MATHS

NCERT - NCERT MATHEMATICS(HINGLISH)

TRIANGLES

Exercise 7 3

1. BE and CF are two equal altitudes of a triangle ABC. Using RHS congruence rule,

prove that the triangle ABC is isosceles.

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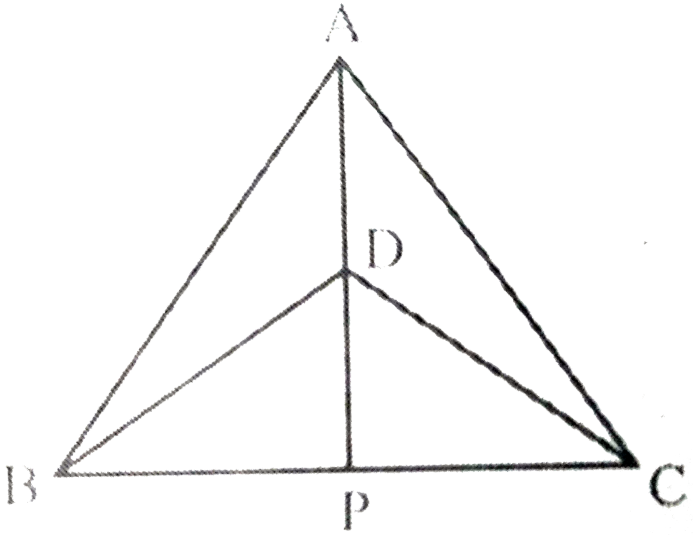
2. $\Delta ABC$and $\Delta DBC$are two isosceles triangles on the same base BC and vertices A and D are on the same side of BC (see Fig. 7.39). If AD is extended to intersect BC at P, show that (i) $\Delta ABD \cong \Delta ACD$

(ii) $\Delta ABP \cong \Delta ACP$

(iii) AP bisects $\angle A$ as well as $\angle D$

(iv) AP is the perpendicular bisector of BC



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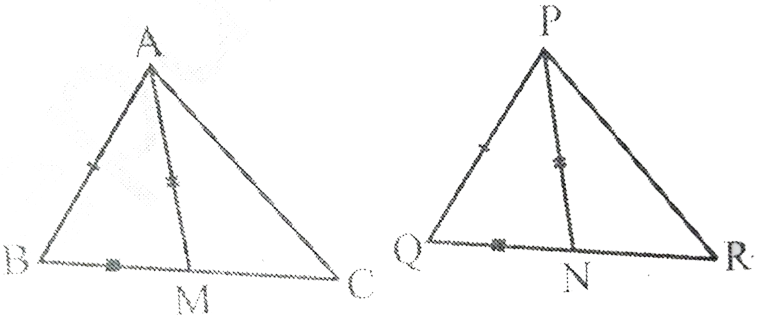
3. Two sides AB and BC and median AM of one triangle ABC are respectively equal to side PQ and QR and median PN of

$\Delta ABC \cong \Delta PQR$(see Fig. 7.40). Show that:

(i) $\Delta ABM \cong \Delta PQN$

(ii) $\Delta ABC \cong \Delta PQR$



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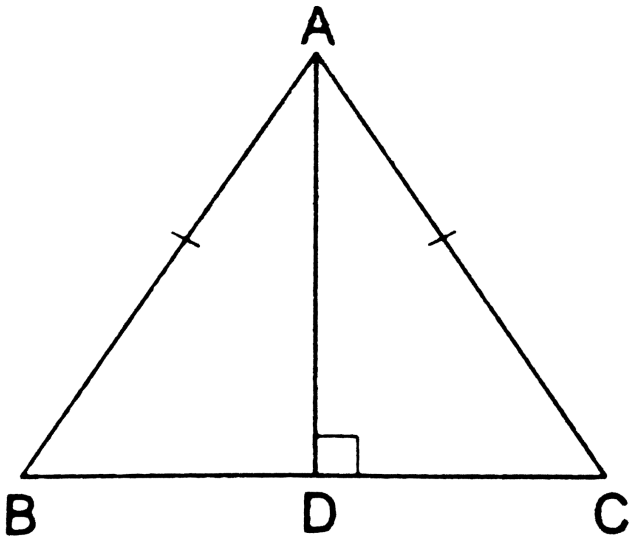
4. AD is an altitude of an isosceles ΔABC in which AB = AC.

Show that (i) AD bisects BC,

(ii) AD bisects $\angle A$.



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5. ABC is an isosceles triangle with $AB = AC$.

Draw $AP \perp BC$ to show that $\angle B = \angle C$.

