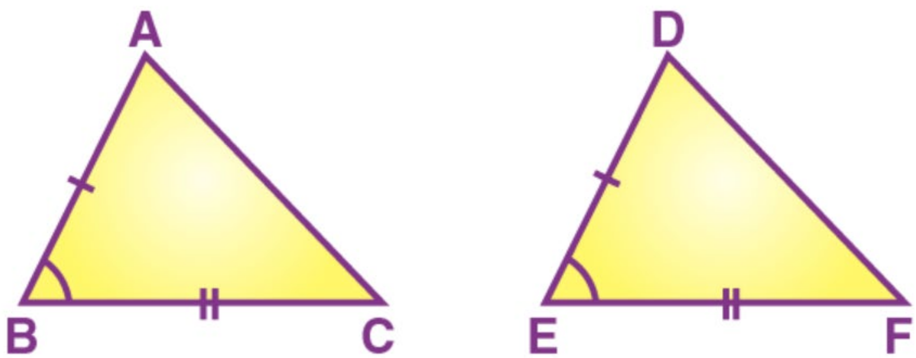
EXERCISE 9A

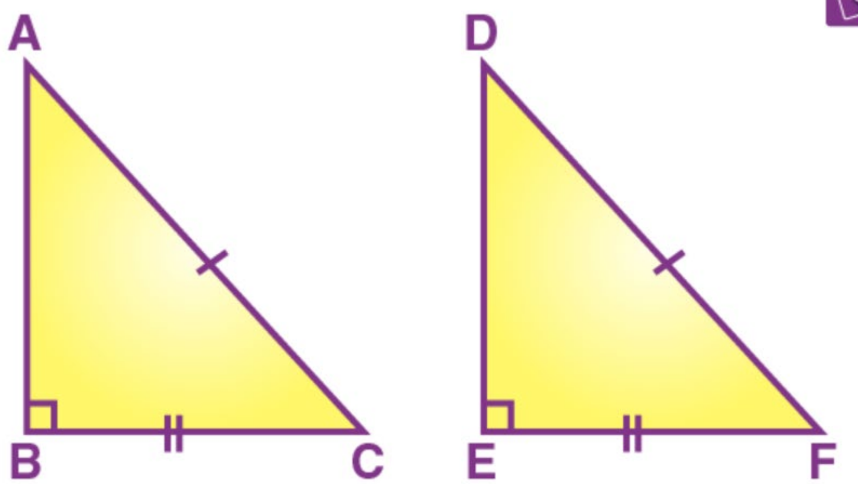
1. Which of the following pairs of triangles are congruent? In each case, state the condition of congruency:
(a) In Δ ABC and Δ DEF, AB = DE, BC = EF and ∠B = ∠E.
(b) In Δ ABC and Δ DEF, ∠B = ∠E = 90^o; AC = DF and BC = EF.
(c) In Δ ABC and Δ QRP, AB = QR, ∠B = ∠R and ∠C = ∠P.
(d) In Δ ABC and Δ PQR, AB = PQ, AC = PR and BC = QR.
(e) In Δ ABC and Δ PQR, BC = QR, ∠A = 90^o, ∠C = ∠R = 40^o and ∠Q=50^o.

Solution:
(a) In Δ ABC and Δ DEF
AB = DE (data)
BC = EF and ∠B = ∠E (given)



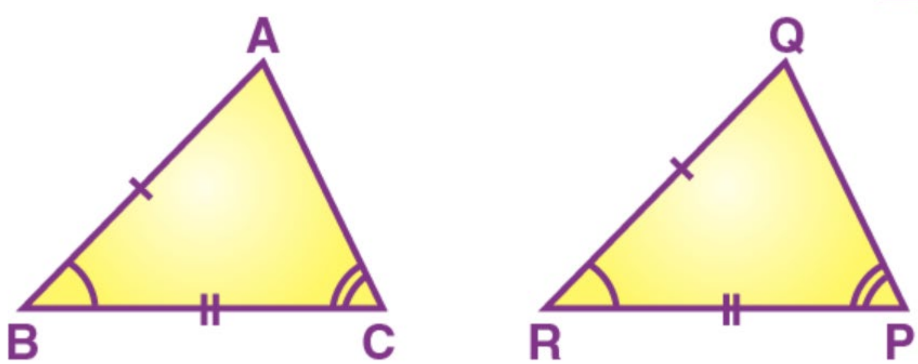
By SAS criteria of congruency and given data we can conclude that,
Δ ABC and Δ DEF are congruent to each other.
Therefore, Δ ABC ≅ Δ DEF.

(b) Given in Δ ABC and Δ DEF,
∠B = ∠E = 90^o;
AC = DF
That is hypotenuse AC = hypotenuse DF
and BC = EF



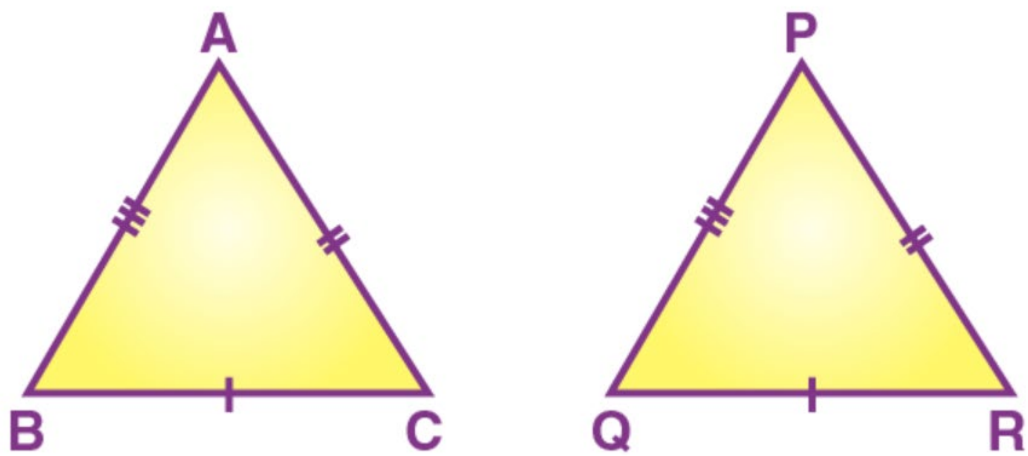
By right angle hypotenuse side postulate of congruency,
The given triangles Δ ABC and Δ DEF are congruent to each other.
Therefore, Δ ABC ≅ Δ DEF.

(c) In Δ ABC and Δ QRP,
Data: AB = QR,
∠B = ∠R and
∠C = ∠P.



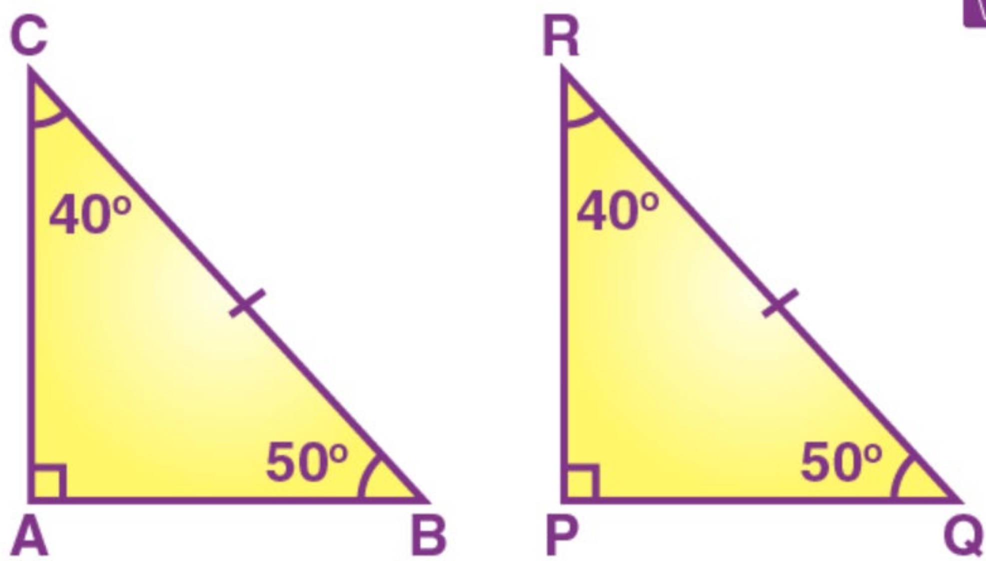
By using SAS postulate and given data we can conclude that
The given triangles Δ ABC and Δ QRP are congruent to each other.
Therefore, Δ ABC ≅ Δ QRP.

(d) In In Δ ABC and Δ PQR,
Data: AB = PQ, AC = PR and BC = QR.



