NCERT Solutions for Class 9 Maths Chapter 7 Triangles Ex 7.2

Question 1.

In an isosceles triangle ABC, with AB = AC, the bisectors of ∠ B and ∠ C intersect each other at O. Join A to O. Show that:

(i) OB = OC

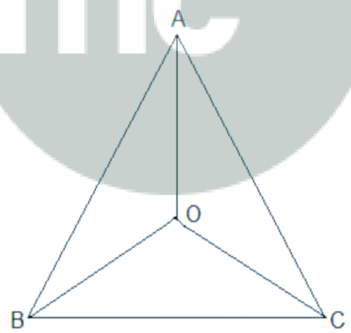
(ii) AO bisects ∠ A

Solution.

It is given in the question that:

AB = AC

The bisectors of ∠B and ∠C intersect each other at O



(i) ABC is an isosceles with AB = AC

Therefore,

∠B = ∠C

$\frac{1}{2}$ ∠B = $\frac{1}{2}$ ∠C

∠OBC = ∠OCB (Angles bisectors)

OB = OC (Side opposite to the equal angles are equal)

(i) In $\Delta AOB \text{ and } \Delta AOC,$

AB = AC (Given)

AO = AO (Common)

OB = OC (Proved above)

Therefore,

By SSS congruence rule

$\Delta AOB \cong \Delta AOC$

∠BAO = ∠CAO (By c.p.c.t)

Thus,

AO bisects ∠A

Question 2.

In Δ ABC, AD is the perpendicular bisector of BC (see figure). Show that Δ ABC is an isosceles triangle in which AB = AC.

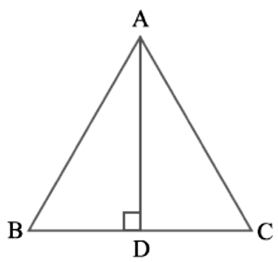


Fig. 7.30

Solution.

It is given in the question that:

AD is the perpendicular bisector of BC

To show: AB = AC

Proof: In ΔADB and ΔADC,

AD = AD (Common)

∠ADB = ∠ADC

BD = CD (AD is the perpendicular bisector)

Therefore,

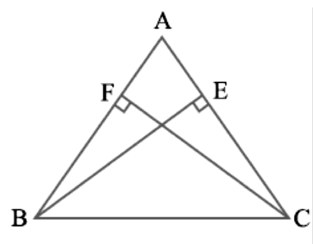
By SAS congruence axiom,

$\Delta ADB \cong \Delta ADC$

AB = AC (By c.p.c.t)

Question 3.

ABC is an isosceles triangle in which altitudes BE and CF are drawn to equal sides AC and AB respectively (see figure). Show that these altitudes are equal.



Solution.

It is given in the question that:

BE and CF are altitudes

AC = AB

To show: BE = CF

Proof: In $\Delta AEB\ and\ \Delta AFC,$

∠A = ∠A (Common)

∠AEB = ∠AFC (Right angles)

AB = AC (Given)

Therefore,

By AAS congruence axiom,

$\Delta AEB\ \cong\ \Delta AFC$

Thus,

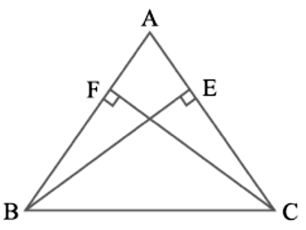
BE = CF (By c.p.c.t)

Question 4.

ABC is a triangle in which altitudes BE and CF to sides AC and AB are equal (see figure) Show that:

(i) Δ ABE ≅Δ ACF

(ii) AB = AC, i.e., ABC is an isosceles triangle



Solution.

It is given in the question that:

BE = CF

(i) In $\Delta ABE\ and\ \Delta ACF,$

∠A = ∠A (Common)

∠AEB = ∠AFC (Right angles)

BE = CF (Given)

Therefore,

By AAS axiom,

$\Delta ABE\ \cong\ \Delta ACF$

(ii) Thus,

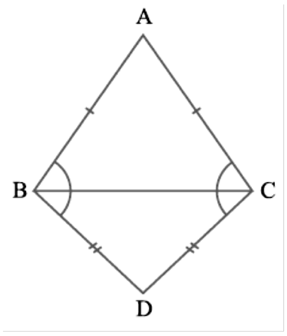
AB = AC (By c.p.c.t)

Therefore,

ABC is an isosceles triangle

Question 5.

