CBSE NCERT Solutions for Class 7 Mathematics Chapter 7

Back of Chapter Questions

Exercise 7.1

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 the other angle is __________.

(C) When we write $\angle A = \angle B$, we actually mean __________.

Solution:

(A) they have the same length

If two-line segments have the same (i.e. equal) length, they are congruent.

Also, if two-line segments are congruent, they have the same length.

(B) 70°

As in the case of line segments, congruency of angles entirely depends on the equality of their measures. So, if two angles are congruent, then angles are equal.

Hence, the measure of the other angle is also 70°

(C) $m\angle A = m\angle B$

We write $m\angle A = m\angle B$ when the measurement of the two congruent angles are same.

In this case it is given that $\angle A = \angle B$, hence we can write this as $m\angle A = m\angle B$

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

Solution:

(A) Sheets of same letter pad

(B) Cookies in the same packet

(C) Measuring scales

(D) Two footballs

(E) Cups

We can choose any two.

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

Solution:

Given, $\Delta ABC \cong \Delta FED$

We know that, if these triangles are congruent, then their corresponding angles and sides will be equal to each other.

Corresponding angles are equal:-

$\angle A \leftrightarrow \angle F$

$\angle B \leftrightarrow \angle E$

$\angle C \leftrightarrow \angle D$

Corresponding sides are equal:-

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

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

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

4. If $\Delta DEF \cong \Delta BCA$, write the part(s) of ΔBCA that correspond to

(A) $\angle E$

(B) $\overline{EF}$

(C) $\angle F$

(D) $\overline{DF}$

Solution:

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

Therefore,

(A) ∠E corresponds to ∠C

(B) $\overline{EF}$ corresponds to $\overline{CA}$

(C) ∠F corresponds to ∠A

(D) $\overline{DF}$ corresponds to $\overline{BA}$

Exercise 7.2

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

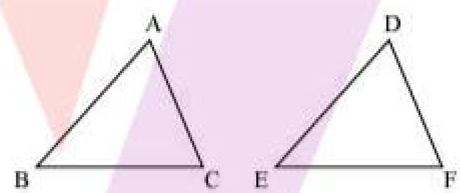
(A) Given:

AC = DF

AB = DE

BC = EF

So, ΔABC ≅ ΔDEF



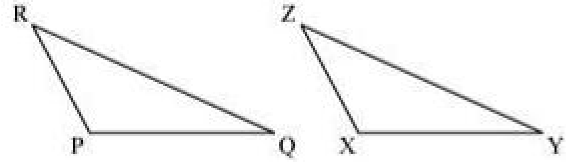
(B) Given:

ZX = RP

RQ = ZY

∠PRQ = ∠XZY

So, ΔPQR ≅ ΔXYZ



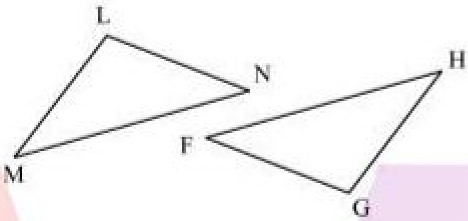
(C) Given:

$\angle MLN = \angle FGH$

$\angle NML = \angle GFH$

$ML = FG$

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



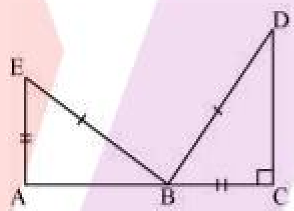
(D) Given:

$EB = DB$

$AE = BC$

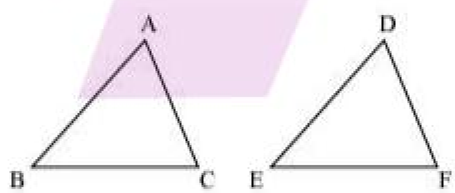
$\angle A = \angle C = 90°$

So, $\Delta ABE \cong \Delta CDB$



Solution:

(A) Given, $\Delta ABC \cong \Delta DEF$

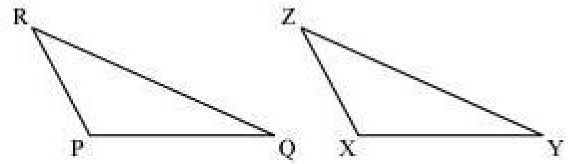


Here, the sides of ΔABC are equal to the sides of ΔDEF.

