RS Aggarwal Solutions for Class 7 Maths chapter 16 Congruence

EXERCISE 16 PAGE: 199

1. State the correspondence between the vertices, sides and angles of the following pairs of congruent triangles.

(i). ΔABC ≅ ΔEFD

Solution:-

Two triangles are congruent if pairs of corresponding sides and corresponding angles are equal. If we write ΔABC ≅ ΔEFD, it would mean that,

Correspondence between vertices:

A ↔ E, B ↔ F, C ↔ D

Correspondence between sides:

AB = EF, BC = FD, CA = DE

Correspondence between angles:

∠A = ∠E, ∠B = ∠F, ∠C = ∠D

(ii). ΔCAB ≅ ΔQRP

Solution:-

Two triangles are congruent if pairs of corresponding sides and corresponding angles are equal. If we write ΔCAB ≅ ΔQRP, it would mean that,

Correspondence between vertices:

C ↔ Q, A ↔ R, B ↔ P

Correspondence between sides:

CA = QR, AB = RP, BC = PQ

Correspondence between angles:

∠C = ∠Q, ∠A = ∠R, ∠B = ∠P

(iii). ΔXZY ≅ ΔQPR

Solution:-

Two triangles are congruent if pairs of corresponding sides and corresponding angles are equal. If we write ΔXZY ≅ ΔQPR, it would mean that,

Correspondence between vertices:

X ↔ Q, Z ↔P, Y ↔ R

Correspondence between sides:

XZ = QP, ZY = PR, XY = QR

Correspondence between angles:

∠X = ∠Q, ∠Z = ∠P, ∠Y = ∠R

(iv). ΔMPN ≅ ΔSQR

Solution:-

Two triangles are congruent if pairs of corresponding sides and corresponding angles are equal. If we write ΔMPN ≅ ΔSQR, it would mean that,

Correspondence between vertices:

M ↔ S, P ↔ Q, N ↔ R

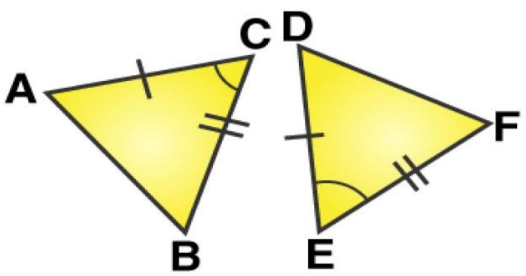
Correspondence between sides:

MP = SQ, PN = QR, MN = SR

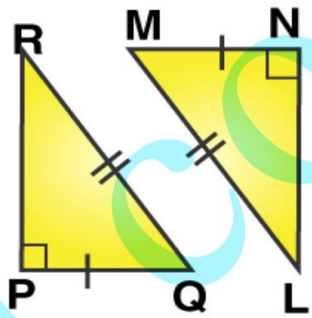
Correspondence between angles:

∠M = ∠S, ∠P = ∠Q, ∠N = ∠R

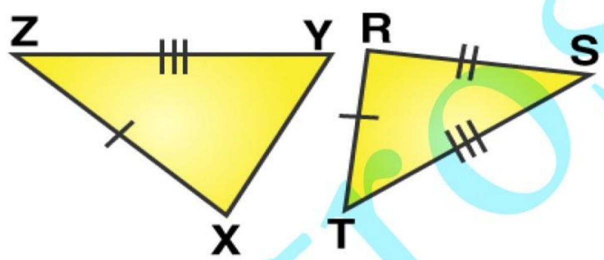
2. Given below are pairs of congruent triangles. State the property of congruence and name the congruent triangles in each case.



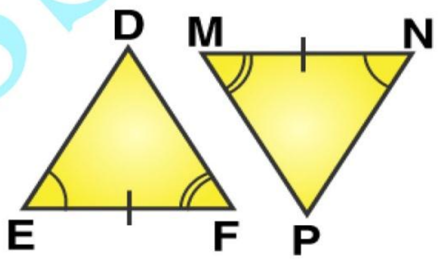
(i)



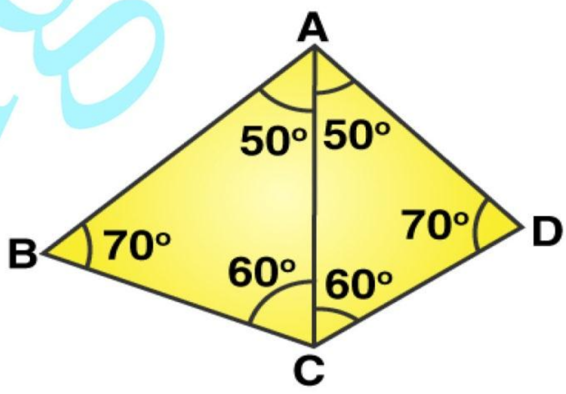
(ii)



(iii)



(iv)



(v)

(i).

