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

Answer 3:

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

The corresponding congruent parts of the triangles are:

(i) $\angle A \leftrightarrow \angle F$

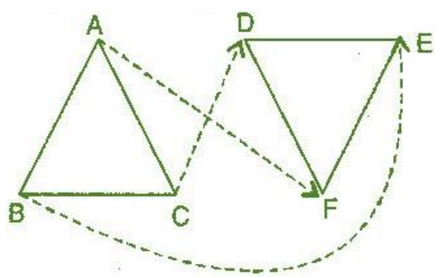
(ii) $\angle B \leftrightarrow \angle E$

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

(i) $\angle E$

(ii) $\overline{EF}$

(iii) $\angle F$

(iv) $\overline{DF}$

Answer 4:

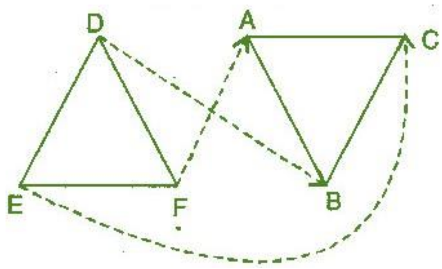
Given: $\Delta DEF \cong \Delta\ BCA$.

(i) $\angle E \leftrightarrow \angle C$

(ii) $\overline{EF} \leftrightarrow \overline{CA}$

(iii) $\angle F \leftrightarrow \angle A$

(iv) $\overline{DF} \leftrightarrow \overline{BA}$



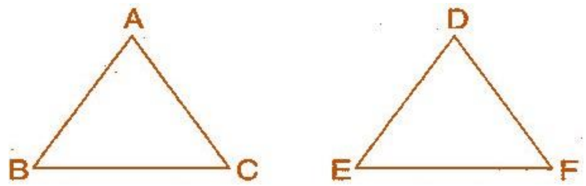
Exercise 7.2

Question 1:

Which congruence criterion do you use in the following?

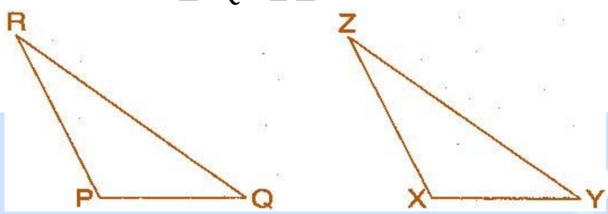
(a) Given: AC = DF, AB = DE, BC = EF

So $\Delta ABC \cong \Delta\ DEF$



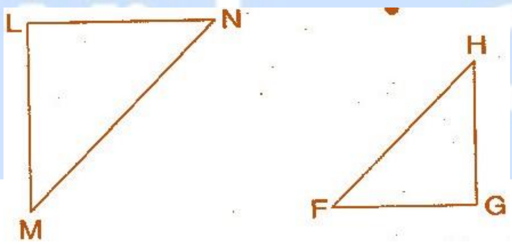
(b) Given: RP = ZX, RQ = ZY, $\angle$ PRQ = $\angle$ XZY

So $\Delta PQR \cong \Delta XYZ$



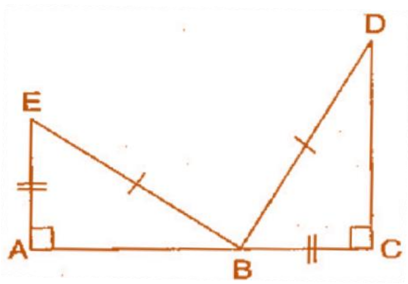
(c) Given: $\angle$ MLN = $\angle$ FGH, $\angle$ NML = $\angle$ HFG, ML = FG

So $\Delta LMN \cong \Delta\ GFH$



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

So $\Delta ABE \cong \Delta CDB$



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, $\Delta ABC \cong \Delta DEF$

(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, $\Delta PQR \cong \Delta XYZ$

(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, $\Delta LMN \cong \Delta GFH$

(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, $\Delta ABE \cong \Delta CDB$

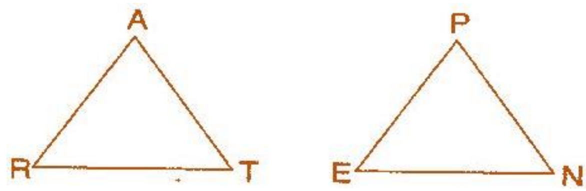
Question 2:

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

(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

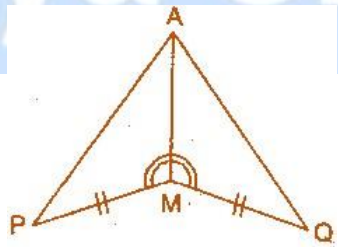
(c) Given: AT = PN

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 ΔABC, ∠ A = 30°, ∠ B = 40° and ∠ C = 110°.

