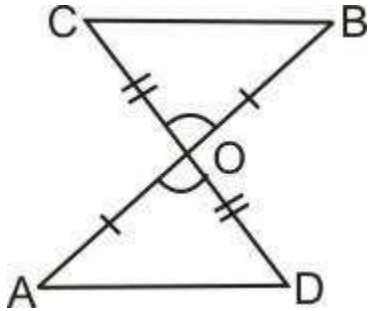# 7. Triangles

Q 1 In figure, OA = OB and OD = OC.

Show that
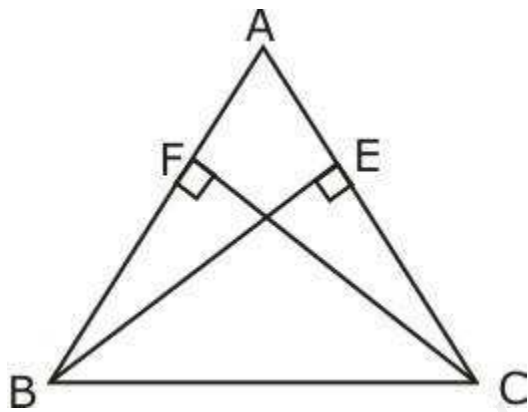
(i) $\triangle$ AOD $\cong$ $\triangle$ BOC

(ii) AD $\parallel$ BC.

Marks (2)

Q 2 ABC is a triangle in which altitudes BE and CF to sides AC and AB are equal. Show that
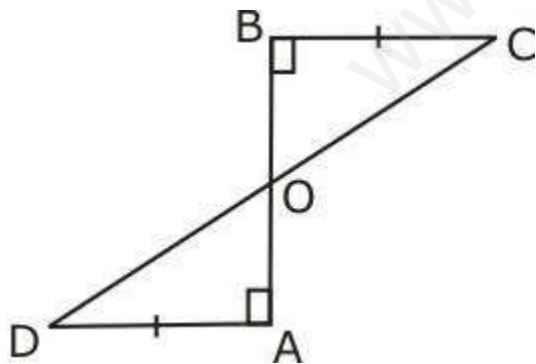
(i) $\triangle$ ABE $\cong$ $\triangle$ ACF

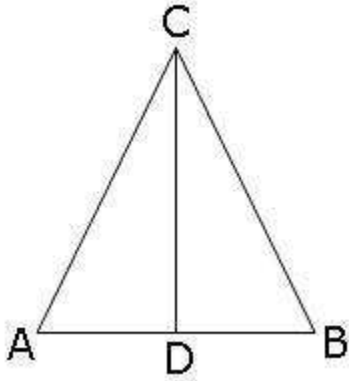(ii) AB = AC, i.e. ABC is an isosceles triangle.

Marks (2)

Q 3 AD and BC are equal perpendiculars to a line segment AB. Show that CD bisects AB.

Marks (2)

Q 4 Triangle *ABC* is an isosceles triangle; *CD* is bisector to the base *AB*. Prove that the altitude, the bisector and the median to the base of triangle *ABC* match.

