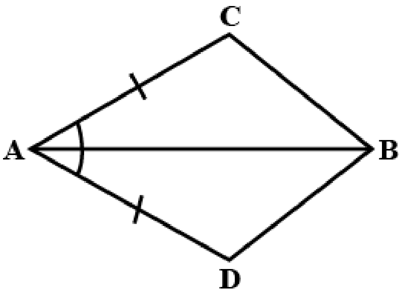
Exercise: 7.1

Q1. In quadrilateral ACBD, AC = AD and AB bisect ∠A (see Fig. 7.16). Show that ΔABC≅ ΔABD. What can you say about BC and BD?



Answer:

Given: AC = AD and AB bisects ∠A

To Prove: Δ ABC ≅ Δ ABD

We can show two sides and the included angle of ABC is equal to the corresponding sides and included angle of ABD.

In Δ ABC and Δ ABD,

AC = AD (Given)

∠CAB = ∠DAB (AB bisects ∠A)

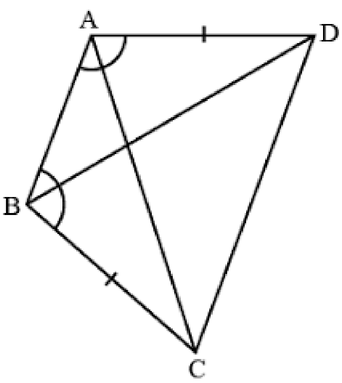
AB = AB (Common)

∴ Δ ABC ≅ Δ ABD (By SAS congruence rule)

∴ BC = BD (By CPCT)

Therefore, BC and BD are of equal lengths.

Q2. ABCD is a quadrilateral in which AD = BC and ∠DAB = ∠CBA (see Fig. 7.17). Prove that



(i) ΔABD ≅ ΔBAC

(ii) BD = AC

(iii) ∠ABD = ∠BAC.

Answer:

The parameters given by the questions are ∠DAB = ∠CBA and AD = BC.

(i) ΔABD and ΔBAC are similar by SAS congruency as

AB = BA (It is the common arm)

∠DAB = ∠CBA and AD = BC (These are given in the question)

So, triangles ABD and BAC are similar i.e. ΔABD ≅ ΔBAC. (Hence proved).

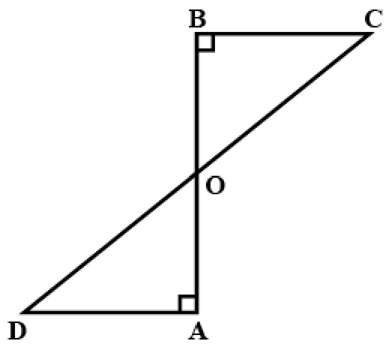
(ii) It is now known that ΔABD ≅ ΔBAC so,

BD = AC (by the rule of CPCT).

(iii) Since ΔABD ≅ ΔBAC so,

Angles ∠ABD = ∠BAC (by the rule of CPCT).

Q3. AD and BC are equal perpendiculars to a line segment AB (see Fig. 7.18). Show that CD bisects AB.

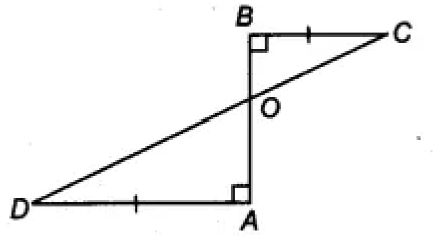


Answer:

Given: AD ⊥ AB, BC ⊥ AB, and AD = BC

To Prove: CD bisects AB or OA = OB

We can show that the two triangles OBC and OAD are congruent by using AAS congruency rule and then we can say corresponding parts of congruent triangles will be equal.



Consider two triangles △ BOC and △ AOD,

In △ BOC and △ AOD,

∠BOC = ∠AOD (Vertically opposite angles)

∠CBO = ∠DAO (Each 90º, since AD and BC are ⊥ to AB)

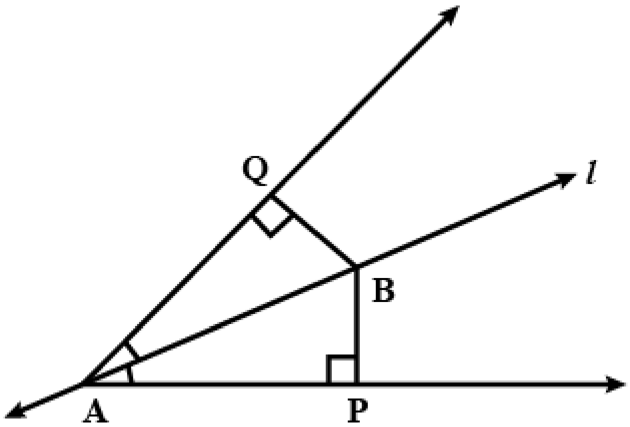
BC = AD (Given)

∴ △BOC ≅ △AOD (AAS congruence rule)

∴ BO = AO (By CPCT)

Thus, CD bisects AB, and O is the mid-point of AB.

Q5. 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 Fig. 7.20). Show that:



Answer:

Given: l is the bisector of an angle ∠A and BP ⊥ AP and BQ ⊥ AQ

To Prove: ΔAPB ≅ ΔAQB and BP = BQ

i) We can show two triangles APB and AQB are congruent by using AAS congruency rule and then show that the corresponding parts of congruent triangles will be equal.

In ΔAPB and ΔAQB,

∠BAP = ∠BAQ (l is the angle bisector of ∠A)

∠APB = ∠AQB (Each 90°)

AB = AB (Common)

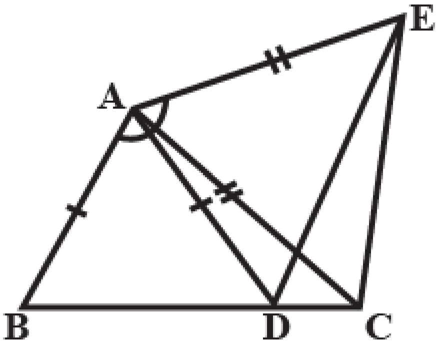
∴ ΔAPB ≅ ΔAQB (By AAS congruence rule)

ii) Since, ΔAPB ≅ ΔAQB

∴ BP = BQ (By CPCT)

Or, it can be said that point B is equidistant from the arms of ∠A.