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Solved Examples

1. AB is a line-segment. P and Q are points on opposite sides of AB such that each of them is equidistant from the points A and B (see Fig. 7.37). Show that the line PQ is the perpendicular bisector of AB

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2. In Fig. 7.8, $OA = OB and\, OD = OC$. Show that $(i)\Delta AOD \cong \Delta BOC$ and $(ii)AD \mid\mid BC$.

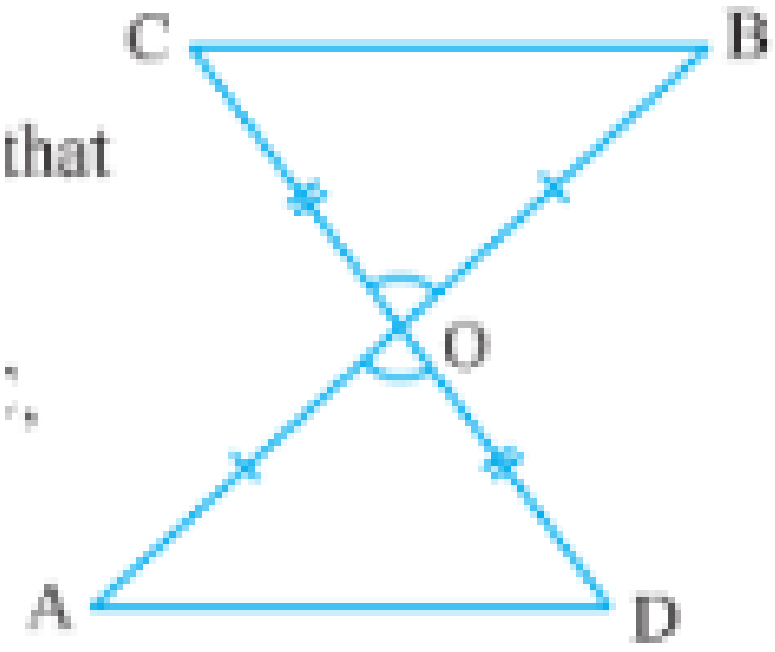

Fig. 7.8

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3. AB is a line segment and line l is its perpendicular bisector. If a point P lies on l, show that P is equidistant from A and B.

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4. Line-segment AB is parallel to another line-segment CD. O is the mid-point of AD (see Fig. 7.15). Show that

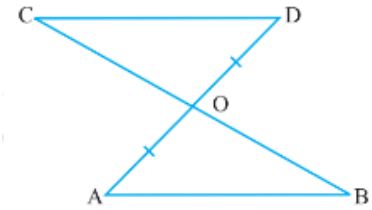

Fig. 7.15

(i) $\Delta AOB \cong \Delta DOC$

(ii) O is also the mid-point of BC

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5. P is a point equidistant from two lines l and m intersecting at point A(see Fig. 7.38). Show that the line AP bisects the angle between them.

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6. D is a point on side BC of ΔABC such that $AD = AC$ (see Fig. 7.47). Show that $AB > AD$.

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7. In $\bigwedge$ ABC, the bisector AD of A is perpendicular to side BC (see Fig. 7.27). Show that $AB = AC$ and ΔABC is isosceles

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8. E and F are respectively the mid-points of equal sides AB and AC of ΔABC(see Fig. 7.28). Show that BF = C E`.

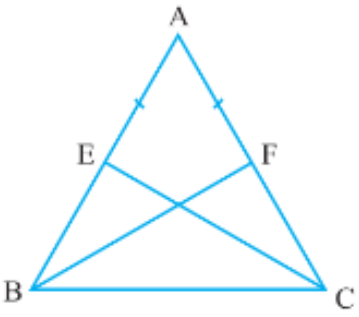

Fig. 7.28

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9. In an isosceles triangle ABC with $AB = AC$, D and E are points on BCsuch that $BE = CD$ (see Fig. 7.29). Show that $AD = AE$

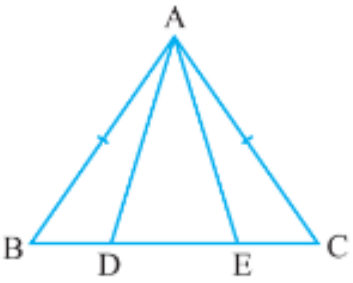

Fig. 7.29

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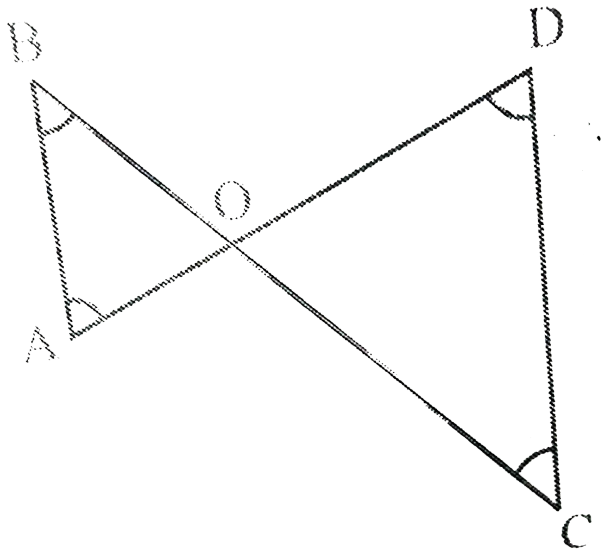
Exercise 7 4

1. In Fig. 7.49, $\angle B < \angle A$ and $\angle C < \angle D$.

Show that $AD < BC$.



