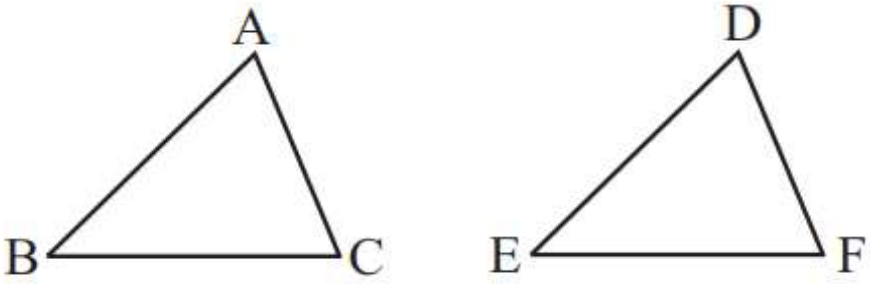
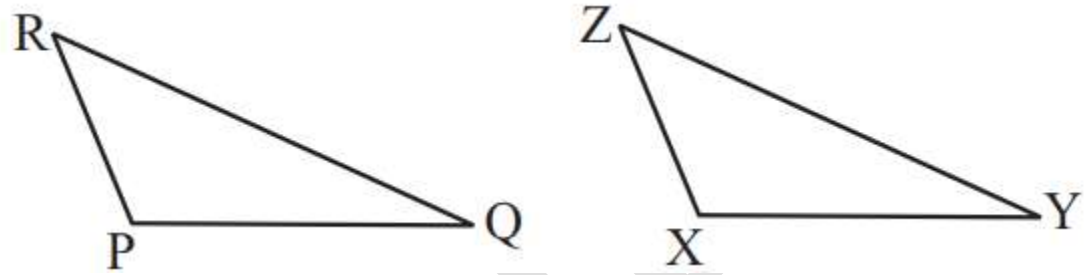
Congruence of Triangles: Exercise 7.2

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

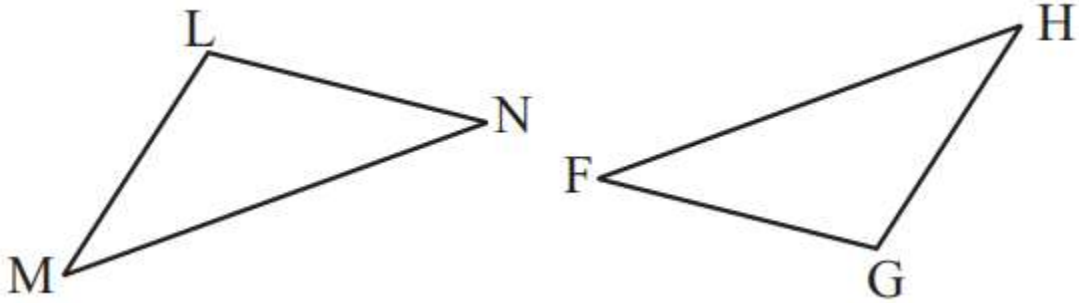
(a) Given: AC = DF
AB = DE
BC = EF
So, ΔABC ≅ ΔDEF



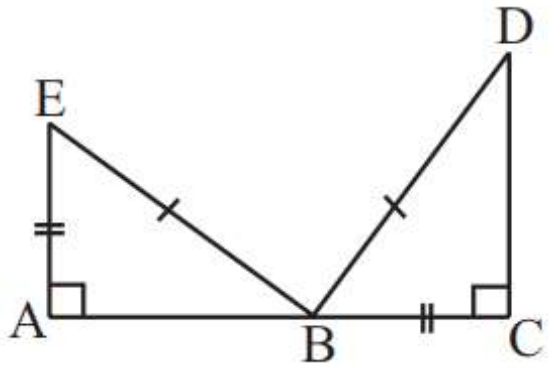
(b) Given: ZX = RP
RQ = ZY
∠PRQ = ∠XZY
So, ΔPQR ≅ ΔXYZ