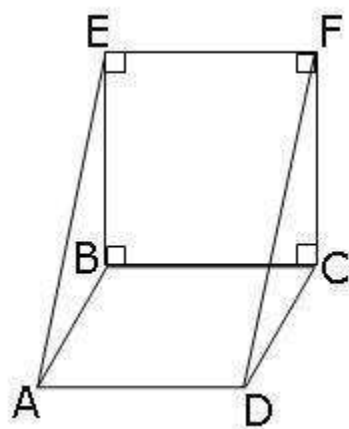

<div align="right">Marks (2)</div>

Q 5

Triangle ABC is congruent to $A_1B_1C_1$. M and M_1 are the points on sides AB and A_1B_1 such that $AM = A_1M_1$. Prove that $CM = C_1M_1$ and $\angle BMC = \angle B_1M_1C_1$.
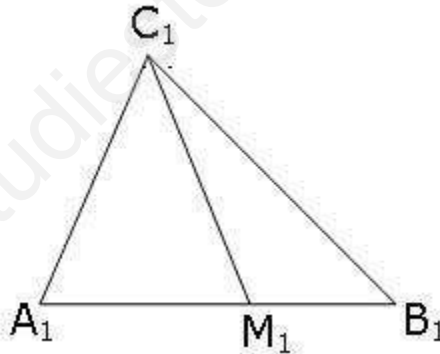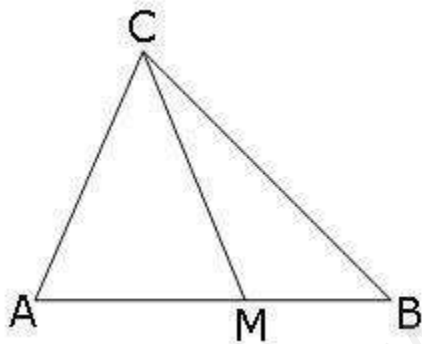
<div align="right">Marks (2)</div>

Q 6 *ABCD* is a parallelogram and *BEFC* is a square. Show that triangles *ABE* and *DCF* are congruent.
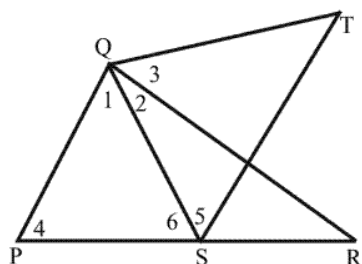
Marks (2)

Q 7 *PQR* and *QST* are two triangles such that

$\angle 4 = \angle 6$

$\angle 1 = \angle 3$
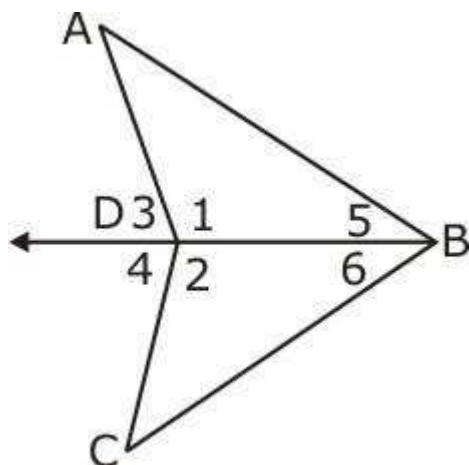
$\angle 4 = \angle 5$

Prove that $\angle R = \angle T$

Marks (2)

Q 8 BD is a line segment. From *D* two line segments *AD* and *DC* are drawn
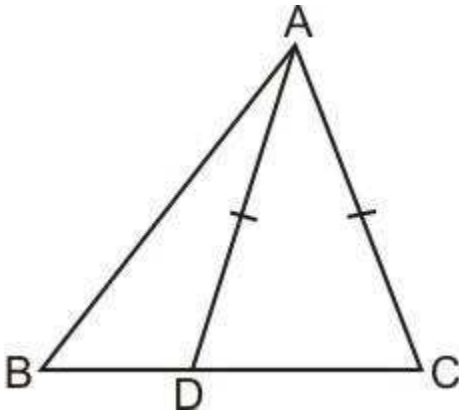
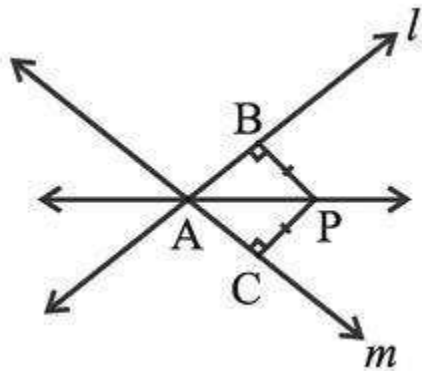such that *AD = CD*, also $\angle 3 = \angle 4$. Prove that segment *BD* bisects

$\angle ABC$.