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

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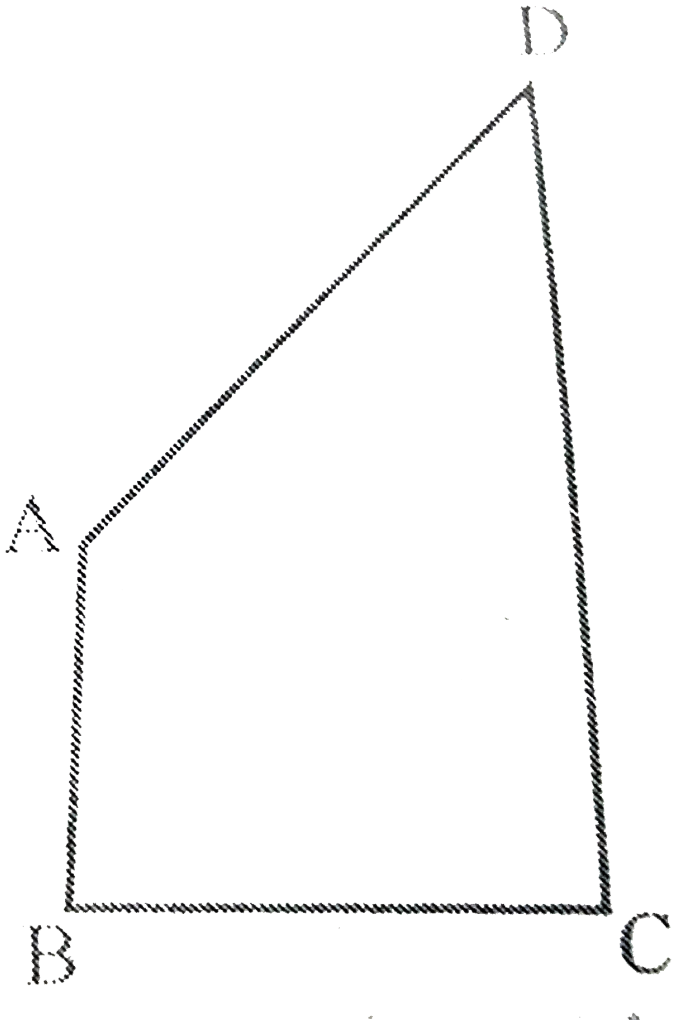
3. AB and CD are respectively the smallest and longest sides of a quadrilateral $ABCD$ (see Fig. 7.50). Show that $\angle A > \angle C$ and

$\angle B > \angle D.$



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

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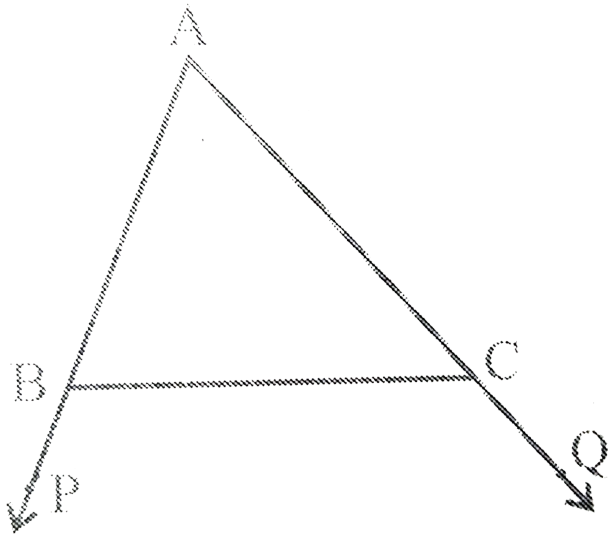
5. In Fig. 7.48, sides AB and AC of ΔABC are extended to points P and Q respectively. Also, $\angle PBC < \angle QCB$. Show that

$AC > AB$.