(c) Given: ∠MLN = ∠FGH
∠NML = ∠GFH
ML = FG
So, ΔLMN ≅ ΔGFH



(d) Given: EB = DB
AE = BC
∠A = ∠C = 90°
So, ΔABE ≅ ΔCDB



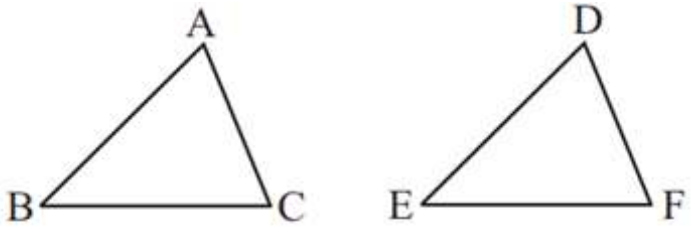
Sol:

(a) Given: AC = DF

AB = DE

BC = EF

So, ΔABC ≅ ΔDEF



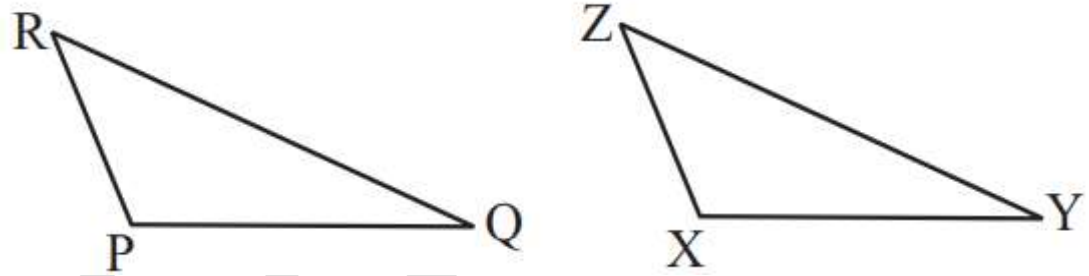
Since, here three corresponding sides of two different triangles are same. So, SSS congruence criterion is used.

(b) Given: ZX = RP

RQ = ZY

∠PRQ = ∠XZY

So, ΔPQR ≅ ΔXYZ



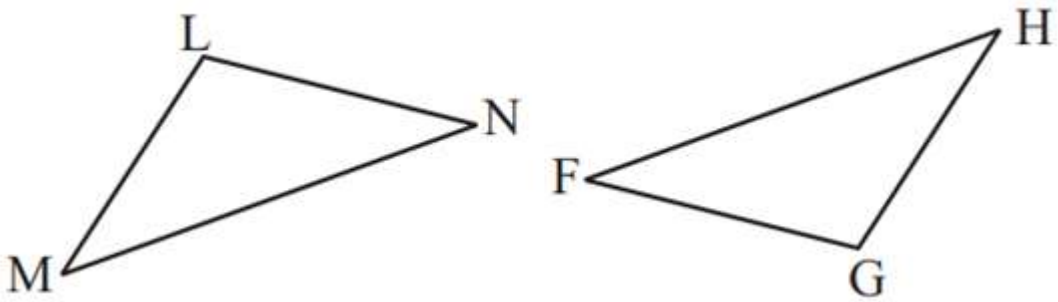
Since, here two corresponding sides and one corresponding angle of two different triangles are same. So, SAS congruence criterion is used.