6. In Fig. 7.21, AC = AE, AB = AD and ∠BAD = ∠EAC. Show that BC = DE.



Answer:

Given: AC = AE, AB = AD and ∠BAD = ∠EAC

To Prove: BC = DE

We can show two triangles BAC and DAE are congruent triangles by using SAS congruency rule and then we can say corresponding parts of congruent triangles will be equal.

It is given that ∠BAD = ∠EAC

Thus, by adding ∠DAC to both sides of this equation, we get

∠BAD + ∠DAC = ∠EAC + ∠DAC (∠DAC is common)

∠BAC = ∠DAE

In ΔBAC and ΔDAE,

AB = AD (Given)

∠BAC = ∠DAE (Proven above)

AC = AE (Given)

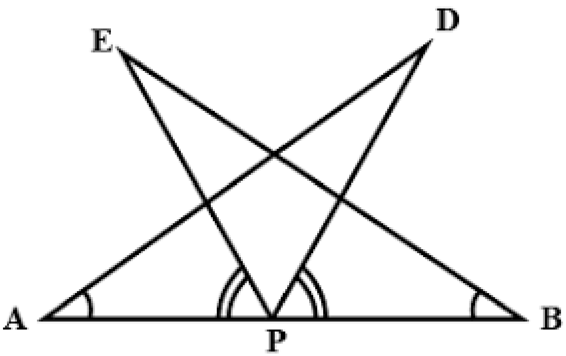
∴ ΔBAC ≅ ΔDAE (By SAS congruence rule)

∴ BC = DE (By CPCT)

Q7. 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 Fig. 7.22). Show that

(i) ΔDAP ≅ ΔEBP

(ii) AD = BE



Given: P is its mid-point of AB, ∠BAD = ∠ABE and ∠EPA = ∠DPB

To Prove: i) ΔDAP ≅ ΔEBP and (ii) AD = BE.

Reasoning: We can show two triangles DAP and EBP congruent by using ASA congruency rule and then we can say corresponding parts of congruent triangles will be equal.

i) It is given that ∠EPA = ∠DPB

∠EPA + ∠DPE = ∠DPB + ∠DPE (∠DPE is common)

∴ ∠DPA = ∠EPB

In ΔDAP and ΔEBP,

∠DAP = ∠EBP (Given)

AP = BP (P is mid-point of AB)

∠DPA = ∠EPB (Proven above)

∴ ΔDAP ≅ ΔEBP (ASA congruence rule)

ii) Since, ΔDAP ≅ ΔEBP

∴ AD = BE (By CPCT)

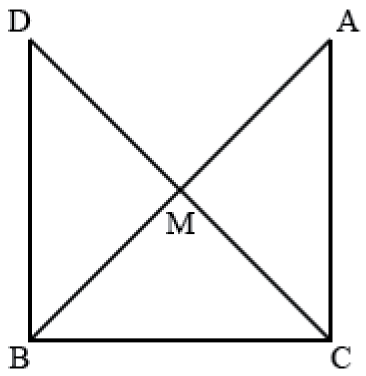
8. In right triangle ABC, right-angled at C, M is the mid-point of hypotenuse AB. C is joined to M and produced to a point D such that DM = CM. Point D is joined to point B (see Fig. 7.23). Show that:

(i) ΔAMC ≅ ΔBMD

(ii) ∠DBC is a right angle.

(iii) ΔDBC ≅ ΔACB

(iv) CM = ½ AB



Answer:

Given: M is the mid-point of hypotenuse AB, ∠C = 90° and DM = CM

To Prove:

i) ΔAMC ≅ ΔBMD

ii) ∠DBC is a right angle.

iii) ΔDBC ≅ ΔACB

iv) CM = 1/2 AB

i) In ΔAMC and ΔBMD,

AM = BM (M is the mid - point of AB)

∠AMC = ∠BMD (Vertically opposite angles)

CM = DM (Given)

∴ ΔAMC ≅ ΔBMD (By SAS congruence rule)

∴ AC = BD (By CPCT)

Also, ∠ACM = ∠BDM (By CPCT)

ii) ∠DBC is a right angle.

We know that, ∠ACM = ∠BDM (proved above)

But, ∠ACM and ∠BDM are alternate interior angles. Since alternate angles are equal, it can be said that DB || AC.

∠DBC + ∠ACB = 180° (Co-interior angles)

∠DBC + 90° = 180° [Since, ΔACB is a right angled triangle]

∴ ∠DBC = 90°

Thus, ∠DBC is a right angle.

iii) In ΔDBC and ΔACB,

DB = AC (Already proved)

∠DBC = ∠ACB = 90° (Proved above)

BC = CB(Common)

∴ Δ DBC ≅ Δ ACB (SAS congruence rule)

iv) CM = 1/2 AB

Since Δ DBC ≅ Δ ACB

AB = DC (By CPCT)

⇒ 1/2 AB = 1/2 DC

It is given that M is the midpoint of DC and AB.

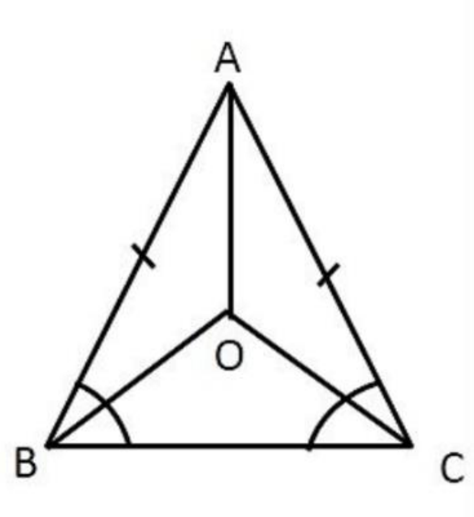
CM = 1/2 DC = 1/2 AB

∴ CM = 1/2 AB

Exercise: 7.3

Q1. 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



Answer:

Given: Triangle ABC is isosceles in which AB=AC also OB and OC are bisectors of angle B and angle C

To Prove: i) OB = OC ii) AO bisects ∠A

Let's construct a diagram according to the given question.