Marks (2)

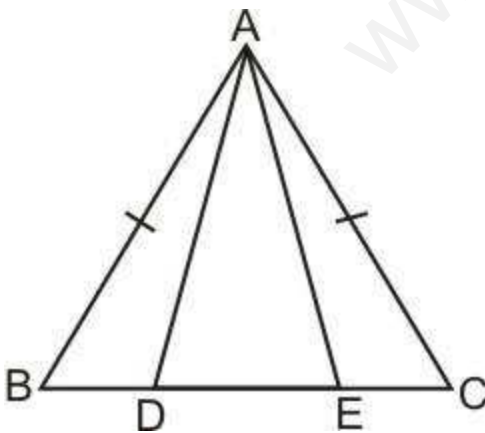Q 9 D is a point on side BC of $\triangle$ABC such that AD = AC. Show that
AB > AD.

Marks (3)

Q 10 P is a point equidistant from two lines l and m intersecting at point A.
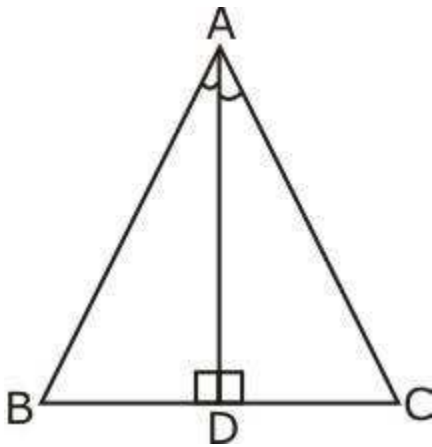Show that the line AP bisects the angle between them.

Marks (3)

Q 11 In an isosceles triangle ABC with AB = AC, D and E are points on BC such that BE = CD. Show that AD = AE.
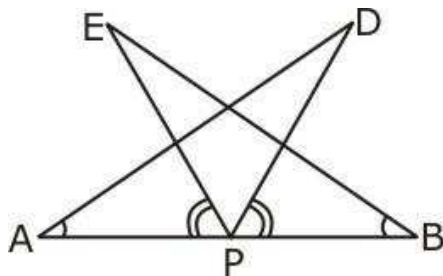

Marks (3)

Q 12 In $\triangle$ ABC, the bisector AD of $\angle$ A is perpendicular to side BC. Show that AB = AC.

Marks (3)

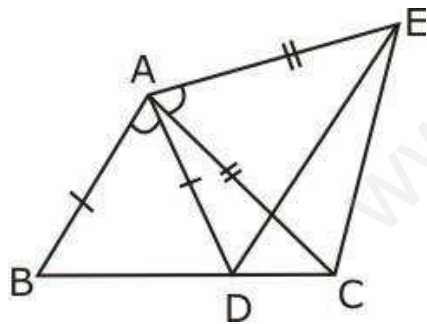Q 13 AB is a line segment and P is its mid-point. D and E are points on the same side of AB such that

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

(i) $\triangle$ DAP $\cong$ $\triangle$ EBP

(ii)   AD = BE

Marks (3)

Q 14 In figure, AC = AE, AB = AD and $\angle$ BAD = $\angle$ EAC. Show that BC = DE.
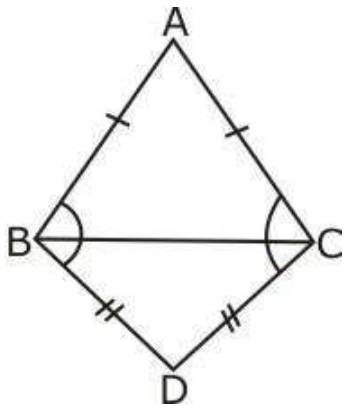
Marks (3)

Q 15 Angles opposite to equal sides of an isosceles triangle are equal.

Marks (3)

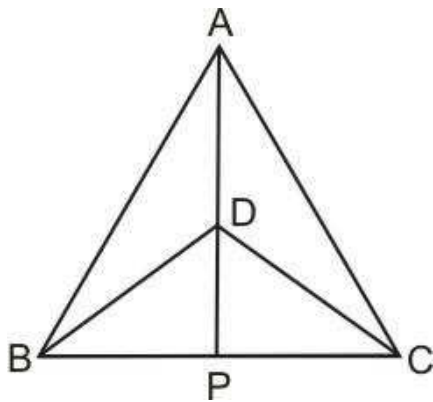Q 16 ABC and DBC are two isosceles triangles on the same base BC. Show that $\angle$ABD = $\angle$ACD.