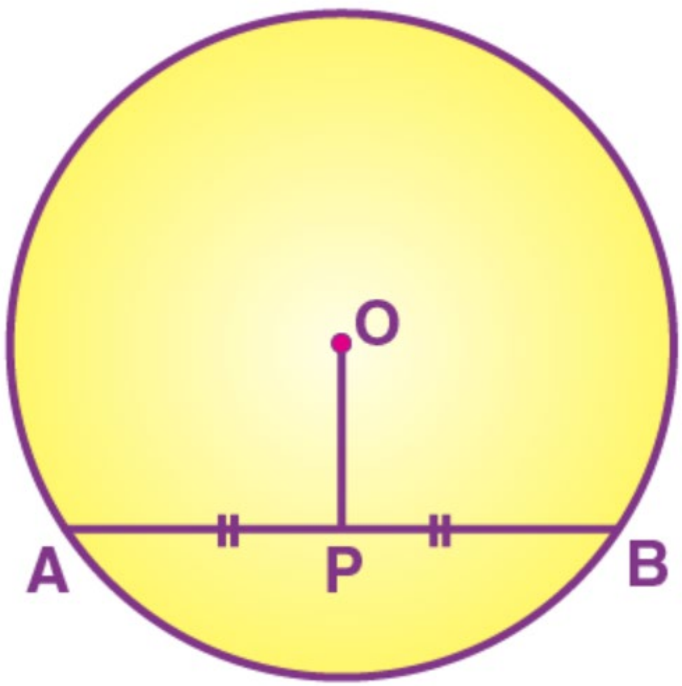
By using SSS postulate of congruency and given data we can conclude that
The given triangles Δ ABC and Δ PQR are congruent to each other.
Therefore, Δ ABC ≅ Δ PQR.

(e) In Δ ABC and Δ PQR,
Data: BC = QR, $\angle A = 90^o$,
$\angle C = \angle R = 40^o$ and $\angle Q = 50^o$
But we know that sum of angle of triangle = 180^o
Therefore, $\angle P + \angle Q + \angle R = 180^o$
$\angle P + 50^o + 40^o = 180^o$
$\angle P + 90^o = 180^o$
$\angle P = 180^o - 90^o$
$\angle P = 90^o$
In Δ ABC and Δ PQR,
$\angle A = \angle P$
$\angle C = \angle R$
BC = QR



By ASA postulate of congruency,
The given triangles Δ ABC and Δ PQR are congruent to each other.
Therefore, Δ ABC ≅ Δ PQR.

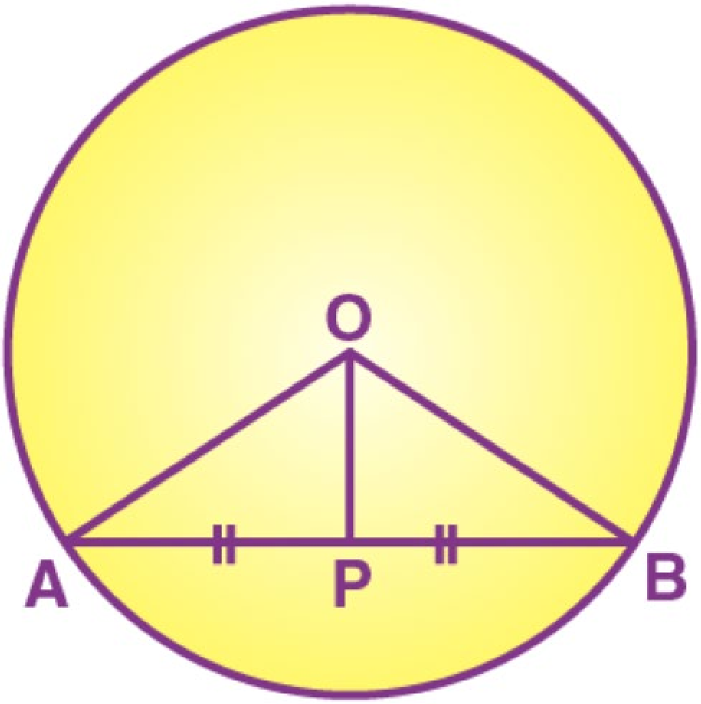
2. The given figure shows a circle with centre O. P is mid-point of chord AB.



Show that OP is perpendicular to AB.

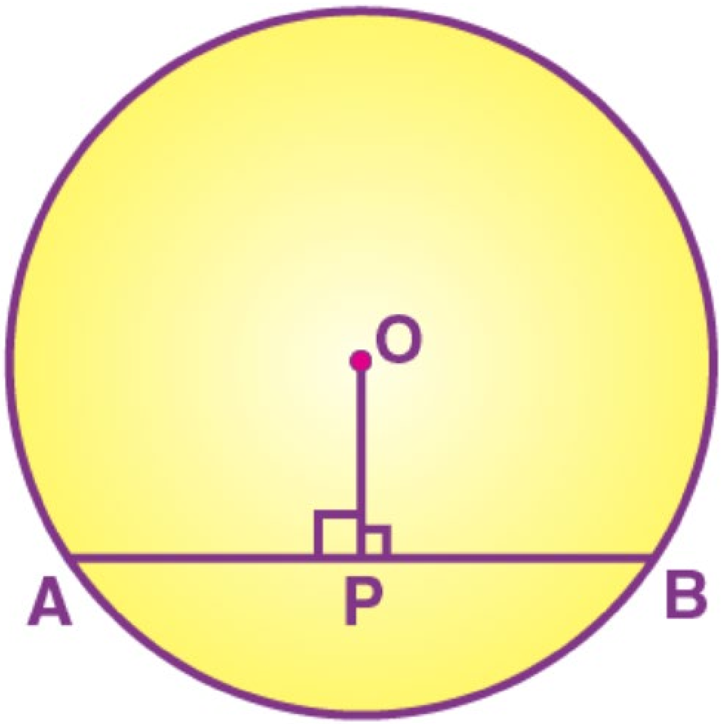
Solution:

Data: in the given figure O centre of circle.
P is mid-point of chord AB. AB is a chord
P is a point on AB such that AP = PB
Now we have to prove that OP ⊥ AB



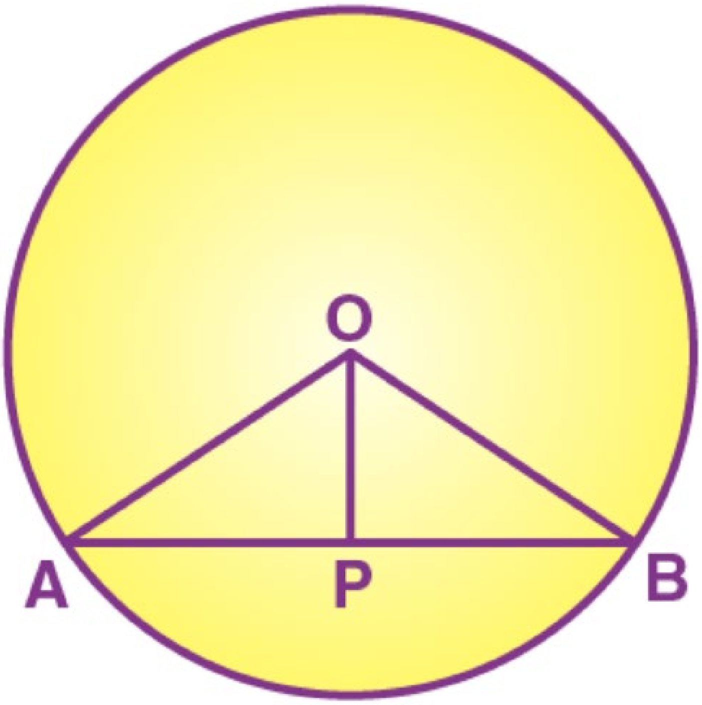
Construction: Join OA and OB
Proof: In Δ OAP and Δ OBP
OA = OB (because radii of common circle)
OP = OP (common)
AP = PB (data)
By SSS postulate of congruent triangles
The given triangles Δ OAP and Δ OBP are congruent to each other.
Therefore, Δ OAP ≅ Δ OBP.
The corresponding parts of the congruent triangles are congruent.
∠OPA = ∠OPB (by Corresponding parts of Congruent triangles)
But ∠OPA + ∠OPB = 180° (linear pair)
∠OPA = ∠OPB = 90°
Hence OP ⊥ AB

3. The following figure shows a circle with centre O.



If OP is perpendicular to AB, prove that AP=BP.

Solution:
Given: In the figure, O is the centre of the circle,
And AB is chord. P is a midpoint on AB such that AP = PB
We need to prove that AP = BP,

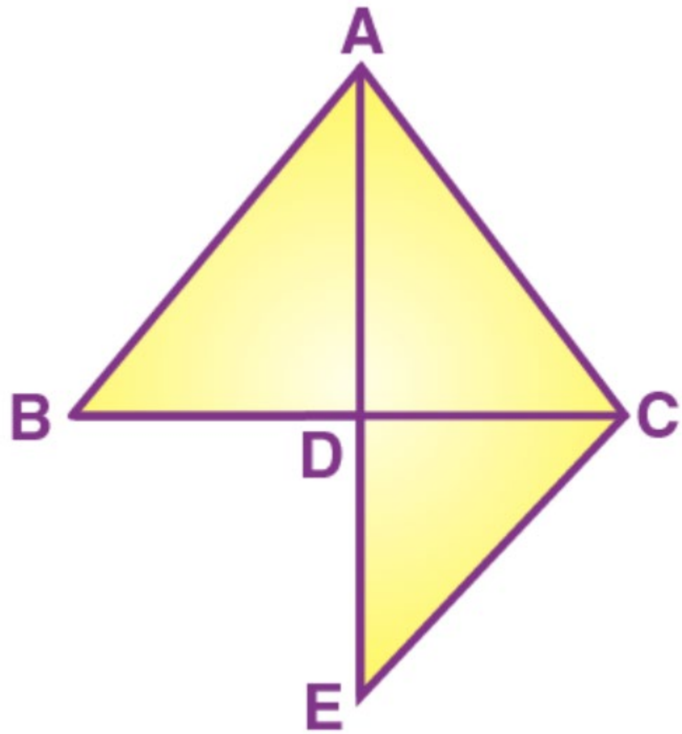


Construction: Join OA and OB
Proof: In right angle triangles Δ OAP and Δ OBP
Hypotenuse OA = Hypotenuse OB (because radii of common circle)
Side OP = OP (common)
AP = PB (data)
By SSS postulate of congruent triangles
The given triangles Δ OAP and Δ OBP are congruent to each other.
Therefore, Δ OAP ≅ Δ OBP.
The corresponding parts of the congruent triangles are congruent.
AP = BP (by Corresponding parts of Congruent triangles)
Hence the proof.