i) OB = OC

It is given that in triangle ABC,

AB = AC (given)

∠ACB = ∠ABC (Angles opposite to equal sides of an isosceles triangle are equal)

1/2 ∠ACB = 1/2 ∠ABC

⇒ ∠OCB = ∠OBC (Since OB and OC are the angle bisectors of ∠ABC and ∠ACB)

∴ OB = OC (Sides opposite to equal angles of an isosceles triangle are also equal)

ii) AO bisects ∠A

In ΔOAB and ΔOAC,

AO = AO (Common)

AB = AC (Given)

OB = OC (Proved above)

Therefore,

ΔOAB ≅ ΔOAC (By SSS congruence rule)

Also, we can use an alternative approach as shown below,

∠OBA = ∠OCA (OB and OC bisects angle ∠B and ∠C)

AB = AC (Given)

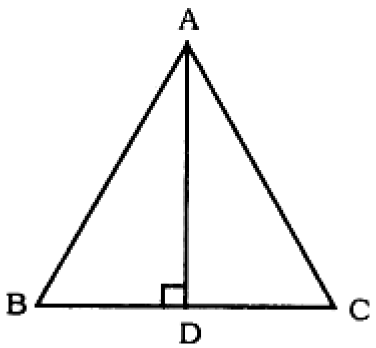
OB = OC (Proved above)

ΔOAB ≅ ΔOAC (By SAS congruence rule)

⇒ ∠BAO = ∠CAO (CPCT)

∴ AO bisects ∠A or AO is the angle bisector of ∠A.

2. In ΔABC, AD is the perpendicular bisector of BC (see Fig. 7.30). Show that ΔABC is an isosceles triangle in which AB = AC.



Answer:

Given: AD is the perpendicular bisector of BC means ∠ADB = ∠ADC = 90° and BD = DC

To Prove: ΔABC is an isosceles triangle in which AB = AC.

In ΔADC and ΔADB,

AD = AD (Common)

∠ADC = ∠ADB (Each 90°)

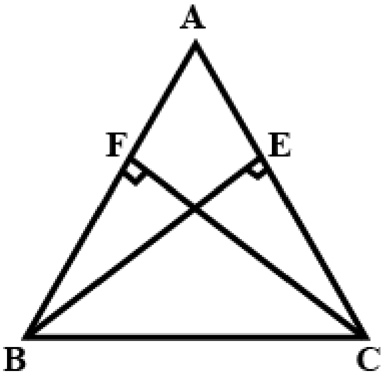
CD = BD (AD is the perpendicular bisector of BC)

∴ ΔADC ≅ ΔADB (By SAS congruence rule)

∴ AB = AC (By CPCT)

Therefore, ABC is an isosceles triangle in which AB = AC.

3. ABC is an isosceles triangle in which altitudes BE and CF are drawn to equal sides AC and AB respectively (see Fig. 7.31). Show that these altitudes are equal.



Answer:

Given: ΔABC is an isosceles triangle

To prove: BE = CF

In ΔAEB and ΔAFC,

∠AEB = ∠AFC (Each 90° as BE and CF are altitudes)

∠A = ∠A (Common angle)

AB = AC (Given ΔABC is an isosceles triangle)

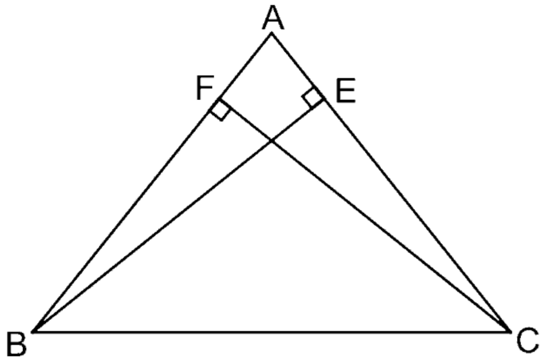
∴ ΔAEB ≅ ΔAFC (By AAS congruence rule)

∴ BE = CF (By CPCT)

4. ABC is a triangle in which altitudes BE and CF to sides AC and AB are equal (see Fig. 7.32). Show that

(i) ΔABE ≅ ΔACF

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



Answer:

(i) In ΔABE and ΔACF,

∠AEB = ∠AFC (Each 90°)

∠A = ∠A (Common angle)

BE = CF (Given)

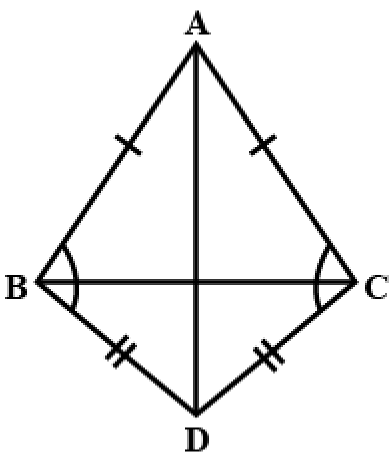
∴ ΔABE ≅ ΔACF (By AAS congruence rule)

(ii) We have proved above that ΔABE ≅ ΔACF

∴ AB = AC (By CPCT)

Hence, ΔABC is an isosceles triangle.

5. ABC and DBC are two isosceles triangles on the same base BC (see Fig. 7.33). Show that ∠ABD = ∠ACD.



Answer:

Given: ABC and DBC are isosceles triangles

To Prove: ∠ABD = ∠ACD

Let's join point A and point B.

In △DAB and △DAC,

AB = AC (Given)

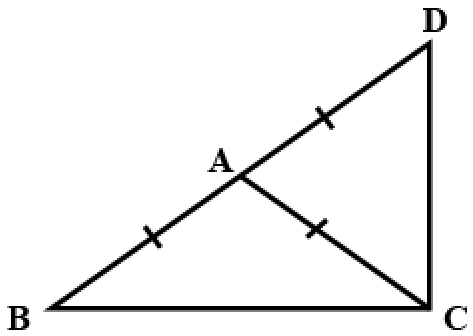
BD = CD (Given)

AD = AD (Common side)

∴ △ ABD ≅ △ ACD (By SSS congruence rule)

∴ ∠ABD = ∠ACD (By CPCT)

Q6. ΔABC is an isosceles triangle in which AB = AC. Side BA is produced to D such that AD = AB (see Fig. 7.34). Show that ∠BCD is a right angle.