Marks (3)

Q 17 $\triangle$ABC and $\triangle$DBC are two isosceles triangles on the same base BC and vertices A and D are on the same side of BC. If AD is extended to intersect BC at P, show that

(i) $\triangle$ABD $\cong$ $\triangle$ACD

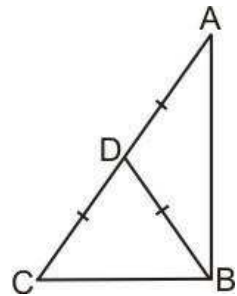(ii) $\triangle$ABP $\cong$ $\triangle$ACP

Marks (3)

Q 18 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.
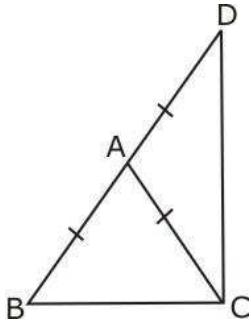
Marks (4)

Q 19 If D is the mid-point of the hypotenuse AC of a right triangle ABC, prove that BD = (1/2)AC.

Marks (4)

Q 20 $\triangle$ ABC is an isosceles triangle in which AB = AC. Side BA is produced to D such that AD = AB. Show that $\angle$ BCD is a right angle.
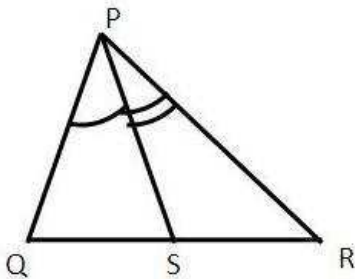

Marks (4)

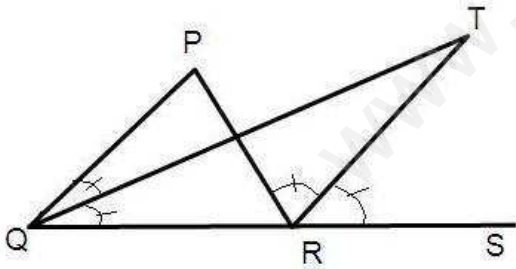Q 21 Prove that the perimeter of a triangle is greater than the sum of its altitudes.

Marks (4)

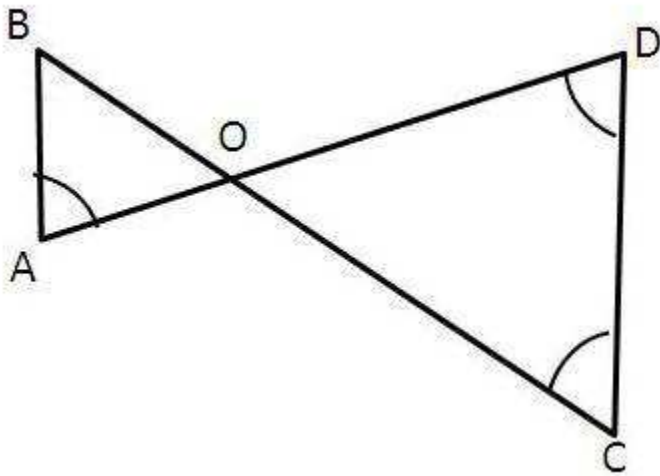Q 22 In Figure, PR>PQ and PS bisects $\angle$ QPR. Prove that $\angle$ PSR>$\angle$ PSQ.

Marks (4)

Q 23 In figure, the side QR of $\triangle$ PQR is produced to a point S. If the bisectors of $\angle$ PQR and $\angle$ PRS meet at point T, then prove that $\angle$ QTR=(1/2) $\angle$ QPR.

Marks (4)

Q 24 In Figure, $\angle B < \angle A$ and $\angle C < \angle D$. Show that D<BC.