4. In a triangle ABC, D is mid-point of BC; AD is produced up to E so that DE = AD. Prove that: (i) Δ ABD and Δ ECD are congruent.
(ii) AB=EC
(iii) AB is parallel to EC.

Solution:
Given Δ ABC in which D is the mid-point of BC
AD is produced to E so that DE = AD
We need to prove that
(i) Δ ABD ≅ Δ ECD
(ii) AB = EC

(iii) AB ∥ EC



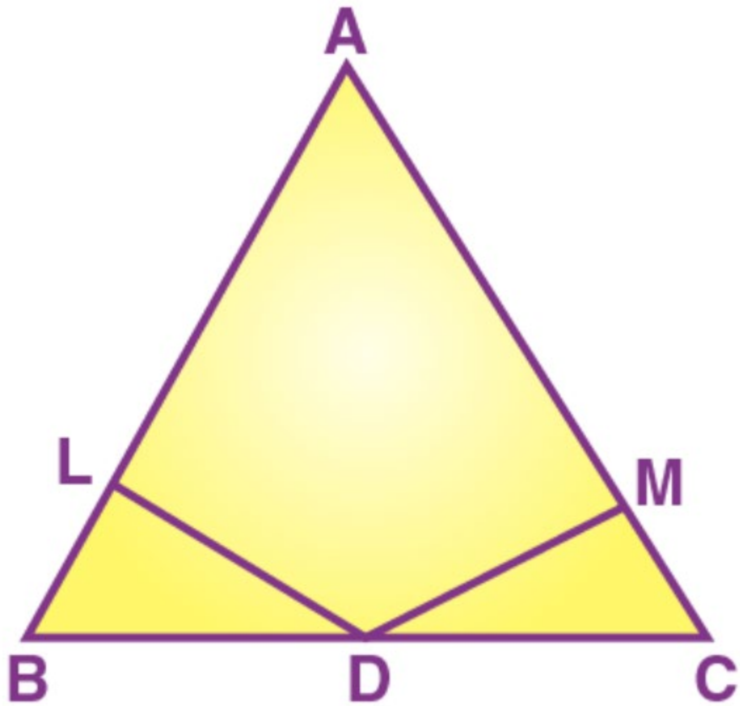
(i) In Δ ABD and Δ ECD
BD = DC (D is the midpoint of BC)
∠ADB = ∠CDE (vertically opposite angles)
AD = DE (Given)
By SAS postulate of congruency of triangles, we have
Δ ABD ≅ Δ ECD

(ii) The corresponding parts of congruent triangles are congruent
Therefore, AB = EC (corresponding parts of congruent triangles)

(iii) Also, we have ∠DAB = ∠DEC (corresponding parts of congruent triangles)
AB ∥ EC [∠DAB = ∠DEC are alternate angles]

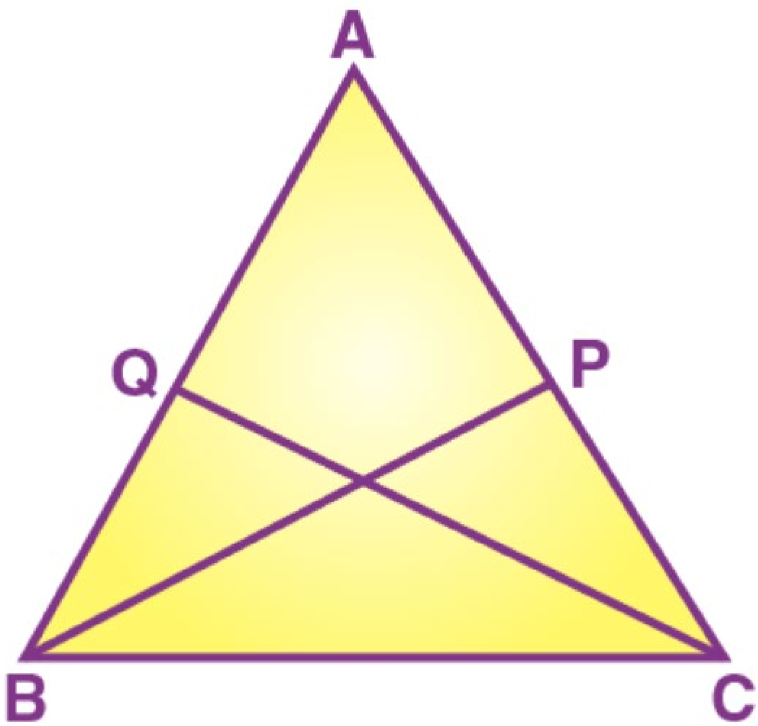
5. A triangle ABC has ∠B = ∠C. Prove that:
(i) The perpendiculars from the mid-point of BC to AB and AC are equal.
(ii) The perpendiculars form B and C to the opposite sides are equal.

Solution:
(i) Given Δ ABC in which ∠B = ∠C.
DL is perpendicular from D to AB
DM is the perpendicular from D to AC.



We need to prove that
DL = DM
Proof:
In Δ ABC and Δ DMC (DL perpendicular to AB and DM perpendicular to AC)
∠DLB = ∠DMC = 90°
∠B = ∠C (Given)
BD = DC (D is midpoint of BC)
By AAS postulate of congruent triangles
Δ DLB ≅ Δ DMC
The corresponding parts of the congruent triangles are congruent
Therefore DL = DM

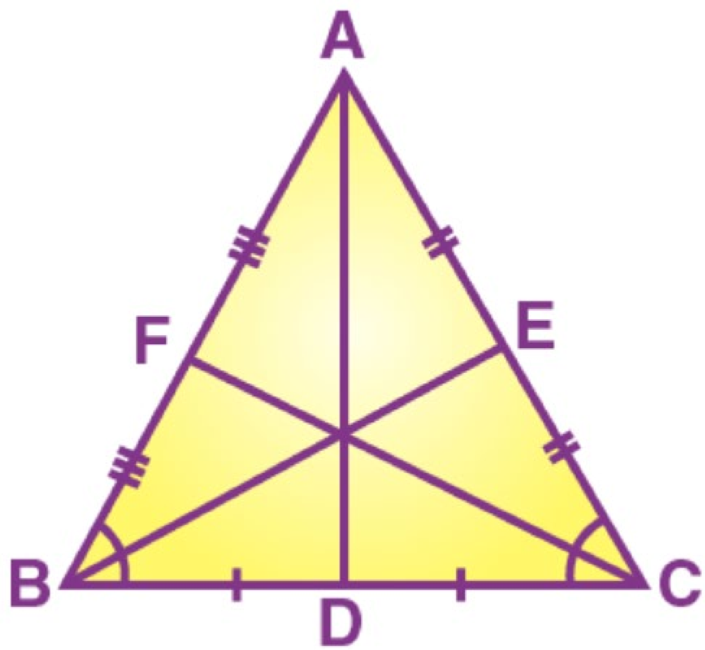
(ii) Given Δ ABC in which ∠B = ∠C.
BP is perpendicular from D to AC
CQ is the perpendicular from C to AB.



We need to prove that
BP = CQ
Proof:
In Δ BPC and Δ CQB (BP perpendicular to AC and CQ perpendicular to AB)
∠BPC = ∠CQB = 90°
∠B = ∠C (Given)
BC = BC (common)
By AAS postulate of congruent triangles
Δ BPC ≅ Δ CQB
The corresponding parts of the congruent triangles are congruent
Therefore BP = CQ

6. The perpendicular bisector of the sides of a triangle AB meet at I. Prove that: IA = IB = IC

Solution:
Given triangle ABC in which AD is the perpendicular bisector of BC
BE is the perpendicular bisector of CA
CF is the perpendicular bisector of AB
AD, BE and CF meet at I



We need to prove that
IA = IB = IC
Proof:
In Δ BID and Δ CID
BD = DC (given)
∠BDI = ∠CDI = 90º (AD is perpendicular bisector of BC)
BC = BC (common)
By SAS postulate of congruent triangles
Δ BID ≅ Δ CID
The corresponding parts of the congruent triangles are congruent
Therefore IB = IC

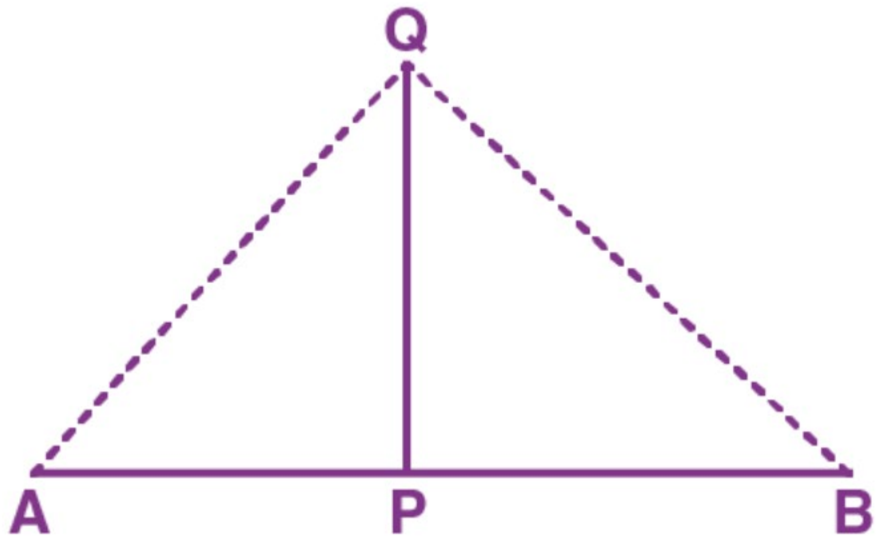
Similarly, In Δ CIE and Δ AIE
CE = AE (given)
∠CEI = ∠AEI = 90º (AD is perpendicular bisector of BC)
IE = IE (common)
By SAS postulate of congruent triangles
Δ CIE ≅ Δ AIE
The corresponding parts of the congruent triangles are congruent
Therefore IC = IA
Thus, IA = IB = IC

7. A line segment AB is bisected at point P and through point P another line segment PQ, which is perpendicular to AB, is drawn. Show that: QA = QB.