Answer:

We can use the property that angles opposite to equal sides are equal and then by the angle sum property in triangle BCD we can show the required result.

In isosceles triangle ABC,

AB = AC (Given)

∴ ∠ACB = ∠ABC (Angles opposite to equal sides of a triangle are equal)

Let ∠ACB = ∠ABC be x. ----------- (1)

In ΔACD,

AC = AD (Since, AB = AD)

∴ ∠ADC = ∠ACD (Angles opposite to equal sides of a triangle are equal)

Let ∠ADC = ∠ACD be y. ----------- (2)

Thus, ∠BCD = ∠ACB + ∠ACD = x + y ----------- (3)

In ΔBCD,

∠ABC + ∠BCD + ∠ADC = 180° (Angle sum property of a triangle)

Substituting the values we get,

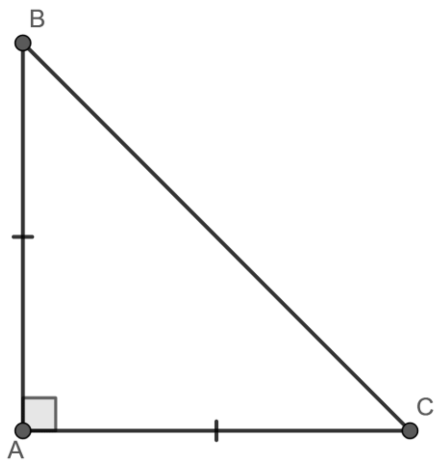
x + (x + y) + y = 180° [From equation (1), (2) and (3)]

2 (x + y) = 180°

2(∠BCD) = 180° [From equation(3)]

∴ ∠BCD = 90°

Q7. ABC is a right-angled triangle in which ∠A = 90° and AB = AC. Find ∠B and ∠C.



Answer:

We can use the property that angles opposite to equal sides are equal and then by using angle sum property in triangle ABC we can find the value of ∠B and ∠C.

It is given that,

AB = AC

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

Let ∠B = ∠C = x

In ΔABC,

∠A + ∠B + ∠C = 180° (Angle sum property of a triangle)

90°+ x + x = 180°

90°+ 2x = 180°

2x = 90°

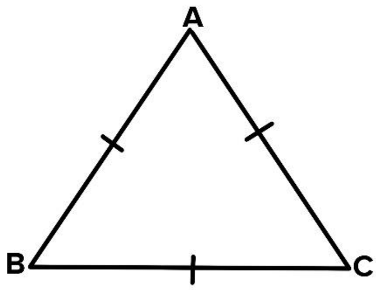
x = 45°

∴ ∠B = ∠C = 45°

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

Answer:

Let's draw an equilateral triangle ABC as shown below.



Therefore,

AB = BC = AC

∴ ∠C = ∠A = ∠B (Angles opposite to equal sides of a triangle are equal)

Let ∠A = ∠B = ∠C be x.

In △ ABC,

∠A + ∠B + ∠C = 180° (Angle sum property of a triangle)

⇒ x + x + x = 180°

⇒ 3x = 180°

⇒ x = 60°

∴ ∠A = ∠B = ∠C = 60°

Hence, in an equilateral triangle, all interior angles are of measure 60°.

Exercise: 7.3

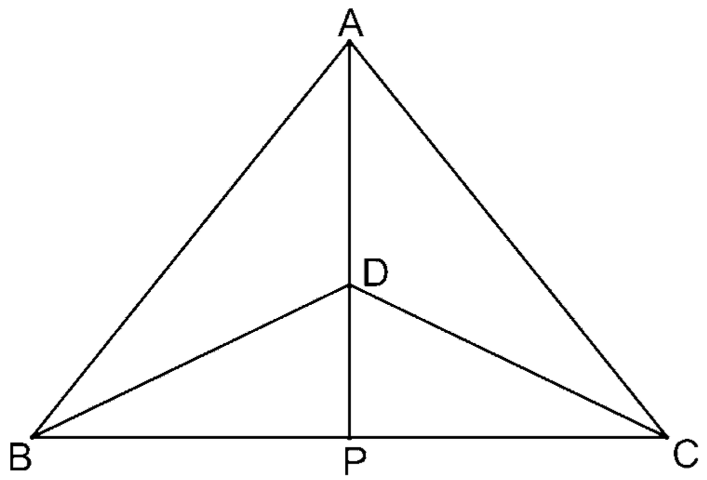
1. ΔABC and ΔDBC are two isosceles triangles on the same base BC and vertices A and D are on the same side of BC (see Fig. 7.39). If AD is extended to intersect BC at P, show that

(i) ΔABD ≅ ΔACD

(ii) ΔABP ≅ ΔACP

(iii) AP bisects ∠A as well as ∠D.

(iv) AP is the perpendicular bisector of BC.



Answer:

Given: Δ ABC and Δ DBC are isosceles triangles.

(i) In ΔABD and ΔACD,

AB = AC (Equal sides of isosceles ΔABC)

BD = CD (Equal sides of isosceles ΔDBC)

AD = AD (Common)

ΔABD ≅ ΔACD (By SSS congruence rule)

By CPCT, we get

∠BAD = ∠CAD

∠BAP = ∠CAP…. (1)

∠ADB = ∠ADC…. (2)

(ii) In ΔABP and ΔACP,

AB = AC (Given)

∠BAP = ∠CAP [From equation (1)]

AP = AP (Common)

∴ ΔABP ≅ ΔACP (By SAS congruence rule)

∴ BP = CP (By CPCT)…. (3)

(iii) From Equation (1) we know that ∠BAP = ∠CAP

Hence, AP is the angle bisector of ∠A.

From equation (2), we know that ∠ADB = ∠ADC

⇒ 180° - ∠ADB = 180° - ∠ADC

⇒ ∠BDP = ∠CDP .... (4)

Hence, AP is the bisector of ∠D.