As per SSS congruency criterion, the three sides of one triangle are equal to the three corresponding sides of another triangle, then the triangles are congruent.

Hence, we use SSS congruency criterion.

(B) Given, $\Delta PQR \cong \Delta XYZ$

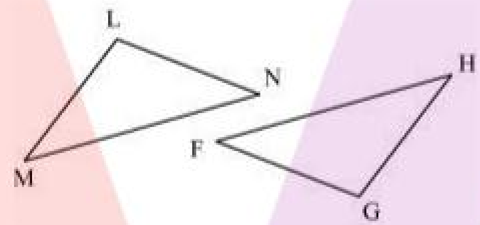


Here, the two sides and the angle included between these sides of ΔPQR are equal to two sides and the angle included between these sides of ΔXYZ.

As per SAS congruency criterion, the two sides and the angle included between them of a triangle are equal to the two corresponding sides and the angle included between them of another triangle, then the triangles are congruent.

Hence, we use SAS congruency criterion.

(C) Given, $\Delta LMN \cong \Delta GFH$

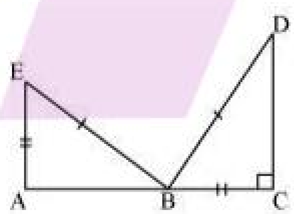


Here, the two angles and the side included between these angles of ΔLMN are equal to two angles and the side included between these angles of ΔGFH.

As per ASA congruency criterion, two angles and the included side of a triangle are equal to two corresponding angles and the included side of another triangle, then the triangles are congruent.

Hence, we use ASA congruency criterion.

(D) Given, $\Delta ABE \cong \Delta CDB$



Here, the given two right-angled triangles, it is given that one side and the hypotenuse are respectively equal.

As per RHS congruency criterion, the hypotenuse and one side of a right-angled triangle are respectively equal to the hypotenuse and one side of another right-angled triangle, then the triangles are congruent.

Hence, we use RHS congruency criterion.

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 =

(ii) AT =

(B) If it is given that ∠T = ∠N and you are to use SAS criterion, you need to have

(i) RT = and

(ii) PN =

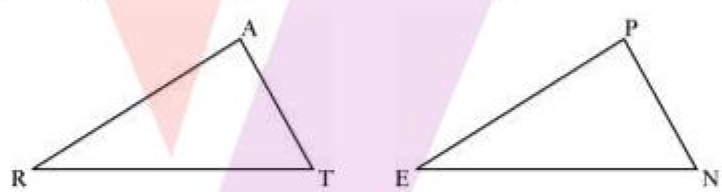
(C) If it is given that AT = PN and you are to use ASA criterion, you need to have

(i) ?

(ii) ?

Solution:

(A) To use SSS congruency criterion we need to show that the three corresponding sides are equal in the two triangles.



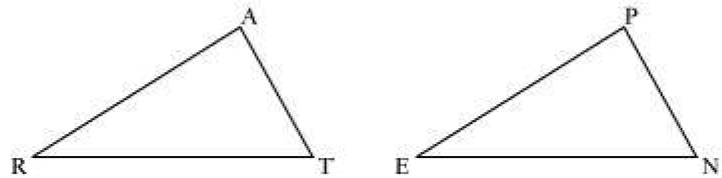
Therefore,

(i) AR = PE

(ii) RT = EN

(iii) AT = PN

(B) To use SAS congruency criterion it is given that ∠T = ∠N, we need to show that the two corresponding sides between which these angles are included are equal in the two triangles.