Solution:

Given triangle ABC in which AB is bisected at P

PQ is the perpendicular to AB



We need to prove that

QA = QB

Proof:

In Δ APQ and Δ BPQ

AP = PB (P is the midpoint of AB)

∠APQ = ∠BPQ = 90° (PQ is perpendicular to AB)

BC = BC (common)

By SAS postulate of congruent triangles

Δ APQ ≅ Δ BPQ

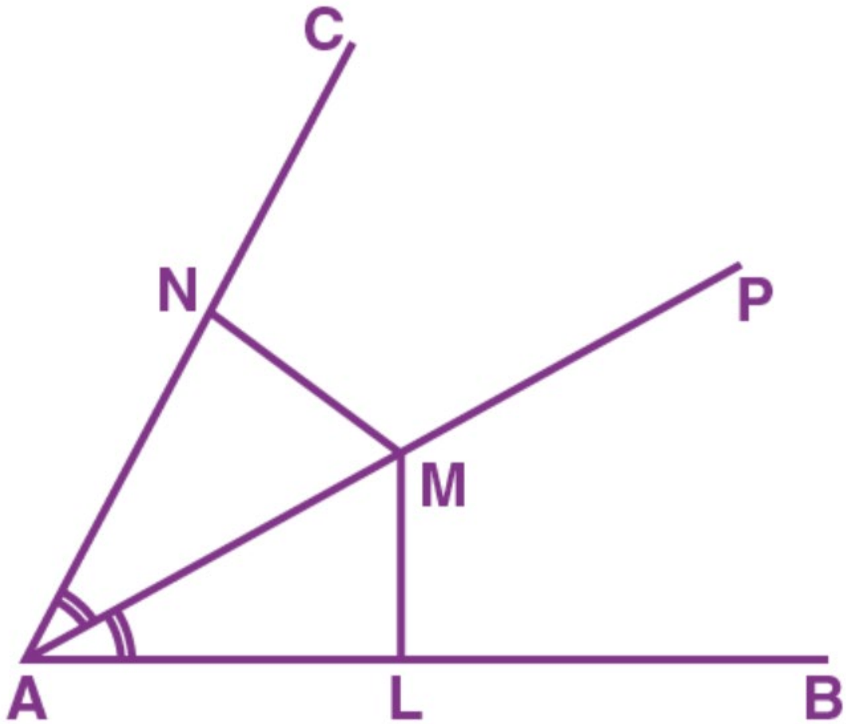
The corresponding parts of the congruent triangles are congruent

Therefore QA = QB

8. If AP bisects angle BAC and M is any point on AP, prove that the perpendiculars drawn from M to AB and AC are equal.

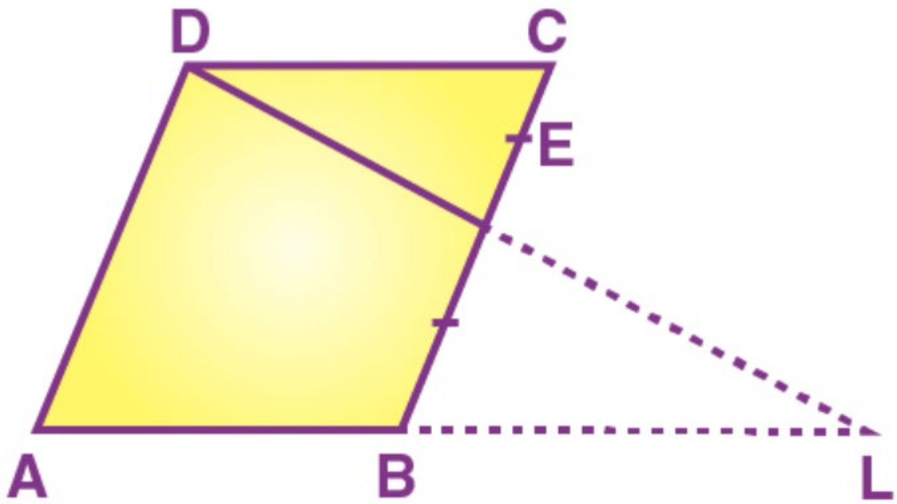
Solution:

From M, draw ML such that ML is perpendicular to AB and MN is perpendicular to AC



In Δ ALM and Δ ANM
∠LAM = ∠MAN (AP is the bisector of ∠BAC)
∠ALM = ∠ANM = 90º (ML is perpendicular to AB and MN is perpendicular to AC)
AM = AM (common)
By AAS postulate of congruent triangles
Δ ALM ≅ Δ ANM
The corresponding parts of the congruent triangles are congruent
Therefore ML = MN
Hence the proof.

9. From the given diagram, in which ABCD is a parallelogram, ABL is al line segment and E is mid-point of BC.
Prove that:
(i) Δ DCE ≅ Δ LBE
(ii) AB = BL.
(iii) AL = 2DC



Solution:

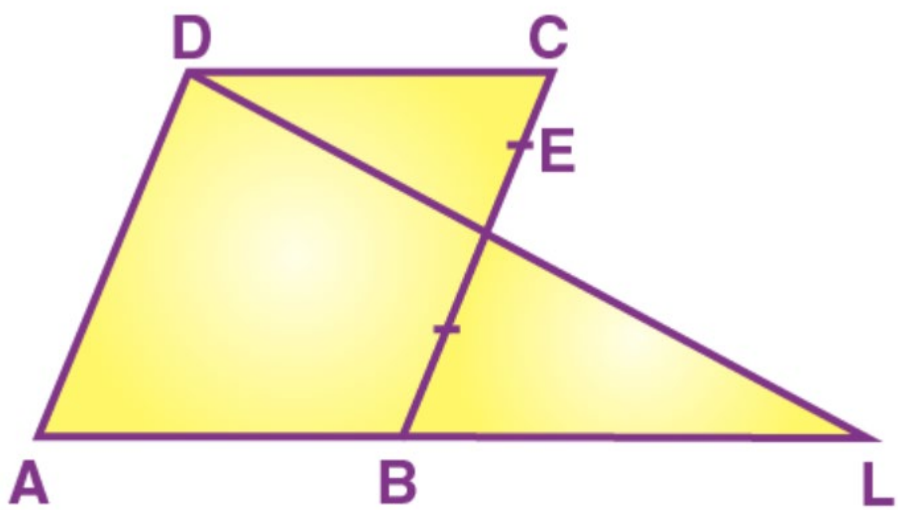
Given ABCD is a parallelogram in which E is the midpoint of BC

We need to prove that

(i) Δ DCE ≅ Δ LBE

(ii) AB = BL.

(iii) AL = 2DC



(i) In Δ DCE and Δ LBE

∠DCE = ∠LBE (DC parallel to AB, alternate angles)

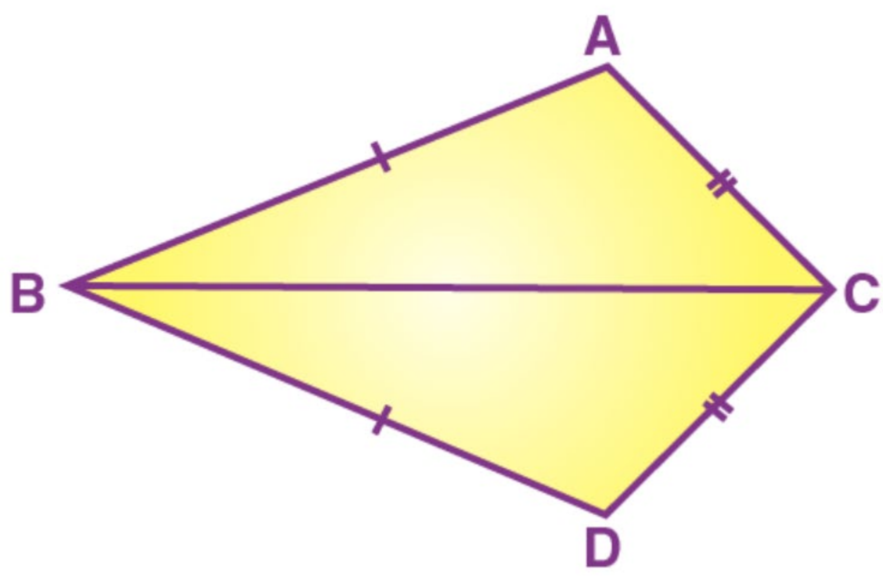
CE = EB (E is the midpoint of BC)

∠DCE = ∠LBE (vertically opposite angles)
By ASA postulate of congruent triangles
Δ DCE ≅ Δ LBE
The corresponding parts of the congruent triangles are congruent
Therefore DC = LB…. (i)

(ii) DC = AB…… (ii)
From (i) and (ii) AB = BL…… (iii)

(iii) AL = AB + BL……… (iv)
From (iii) and (iv) AL = AB + AB
AL = 2AB
AL = 2DC from (ii)

10. In the given figure, AB = DB and Ac = DC.
If ∠ABD = 58°,
∠ DBC = (2x - 4)°,
∠ACB = y + 15° and
∠DCB = 63°; find the values of x and y.