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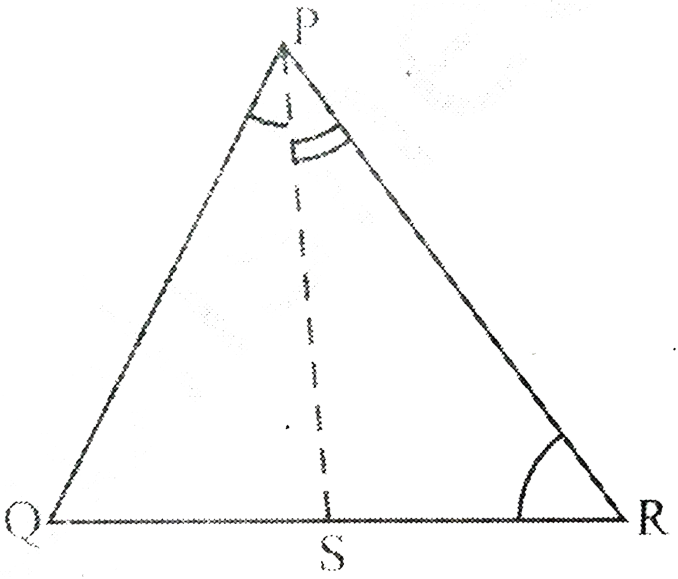
6. In Fig 7.51, $PR > PQ$ and PS bisects $\angle QPR$. Prove that $\angle PSR > \angle PSQ$.



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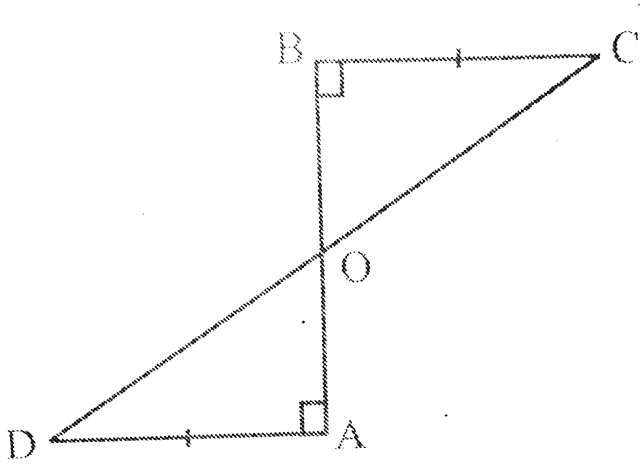
Exercise 7 1

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

bisects AB.



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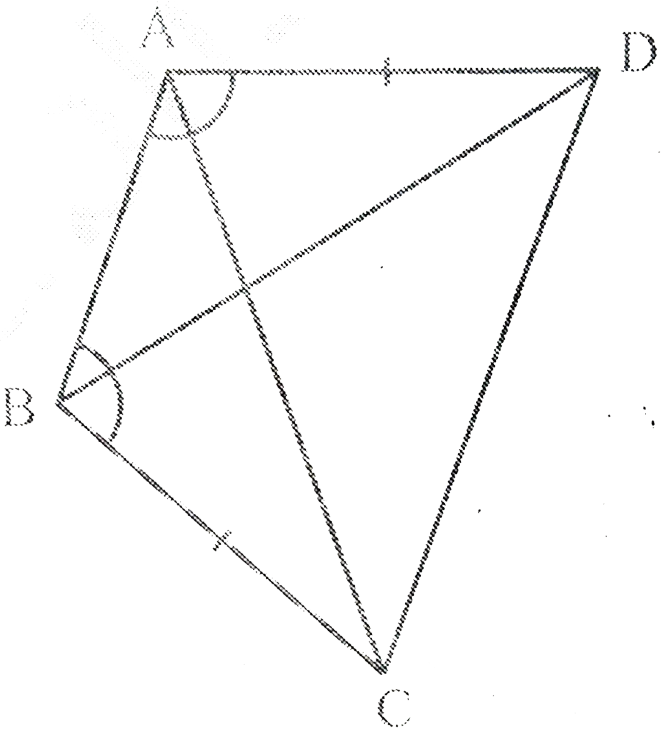
2. ABCD is a quadrilateral in which and $\angle DAB = \angle CBA$(see Fig. 7.17). Prove that