(c) Given: ∠MLN = ∠FGH

∠NML = ∠GFH

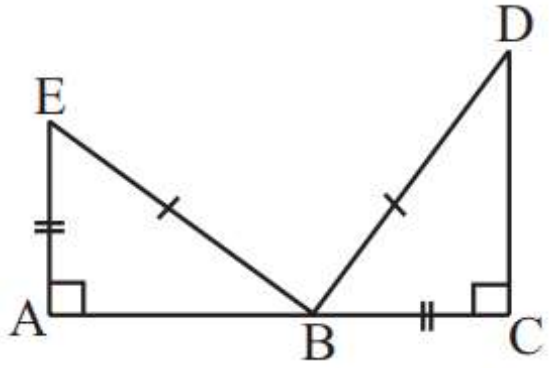
ML = FG

So, ΔLMN ≅ ΔGFH



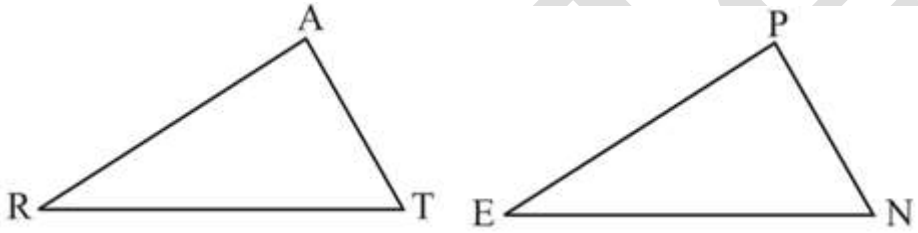
Since, here two corresponding angles and one corresponding side of two different triangles are same. So, ASA congruence criterion is used.

(d) Given: EB = DB
AE = BC
∠A = ∠C = 90°
So, ΔABE ≅ ΔCDB



Since, here two corresponding sides and one corresponding right angle of two different triangles are same. So, RHS congruence criterion is used.

Q.2 You want to show that ΔART ≅ ΔPEN,



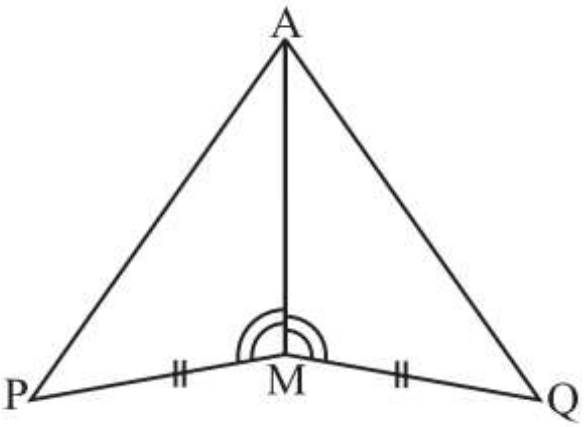
(a) If you have to use SSS criterion, then you need to show
(i) AR = (ii) RT = (iii) AT =
(b) If it is given that ∠T = ∠N and you are to use SAS criterion, you need to have
(i) RT = and (ii) PN =
(c) If it is given that AT = PN and you are to use ASA criterion, you need to have
(i) ? (ii) ?

Sol: **Given:** ΔART ≅ ΔPEN
(a) From the SSS criterion,
(i) AR = PE (ii) RT = EN (iii) AT = PN

(b) Since, ∠T = ∠N
From the SAS criterion,
(i) RT = EN and (ii) PN = AT

(c) Since, AT = PN
From the ASA criterion,
(i) ∠ATR = ∠PNE
(ii) ∠RAT = ∠EPN

Q.3 You have to show that ΔAMP ≅ ΔAMQ. In the following proof, supply the missing reasons.



Steps	Reasons
(i) PM = QM	(i) ...
(ii) ∠PMA = ∠QMA	(ii) ...
(iii) AM = AM	(iii) ...
(iv) ΔAMP ≅ ΔAMQ	(iv) ...

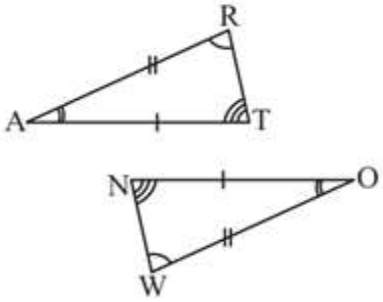
Sol:

Steps	Reasons
(i) PM = QM	(i) Given in figure
(ii) ∠PMA = ∠QMA	(ii) Given in figure
(iii) AM = AM	(iii) Common side for both triangle
(iv) ΔAMP ≅ ΔAMQ	(iv) From the SAS congruence criterion,

Q.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?

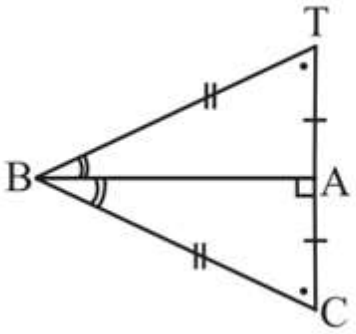
Sol: No, The student is not justified. Since the two triangles with equal corresponding angles need not be congruent because of the different lengths of the side of one triangle.