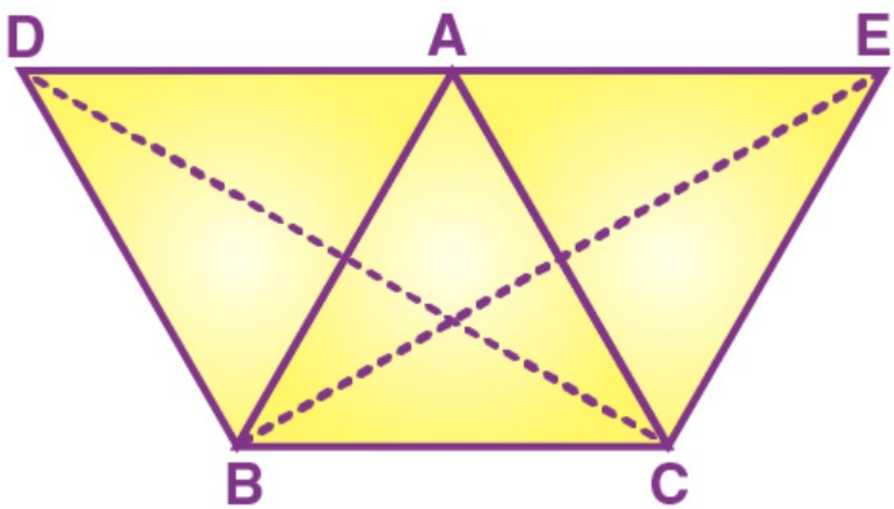
Solution:
Given: In the given figure, AB = DB and Ac = DC.
If ∠ABD = 58°,
∠ DBC = (2x - 4)°,
∠ACB = y + 15° and
∠DCB = 63°;

We need to find the values of x and y.
In Δ ABC and Δ DBC
AB = DB (given)
AC = DC (given)
BC = BC (common)
By SSS postulate of congruent triangles
Δ ABC ≅ Δ DBC
The corresponding parts of the congruent triangles are congruent
Therefore
$\angle ACB = \angle DCB$
$y^\circ + 15^\circ = 63^\circ$
$y^\circ = 63^\circ - 15^\circ$
$y^\circ = 48^\circ$
$\angle ACB = \angle DCB$ (corresponding parts of the congruent triangles)
But $\angle DCB = (2x - 4)^\circ$
We have $\angle ACB + \angle DCB = \angle ABD$
$(2x - 4)^\circ + (2x - 4)^\circ = 58^\circ$
$4x - 8^\circ = 58^\circ$
$4x = 58^\circ + 8^\circ$
$4x = 66^\circ$
$x = 66^\circ/4$
$x = 16.5^\circ$
Thus, the values of x and y are
$x = 16.5^\circ$ and $y = 48^\circ$

EXERCISE 9B PAGE:125

1. On the sides AB and AC of triangle ABC, equilateral triangle ABD and ACE are drawn.
Prove that:
(i) ∠CAD = ∠BAE
(ii) CD = BE.

Solution:
Given triangle ABD is an equilateral triangle
Triangle ACE is an equilateral triangle
Now, we need to prove that
(i) ∠CAD = ∠BAE
(ii) CD = BE.

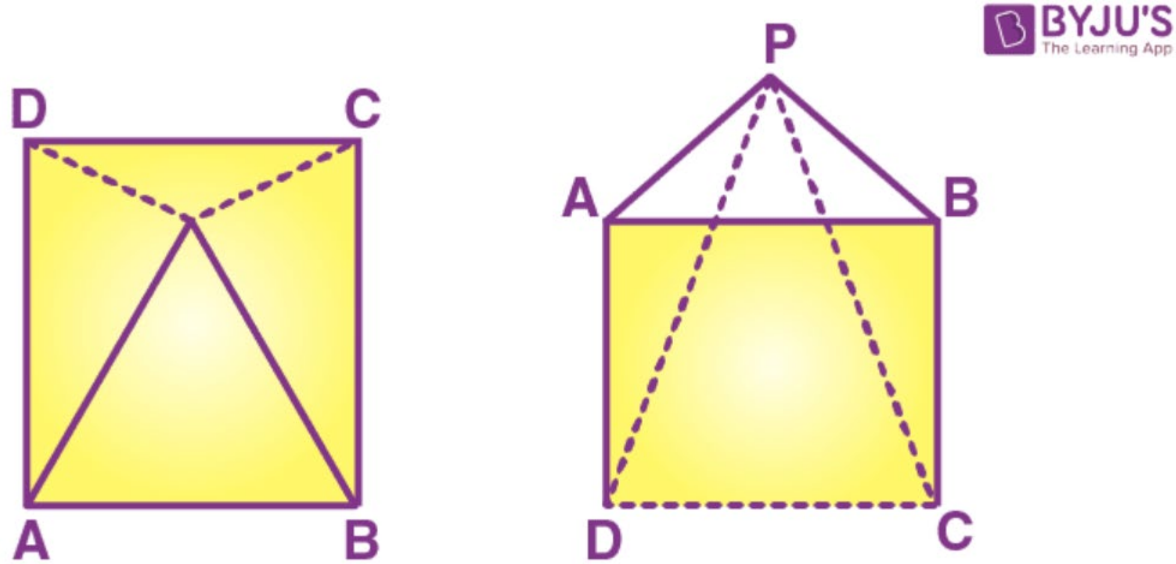


Proof:
(i) Δ ABD is equilateral
Each angle = 60^o
∠BAD = 60^o ……(i)
Similarly,
Δ ACE is equilateral
Each angle = 60^o
∠CAE = 60^o ………..(ii)
∠BAD = ∠CAE from (i) and (ii)………..(iii)
Adding ∠BAC to both sides, we have
∠BAD + ∠BAC = ∠CAE + ∠BAC
∠CAD = ∠BAE………(iv)

(ii) In Δ CAD and Δ BAE

AC = AE (triangle ACE is equilateral)
∠CAD = ∠BAE from (iv)
AD = AB (triangle ABD is equilateral)
By SAS postulate of congruent triangles
Δ CAD ≅ Δ BAE
The corresponding parts of the congruent triangles are congruent
Therefore CD = BE
Hence the proof.

2. In the following diagrams, ABCD is a square and APB is an equilateral triangle.
In each case,
(i) Prove that: Δ APD ≅ Δ BPC
(ii) Find the angles of ΔDPC.



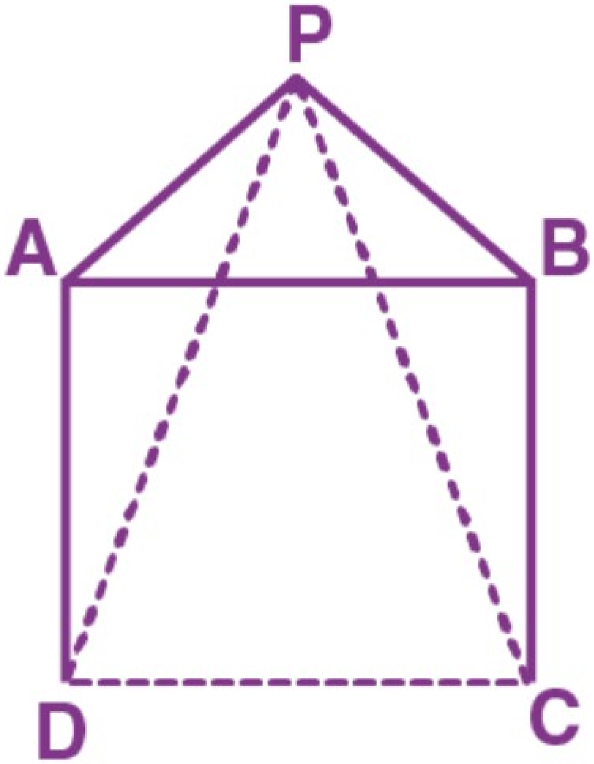
Solution:
(a)
(i) Proof:
AP = PB = AB [Δ APB is an equilateral triangle]
Also we have,
∠PBA = ∠PAB = ∠APB = 60^o …….. (1)
Since ABCD is a square, we have
∠A = ∠B = ∠C = ∠D = 90^o ……….. (2)
Since ∠DAP = ∠A - ∠PAB …………. (3)
∠DAP = $90^o – 60^o$
∠DAP = 30^o [from equation 1 and equation 2] …………… (4)

Similarly ∠CBP = ∠B - ∠PBA
∠CBP = $90^o – 60^o$

$\angle CBP = 30^o$ [from equation 1 and equation 2] ………… (5)
$\angle DAP = \angle CBP$ [from equation 4 and equation 5] ……. (6)
Δ APD and Δ BPC
AD = BC [sides of square ABCD]
$\angle DAP = \angle CBP$ [from 6]
AP = BP [sides of equilateral triangle APB]
Therefore by SAS criteria of congruency, we have
$\Delta APD \cong \Delta BPC$