(iv) In ΔBDP and ΔCDP,

DP = DP (Common side)

∠BDP = ∠CDP (Using (4))

DB = DC (Equal sides of isosceles ΔDBC)

∴ ΔBDP ≅ ΔCDP (By SAS conguence rule)

∴ ∠BPD = ∠CPD (By CPCT)…. (5)

∠BPD + ∠CPD = 180° (Linear pair angles)

∠BPD + ∠BPD = 180° [From Equation (5)]

∠BPD = 90°… (6)

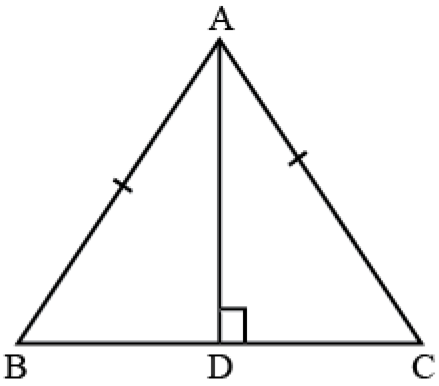
Also, BP = CP [From equation (3)]

Thus, AP is the perpendicular bisector of BC.

Q2. AD is the altitude of an isosceles triangle ABC in which AB = AC. Show that

(i) AD bisects BC (ii) AD bisects ∠A.

Answer:



(i) In ΔBAD and ΔCAD,

∠ADB = ∠ADC (Each 90° as AD is an altitude)

AB = AC (Given)

AD = AD (Common)

∴ ΔBAD ≅ ΔCAD (By RHS Congruence rule)

∴ BD = CD (By CPCT)

Hence, AD bisects BC.

(ii) Since, ΔBAD ≅ ΔCAD

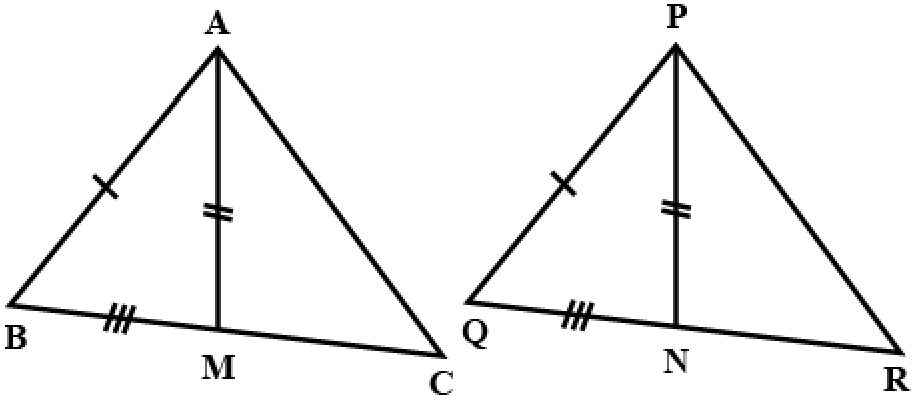
By CPCT, ∠BAD = ∠CAD

Hence, AD bisects ∠A.

Q3. Two sides AB and BC and median AM of one triangle ABC are respectively equal to sides PQ and QR and median PN of ΔPQR (see Fig. 7.40). Show that:

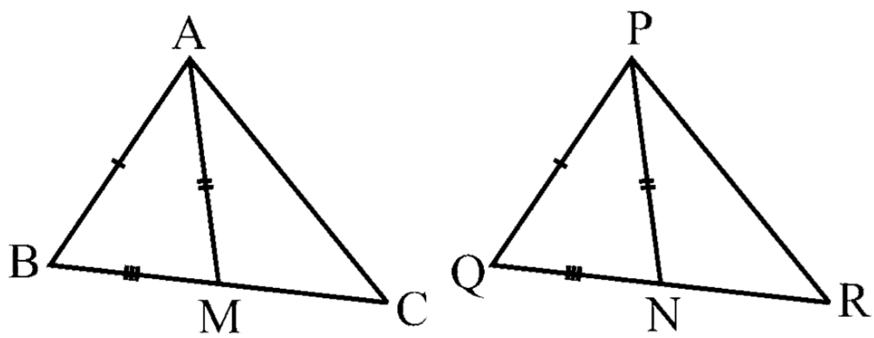
(i) ΔABM ≅ ΔPQN

(ii) ΔABC ≅ ΔPQR



Answer:

Given: AB = PQ, AM = PN, BM = QN



(i) In ΔABC, AM is the median to BC.

∴ BM = 1/2 BC

In ΔPQR, PN is the median to QR.

∴ QN = 1/2 QR

It is given that BC = QR

∴ 1/2 BC = 1/2 QR

∴ BM = QN … (1)

In ΔABM and ΔPQN,

AB = PQ (Given)

BM = QN [From equation (1)]

AM = PN (Given)

∴ ΔABM ≅ ΔPQN (Using SSS congruence criterion)

⇒ ∠ABM = ∠PQN (By CPCT)

⇒ ∠ABC = ∠PQR … (2)

(ii) In Δ ABC and Δ PQR ,

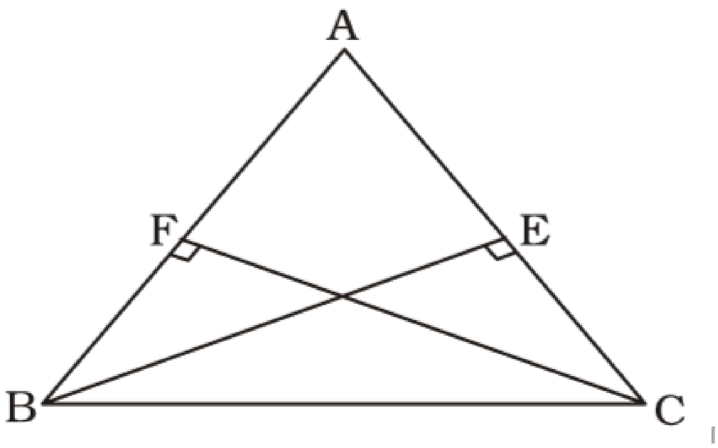
AB = PQ (Given)

∠ABC = ∠PQR [From Equation (2)]

BC = QR (Given)

∴ ΔABC ≅ ΔPQR (By SAS congruence rule)

Q4. BE and CF are two equal altitudes of a triangle ABC. Using RHS congruence rule, prove that the triangle ABC is isosceles.



Answer:

It is known that BE and CF are two equal altitudes.