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

(ii) $BD = AC$

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



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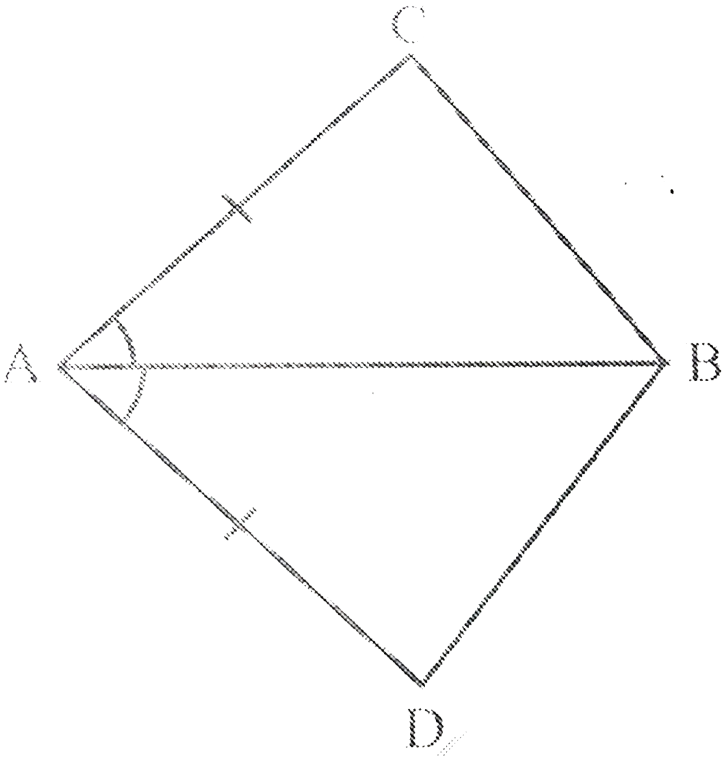
3. In quadrilateral ACBD, $AC = AD$and AB bisects $\angle A$(see Fig. 7.16). Show that $\Delta ABC \cong \Delta ABD$



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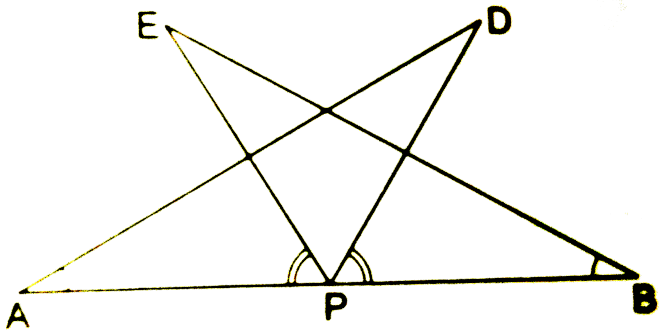
4. AB is a line segment and P is its midpoint. D and E are points on the same side of AD such that

$\angle BAD = \angle ABE$ and $\angle EPA = \angle DPB$.

Show that (i) $\Delta DAP \cong \Delta EBP$,

$(ii) AD = BE$.



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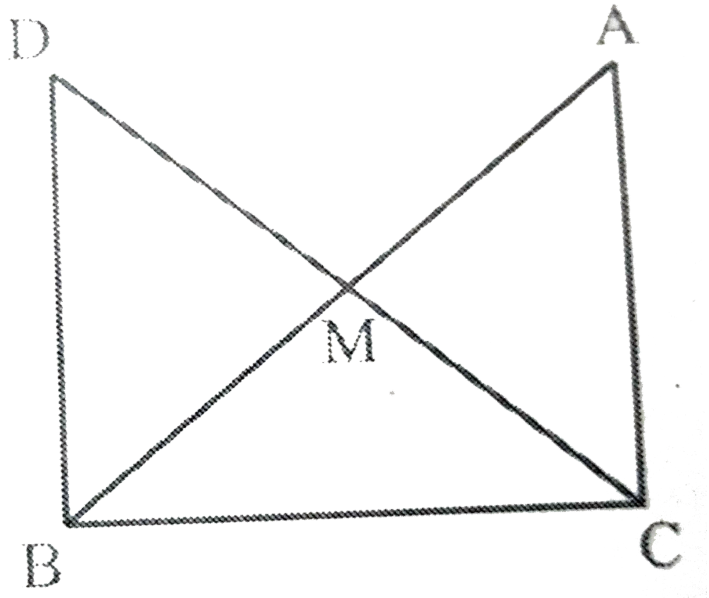
5. In right triangle ABC, right-angled at C, M is the mid-point of hypotenuse AB. C is joined to M and produced to a point D such that $DM = CM$. Point D is joined to point B (see Fig. 7.23). Show that:

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

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

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

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



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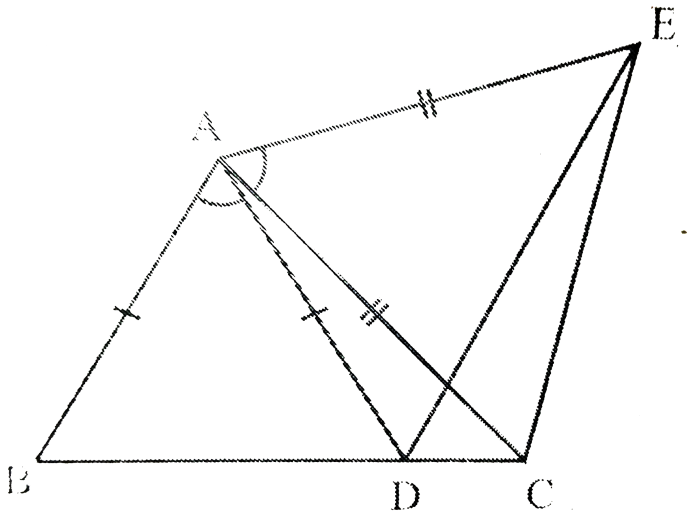
6. In Fig. 7.21, $AC = AE$, $AB = AD$and $\angle BAD = \angle EAC$. Show that $BC = DE$.



