MATHS

BOOKS - NAVBODH MATHS (HINGLISH)

TRIANGLES

Exercise 7 1

1. In quadrilateral ACBD, AC= AD and AB bisects

L A . Show that triangle ABC is congruent to

triangle ADB. What can you say about BC and BD?

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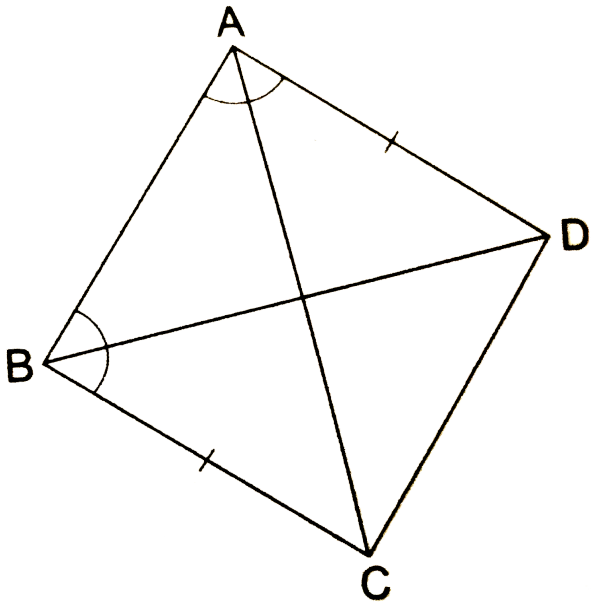
2. In the given figure, ABCD is a quadrilateral in which AD = BC and $\angle DAB = \angle CBA$.

Prove that (i) $\Delta ABD \cong \Delta BAC$,

(ii) BD = AC,

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



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

bisects AB.

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4. 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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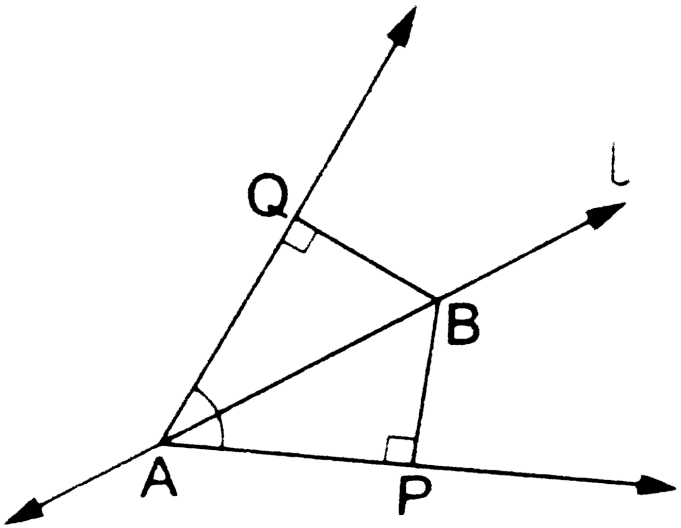
5. In the given figure, line l is the bisector of an angle $\angle A$ and B is any point on l. If BP and BQ

are perpendiculars from B to the arms of $\angle A$, show that

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

(ii) BP = BQ, i.e., B is equidistant from the arms of $\angle A$.



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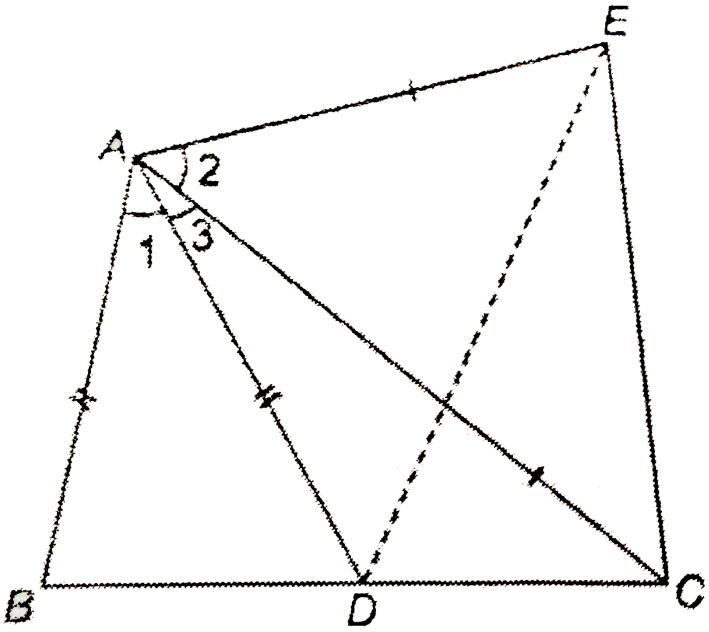
6. In the given figure, $AC = AE$, $AB = AD$ and $\angle BAD = \angle EAC$. Prove that $BC = DE$.



