



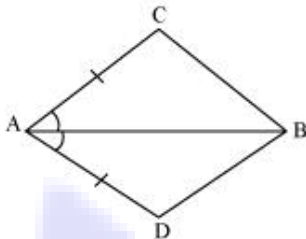
SpeedLabs

MATHS

CBSE 9th

TEEVRA EDUTECH PVT. LTD.

Q.1 In quadrilateral ABCD (See figure). $AC = AD$ and AB bisects $\angle A$. Show that $\triangle ABC \cong \triangle ABD$. What can you say about BC and BD?



Ans. Given: In quadrilateral ABCD, $AC = AD$ and AB bisects $\angle A$.

To prove: $\triangle ABC \cong \triangle ABD$

Proof: In $\triangle ABC$ and $\triangle ABD$,

$AC = AD$ [Given]

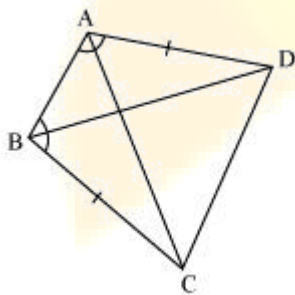
$\angle BAC = \angle BAD$ [\because AB bisects $\angle A$]

$AB = AB$ [Common]

$\therefore \triangle ABC \cong \triangle ABD$ [By SAS congruency]

Thus $BC = BD$ [By C.P.C.T.]

Q.2 ABCD is a quadrilateral in which $AD = BC$ and $\angle DAB = \angle CBA$. (See figure). Prove that:



(i) $\triangle ABD \cong \triangle BAC$

(ii) $BD = AC$

(iii) $\angle ABD = \angle BAC$

Ans. (i) In $\triangle ABC$ and $\triangle ABD$,

$BC = AD$ [Given]

$\angle DAB = \angle CBA$ [Given]

$AB = AB$ [Common]

$\therefore \Delta ABC \cong \Delta ABD$ [By SAS congruency]

Thus $AC = BD$ [By C.P.C.T.]

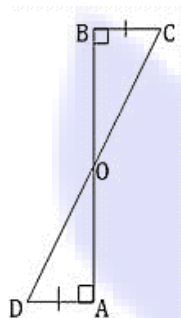
(ii) Since $\Delta ABC \cong \Delta ABD$

$\therefore AC = BD$ [By C.P.C.T.]

(iii) Since $\Delta ABC \cong \Delta ABD$

$\therefore \angle ABD = \angle BAC$ [By C.P.C.T.]

Q.3 AD and BC are equal perpendiculars to a line segment AB. Show that CD bisects AB (See figure)



Ans. In ΔBOC and ΔAOD ,

$\angle OBC = \angle OAD = 90^\circ$ [Given]

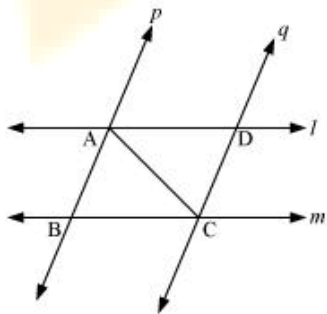
$\angle BOC = \angle AOD$ [Vertically Opposite angles]

$BC = AD$ [Given]

$\therefore \Delta BOC \cong \Delta AOD$ [By ASA congruency]

$\Rightarrow OB = OA$ and $OC = OD$ [By C.P.C.T.]

Q.4 l and m are two parallel lines intersected by another pair of parallel lines P and q (See figure). Show that $\Delta ABC \cong \Delta CDA$.



Ans. AC being a transversal. [Given]

Therefore $\angle DAC = \angle ACB$ [Alternate angles]

Now $p \parallel q$ [Given]

And AC being a transversal. [Given]

Therefore $\angle BAC = \angle ACD$ [Alternate angles]

Now In ΔABC and ΔADC ,

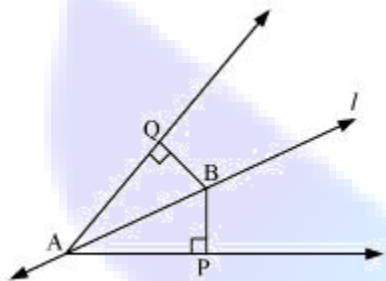
$\angle ACB = \angle DAC$ [Proved above]

$\angle BAC = \angle ACD$ [Proved above]

$AC = AC$ [Common]

$\therefore \Delta ABC \cong CDA$ [By ASA congruency]

Q.5 Line l is the bisector of the angle A and B is any point on l . BP and BQ are perpendiculars from B to the arms of $\angle A$. Show that:



(i) $\Delta APB \cong \Delta AQB$

(ii) $BP = BQ$ or P is equidistant from the arms of $\angle A$ (See figure).

Ans. Given: Line l bisects $\angle A$.

