Mathematics

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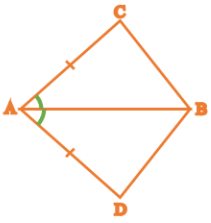
(Chapter – 7)(Triangles)

(Class – 9)

Exercise 7.1

Question 1:

In quadrilateral ACBD, AC = AD and AB bisects ∠A (see Figure). Show that ΔABC ≅ ΔABD. What can you say about BC and BD?



Answer 1:

In ΔACB and ΔADB,

AC = AD	[∵ Given]
∠CAB = ∠DAB	[∵ AB bisects angle A]
AB = AB	[∵ Common]
अतः, ΔABC ≅ ΔABD	[∵ SAS Congruency Rule]
BC = BD	[∵ Corresponding parts of congruent triangles are equal]

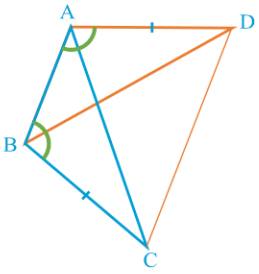
Question 2:

ABCD is a quadrilateral in which AD = BC and ∠ DAB = ∠ CBA (see Figure). Prove that

(i) ΔABD ≅ ΔBAC

(ii) BD = AC

(iii) ∠ABD = ∠BAC



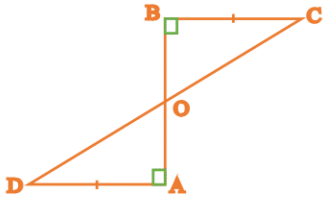
Answer 2:

(i) In ΔABD and ΔBAC,

AD = BC	[∵ Given]
∠DAB = ∠CAB	[∵ Given]
AB = AB	[∵ Common]
Hence, ΔABD ≅ ΔBAC	[∵ SAS Congruency Rule]
(ii) BD = AC	[∵ Corresponding parts of congruent triangles are equal]
(iii) ∠ABD = ∠BAC	[∵ Corresponding parts of congruent triangles are equal]

Question 3:

AD and BC are equal perpendiculars to a line segment AB (see Figure). Show that CD bisects AB.



Answer 3:

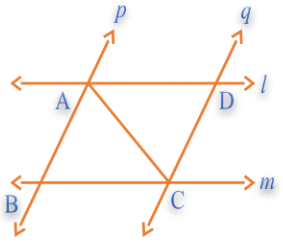
In ΔOCB and ΔODA,

∠BOC = ∠AOD	[∵ Vertically Opposite Angles]
∠CBO = ∠DAO	[∵ Each 90°]
BC = AD	[∵ Given]
Hence, ΔOCB ≅ ΔODA	[∵ AAS Congruency Rule]
BO = AO	[∵Corresponding parts of congruent triangles are equal]

Hence, CD bisects AB.

Question 4:

l and *m* are two parallel lines intersected by another pair of parallel lines *p* and *q* (see Figure). Show that Δ ABC ≅ Δ CDA.



Answer 4:

In ΔABC and ΔCDA,

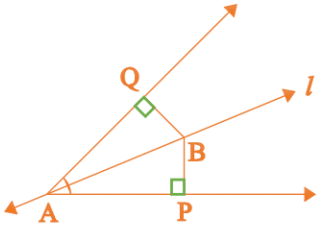
∠BAC = ∠ACD	[∵ Alternate Angles]
AC = AC	[∵ Common]
∠BCA = ∠DAC	[∵ Alternate Angles]
Hence, ΔABC ≅ ΔCDA	[∵ ASA Congruency Rule]

Question 5:

Line l is the bisector of an angle ∠A and B is any point on l. BP and BQ are perpendiculars from B to the arms of ∠A (see Figure). Show that:

(i) ΔAPB ≅ ΔAQB

(ii) BP = BQ or B is equidistant from the arms of ∠A.