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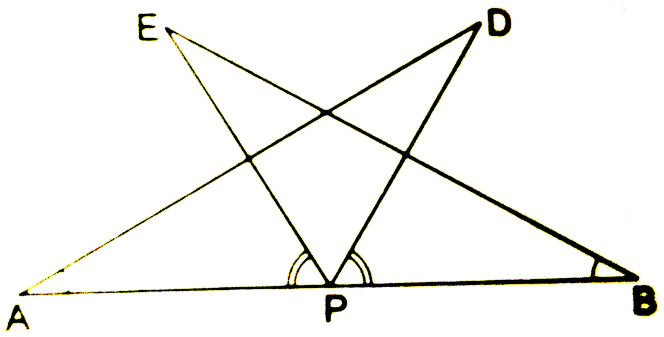
7. AB is a line segment and P is its midpoint. D and E are points on the same side of AD such that

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

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

$(ii) AD = BE.$



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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) $\Delta AMC \cong \Delta BMD$(ii) `/_

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Exercise 7 2

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

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2. 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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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.

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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) $\Delta ABE \cong \Delta ACF$(ii) $AB = AC$, i.e., ABC is an isosceles triangle

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5. 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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6. DABC is an isosceles triangle in which $AB\backslash = \backslash AC$. 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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7. ABC is a right angled triangle in which $\angle A\ = \ 90o$ and $AB\ = \ AC$. Find $\angle B\ and \angle C.$

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

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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 figure). If AD is extended to intersect BC at P, show

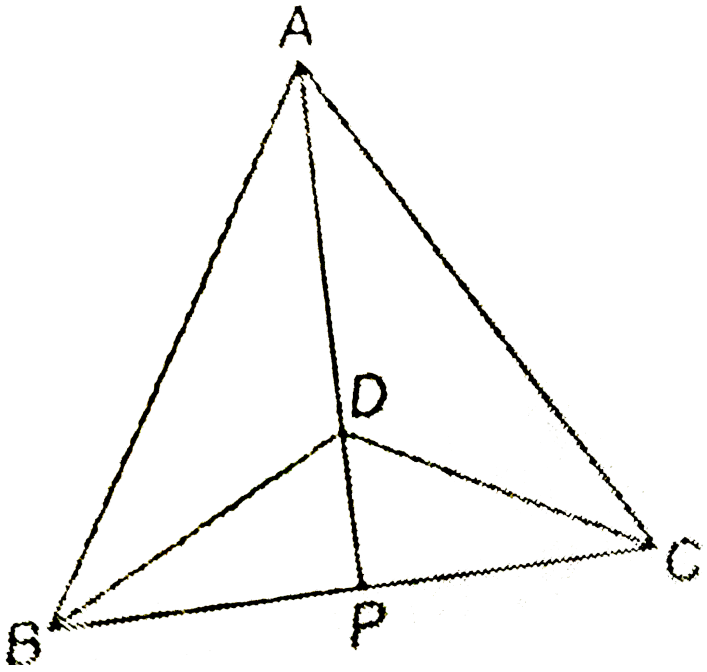
that :

