

EXERCISE 7.1

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1. Complete the following statements:

(a) Two line segments are congruent if _____.

Solution:-

Two line segments are congruent if they have the same length.

(b) Among two congruent angles, one has a measure of 70° ; the measure of the other angle is _____.

Solution:-

Among two congruent angles, one has a measure of 70° ; the measure of the other angle is 70° .

Because, if two angles have the same measure, they are congruent. Also, if two angles are congruent, their measure are same.

(c) When we write $\angle A = \angle B$, we actually mean _____.

Solution:-

When we write $\angle A = \angle B$, we actually mean $m \angle A = m \angle B$.

2. Give any two real-life examples for congruent shapes. **Solution:-**

The two real-life example for congruent shapes are,

- (i) Fan feathers of same brand.
- (ii) Size of chocolate in the same brand.
- (iii) Size of pens in the same brand

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

Solution:-

Two triangles are congruent if pairs of corresponding sides and corresponding angles are equal.

All the corresponding congruent parts of the triangles are,

$\angle A \leftrightarrow \angle F$, $\angle B \leftrightarrow \angle E$, $\angle C \leftrightarrow \angle D$

Correspondence between sides:

$\overline{AB} \leftrightarrow \overline{FE}$

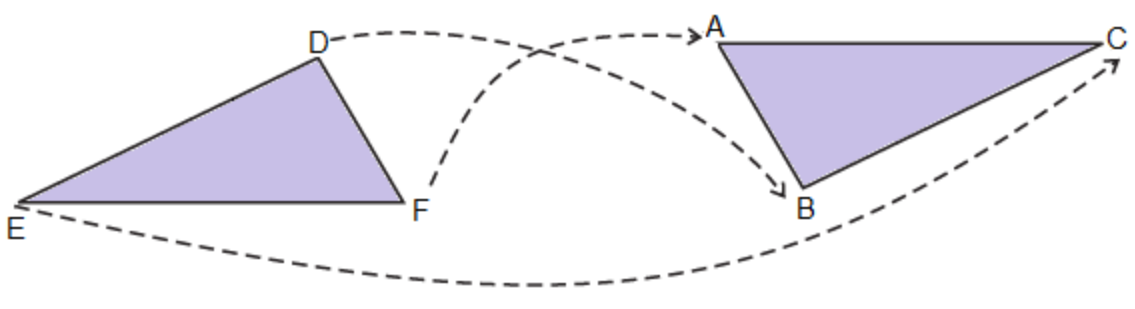
$\overline{BC} \leftrightarrow \overline{ED}$

$\overline{CA} \leftrightarrow \overline{DF}$

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) $\overline{DF}$

Solution:-



From above the figure we can say that,
The part(s) of $\triangle BCA$ that correspond to,

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

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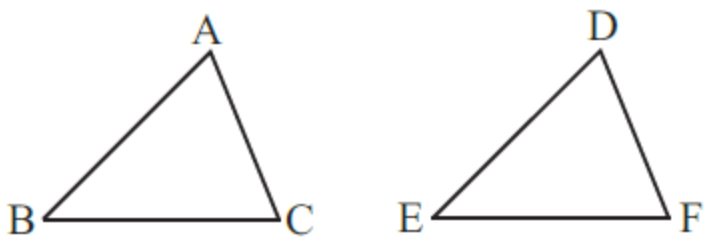
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EXERCISE 7.2

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1. Which congruence criterion do you use in the following?

(a) Given: $AC = DF$
 $AB = DE$
 $BC = EF$
So, $\triangle ABC \cong \triangle DEF$

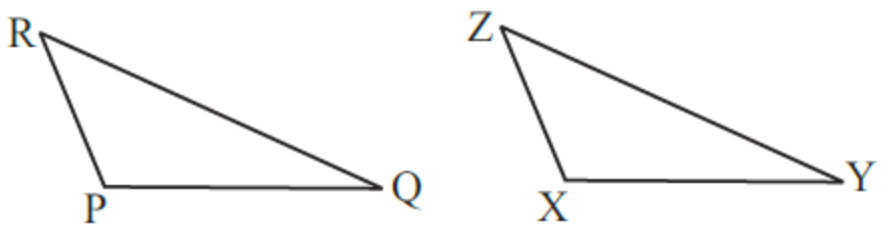


Solution:-

By SSS congruence property:- Two triangles are congruent if the three sides of one triangle are respectively equal to the three sides of the other triangle.

$\triangle ABC \cong \triangle DEF$

(b) Given: $ZX = RP$
 $RQ = ZY$
 $\angle PRQ = \angle XZY$
So, $\triangle PQR \cong \triangle XYZ$



Solution:-

By SAS congruence property:- Two triangles are congruent if the two sides and the included angle of one are respectively equal to the two sides and the included angle of the other.