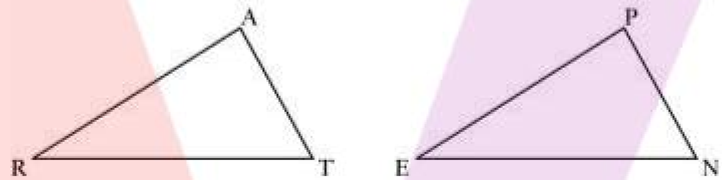


Therefore,

(i) RT = EN

(ii) PN = AT

(C) To use ASA congruency criterion it is given that AT = PN, we need to show that the two corresponding angles which include the given sides are equal in the two triangles.



Therefore,

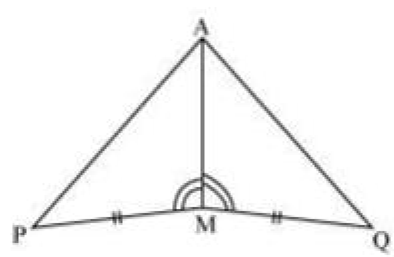
(i) $\angle ATR = \angle PNE$

(ii) $\angle RAT = \angle EPN$

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

In the following proof, supply the missing reasons.

-	Steps	-	Reasons
(A)	PM = QM	(A)	...
(B)	$\angle PMA = \angle QMA$	(B)	...
(C)	AM = AM	(C)	...
(D)	$\Delta AMP \cong \Delta AMQ$	(D)	...



Solution:

(A) From the figure it is given that PM = QM

(B) From the figure it is given that ∠PMA = ∠QMA

(C) From the figure, we see that, AM is the common side.

Hence AM = AM

(D) From SAS congruency criterion, the two sides and the angle included between these sides of ΔAMP are equal to two sides and the angle included between these sides of ΔAMQ

Hence, we can say that ΔAMP ≅ AMQ

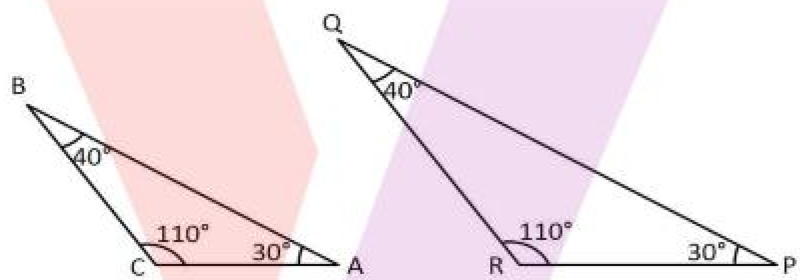
4. In ΔABC, $\angle A = 30^o$, $\angle B = 40^o$ and $\angle C = 110^o$

In ΔPQR, $\angle P = 30^o$, $\angle Q = 40^o$ and $\angle R = 110^o$

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

Solution:

No. This property represents that these triangles have their respective angles of equal measure.



In two triangles, if the angles are equal, then the sides opposite to the equal angles are in the same ratio (or proportional) and hence the two triangles are similar.

From the figure,

∠A = ∠P,

∠B = ∠Q and

∠C = ∠R

∴ ΔABC ≅ ΔPQR

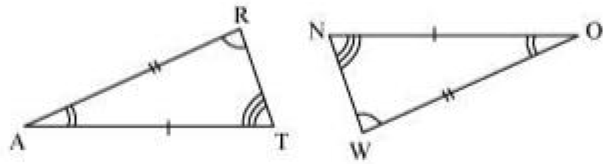
However, no information has been given about their sides.

The sides of these triangles may have a ratio different than 1: 1 i.e., they might not be equal.

Therefore, AAA property does not prove the two triangles congruent.

5. In the figure, the two triangles are congruent.

The corresponding parts are marked. We can write ΔRAT ≅?



Solution:

From the figure, it can be observed that,

∠RAT = ∠WON

∠ART = ∠OWN

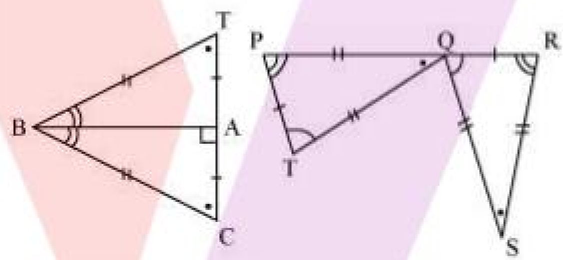
AR = OW

Therefore, by ASA congruency criterion ΔRAT ≅ ΔWON.