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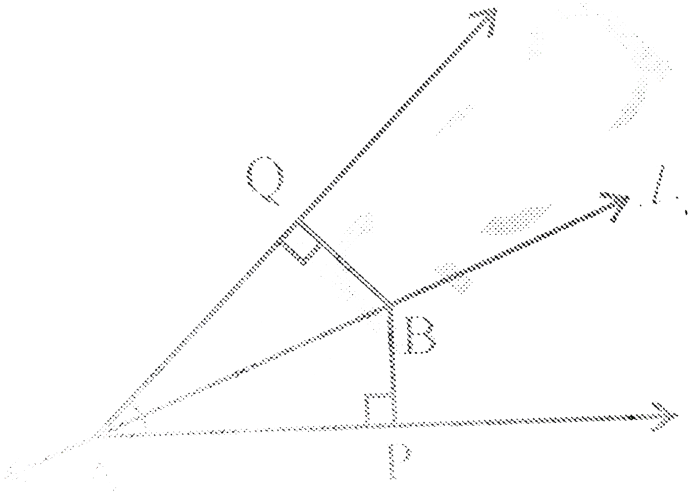
7. line l is the bisector of an angle $\angle A \; and \angle B$ is any point on l. BP and BQ are perpendiculars from B to the arms of $\angle A$. Show that:

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

(ii) BP = BQ or B is equidistant from the arms of $\angle A$



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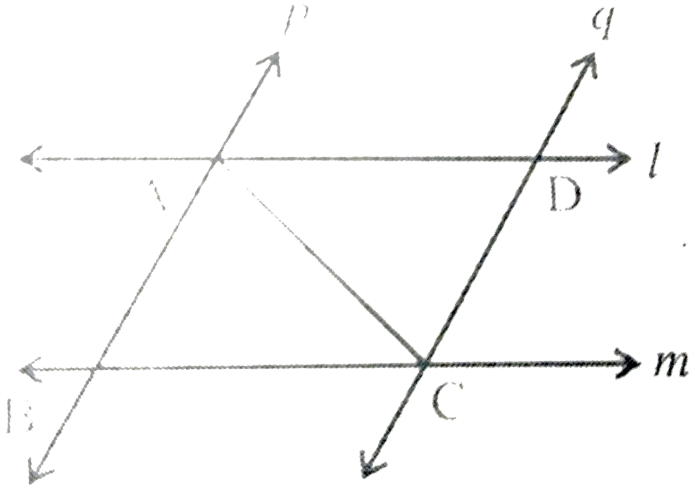
8. l and m are two parallel lines intersected by another pair of parallel lines p and q (see Fig.

7.19). Show that $\Delta ABC \cong \Delta CDA$.



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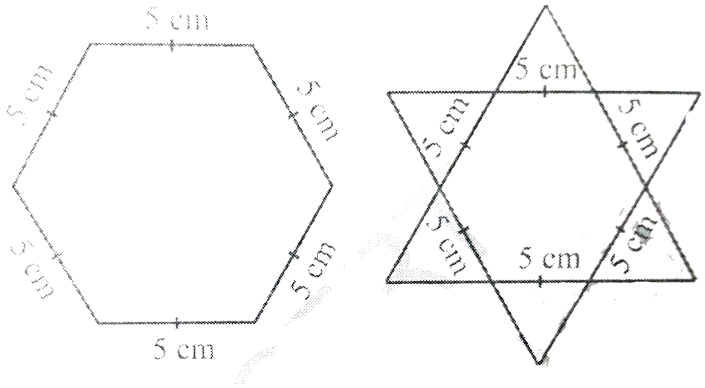
Exercise 7 5

1. Complete the hexagonal and star shaped Rangolies [see Fig. 7.53 (i) and (ii)] by filling them with as many equilateral triangles of side 1 cm as you can. Count the number of triangles in each case. Which has more triangles?