Now, in ΔBEC and ΔCFB,

∠BEC = ∠CFB = 90° (Same Altitudes)

BC = CB (Common side)

BE = CF (Common side)

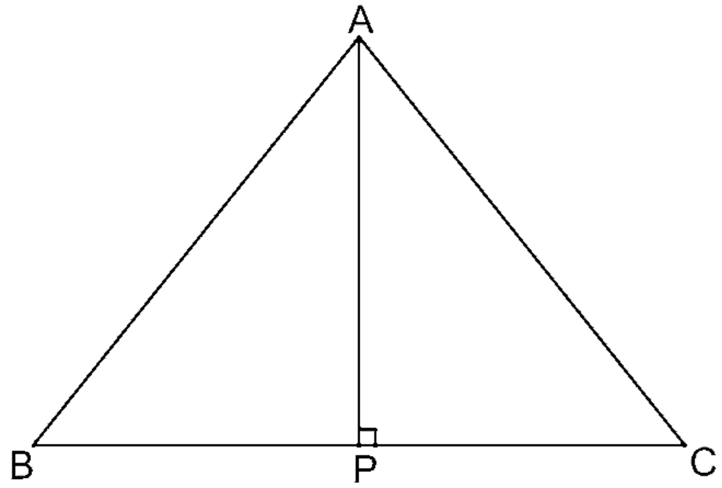
So, ΔBEC ≅ ΔCFB by RHS congruence criterion.

Also, ∠C = ∠B (by CPCT)

Therefore, AB = AC as sides opposite to the equal angles is always equal.

Q5. ABC is an isosceles triangle with AB = AC. Draw AP ⊥ BC to show that ∠B = ∠C.

Answer:



In triangles APB and APC,

∠APB = ∠APC (Each 90°)

AB = AC (Since ABC is an isosceles triangle)

AP = AP (Common)

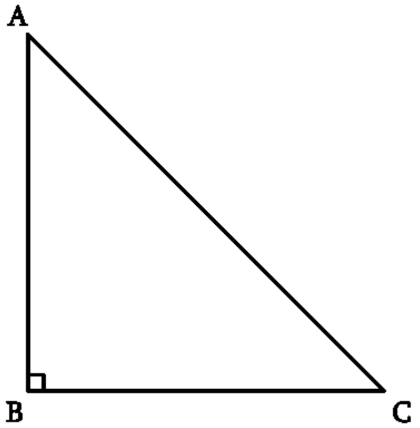
ΔAPB ≅ ΔAPC (Using RHS congruence rule)

Thus, ∠B = ∠C (CPCT)

Exercise: 7.4

Q1. Show that in a right-angled triangle, the hypotenuse is the longest side.

Answer:



Let us consider a right-angled triangle ABC, right-angled at B.

In ΔABC,

$\angle A + \angle B + \angle C = 180°$ (Angle sum property of a triangle)

$\angle A + 90^o + \angle C = 180°$

$\angle A + \angle C = 90°$

Hence, the other two angles have to be acute (i.e., less than 90^o).

Thus, ∠B is the largest angle in ΔABC.

So, $\angle B > \angle A$ and $\angle B > \angle C$

Therefore, AC > BC and AC > AB [Using theorem 7.7 of triangles, in any triangle, the side opposite to the larger (greater) angle is longer.]

Therefore, AC is the largest side in ΔABC.

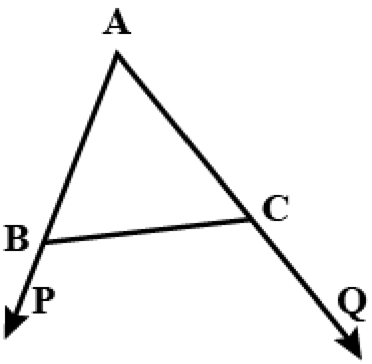
However, AC is the hypotenuse of ΔABC.

Therefore, the hypotenuse is the longest side in a right-angled triangle.

Q2. In Fig. 7.48, sides AB and AC of ΔABC are extended to points P and Q respectively. Also, ∠PBC < ∠QCB. Show that AC > AB.

Answer:

Let's look into the solution below.



In the given figure,

∠ABC + ∠PBC = 180° [Linear pair of angles]

Also, ∠ABC = 180° - ∠PBC ... (1)

∠ACB + ∠QCB = 180° [Linear pair]

∠ACB = 180° - ∠QCB ... (2)

As ∠PBC < ∠QCB (given),

180^o - ∠PBC > 180^o - ∠QCB

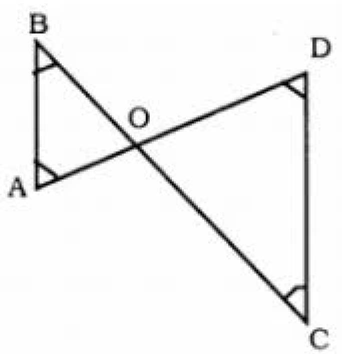
∠ABC > ∠ACB [From Equations (1) and (2)]

Thus, AC > AB (Side opposite to the larger angle is larger).

Hence proved, AC > AB.

Q3. In Fig. 7.49, ∠B < ∠A and ∠C < ∠D. Show that AD < BC.

Answer:



Given: ∠B < ∠A and ∠C < ∠D

To prove: AD < BC

We can use the fact that in any triangle, the side opposite to the larger (greater) angle is longer.

In ΔAOB, ∠B < ∠A (given)

AO < OB (The side opposite to the smaller angle is smaller) ... (1)

In ΔCOD, ∠C < ∠D

OD < OC (The side opposite to the smaller angle is smaller) ... (2)

On adding Equations (1) and (2), we obtain

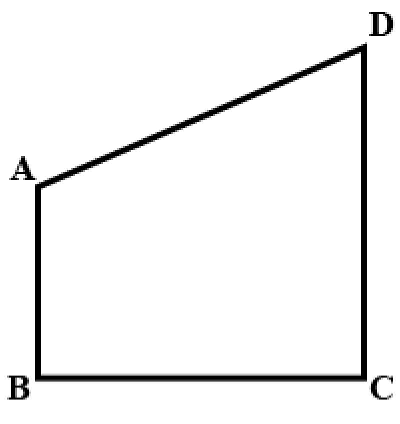
AO + OD < BO + OC

AD < BC

Hence, proved

Q4. AB and CD are respectively the smallest and longest sides of a quadrilateral ABCD (see Fig. 7.50).