Solution:-

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.

ΔACB ≅ ΔDEF

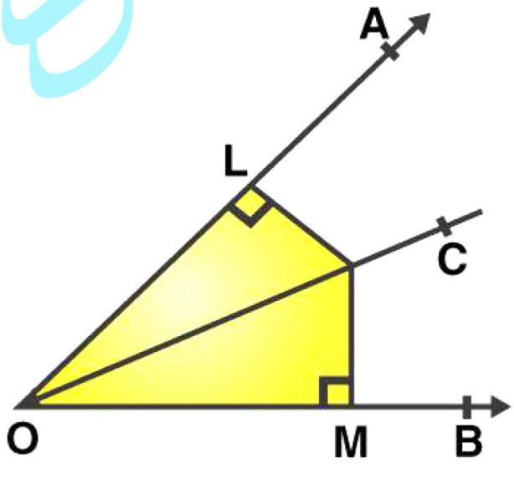
(ii).
Solution:-
RHS congruence property:- Two right triangles are congruent if the hypotenuse and one side of the first triangle are respectively equal to the hypotenuse and one side of the second.
ΔRPQ ≅ ΔLNM

(iii).
Solution:-
SSS congruence property:- Tow triangles are congruent if the three sides of one triangle are respectively equal to the three sides of the other triangle.
ΔYXZ ≅ ΔTRS

(iv).
Solution:-
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.
ΔDEF ≅ ΔPNM

(v).
Solution:-
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.
ΔACB ≅ ΔACD

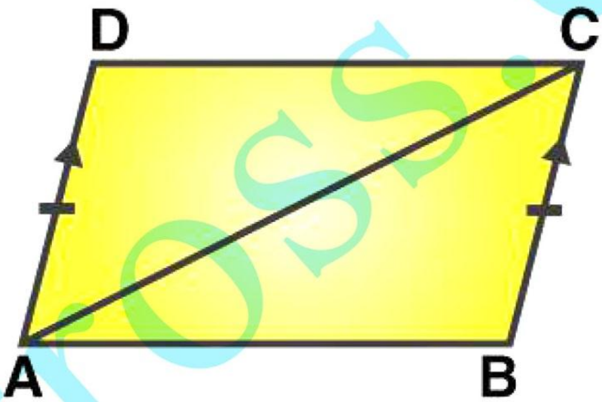
3. In Fig. (i), PL ⊥ OA and PM ⊥ OB such that PL = PM. Is ΔPLO ≅ ΔPMO? Give reasons in support of your answer.



Solution:-
From the question:-

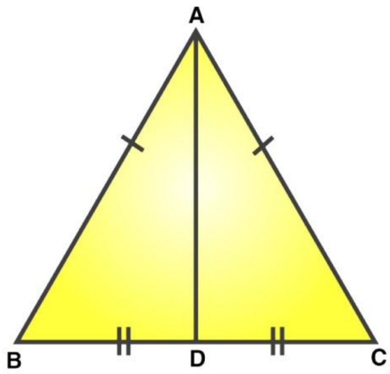
Is given that PL ⊥ OA, PM ⊥ OB and PL = PM
To prove:
ΔPLO ≅ ΔPMO
Proof:
From the fig,
In ΔPLO and ΔPMO,
∠PLO = ∠PMO = 90^O
PO = PO (common side)
PL = PM (given)
∴ ΔPLO ≅ ΔPMO
Yes. ΔPLO ≅ ΔPMO by the RHS congruence property

4. In fig. (ii), AD = BC and AD ∥ BC. Is AB = DC? Give reasons in support of your answer.



Solution:-
From the question,
Is given that AD = BC and AD ∥ BC
To prove:
AB = DC
Proof:
In ΔABC and ΔCDA,
BC = DA (given)
AD ∥ BC (given)
∠BCA = ∠DAC (alternate angles)
AC = AC (common)
∴ ΔABC ≅ ΔCDA
AB = CD
Yes. AB = CD by the SAS congruence property.

5. In the adjoining figure, AB = AC and BD = DC. Prove that ΔADB ≅ ΔADC and hence show that (i) ∠ADB = ∠ADC = 90°, (ii) ∠BAD = ∠CAD.



Solution:-

Given,

AB = AC and BD = DC

To prove,

ΔADB ≅ ΔADC

Proof,

In the right triangles ADB and ADC, we have:

Hypotenuse AB = Hypotenuse AC (given)

BD = DC (given)

AD = AD (common)

∴ ΔADB ≅ ΔADC

By SSS congruence property:

∠ADB = ∠ADC (corresponding parts of the congruent triangles) … (1)

∠ADB and ∠ADC are on the straight line.