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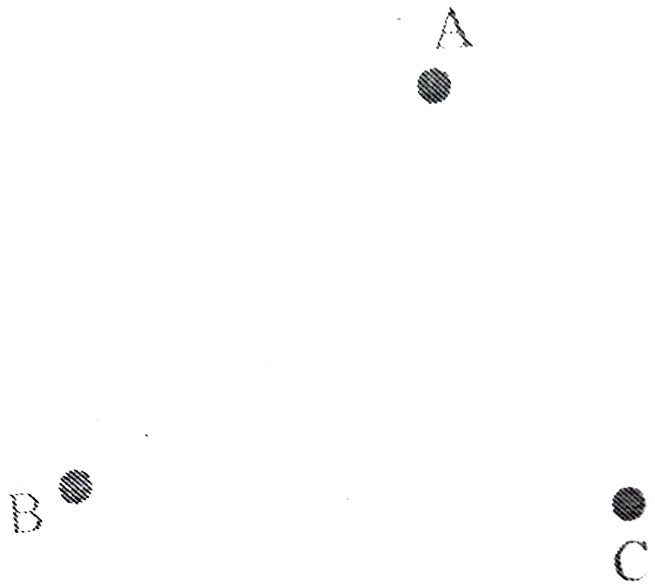
2. In a huge park, people are concentrated at three points (see Fig. 7.52):A : where there are different slides and swings for children,B : near which a man-made lake is situated,C : which is near to a large parking and exit. Where should an ice cream parlour be set up so that maximum number of persons can approach it?(Hint : The parlour should be

equidistant from A, B and C).



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

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

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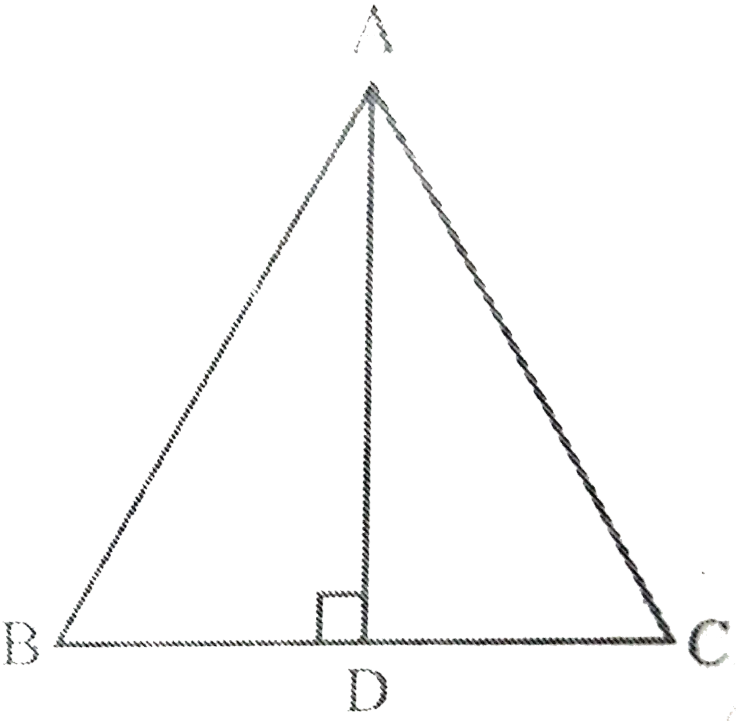
Exercise 7 2

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



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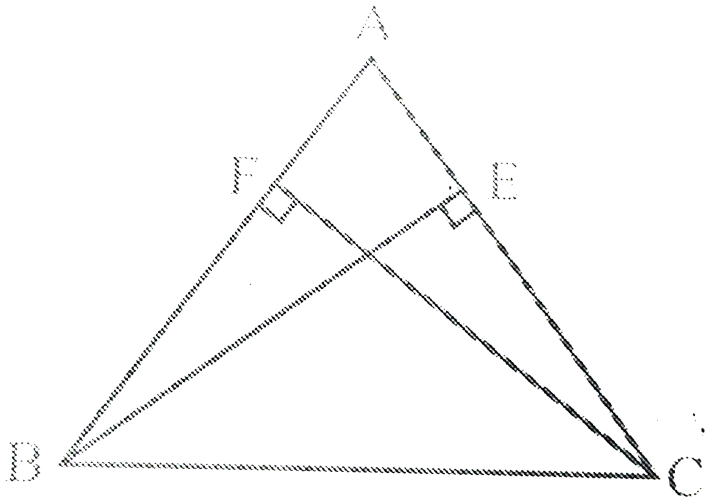
2. ABC is an isosceles triangle in which altitudes BE and CF are drawn to equal sides AC and AB respectively (see Fig. 7.31). Show that these altitudes are equal.