Show that ∠A > ∠C and ∠B > ∠D.

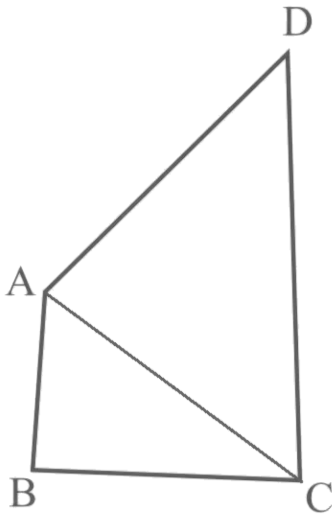


Answer:

Given: AB and CD are respectively the smallest and longest sides of a quadrilateral ABCD

To prove: ∠A > ∠C and ∠B > ∠D

Let's join vertex A to C as shown below.



In the above ΔABC,

AB < BC (given AB is the smallest side of quadrilateral ABCD)

∠ACB < ∠BAC (Angle opposite to the smaller side is smaller) ... (1)

In ΔADC,

AD < CD (given CD is the largest side of quadrilateral ABCD)

∠ACD < ∠CAD (Angle opposite to the smaller side is smaller) ... (2)

On adding Equations (1) and (2), we obtain

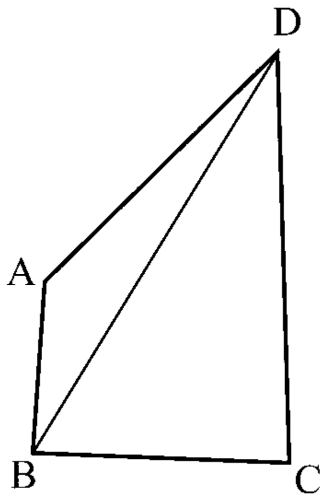
∠ACB + ∠ACD < ∠BAC + ∠CAD

∠C < ∠A

This means, ∠A > ∠C

Hence Proved.

Let's now join BD.



In ΔABD,

AB < AD (Given AB is the smallest side of quadrilateral ABCD)

∠ADB < ∠ABD (Angle opposite to the smaller side is smaller) ...(3)

In ΔBDC,

BC < CD (Given CD is the largest side of quadrilateral ABCD)

∠BDC < ∠CBD (Angle opposite to the smaller side is smaller) ... (4)

On adding equations (3) and (4), we obtain

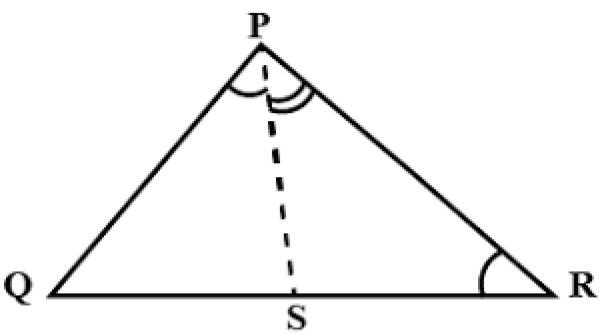
∠ADB + ∠BDC < ∠ABD + ∠CBD

∠D < ∠B

This means, ∠B > ∠D

Hence, proved.

Q5. In Fig 7.51, PR > PQ and PS bisect ∠QPR. Prove that ∠PSR > ∠PSQ.



Given: PR > PQ and PS bisects ∠QPR

To prove: ∠PSR > ∠PSQ

As PR > PQ, ∠PQS > ∠PRS (Angle opposite to larger side is larger) ...(1)

PS is the angle bisector of ∠QPR.

∠QPS = ∠RPS ...(2) [Since, PS bisects ∠QPR]

∠PSR is the exterior angle of ΔPQS.

∠PSR = ∠PQS + ∠QPS ...(3) [Using exterior angle sum property]

∠PSQ is the exterior angle of ΔPRS.

∠PSQ = ∠PRS + ∠RPS ...(4) [Using exterior angle sum property]

From Equations (1) and (2), we obtain

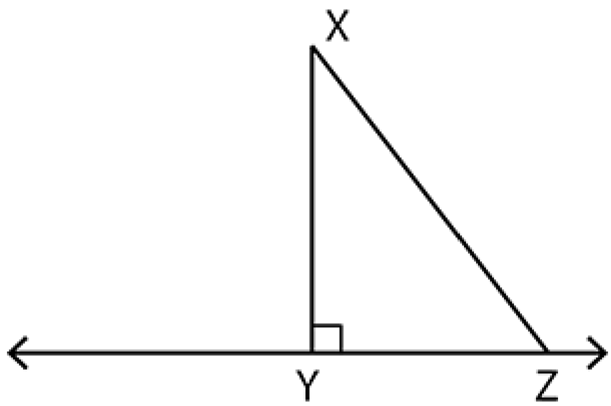
∠PQS + ∠QPS > ∠PRS + ∠RPS

∠PSR > ∠PSQ [From Equations (3) and (4)]

Q6. Show that the perpendicular line segment is the shortest of all line segments drawn from a given point, not on it.

Answer:

We know that in a triangle if one angle is 90 degrees, then the other angles have to be acute.



Let us take a line l and from point P, that is, not on line l, draw two line segments PN and PM. Let PN be perpendicular to line l and PM is drawn at some other angle.

In ΔPNM, ∠N = 90^o

∠P + ∠N + ∠M = 180^o (Angle sum property of a triangle)

$\angle P + \angle M = 90^o$

Clearly, ∠M is an acute angle.

$\angle M < \angle N$

PN < PM (The side opposite to the smaller angle is smaller)

Similarly, by drawing different line segments from P to l, it can be proved that PN is smaller in comparison to all of them. Therefore, it can be observed that of all line segments drawn from a given point not on it, the perpendicular line segment is the shortest.