ABC and DBC are two isosceles triangles on the same base BC (see figure). Show that∠ ABD = ∠ ACD



Solution.

It is given in the question that:

ABC and DBC are two isosceles triangles

To show: ∠ABD = ∠ACD

Proof: In ΔABD and ΔACD,

AD = AD (Common)

AB = AC (ABC is an isosceles triangle)

BD = CD (BCD is an isosceles triangle)

Therefore,

By SSS axiom,

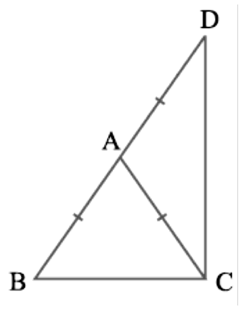
$\Delta ABD \cong \Delta ACD$

Thus,

∠ABD = ∠ACD (By c.p.c.t)

Question 6.

ΔABC is an isosceles triangle in which AB = AC. Side BA is produced to D such that AD = AB (see figure). Show that $\angle$ BCD is a right angle.



Solution.

It is given in the question that:

AB = AC and

AD = AB

Proof: In ΔABC,

AB = AC (Given)

$\angle$ACB = $\angle$ABC (Angles opposite to equal sides are equal)

In ΔACD,

AD = AB

$\angle$ADC = $\angle$ACD (Angles opposite to equal sides are equal)

Now,

In ΔABC,

$\angle CAB + \angle ACB + \angle ABC = 180^o$

$\angle CAB + 2\angle ACB = 180^o$

$\angle CAB = 180^o - 2\angle ACB$ (i)

Similarly,

In ΔADC,

$\angle CAD = 180^o - 2\angle ACD$ (ii)

Also,

$\angle CAB + \angle CAD = 180^o$ (BD is a straight line)

Adding (i) and (ii), we get

$\angle CAB + \angle CAD = 180^o - 2\angle ACB + 180^o - 2\angle ACD$

$180^o = 360^o - 2\angle ACB - 2\angle ACD$

$2 (\angle ACB + \angle ACD) = 180^o$

$\angle BCD = 90^o$

Question 7.

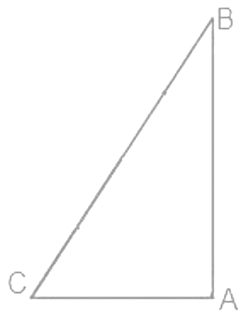
ABC is a right-angled triangle in which $\angle A = 90°$ and AB = AC. Find $\angle B$ and $\angle C$.

Solution. It is given in the question that:

$\angle A = 90^o$

And,

AB = AC



According to question,

AB = AC

∠B = ∠C (Angles opposite to equal sides are equal)

Now,

∠A + ∠B + ∠C = 180° (Sum of the interior angles of a triangle)

90° + 2∠B = 180°

2∠B = 90°

∠B = 45°

Thus,

∠B = ∠C = 45°

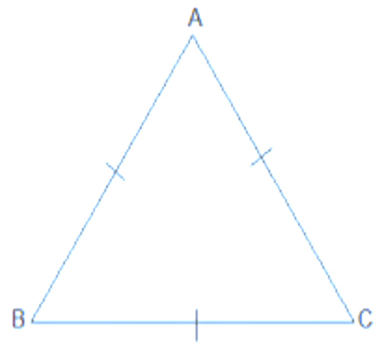
Question 8.

Show that the angles of an equilateral triangle are 60° each.

Solution.

Let us consider,

ABC be an equilateral triangle



BC = AC = AB (Length of all sides is same)

$\angle A = \angle B = \angle C$ (Sides opposite to the equal angles are equal)

Also,

$\angle A + \angle B + \angle C = 180^{\circ}$

$3\angle A = 180^{\circ}$

$\angle A = 60^{\circ}$

Therefore,

$\angle A = \angle B = \angle C = 60^{\circ}$

Thus,

The angles of an equilateral triangle are 60° each