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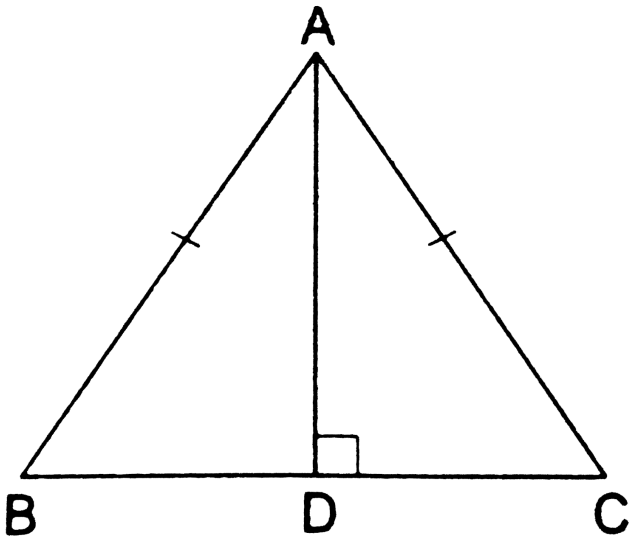
2. AD is an altitude of an isosceles ΔABC in which AB = AC.

Show that (i) AD bisects BC,

(ii) AD bisects $\angle A$.



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3. Two sides AB and BC and median AM of one triangle ABC are respectively equal to sides 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. 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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5. ABC is an isosceles triangle with $AB\ = \ AC$. Draw $AP \perp BC$ to show that $\angle B\ = \angle C$.

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Exercise 7 4

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

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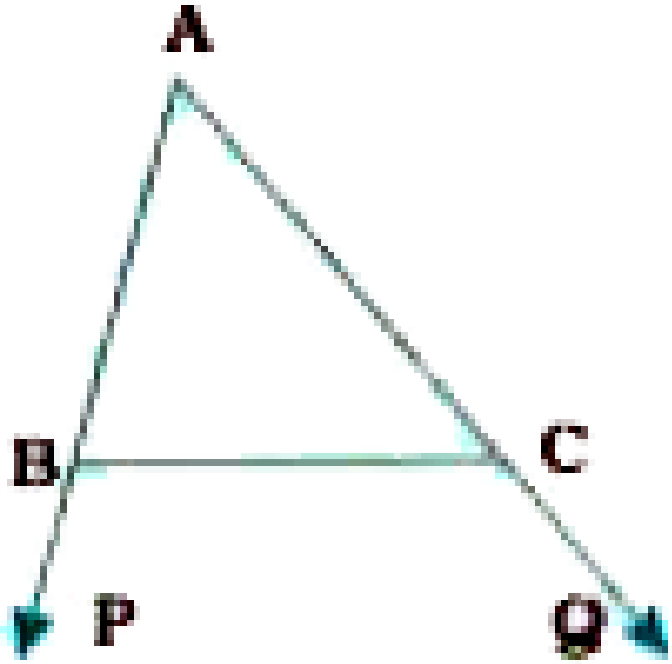
2. In the given figure, sides AB and AC of $\triangle$ ABC are extended to points P and Q respectively. Also, $\angle PBC < \angle QCB$. Show

that AC $>$ AB



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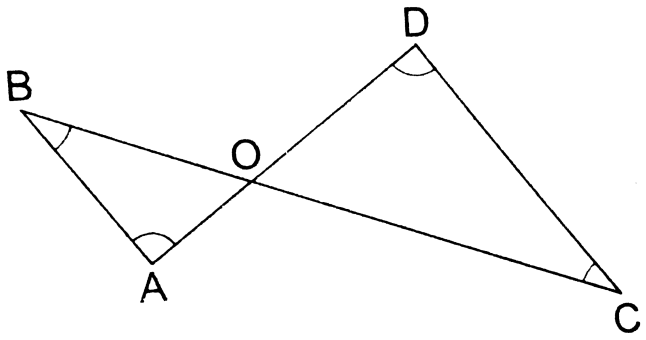
3. In the given figre, $\angle B < \angle A$ and $\angle C < \angle D$. Show that $AD < BC$.