$\triangle ACB \cong \triangle DEF$

(c) Given: $\angle MLN = \angle FGH$

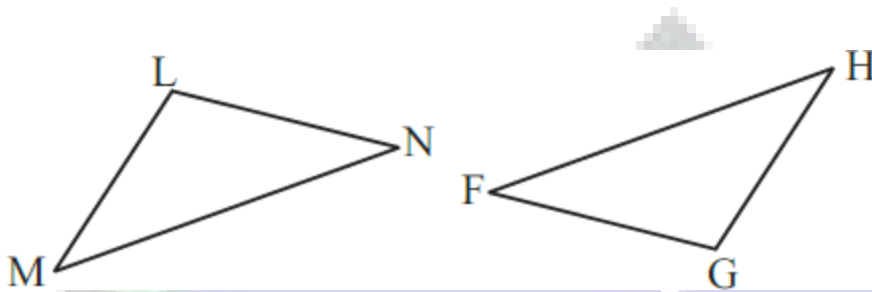
$\angle NML = \angle GFH$

$$\angle ML = \angle FG$$

$$\text{So, } \triangle LMN \cong \triangle GFH$$



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Solution:-

By ASA congruence property:- Two triangles are congruent if the two angles and the included side of one are respectively equal to the two angles and the included side of the other.

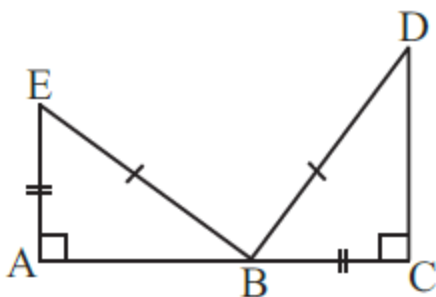
$$\triangle LMN \cong \triangle GFH$$

(d) Given: $EB =$

DB $AE = BC$

$$\angle A = \angle C = 90^\circ$$

So, $\triangle ABE \cong \triangle ACD$



Solution:-

By RHS congruence property:- Two right triangles are congruent if the hypotenuse and one side of the first triangle are respectively equal to the hypotenuse and one side of the second.

$$\triangle ABE \cong \triangle DCB$$

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) $AT =$



Solution:-

We know that,

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

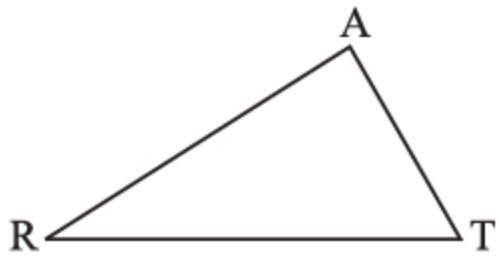
$\therefore$ (i) $AR = PE$

(ii) $RT = EN$

(iii) $AT = PN$

(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) $PN =$



Solution:-

We know that,

SAS criterion is defined as, two triangles are congruent if the two sides and the included angle of one are respectively equal to the two sides and the included angle of the other.

$\therefore$ (i) $RT = EN$

(ii) $PN = AT$

(c) If it is given that $AT = PN$ and you are to use ASA criterion, you need to have

(i) ? (ii) ?

Solution:-

We know that,

ASA criterion is defined as, two triangles are congruent if the two angles and the included side of one are respectively equal to the two angles and the included side of the other.

Then,



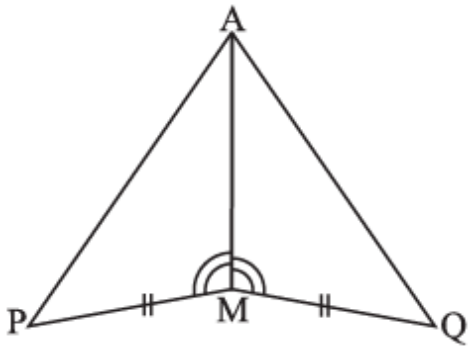
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- (i) $\angle ATR = \angle PNE$
(ii) $\angle RAT = \angle EPN$

3. You have to show that $\triangle AMP \cong \triangle AMQ$.

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) $\triangle AMP \cong \triangle AMQ$	(iv) ...



Solution:-

Steps	Reasons
(i) $PM = QM$	(i) From the given figure
(ii) $\angle PMA = \angle QMA$	(ii) From the given figure
(iii) $AM = AM$	(iii) Common side for the both triangles
(iv) $\triangle AMP \cong \triangle AMQ$	(iv) By SAS congruence property:- Two triangles are congruent if the two sides and the included angle of one are respectively equal to the two sides and the included angle of the other.