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3. 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

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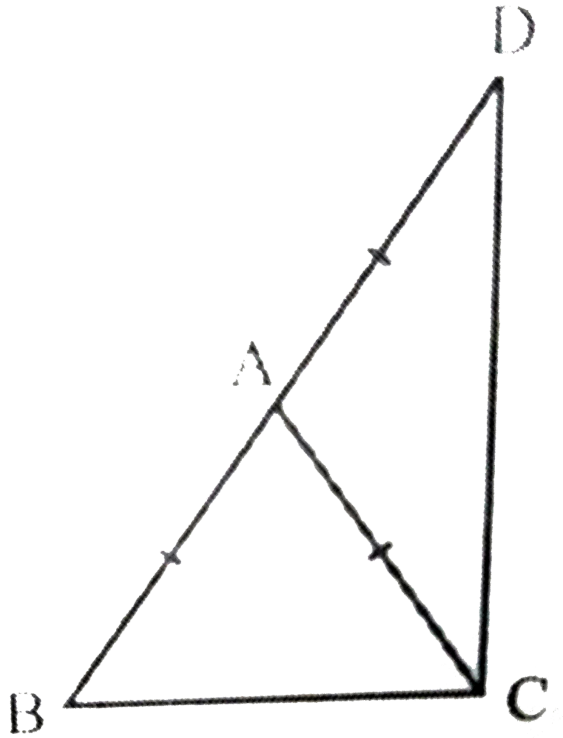
4. ΔABC is an isosceles triangle in which $AB = AC$. Side BA is produced to D such that $AD = AB$ (see Fig. 7.34). Show that $\angle BCD$ is

a right angle.



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

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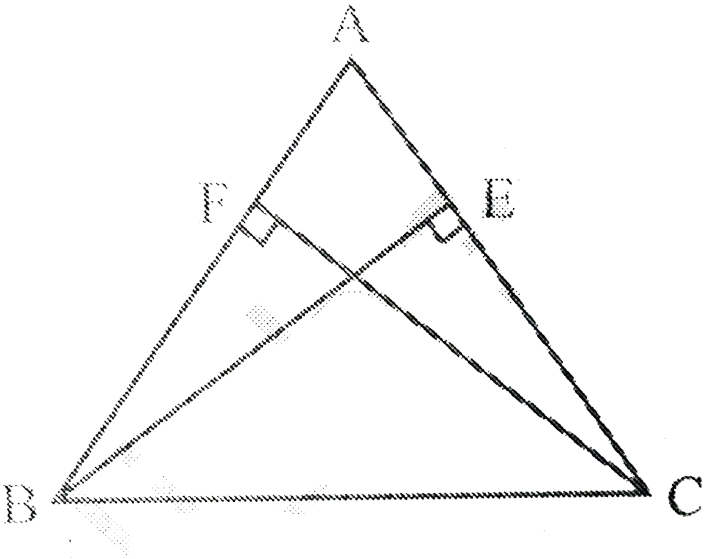
6. ABC is a triangle in which altitudes BE and CF to sides AC and AB are equal (see Fig. 7.32). Show that

(i) $\Delta ABE \cong \Delta ACF$

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

triangle.



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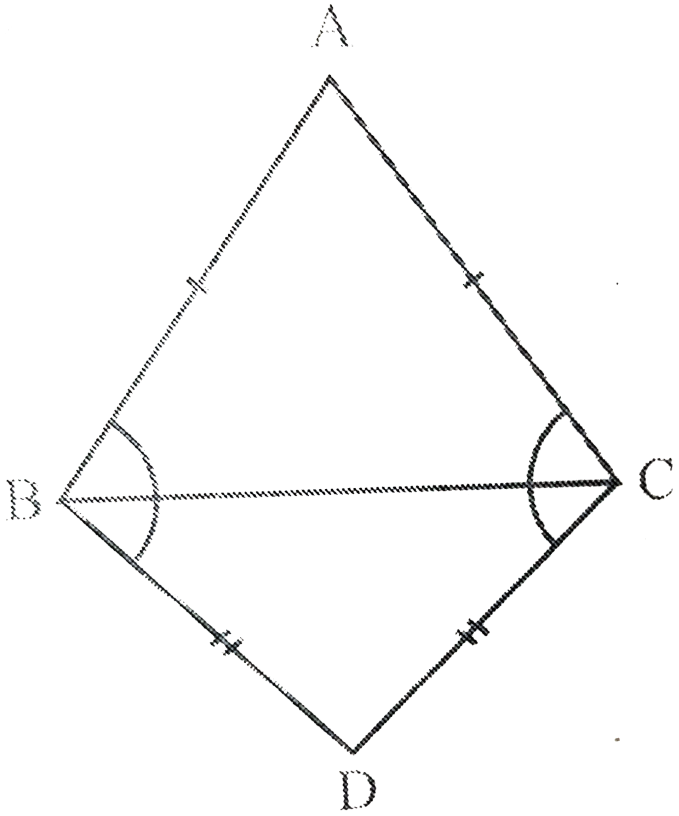
7. ABC and DBC are two isosceles triangles on the same base BC (see Fig. 7.33). Show that

$\angle ABD = \angle ACD$



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

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