∴∠ADB + ∠ADC =180°

∠ADB + ∠ADB = 180°

2 ∠ADB = 180°

∠ADB = 180/2

∠ADB = 90°

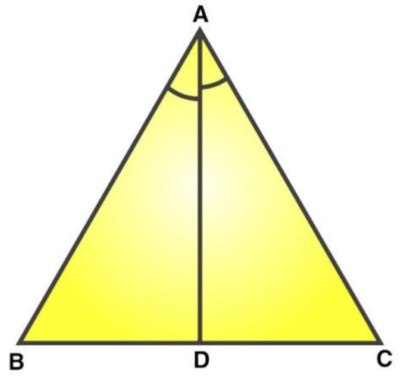
From (1):

∠ADB = ∠ADC = 90°

(ii) ∠BAD = ∠CAD (∵ corresponding parts of the congruent triangles)

6. In the adjoining figure, ABC is a triangle in which AD is the bisector of ∠A. If AD ⊥BC, show that ΔABC is isosceles.

Solution:-



Given:

AD is the bisector of ∠A

So we have, ∠DAB = ∠DAC … (1)

AD ⊥BC

So we have, ∠BDA = ∠CDA = 90°

To prove,

ΔABC is isosceles.

Proof,

In ΔDAB and ΔDAC,

∠BDA = ∠CDA = 90°

DA = DA (common)

∠DAB = ∠DAC (from 1)

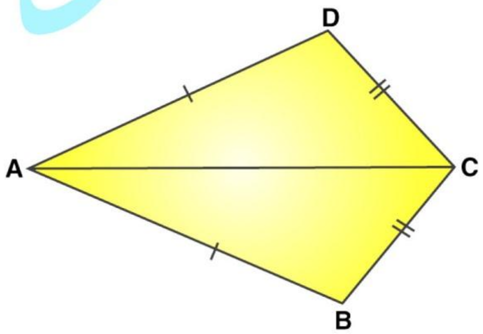
By ASA congruence property,

ΔDAB ≅ ΔDAC

AB = AC

Hence, ΔABC is isosceles.

7. In the adjoining figure, AB = AD and CB = CD. Prove that ΔABC ≅ ΔADC.
Solution:-



Given,

AB = AD and CB = CD

To prove,

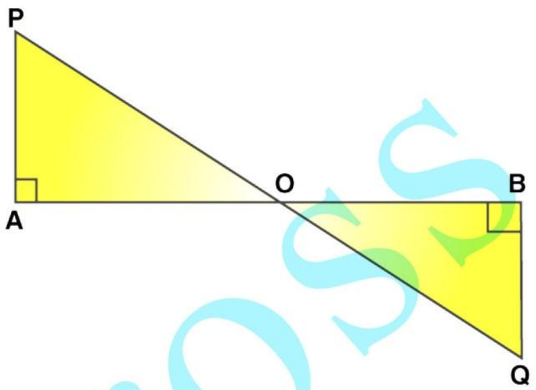
ΔABC ≅ ΔADC.

Proof,
In ΔABC and ΔADC

AB = AD (given)
CB = CD (given)
AC = AC (common)

∴ ΔABC ≅ ΔADC.
(By SSS congruence property)

8. In the given figure, PA ⊥ AB, QB ⊥ AB and PA = QB. Prove that ΔOAP = ΔOBQ. Is OA =OB?
Solution:-



Given,
PA ⊥ AB, QB ⊥ AB and PA = QB
To prove,
ΔOAP = ΔOBQ
Is OA =OB?
Proof,
In ΔOAP and ΔOBQ

PA = QB (given)
∠POA = ∠QOB (vertically opposite angles)
∠OAP = ∠OBQ = 90°

From AAS congruence property,
ΔOAP ≅ ΔOBQ
Then,
OA = OB (corresponding parts of the congruent triangles)

9. In the given figure, triangles ABC and DCB are right-angled at A and D respectively and AC = DB. Prove that ΔABC = ΔDCB.
Solution:-

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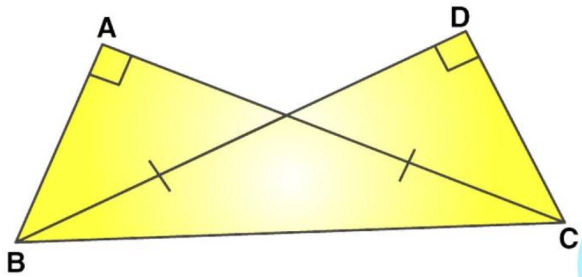

Given,

Triangles ABC and DCB are right-angled at A and D respectively.

AC = DB

To prove,

ΔABC = ΔDCB

Proof,

In ΔABC and ΔDCB:

AC = DB (given)

BC = BC (common)

∠CAB = ∠BDC = 90^o

From the RHS congruence property,

ΔABC ≅ ΔDCB.