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?

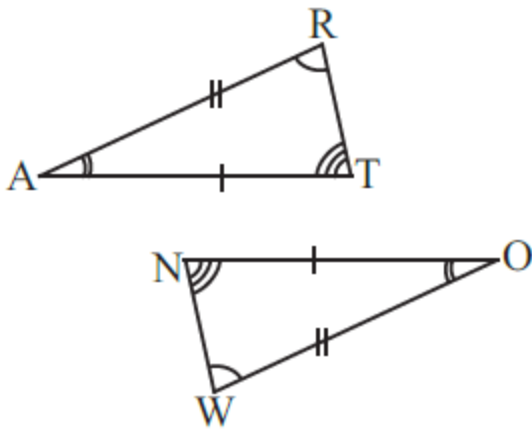
Solution:-

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

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



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Solution:-

From the given figure,
We may observe that,

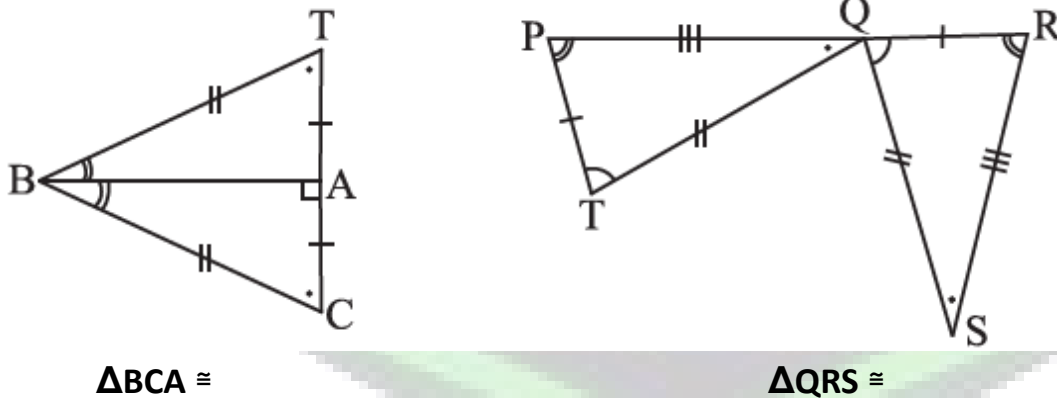
$$\angle TRA = \angle OWN$$

$$\angle TAR = \angle NOW$$

$$\angle ATR = \angle ONW$$

Hence, $\triangle RAT \cong \triangle WON$

6. Complete the congruence statement:



$\triangle BCA \cong$

$\triangle QRS \cong$

Solution:-

First consider the $\triangle BCA$ and $\triangle BTA$

From the figure, it is given that,

$$BT = BC$$

Then,

BA is common side for the $\triangle BCA$ and $\triangle BTA$

Hence, $\triangle BCA \cong \triangle BTA$

Similarly,



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Consider the ΔQRS and ΔTPQ
From the figure, it is given that

$$PT = QR$$

$$TQ = QS$$

$$PQ = RS$$

Hence, $\Delta QRS \cong \Delta TPQ$

7. In a squared sheet, draw two triangles of equal areas such that

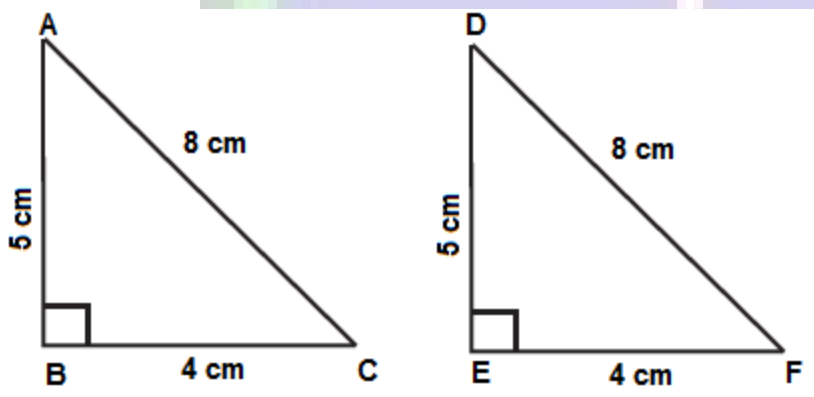
(i) The triangles are congruent.

(ii) The triangles are not congruent.

What can you say about their perimeters?