Marks (4)

Most Important Questions

Q 1 In the given figure ABCD is a quadrilateral in which AD = BC and $\angle DBA = \angle CBA$ Prove that
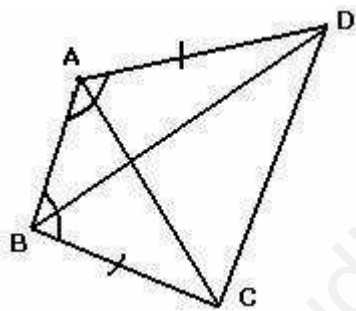
(i) $\triangle ABD \cong \triangle BAC$

(ii) BD= AC

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

Q 2 Line segment AB is parallel to another line segment CD. O is the mid-point of AD. Show that

(i) $\triangle AOB \cong \triangle DOC$ (ii) O is also the mid-point of BC.

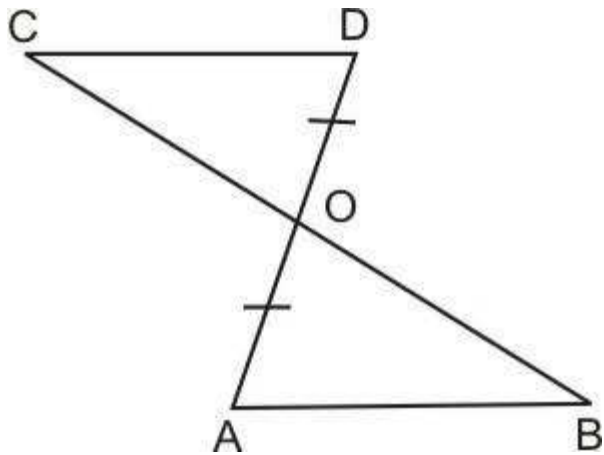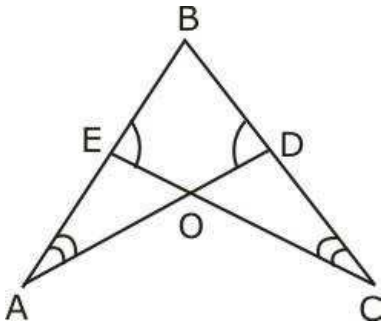Q 3 In the given figure it is given that $\angle A = \angle C$ and AB = BC. Prove that $\triangle ABD \cong \triangle CBE$.

Q 4 In $\triangle ABC$, AB = AC, and the bisectors of angles B and C intersect at point O. Prove that BO=CO and the ray AO is the bisector
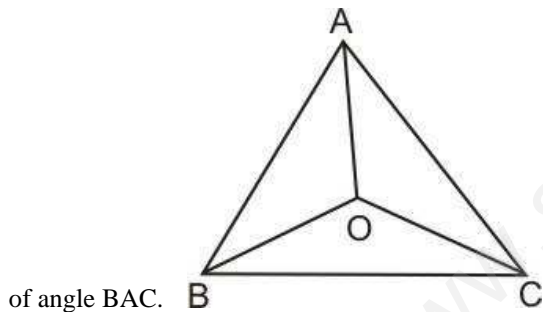
of angle BAC.

Q 5 $\triangle ABC$ and $\triangle DBC$ are two triangles on the same base BC such that AB= AC and DB= DC. Prove that $\angle ABD = \angle ACD$.