Answer 5:

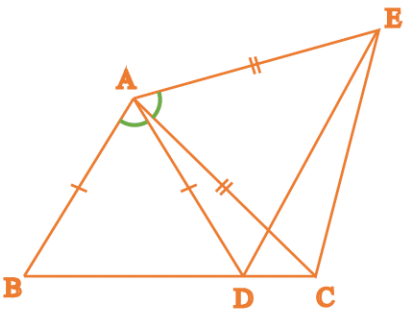
(i) In ΔAPB and ΔAQB,

∠APB = ∠AQB	[∵ Each 90°]
∠PAB = ∠QAB	[∵ Line l bisects angle A]
AB = AB	[∵ Common]
Hence, ΔAPB ≅ ΔAQB	[∵ AAS Congruency Rule]

(ii) BP = BQ [∵Corresponding parts of congruent triangles are equal]

Question 6:

In Figure, AC = AE, AB = AD and ∠BAD = ∠EAC. Show that BC = DE.



Answer 6:

∠BAD = ∠EAC	[∵ Given]

Adding ∠DAC both sides, we have

∠BAD + ∠DAC = ∠EAC + ∠DAC

⇒ ∠BAC = ∠EAD

In ΔBAC and ΔDAE,

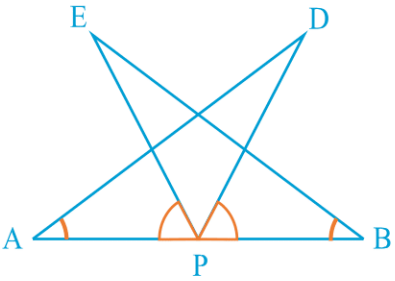
AB = AD	[∵ Given]
∠BAC = ∠EAD	[∵ Proved above]
AC = AE	[∵ Given]
Hence, ΔBAC ≅ ΔDAE	[∵ SAS Congruency Rule]
BC = DE	[∵Corresponding parts of congruent triangles are equal]

Question 7:

AB is a line segment and P is its mid-point. D and E are points on the same side of AB such that ∠BAD = ∠ABE and ∠EPA = ∠DPB (see Figure). Show that

(i) ΔDAP ≅ ΔEBP

(ii) AD = BE



Answer 7:

(i) ∠EPA =∠DPB [∵ Given]

Adding ∠EPD both sides, we have

∠EPA + ∠EPD = ∠DPB + ∠EPD

⇒ ∠APD = ∠BPE

In ΔDAP and ΔEBP,

∠A = ∠B	[∵ Given]
AP = PB	[∵ P is mid-point of line segment AB]
∠APD = ∠BPE	[∵ Proved above]
Hence, ΔDAP ≅ ΔEBP	[∵ ASA Congruency Rule]

(ii) AD = BE [∵Corresponding parts of congruent triangles are equal]

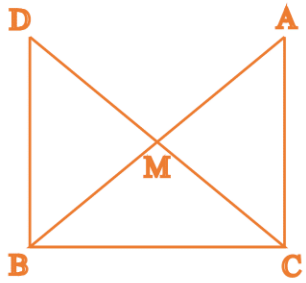
Question 8:

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) $\Delta AMC \cong \Delta BMD$

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

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



Answer 8:

(i) In ΔAMC and ΔBMD,

$CM = DN$	[∵ Given]
$\angle AMC = \angle BMD$	[∵ Vertically Opposite Angles]
$AM = MB$	[∵ M is the mid-point of line segment AB]
Hence, $\Delta AMC \cong \Delta BMD$	[∵ SAS Congruency Rule]

(ii) $\Delta AMC \cong \Delta BMD$ [∵ Proved above]

$\angle CAM = \angle DBM$ [∵Corresponding parts of congruent triangles are equal]

Since, alternate angles ($\angle CAM$ and $\angle DBM$) are equal, therefore AC || BD.

$\angle ACB + \angle DBC = 180°$ [∵ Co-interior angles]

$\Rightarrow 90° + \angle DBC = 180°$ [∵ Angle C is right angle]

$\Rightarrow \angle DBC = 180° - 90° = 90°$

Hence, $\angle DBC$ is a right angle.

(iii) In ΔDBC and ΔACB,

$DB = AC$	[∵ $\Delta AMC \cong \Delta BMD$]
$\angle DBC = \angle ACB$	[∵ Proved above]
$BC = BC$	[∵ M is the mid-point of line segment AB]
Hence, $\Delta DBC \cong \Delta ACB$	[∵ SAS Congruency Rule]