Solution:-

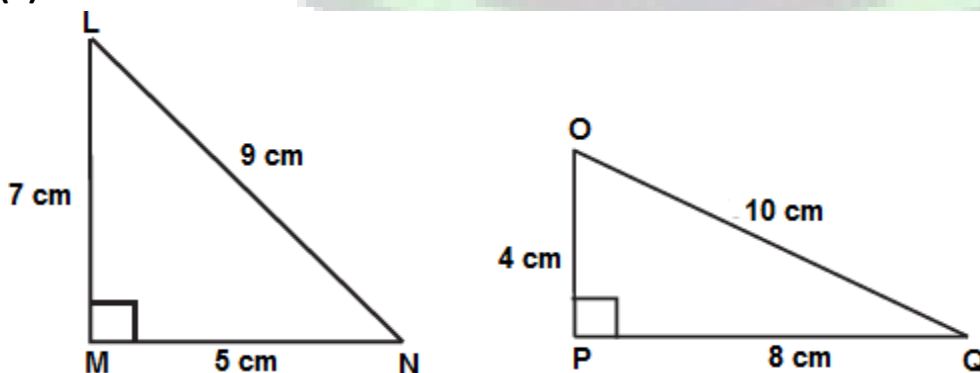
(ii)



In the above figure, ΔABC and ΔDEF have equal areas. And also, $\Delta ABC \cong \Delta DEF$

So, we can say that perimeters of ΔABC and ΔDEF are equal.

(ii)



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In the above figure, $\triangle LMN$ and $\triangle OPQ$



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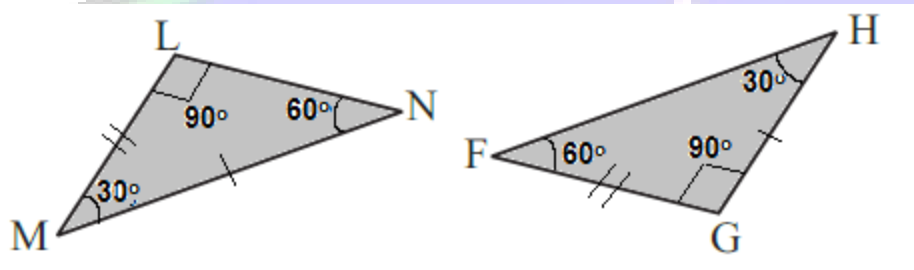
$\triangle LMN$ is not congruent to $\triangle OPQ$

So, we can also say that their perimeters are not same.

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

Solution:-

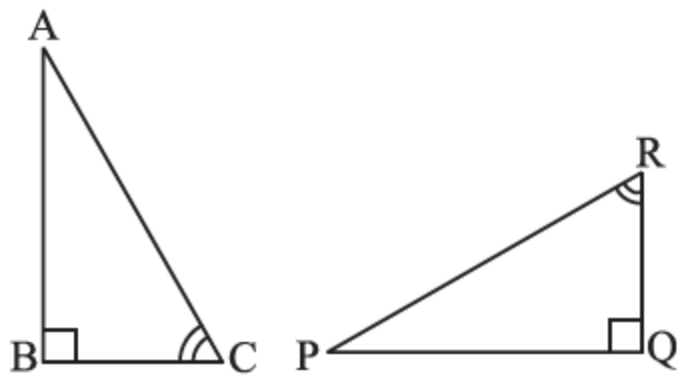
Let us draw triangles LMN and FGH .



In the above figure, all angles of two triangles are equal. But, out of three sides only two sides are equal.

Hence, $\triangle LMN$ is not congruent to $\triangle FGH$.

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



Solution:-

By observing the given figure, we can say that

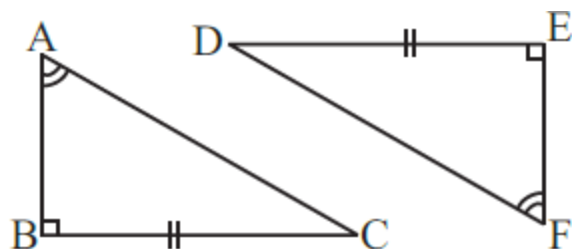
$$\angle ABC = \angle PQR$$

$$\angle BCA = \angle PRQ$$

The other additional pair of corresponding part is $BC = QR$

$$\therefore \triangle ABC \cong \triangle PQR$$

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



Solution:-

From the figure, it is given that,

$$\angle ABC = \angle DEF = 90^\circ$$

$$\angle BAC = \angle DFE$$

$$BC = DE$$

By ASA congruence property, two triangles are congruent if the two angles and the included side of one are respectively equal to the two angles and the included side of the other.

$$\triangle ABC \cong \triangle FED$$

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