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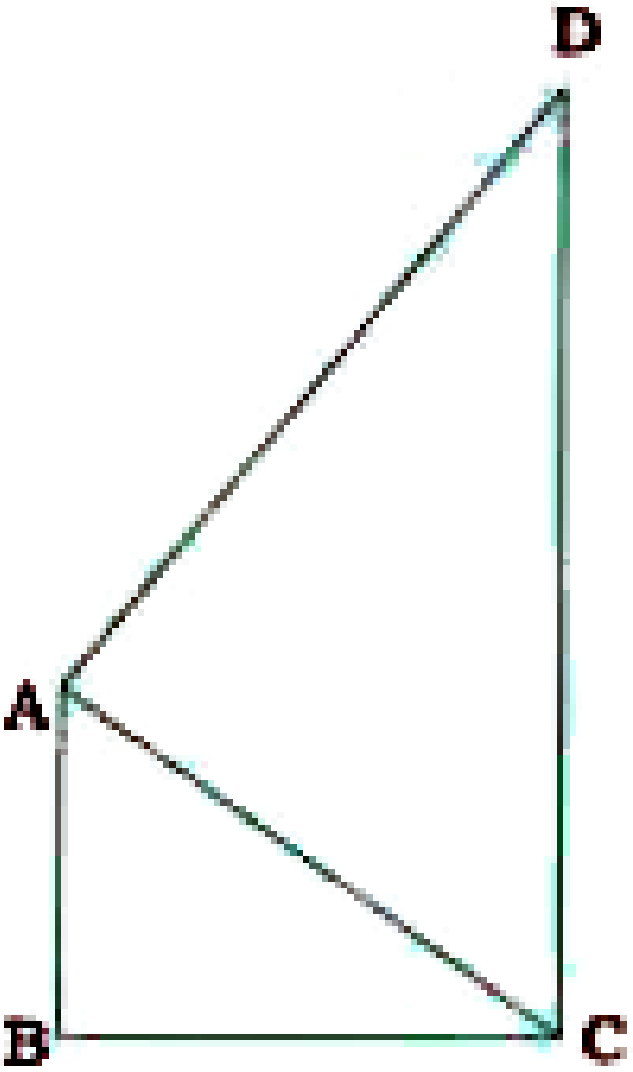
4. AB and CD are respectively the smallest and longest sides of a quadrilateral ABCD (see th e

given figure). Show that $\angle A > \angle C$ and $\angle B > \angle D$



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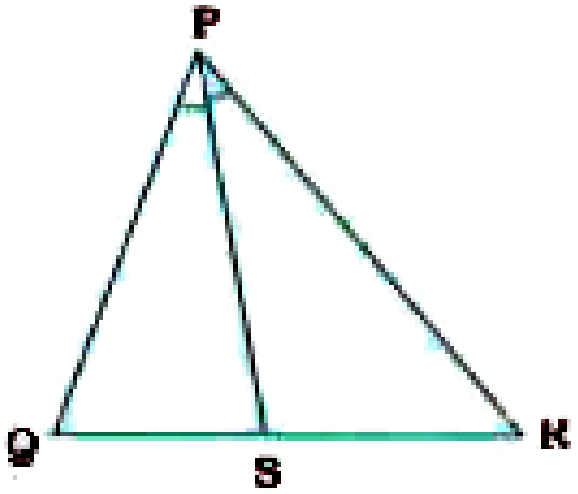
5. In the given figure, PR $>$ PQ and PS bisects $\angle$ QPR. Prove that $\angle PSR > \angle PSQ$.



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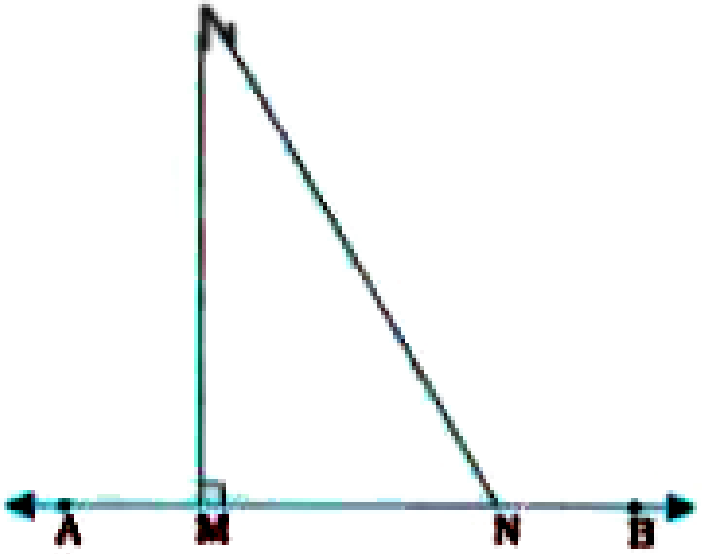
6. Show that of all line segments drawn from a given point on a given line, the perpendicular line segment is the shortest.