6. Complete the congruence statement:

ΔBCA ≅?

ΔQRS ≅?



Solution:

From the figure, in ΔBCA and ΔBTA, we can observe that

BC = BT

TA = CA

BA is common.

Therefore, ΔBCA ≅ ΔBTA. [By SSS congruency criterion]

Similarly, in ΔQRS and ΔTPQ it can be observed that,

PQ = RS

TQ = QS

PT = RQ

Therefore, ΔQRS ≅ ΔTPQ [By SSS congruency criterion]

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

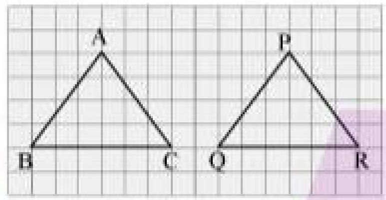
(A) The triangles are congruent.

(B) The triangles are not congruent.

What can you say about their perimeters?

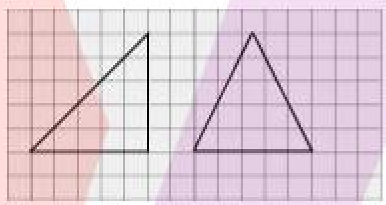
Solution:

(A)



By SSS congruency criterion, ΔABC and ΔPQR have the same area and are congruent to each other also. Also, along with the area the perimeter of both the triangles will be the same.

(B)

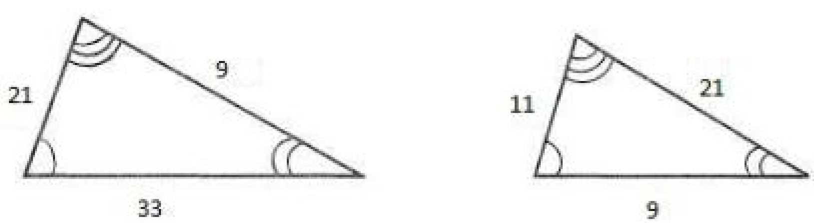


Here, the two triangles have the same height and base. Thus, their areas are equal.

However, it can be observed that these triangles are not congruent to each other. Also, the perimeter of both the triangles will not be the same.

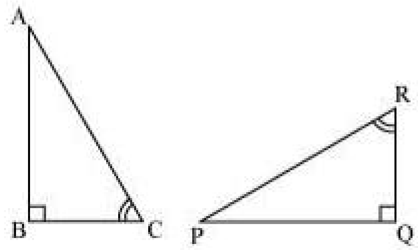
8. Draw a rough sketch of two triangles such that they have five pairs of congruent parts but still the triangles are not congruent.

Solution:



From the figure, we can see that that there are 5 pairs of congruent parts, i.e., 3 angles and 2 sides. But the two triangles are not congruent.

9. If ΔABC and ΔPQR are to be congruent, name one additional pair of corresponding parts. What criterion did you use?



Solution:

For ΔABC and ΔPQR to be congruent, we can say,

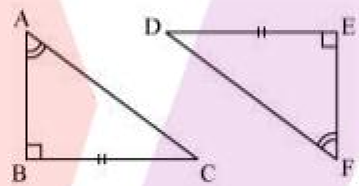
$BC = QR$

Therefore, by ASA criterion,

$\Delta ABC \cong \Delta PQR$

10. Explain, why

$\Delta ABC \cong \Delta FED$



Solution:

From the figure, it is given that:

$\angle ABC = \angle FED$ (1)

$\angle BAC = \angle EFD$ (2)

The two angles of ΔABC are equal to the two respective angles of ΔFED. Also, the sum of all interior angles of a triangle is 180°. Therefore, third angle of both triangles will also be equal in measure.

$\angle BCA = \angle EDF$ (3)

Also, given that,

$BC = ED$ (4)

By using equation (1), (3), and (4), we obtain

$\Delta ABC \cong \Delta FED$ (By ASA criterion)

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