In ΔPQR, ∠ P = 30°, ∠ Q = 40° and ∠ R = 110°.

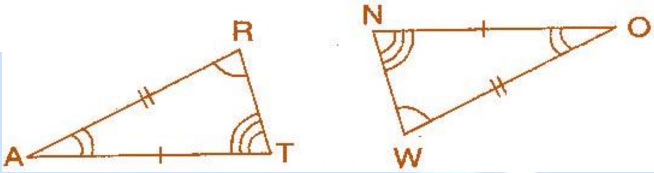
A student says that ΔABC ≅ ΔPQR by AAA congruence criterion. Is he justified? Why or why not?

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 Δ RAT ≅ ?



Answer 5:

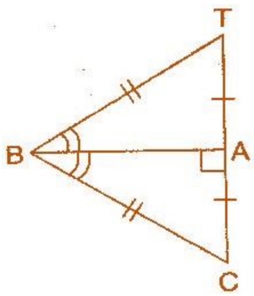
In the figure, given two triangles are congruent. So, the corresponding parts are:

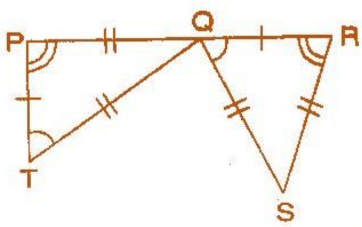
A ↔ O, R ↔ W, T ↔ N.

We can write, Δ RAT ≅ Δ WON [By SAS congruence rule]

Question 6:

Complete the congruence statement:





Δ BCA ≅ ? Δ QRS ≅ ?

Answer 6:

In Δ BAT and Δ BAC, given triangles are congruent so the corresponding parts are:

B ↔ B, A ↔ A, T ↔ C

Thus, Δ BCA ≅ Δ BTA [By SSS congruence rule]

In Δ QRS and ΔTPQ, given triangles are congruent so the corresponding parts are:

P ↔ R, T ↔ Q, Q ↔ S

Thus, Δ QRS ≅ ΔTPQ [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 ΔABC and ΔPQR.

When two triangles have equal areas and

(i) these triangles are congruent, i.e., ΔABC ≅ ΔPQR [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.

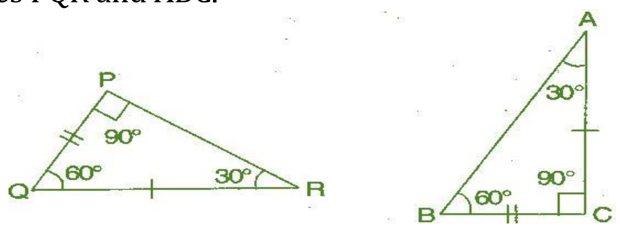
(ii) But, if the triangles are not congruent, then their perimeters are not same because lengths of sides of first triangle are not equal to the length of corresponding sides of another triangle.

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:

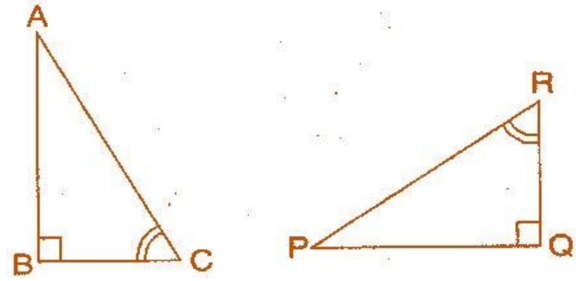
Let us draw two triangles PQR and ABC.



All angles are equal, two sides are equal except one side. Hence, ΔPQR are not congruent to ΔABC.

Question 9:

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



Answer 9:

ΔABC and ΔPQR are congruent. Then one additional pair is $\overline{BC} = \overline{QR}$.

Given: ∠ B = ∠ Q = 90 °

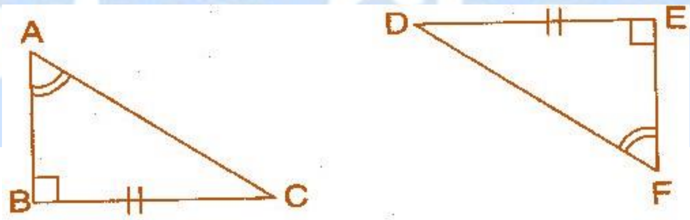
∠ C = ∠R

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

Therefore, ΔABC ≅ ΔPQR [By ASA congruence rule]

Question 10:

Explain, why ΔABC ≅ ΔFED.



Answer 10:

Given: ∠ A = ∠ F, BC = ED, ∠ B = ∠ E

In ΔABC and ΔFED,

∠ B = ∠ E = 90 °

∠ A = ∠ F

BC = ED

Therefore, ΔABC ≅ ΔFED [By RHS congruence rule]