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Exercise 7 5

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

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

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3. 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 a

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4. 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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Skill Testing Exercise

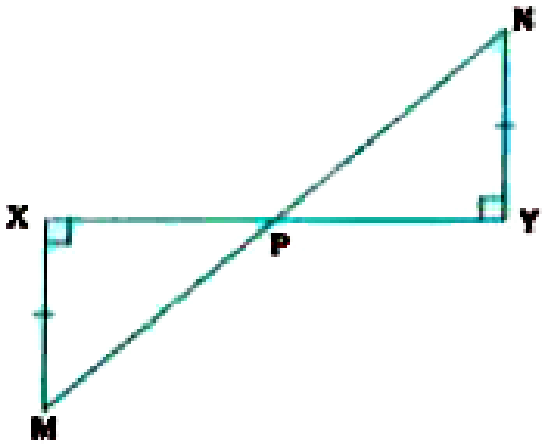
1. In the given figure, XM and YN are both $<$

perpendicular to line segment XY and XM = YN.

4 Prove that P is the midpoint of XY as well as

MN

as MN.



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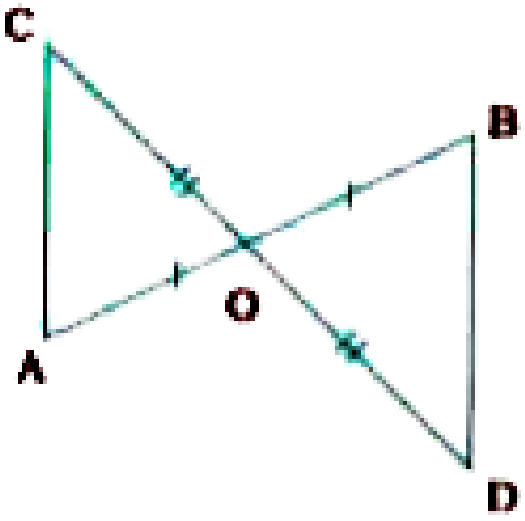
2. In the given figure AB and CD bisect each other at O. Prove that AC = BD.



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3. In rectangle ABCD, E is the midpoint of side BC. Prove that, AE = DE.

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4. Prove that the medians of an equilateral triangle are equal.

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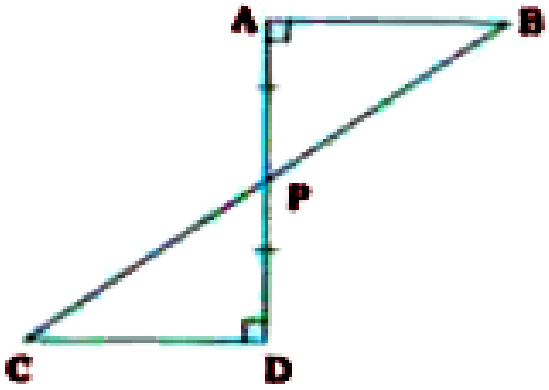
5. In the given figure, AB and DC are both perpendicular to line segment AD. BC intersects AD at P and P is the midpoint of AD. Prove that, (1) AB = CD (2) P is the midpoint

of BC.



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6. In $\triangle$ ABC, the bisectors of $\angle B$ and $\angle C$ intersect at I. A line drawn through I and parallel to BC intersects AB at P and AC at Q. Prove that PQ = BP + CQ.

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7. In a triangle ABC , AB = AC and $\angle A = 36^\circ$ If the internal bisector of angle C meets AB at D . Prove that AD = BC.

