In the following proof, supply the missing reasons:



Steps	Reasons
(i) $PM = QM$	(i) _____
(ii) $\angle PMA = \angle QMA$	(ii) _____
(iii) $AM = AM$	(iii) _____
(iv) $\Delta AMP \cong \Delta AMQ$	(iv) _____

Answer 3:

Steps	Reasons
(i) $PM = QM$	(i) Given
(ii) $\angle PMA = \angle QMA$	(ii) Given
(iii) $AM = AM$	(iii) Common
(iv) $\Delta AMP \cong \Delta AMQ$	(iv) SAS congruence rule

Question 4:

In $\triangle ABC$, $\angle A = 30^\circ$, $\angle B = 40^\circ$ and $\angle C = 110^\circ$.

In $\triangle PQR$, $\angle P = 30^\circ$, $\angle Q = 40^\circ$ and $\angle R = 110^\circ$.

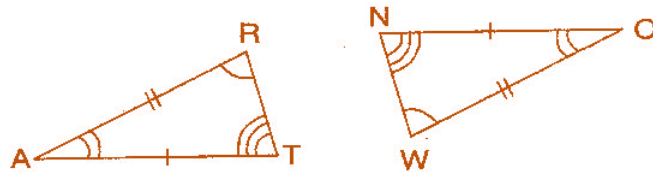
A student says that $\triangle ABC \cong \triangle PQR$ by AAA congruence criterion. Is he justified? Why or why not?

Answer 4:

No, because the two triangles with equal corresponding angles need not be congruent. In such a correspondence, one of them can be an enlarged copy of the other.

Question 5:

In the figure, the two triangles are congruent. The corresponding parts are marked. We can write $\triangle RAT \cong ?$



Answer 5:

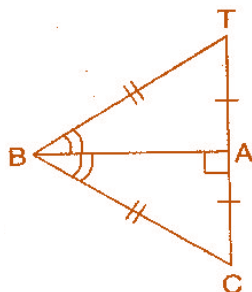
In the figure, given two triangles are congruent. So, the corresponding parts are:

$A \leftrightarrow O$, $R \leftrightarrow W$, $T \leftrightarrow N$.

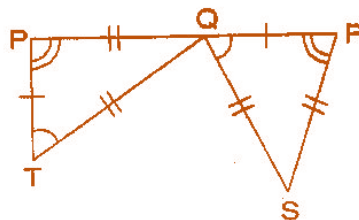
We can write, $\triangle RAT \cong \triangle WON$ [By SAS congruence rule]

Question 6:

Complete the congruence statement:



$\triangle BCA \cong ?$



$\triangle QRS \cong ?$

Answer 6:

In $\triangle BAT$ and $\triangle BAC$, given triangles are congruent so the corresponding parts are:

$B \leftrightarrow B$, $A \leftrightarrow A$, $T \leftrightarrow C$

Thus, $\triangle BCA \cong \triangle BTA$ [By SSS congruence rule]

In $\triangle QRS$ and $\triangle TPQ$, given triangles are congruent so the corresponding parts are:

$P \leftrightarrow R$, $T \leftrightarrow Q$, $Q \leftrightarrow S$

Thus, $\triangle QRS \cong \triangle TPQ$ [By SSS congruence rule]

Question 7:

In a squared sheet, draw two triangles of equal area such that:

- (i) the triangles are congruent.
- (ii) the triangles are not congruent.

What can you say about their perimeters?

Answer 7:

In a squared sheet, draw $\triangle ABC$ and $\triangle PQR$.

When two triangles have equal areas and

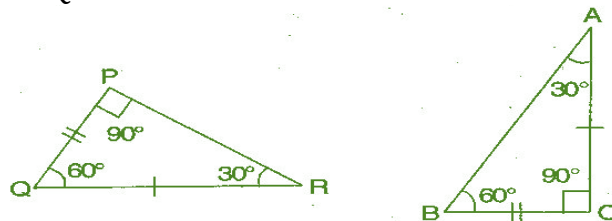
- (i) these triangles are congruent, i.e., $\triangle ABC \cong \triangle PQR$ [By SSS congruence rule]
Then, their perimeters are same because length of sides of first triangle are equal to the length of sides of another triangle by SSS congruence rule.
- (ii) But, if the triangles are not congruent, then their perimeters are not same because lengths of sides of first triangle are not equal to the length of corresponding sides of another triangle.

Question 8:

Draw a rough sketch of two triangles such that they have five pairs of congruent parts but still the triangles are not congruent.

Answer 8:

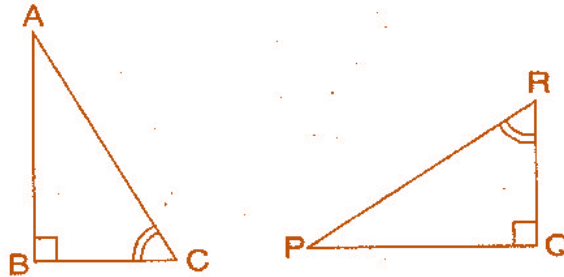
Let us draw two triangles PQR and ABC .



All angles are equal, two sides are equal except one side. Hence, $\triangle PQR$ are not congruent to $\triangle ABC$.

Question 9:

If $\triangle ABC$ and $\triangle PQR$ are to be congruent, name one additional pair of corresponding parts. What criterion did you use?



Answer 9:

$\triangle ABC$ and $\triangle PQR$ are congruent. Then one additional pair is $\overline{BC} = \overline{QR}$.

Given: $\angle B = \angle Q = 90^\circ$

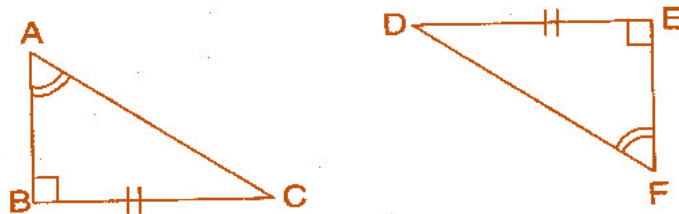
$\angle C = \angle R$

$\overline{BC} = \overline{QR}$

Therefore, $\triangle ABC \cong \triangle PQR$ [By ASA congruence rule]

Question 10:

Explain, why $\triangle ABC \cong \triangle FED$.



Answer 10:

Given: $\angle A = \angle F$, $BC = ED$, $\angle B = \angle E$

In $\triangle ABC$ and $\triangle FED$,

$\angle B = \angle E = 90^\circ$

$\angle A = \angle F$

$BC = ED$

Therefore, $\triangle ABC \cong \triangle FED$ [By RHS congruence rule]