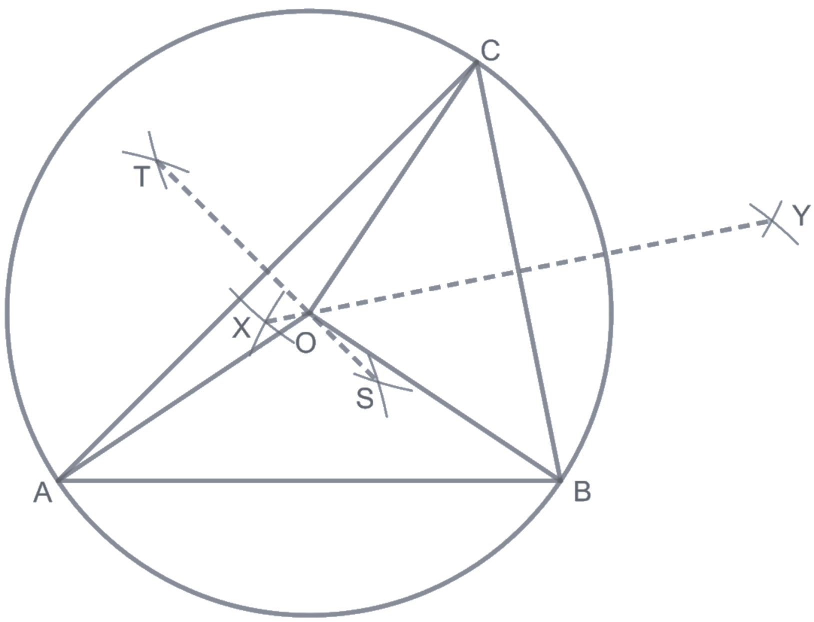
Exercise: 7.5

Q1. ABC is a triangle. Locate a point in the interior of ΔABC that is equidistant from all the vertices of ΔABC.

Answer:

Circumcentre is the point where perpendicular bisectors of the sides of the triangle meet together.

The circumcentre of a triangle is always equidistant from all the vertices of that triangle.



In ΔABC, we can find the circumcentre by drawing the perpendicular bisectors of sides AC and CB.

As we see that O is the point where these bisectors are meeting.

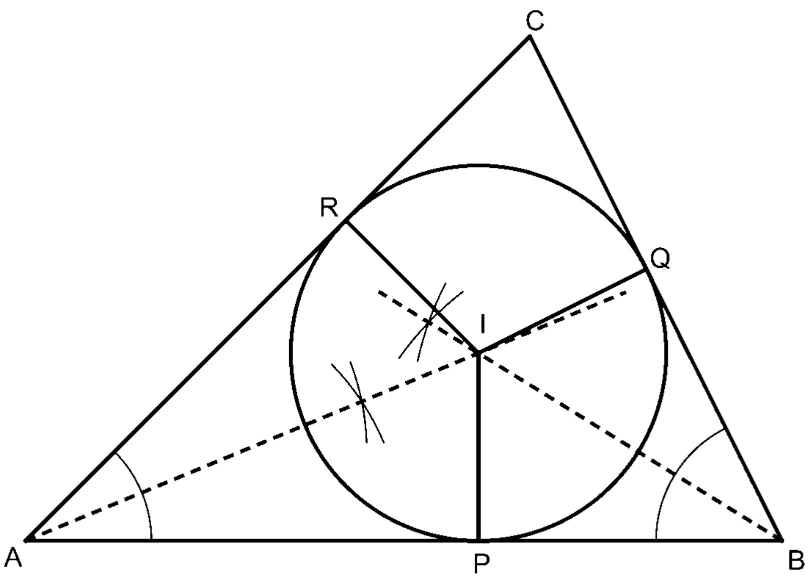
Therefore, O which is called the circumcentre is the point that is equidistant from all the vertices of ΔABC that is, OA = OB = OC.

Q2. In a triangle locate a point in its interior that is equidistant from all the sides of the triangle.

Answer:

The point which is equidistant from all the sides of a triangle is called the incentre of the triangle.

The incentre of a triangle is the intersection point of the angle bisectors of the interior angles of that triangle.



Here, in ΔABC, we can find the incentre of this triangle by drawing the angle bisectors of the interior angles of this triangle. I is the point where these angle bisectors are intersecting each other.

Therefore, I is the point which is equidistant from all the sides of ΔABC that is IP = IQ = IP.

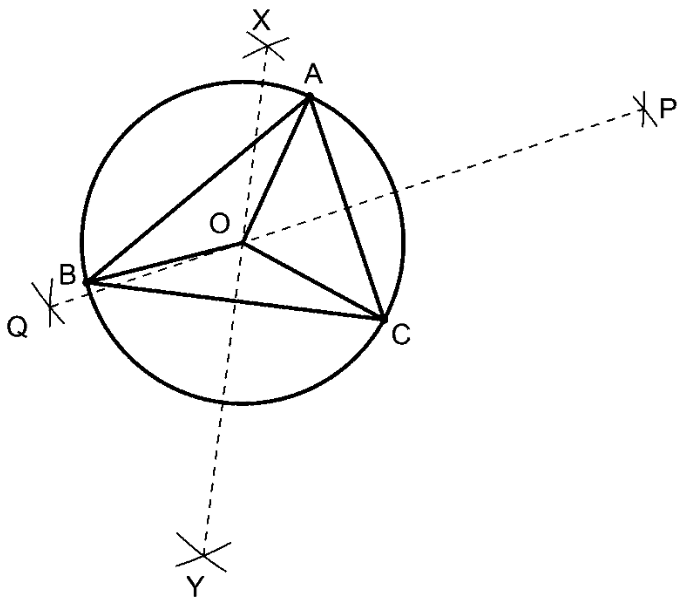
Q3. In a huge park, people are concentrated at three points (see Fig. 7.52):

A: where there are different slides and swings for children,
B: near which a man-made lake is situated,
C: which is near to a large parking and exit.
Where should an ice cream parlor be set up so that a maximum number of persons can approach it?
(Hint: The parlor should be equidistant from A, B, and C)

Answer: The maximum number of persons can approach the ice cream parlor if it is equidistant from A, B, and C. In a triangle, the circumcentre is the only point that is equidistant from its vertices.

So, the ice cream parlor should be set up at the circumcentre O of ΔABC as shown below.

We can find circumcentre O of this triangle by drawing perpendicular bisectors of the sides of this triangle.



In this situation, the maximum number of people can approach it.