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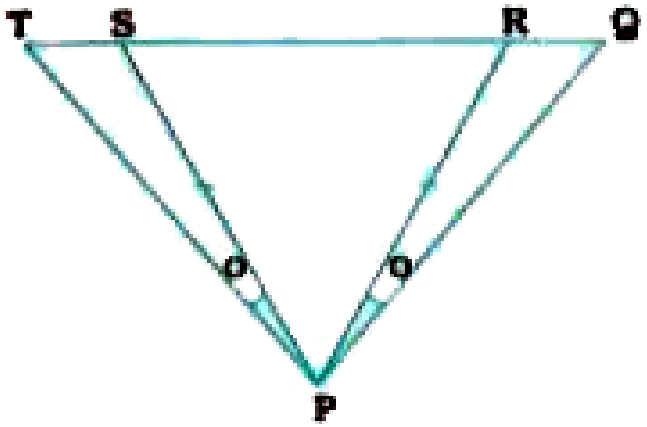
8. In the given figure, $PS = PR$ and $\angle TPS = \angle QPR$. Prove that $PT = PQ$.



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9. In $\triangle$ ABC, D is the midpoint of BC. DFZAB and DE $\perp$ AC, where points F and E lie on AB and AC respectively. If DF = DE, prove that /\ ABC is an isosceles triangle.

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10. In parallelogram ABCD, diagonals AC and BD are equal. Find the measure of $\angle$ ABC and prove that the quadrilateral ABCD is a rectangle.

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11. $\triangle$ ABC and $\triangle$ DBC are isosceles triangles on the same base BC. Prove that line AD bisects BC at right angles

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12. $AD,\ BE\ and\ CF,$ the altitudes of ABC are equal. Prove that ABC is an equilateral triangle.

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13. In quadrilateral ABCD, BA = BC and DA = DC. Prove that BD bisects $\angle$ ABC as well as $\angle$ ADC.

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14. In $\triangle ABC, AB > AC$ and D is any point on BC. Prove that, AB $>$ AD.

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15. In $\triangle ABC, AC > AB$. AB is extended to P and AC is extended to Q. Prove that, $\angle PBC < \angle QCB$.

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16. In $\triangle$ ABC, AD, BE and CF are altitudes. Prove I, that,

$AD + BE + CF < AB + BC + CA$

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17. S is any point in the interior of a $\triangle PQR$.

Prove that $SQ + SR < PQ + PR$

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18. In $\triangle$ ABC, AD is a median. Prove that AB + AC $>$ 2AD

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19. Prove that the perimeter of a triangle is greater than the sum of its three medians.

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Multiple Choice Questions

1. In $\triangle ABC, \angle A = \angle C, AC = 5$ and BC =

4. Then, the perimeter of $\triangle$ ABC is .....

A. 9

B. 14

C. 13

D. 15

Answer: option 3

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2. In $\triangle$ PQR, PQ = PR, QR is extended to S and $\angle PRS = 110^\circ$. Then, $\angle PQR$ = ...

A. 30°

B. 50°

C. 80°

D. 70°

Answer: option 4

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3. In $\triangle ABC$ and $\triangle$ DEF, AB = DE, BC = EF and $\angle B = \angle E$. If the perimeter of $\triangle$ ABC is 20, then the perimeter of $\triangle$ DEF is .....

A. 10

B. 20

C. 15

D. 40

Answer: B

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4. In $\triangle ABC$ and $\triangle PQR, AB = PQ, \angle A = \angle P$ and $\angle B = \angle Q$. If $\angle A + \angle C = 130^\circ$, then $\angle Q$ = ...

A. 65°

B. 130°

C. 50°

D. 100°

Answer: option 3

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5. In $\triangle PQR, \angle P = \angle Q = \angle R.$ If PQ = 6, then the perimeter of $\triangle$ PQR is .....

A. 12

B. 9

C. 18

D. 24

Answer: 18

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6. In $\Delta ABC, AB < AC$. Then, ... holds good

A. $\angle A < \angle B$

B. $\angle B < \angle C$

C. $\angle C < \angle A$

D. $\angle C < \angle B$

Answer: A::B::C

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7. In $\triangle PQR$, if $\angle R > \angle Q$ then

A. $PQ > PR$

B. $QR > PQ$

C. $PR < PQ$

D. $PQ > QR$

Answer:

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8. In $\triangle ABC, AB > BC$ and BC $>$ AC.

Then, the smallest angle of $\triangle$ ABC is .....

A. $\angle A$

B. $\angle C$

C. $\angle B$

D. $\angle A$ or $\angle C$

Answer: option 1

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9. ..... cannot be the measures of the sides of a triangle.