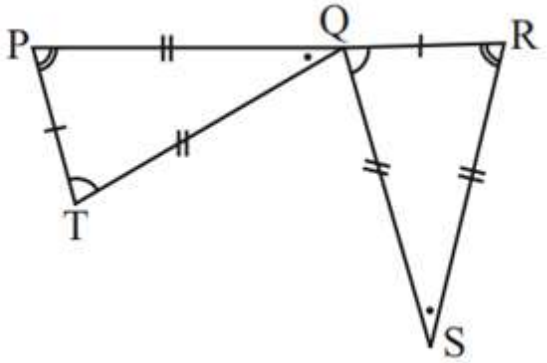
Q.5 In the figure, the two triangles are congruent. The corresponding parts are marked. We can write ΔRAT ≅ ?



Sol: From the figure,
In triangles ΔRAT and ΔWON,
∠TRA = ∠OWN (Given)
$\overline{AT} \leftrightarrow \overline{ON}$ (Given)
∠ATR = ∠ONW (Given)
So, from SAS criterion,
Thus, ΔRAT ≅ ΔWON

Q.6 Complete the congruence statement:

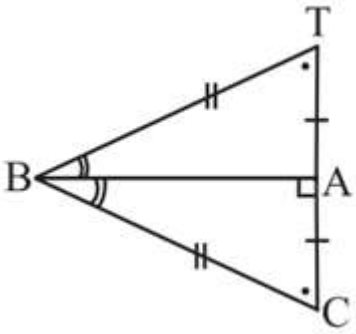




ΔBCA ≅ ? **ΔQRS ≅ ?**

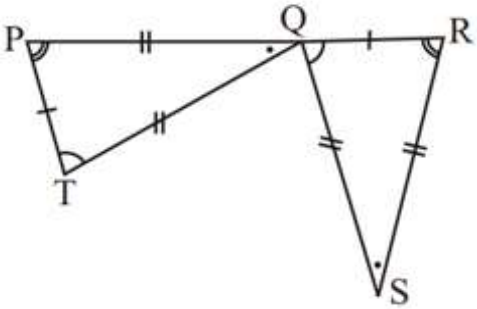
Sol:

(i) Given figure:



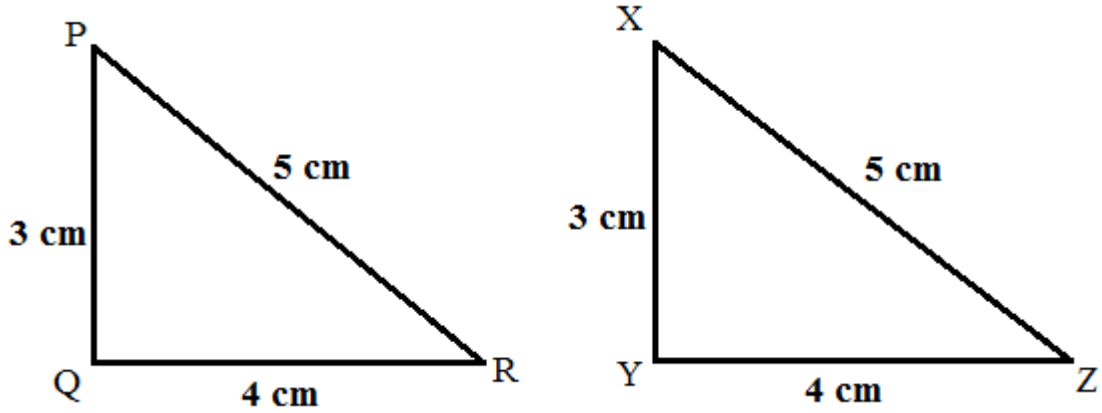
In ΔBCA and ΔBTA
From the figure,
BT = BC (Given)
BA = BA (Common side)
TA = CA (Given)
So, from SSS congruency criterion,
ΔBCA ≅ ΔBTA

(ii) Given figure:



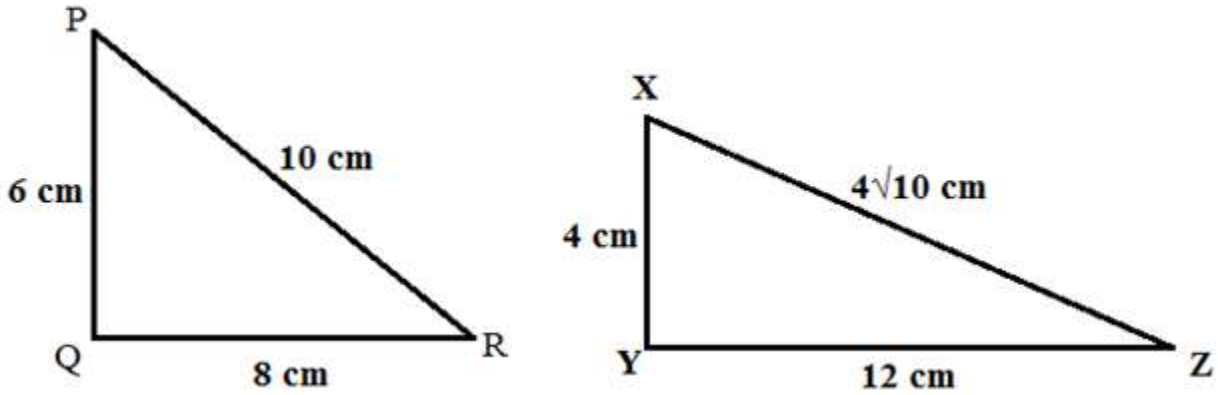
In ΔQRS and ΔTPQ,
From the figure,
PT = QR (Given)
TQ = QS
∠P = ∠R (Given)
So, from SAS congruency criterion,
Hence, ΔQRS ≅ ΔTPQ

Q.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?
Sol: Drawing of two triangles of equal areas.
(i) The triangles are congruent.



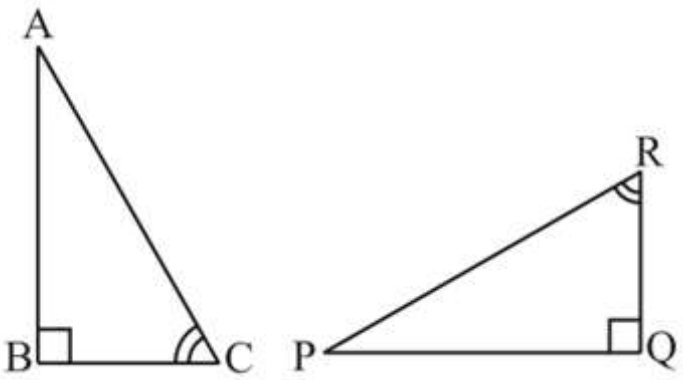
From above figure, we can see that ΔPQR and ΔXYZ have equal corresponding sides and equal areas. So, ΔPQR ≅ ΔXYZ.
And their perimeter of ΔPQR and ΔXYZ are equal.

(ii) The triangles are not congruent.



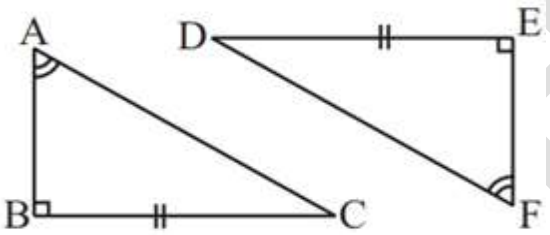
From the figure, ΔPQR and ΔXYZ with equal area.
ΔPQR is not congruent to ΔXYZ.
And their perimeters are not same.

Q.8 If ΔABC and ΔPQR are to be congruent, name one additional pair of corresponding parts. What criterion did you use?



Sol: From the figure,
In ΔABC and ΔPQR
∠ABC = ∠PQR (Given, each 90°)
∠BCA = ∠PRQ (Given)
And other additional pair of corresponding part is AB = PQ
So, from ASA criterion of congruency
Thus, ΔABC ≅ ΔPQR

Q.9 Explain, why ΔABC ≅ ΔFED,



Sol: From the figure,
In ΔABC and ΔFED,
∠ABC = ∠DEF (Given, each 90°)
∠BAC = ∠DFE (Given)
BC = DE (Given)
From ASA congruence criterion,
Thus, ΔABC ≅ ΔFED