(ii) AP = PB = AB [Δ APB is an equilateral triangle] ……… (7)
AB = BC = CD = DA [sides of square ABCD] ………….. (8)
From equation 7 and 8, we have
AP = DA and PB = BC ……… (9)
In Δ APD,
AP = DA [from 9]
$\angle ADP = \angle APD$ [angles opposite to equal sides are equal]
$\angle ADP + \angle APD + \angle DAP = 180^o$ [sum of angles of a triangle = 180^o]
$\angle ADP + \angle APD + 30^o = 180^o$
$\angle ADP + \angle ADP = 180^o – 30^o$ [from 2 and from 10]
$2 \angle ADP = 150^o$
$\angle ADP = 75^o$
We have $\angle PCD = \angle C - \angle PCB$
$\angle PCD = 90^o – 75^o$
$\angle PCD = 15^o$ ……… (13)
In triangle DPC
$\angle PDC = 15^o$
$\angle PCD = 15^o$
$\angle PCD + \angle PDC + \angle DPC = 180^o$
$\angle DPC = 180^o – 30^o$
$\angle DPC = 150^o$
Therefore angles are 15^o, 150^o and 15^o

(b)
(i) Proof: In triangle APB
AP = PB = AB
Also,
We have,
$\angle PBA = \angle PAB = \angle APB = 60^o$ ……… (1)
Since ABCD is a square, we have
$\angle A = \angle B = \angle C = \angle D = 90^o$ ………. (2)
$\angle DAP = \angle A + \angle PAB$……. (3)
$\angle DAP = 90^o + 60^o$
$\angle DAP = 150^o$ [from 1 and 2] ……. (4)

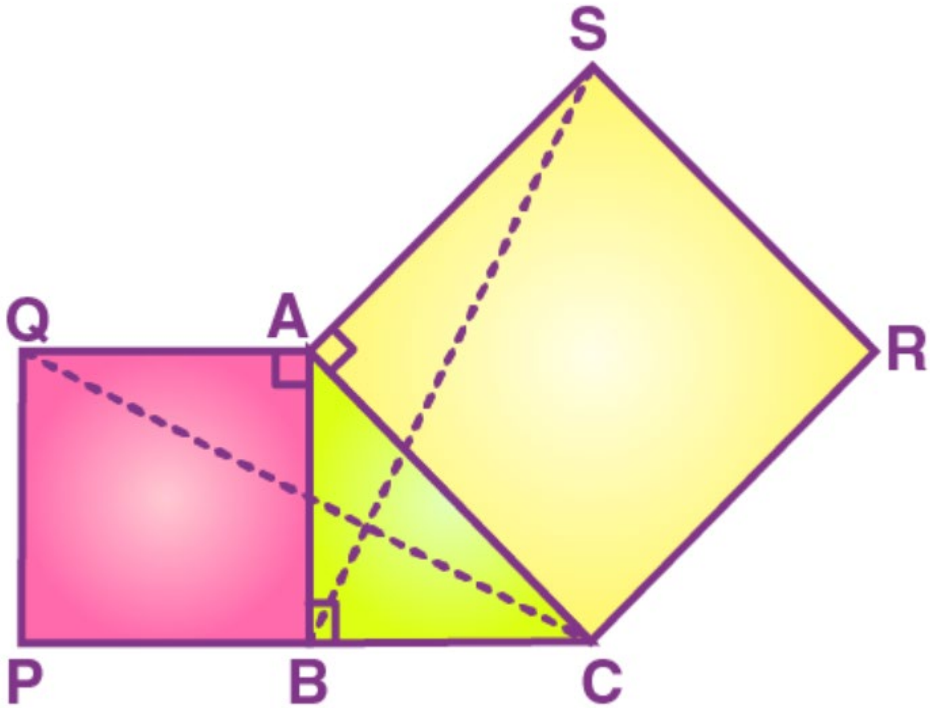


$\angle CBP = \angle B + \angle PBA$........ (3)
$\angle CBP = 90^o + 60^o$
$\angle CBP = 150^o$ [from 1 and 2] ...... (5)
$\angle DAP = \angle CBP$ [from 4 and 5] .... (6)
In triangle APD and triangle BPC
AD = BC [sides of square ABCD]
$\angle DAP = \angle CBP$ [from 6]
AP = BP [sides of equilateral triangle APB]
By SAS criteria we have
$\Delta APD \cong \Delta BPC$

(ii) AP = PB = AB [triangle APB is an equilateral triangle] .... (7)
AB = BC = CD = DA [sides of square ABCD] .... (8)
From equation 7 and 8, we have
AP = DA and PB = BC .... (9)
In Δ APD,
AP = DA [from 9]
$\angle ADP = \angle APD$ [angles opposite to equal sides are equal] .... (10)
$\angle ADP + \angle APD + \angle DAP = 180^o$ [sum of angles of a triangle = 180^o]
$\angle ADP + \angle APD + 150^o = 180^o$
$\angle ADP + \angle ADP = 180^o - 150^o$ [from 2 and from 10]
$2\angle ADP = 30^o$

$\angle ADP = 15^o$
We have $\angle PCD = \angle D - \angle ADP$
$\angle PCD = 90^o – 15^o$
$\angle PCD = 75^o$ ……… (11)
In triangle BPC
PB = BC [from 9]
$\angle PCB = \angle BPC$ ……… (12)
$\angle PCB + \angle BPC + \angle CPB = 180^o$
$\angle PCB + \angle PCB = 180^o – 150^o$ [from 2 and from 10]
$2\ \angle PCB = 30^o$
$\angle PCB = 15^o$
We have $\angle PCD = \angle C - \angle PCB$
$\angle PCD = 90^o – 15^o$
$\angle PCD = 75^o$ ……… (11)
In triangle DPC
$\angle PDC = 75^o$
$\angle PCD = 75^o$
$\angle PCD + \angle PDC + \angle DPC = 180^o$
$75^o + 75^o + \angle DPC = 180^o$
$\angle DPC = 180^o – 150^o$
$\angle DPC = 30^o$
Angles of triangle are 75^o, 30^o and 75^o

3. In the figure, given below, triangle ABC is right-angled at B. ABPQ and ACRS are squares. Prove that:
(i) ΔACQ and ΔASB are congruent.
(ii) CQ = BS.



Solution:

Triangle ABC is right-angled at B.
ABPQ and ACRS are squares.
We need to prove that:
(i) ΔACQ and ΔASB are congruent.
(ii) CQ = BS.
Proof:
(i) ∠QAB = 90º (ABPQ is a square) …. (1)
∠SAC = 90º (ACRS is a square) ………. (2)
From (1) and (2) we have
∠QAB = ∠SAC ………… (3)
Adding ∠BAC both sides of (3) we get
∠QAB + ∠BAC = ∠SAC + ∠BAC
∠QAC = ∠SAB ………. (4)

In Δ ACQ and Δ ASB
QA = QB (sides of a square ABPQ)
∠CAD = ∠BAE from (iv)
AC = AS (side of a square ACRS)
By AAS postulate of congruent triangles
Therefore Δ ACQ ≅ Δ ASB

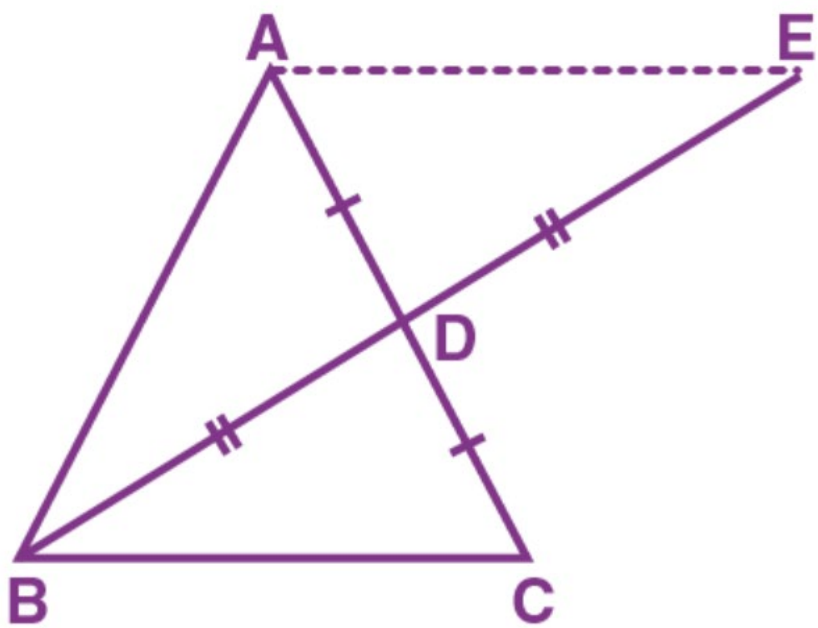
(ii)The corresponding parts of the congruent triangles are congruent

Therefore CQ = BS

4. In a ΔABC, BD is the median to the side AC, BD is produced to E such that BD = DE. Prove that: AE is parallel to BC.

Solution:

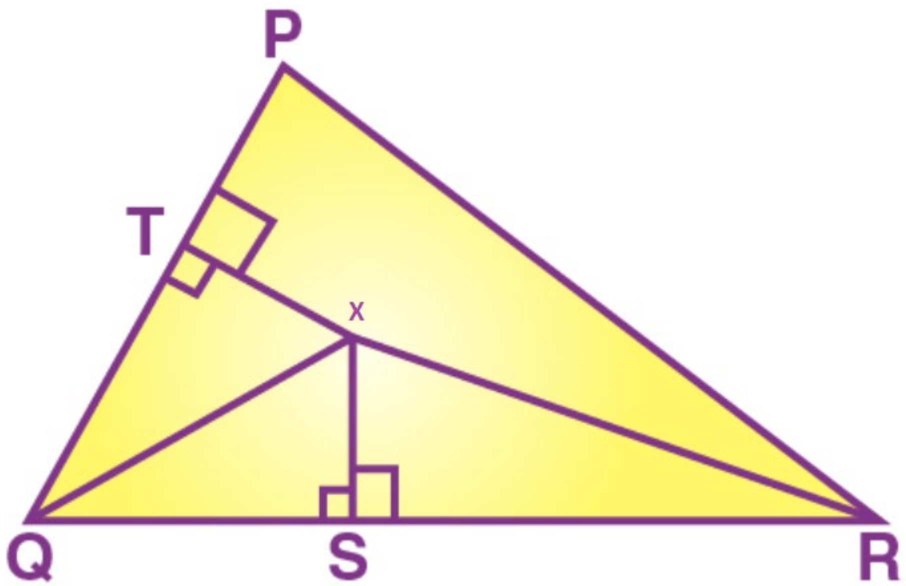
Given in a ΔABC, BD is the median to the side AC,
BD is produced to E such that BD = DE.
Now we have to prove that: AE is parallel to BC.
Construction: Join AE



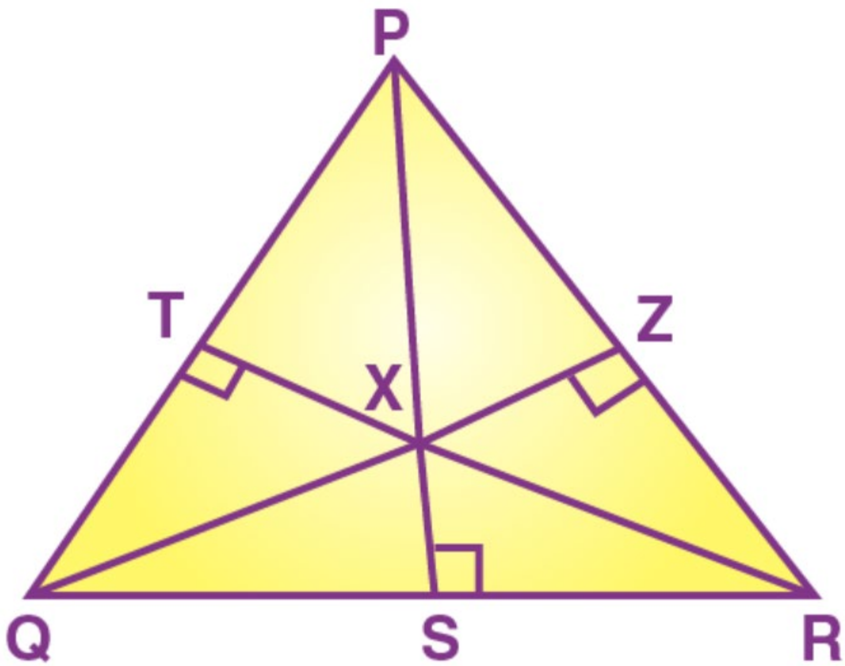
Proof:
AD = DC (BD is median to AC)
In Δ BDC and Δ ADE
BD = DE (Given)
∠BDC = ∠ADE = 90^o (vertically opposite angles)
AD = DC (from 1)
By SAS postulate of congruent triangles
Therefore Δ BDC ≅ Δ ADE
The corresponding parts of the congruent triangles are congruent
∠BDC = ∠ADE
But these are alternate angles
And AC is the transversal
Thus, AE parallel to BC

5. In the adjoining figure, OX and RX are the bisectors of the angles Q and R respectively of the triangle PQR.

If XS ⊥ QR and XT ⊥ PQ; prove that:
(i) Δ XTQ ≅ Δ XSQ
(ii) PX bisects angle ∠P.



Solution:
In the adjoining figure,
OX and RX are the bisectors of the angles Q and R respectively of the triangle PQR.
If XS ⊥ QR and XT ⊥ PQ;
We have to prove that:
(i) Δ XTQ ≅ Δ XSQ
(ii) PX bisects angle ∠P.
Construction:
Draw If XZ⊥ PR and join PX



Proof:
(i) In Δ XTQ and Δ XSQ
∠QTX = ∠QSX = 90º (XS perpendicular to QR and XT perpendicular to PQ)
∠QTX = ∠QSX (QX is bisector of angle Q)
QX = QX (common)
By AAS postulate of congruent triangles
Therefore Δ XTQ ≅ Δ XSQ ………….. (1)

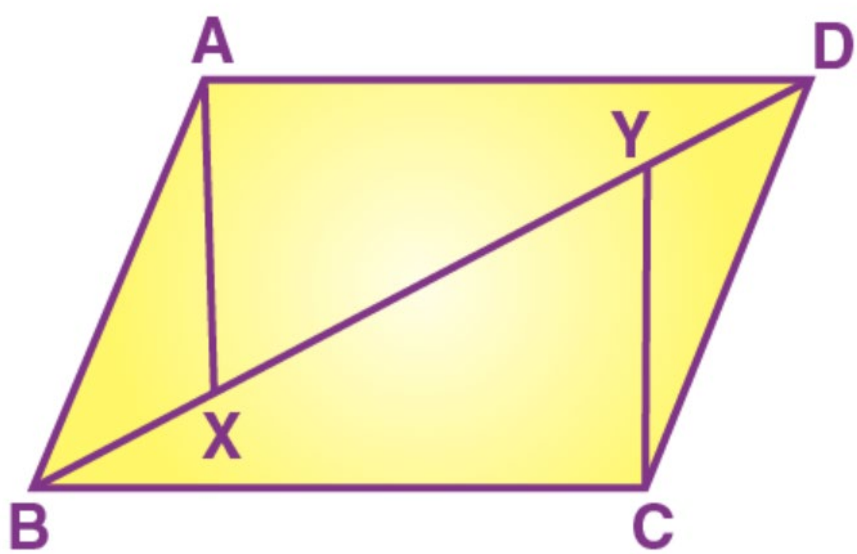
(ii) The corresponding parts of the congruent triangles are congruent
Therefore XT = XS (by c.p.c.t)
In Δ XSR and Δ XZR
∠XSR = ∠XZR = 90º (XS perpendicular to XS and angle XSR = 90º)
∠SRX = ∠ZRX (RX is a bisector of angle R)
RX = RX (common)
By AAS postulate of congruent triangles
Therefore Δ XSR ≅ Δ XZR ………….. (1)
The corresponding parts of the congruent triangles are congruent
Therefore XS = XZ (by c.p.c.t) ……….. (2)
From (1) and (2)
XT = XZ …………… (3)

In Δ XTP and Δ XZP
∠XTP = ∠XZP = 90º (Given)
XP = XP (common)
XT = XZ (from 3)

By right angle hypotenuse side postulate of congruent triangles
Therefore Δ XTP ≅ Δ XZP
The corresponding parts of the congruent triangles are congruent
∠XPT = ∠XPZ
PX bisects ∠SRX = ∠P

6. In the parallelogram ABCD, the angles A and C are obtuse. Points X and Y are taken on the diagonal BD such that the angles XAD and YCB are right angles.
Prove that: XA = YC.

Solution:
ABCD is a parallelogram in which ∠A and ∠C are obtuse.

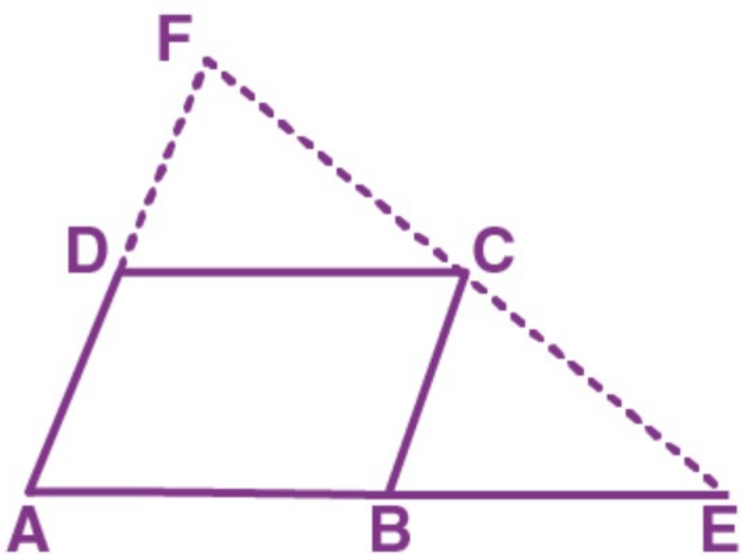


Points X and Y are on the diagonal BD
Such that ∠XAD = ∠YCB = 90°
We need to prove that XA = YC
Proof:
In Δ XAD and Δ YCB
∠XAD = ∠YCB = 90° (Given)
AD = BC (opposite sides of a parallelogram)
∠ADX = ∠CBY (alternate angles)
By ASA postulate of congruent triangles
Therefore Δ XAD ≅ Δ YCB
The corresponding parts of the congruent triangles are congruent
Therefore XA = YC
Hence the proof.