A. 10,12,14

B. 2,3,4

C. 8,9,10

D. 2,4,10

Answer: A::B::D

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10. In $\triangle PQR, PQ = 4, QR = 6$ and PR = 5. Then, ... is the angle with greatest measure in $\triangle$ PQR.

A. $\angle P$

B. $\angle Q$

C. $\angle R$

D. $\angle QPR$

Answer: A

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11. In $\triangle XYZ, \angle X = 45^\circ$ and $\angle Z = 60^\circ$.

Then, ... is the longest side of $\triangle$ XYZ.

A. XY

B. YZ

C. XZ

D. XY or YZ

Answer:

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12. The perimeter of an isosceles triangle is 100 cm. If the base is 36 cm, find the length of the equal sides.

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13. In ΔABC, AB = 4 and BC = 7, Then , ... holds good.

A. $AC < 7$

B. $AC > 4$

C. $4 < AC < 7$

D. $3 < AC < 11$

Answer: A::C

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14. In $\Delta PQR, PQ = 3$ and $QR = 7$ Then .....holds good.

A. $PR = 4$

B. $PR = 10$

C. $10 > PR > 4$

D. $7 > PR > 3$

Answer:

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15. In $\triangle ABC$ the bisectors of $\angle B$ and $\angle C$ intersect at I if $\angle A = 70^\circ$ then $\angle BIC = \ldots\ldots\ldots\ldots\ldots$

A. 35°

B. 75°

C. 100°

D. 125°

Answer: A::B

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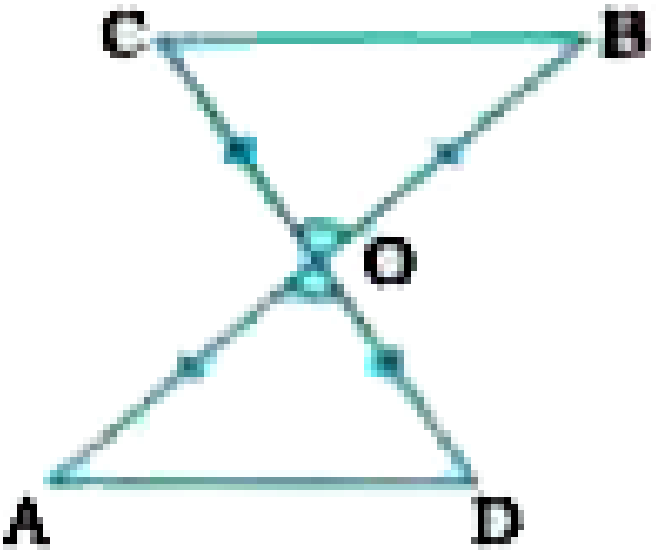
Sums To Enrich Remember

1. In the given figure, OA = OB and OD = OC. Show that

(i) $\Delta AOD \cong \Delta BOC$ and (ii) $AD \mid\mid BC$



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2. 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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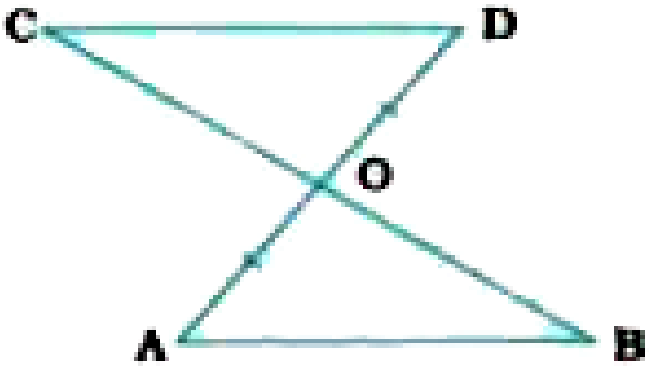
3. Line segment AB is parallel to another line segment CD. O is the midpoint of AD (see the given figure). Show that

(i) $\triangle AOB = \triangle DOC$

(ii) O is also the midpoint of BC



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

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5. E and F are respectively the mid-points of equal sides AB and AC of ΔABC (see Fig. 7.28). Show that $BF\backslash \quad = \backslash \quad CE$.