$\angle BAP = \angle BAQ$

(i) In ΔABP and ΔABQ ,

$\angle BAP = \angle BAQ$ [Given]

$\angle BPA = \angle BQA = [Given]$

$AB = AB$ [Common]

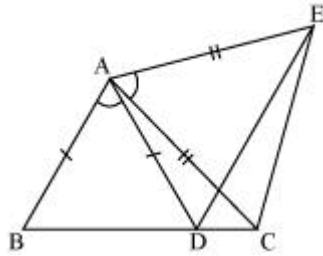
$\therefore \Delta APB \cong AQB$ [By ASA congruency]

(ii) Since $\Delta APB \cong AQB$

$\therefore BP = BQ$ [By C.P.C.T.]

$\Rightarrow B$ is equidistant from the arms of $\angle A$.

Q.6 In figure, $AC = AB$, $AB = AD$ and $\angle BAD = \angle EAC$. Show that $BC = DE$.



Ans. Given that $\angle BAD = \angle EAC$

Adding $\angle DAC$ on both sides, we get

$$\angle BAD + \angle DAC = \angle EAC + \angle DAC$$

$$\Rightarrow \angle BAC = \angle EAD \dots\dots\dots (i)$$

Now in $\triangle ABC$ and $\triangle AED$,

$$AB = AD \text{ [Given]}$$

$$AC = AE \text{ [Given]}$$

$$\angle BAC = \angle DAE \text{ [From eq. (i)]}$$

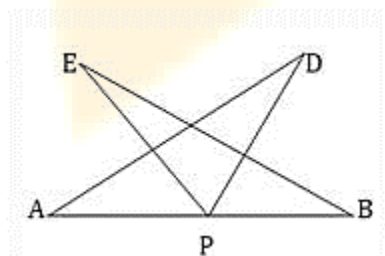
$$\therefore \triangle ABC \cong \triangle AED \text{ [By SAS congruency]}$$

$$\Rightarrow BC = DE \text{ [By C.P.C.T.]}$$

Q.7 AB is a line segment and P is the mid-point. D and E are points on the same side of AB such that $\angle BAD = \angle ABE$ and $\angle EPA = \angle DPB$. Show that:

(i) $\triangle DAF \cong \triangle FBA$

(ii) $AD = BE$ (See figure)



Ans. Given that $\angle EPA = \angle DPB$

Adding $\angle EPD$ on both sides, we get

$$\angle EPA + \angle EPD = \angle DPB + \angle EPD$$

$$\Rightarrow \angle APD = \angle BPE \dots\dots\dots (i)$$

Now in $\triangle APD$ and $\triangle BPE$,

$$\angle PAD = \angle PBE \text{ [} \because \angle BAD = \angle ABE \text{ (given),}$$

$$\therefore \angle PAD = \angle PBE]$$

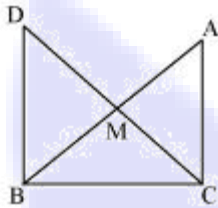
$$AP = PB \text{ [P is the mid-point of AB]}$$

$$\angle APD = \angle BPE \text{ [From eq. (i)]}$$

$$\therefore \triangle DPA \cong \triangle EBP \text{ [By ASA congruency]}$$

$$\Rightarrow AD = BE \text{ [By C.P.C.T.]}$$

Q.8 In right triangle ABC, right angled at C, M is the mid-point of hypotenuse AB. C is joined to M and produced to a point D such that DM = CM. Point D is joined to point B. (See figure)



Show that:

(i) $\triangle AMC \cong \triangle BMD$

(ii) $\angle DBC$ is a right angle.

(iii) $\triangle DBC \cong \triangle ACB$

(iv) $CM = \frac{1}{2} AB$

Ans. (i) In $\triangle AMC$ and $\triangle BMD$,

$$AM = BM \text{ [AB is the mid-point of AB]}$$

$$\angle AMC = \angle BMD \text{ [Vertically opposite angles]}$$

$$CM = DM \text{ [Given]}$$

$$\therefore \triangle AMC \cong \triangle BMD \text{ [By SAS congruency]}$$

$$\therefore \angle ACM = \angle BDM \text{ (i)}$$

$$\angle CAM = \angle DBM \text{ and } AC = BD \text{ [By C.P.C.T.]}$$

(ii) For two lines AC and DB and transversal DC, we have,

$$\angle ACD = \angle BDC \text{ [Alternate angles]}$$

$$\therefore AC \parallel DB$$

Now for parallel lines AC and DB and for transversal BC.

$$\angle DBC = \angle ACB \text{ [Alternate angles] (ii)}$$

But ABC is a right-angled triangle, right angled at C.

$$\therefore \angle ACB = 90^\circ \text{ (iii)}$$

Therefore $\angle DBC =$ [Using eq. (ii) and (iii)]

$\Rightarrow \angle DBC$ is a right angle.

(iii) Now in $\triangle DBC$ and $\triangle ABC$,

$DB = AC$ [Proved in part (i)]

$\angle DBC = \angle ACB = 90^\circ$ [Proved in part (ii)]

$BC = BC$ [Common]

$\therefore \triangle DBC \cong \triangle ACB$ [By SAS congruency]

(iv) Since $\triangle DBC \cong \triangle ACB$ [Proved above]

$\therefore DC = AB$

$\Rightarrow AM + CM = AB$

$\Rightarrow CM + CM = AB$ [$\because DM = CM$]

$\Rightarrow 2CM = AB$

$$CM = \frac{1}{2} AB$$