7. ABCD is a parallelogram. The sides AB and AD are produced to E and F respectively, such produced

to E and F respectively, such that AB = BE and AD = DF.
Prove that: Δ BEC ≅ Δ DCF

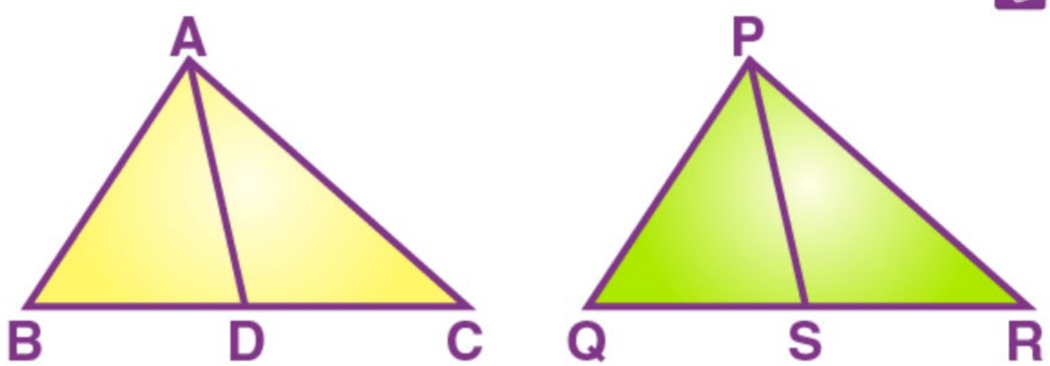
Solution:
ABCD is a parallelogram.
The sides AB and AD are produced to E and F respectively,
Such that AB = BE and AD = DF.
We need to prove that Δ BEC ≅ Δ DCF



Proof:
AB = DC (opposite sides of a parallelogram) ……. (1)
AB = BE (given) ……….. (2)
From (1) and (2) we have
BE = DC (opposite sides of a parallelogram) ………. (3)
AD = BC (opposite sides of a parallelogram) …….. (4)
AD = DF (given) ………… (5)
From (4) and (5) we have
BC = DF ……… (6)
Since AD parallel to BC the corresponding angles are equal
∠DAB = ∠CBE …….. (7)
Since AD parallel to DC the corresponding angles are equal
∠DAB = ∠FDC ……… (8)
From (7) and (8)
∠CBE = ∠FDC …….. (9)
In Δ BEC and Δ DCF
BE = DC (from (3))
∠CBE = ∠FDC (from (9))
BC = DF (from (6))

By SAS postulate of congruent triangles
Therefore Δ BEC ≅ Δ DCF
Hence the proof.

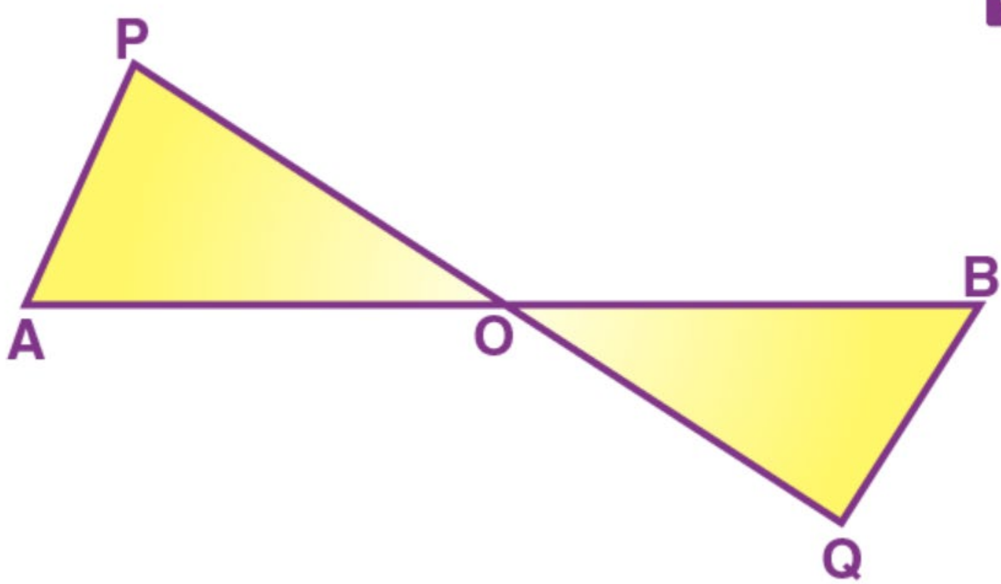
8. In the following figures, the sides AB and BC and the median AD of triangle ABC are equal to the sides PQ and QR and median PS of the triangle PQR. Prove that ΔABC and ΔPQR are congruent.



Solution:
Since BC = QR
We have BD = QS and DC = SR (D is the midpoint of BC and S is the midpoint of QR)
In Δ ABD and Δ PQS
AB = PQ ……… (1)
AD = PS ………. (2)
BD = QS ……….. (3)
By SSS postulate of congruent triangles
Therefore Δ ABD ≅ Δ PQS
Similarly
In Δ ADC and Δ PSR
AD = PS ……….. (4)
AC = PR ……….. (5)
DC = SR ………. (6)
By SSS postulate of congruent triangles
Therefore Δ ADC ≅ Δ PSR
We have
BC = BD + DC (D is the midpoint of BC)
= QS + SR (from (3) and (6))
= QR (S is the midpoint of QR) ……… (7)
Now again consider the triangles Δ ABC and Δ PR
AB = PQ (from 1)
BC = QR (from 7)
AC = PR (from 7)

By SSS postulate of congruent triangles
Therefore Δ ABC ≅ Δ PQR
Hence the proof.

9. In the following diagram, AP and BQ are equal and parallel to each other.



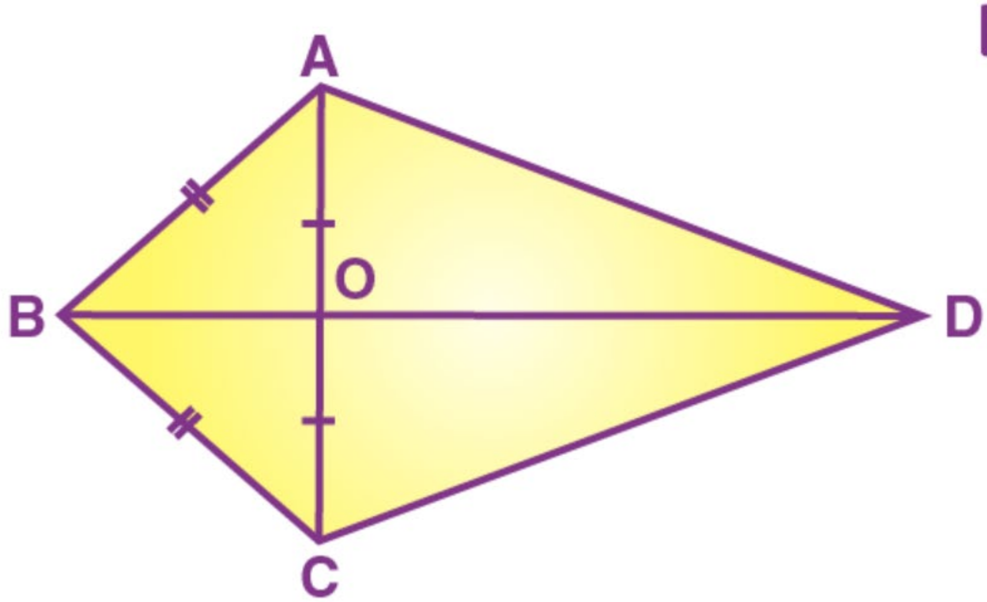
Prove that
(i) Δ AOP ≅ Δ BOQ
(ii) AB and PQ bisect each other

Solution:
In the figure AP and BQ are equal and parallel to each other
Therefore AP = BQ and AP parallel to BQ
We need to prove that
(i) Δ AOP ≅ Δ BOQ
(ii) AB and PQ bisect each other
(i) since AP parallel to BQ
∠APO = ∠BQO (alternate angles) …….. (1)
And ∠PAO = ∠QBO (alternate angles) …….. (2)
Now in Δ AOP and Δ BOQ
∠APO = ∠BQO (from 1)
AP = PQ (given)
∠PAO = ∠QBO (from 2)
By ASA postulate of congruent triangles,
Δ AOP ≅ Δ BOQ

(ii) the corresponding parts of the congruent triangles are congruent
Therefore OP = OQ (by c.p.c.t)

OA = OB (by c.p.c.t)
Hence AB and PQ bisect each other

10. In the following figure, OA = OC and AB = BC.
(i) ∠P= 90°
(ii) Δ AOD ≅ Δ COD
(iii) AD = CD



Solution:
Given OA = OC and AB = BC.
Now we have to prove that,
(i) ∠P= 90°
(ii) Δ AOD ≅ Δ COD
(iii) AD = CD

(i) In Δ ABO and Δ CBO
AB = BC (given)
AO = CO (given)
OB = OB (common)
By SSS postulate of congruent triangles
Therefore Δ ABO ≅ Δ CBO
The corresponding parts of the congruent triangles are congruent
∠ABO = ∠CBO (by c.p.c.t)Hence∠ABD = ∠CBD
∠AOB = ∠CBO (by c.p.c.t)
We have ∠ABO + ∠CBO = 180° (linear pair)
∠ABO = ∠CBO = 90°
And AC perpendicular to BD

(ii) In Δ AOD and Δ COD
OD = OD (common)
∠AOD = ∠COD (each = 90^o)
AO = CO (given)
By SAS postulate of congruent triangles
Therefore Δ AOD ≅ Δ COD

(iii) The corresponding parts of the congruent triangles are congruent
Therefore AD = CD (by c.p.c.t)
Hence the proof.