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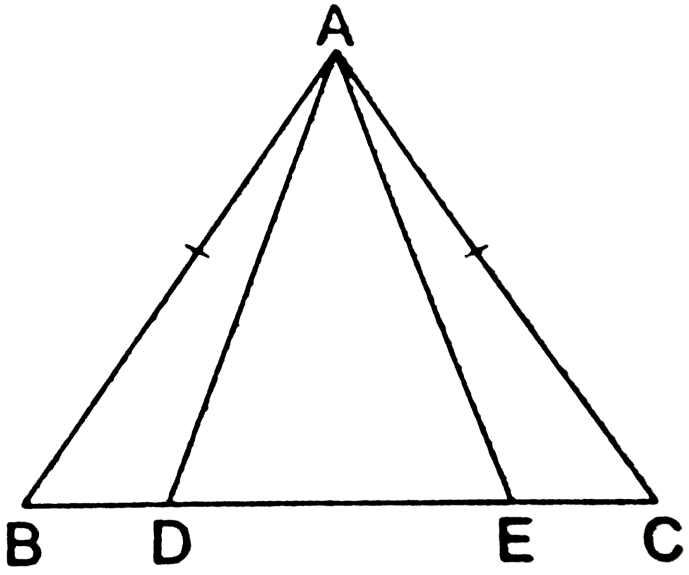
6. In an isosceles ΔABC with AB = AC, D and E are point on BC such that BE = CD. Show that AD = AE.



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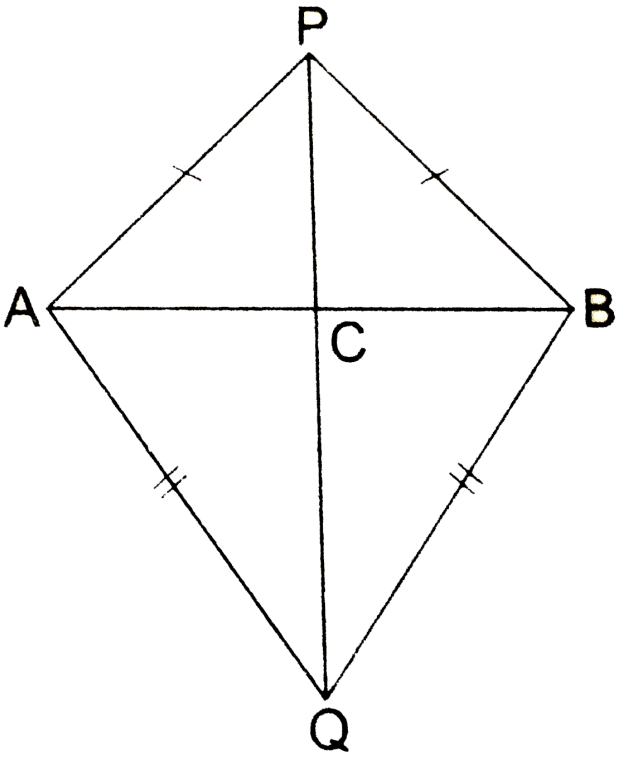
7. In the given figure, AB is a line segment. P and Q are points on opposite sides of AB such that each of them is equidistant from the points A and B. Show that the line PQ is the

perpendicular bisector of AB.



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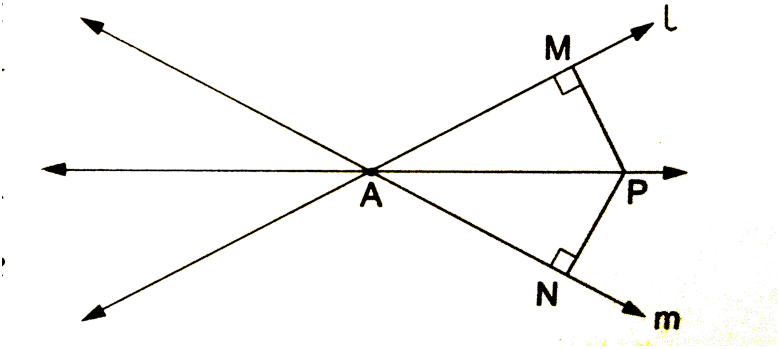
8. P is a point equidistant from two lines l and m intersecting at a point A, as shown in the given figure. Show that the line AP bisects tha angle between them.



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9. 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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