Q 6 Line l is the bisector of an angle $\angle$A and B is any point on l. BP and BQ are perpendiculars from B to the arms of $\angle$A. Show that
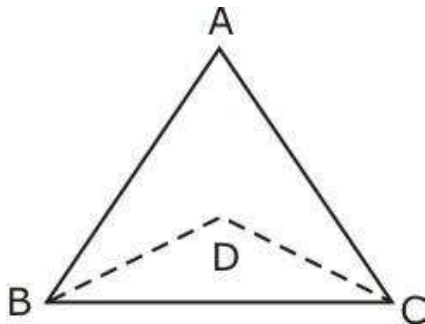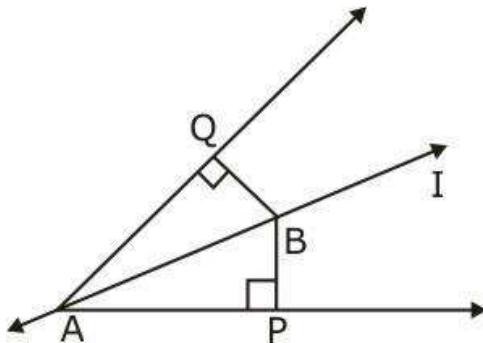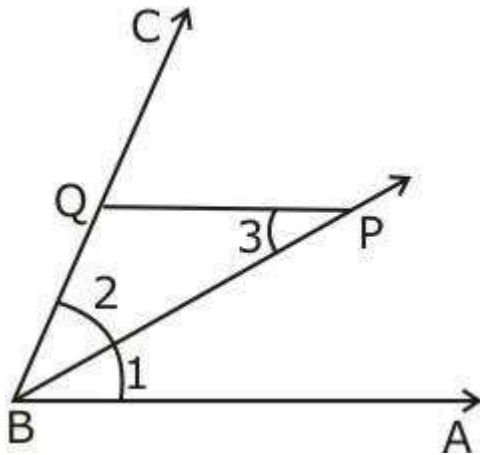
(i) $\triangle$APB $\cong$ $\triangle$AQB

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

Q 7 P is a point on the bisector of ABC. If the line through P parallel to AB meets BC at Q, prove that the triangle BPQ is isosceles.

Q 8 In two right triangles one side and an acute angle of one are equal to the corresponding side and angle of the other. Prove that the triangles are congruent.

Q 9 AD and BE are respectively altitudes of an isosceles triangle ABC with AC = BC. Prove that AE = BD.
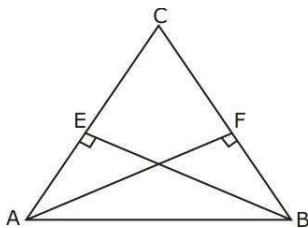
Q 10 If the bisector of the exterior vertical angle of a triangle is parallel to the base. Show that the triangle is isosceles.

Q 11 If E and F are respectively the midpoints of equal sides AB and AC of a triangle ABC, Show that BF = CE.

Q 12 In an isosceles triangle ABC with AB= AC, D and E are points on BC such that BE= CD, show that AD =AE.

Q 13 ABC and DBC are two isosceles triangles on the same base BC. Show that $\angle$ABD = $\angle$ACD.
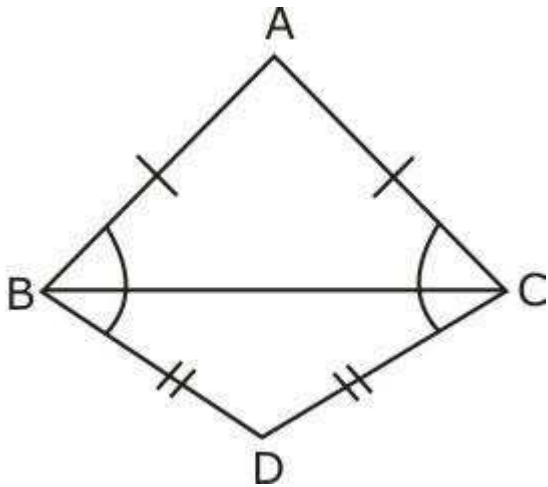
Q 14 ABC is a right-angled triangle in which $\angle A = 90^{\circ}$ and AB = AC. Find $\angle B$ and $\angle C$.

Q 15 ABC is an isosceles triangle with AB = AC. Show that $\angle B = \angle C$.

Q 16 If BE and CF are equal altitudes of a triangle ABC. Prove that triangle ABC is isosceles.

Q 17 AD is the altitude of an isosceles triangle in which AB = AC. Show that

(i) AD bisects BC

(ii) AD bisects $\angle A$.

Q 18 In the given figure QPR = PQR and M and N are respectively on sides QR and PR of PQR such that QM= PN. Prove that OP= OQ, were O is the point of intersection of PM and QN.
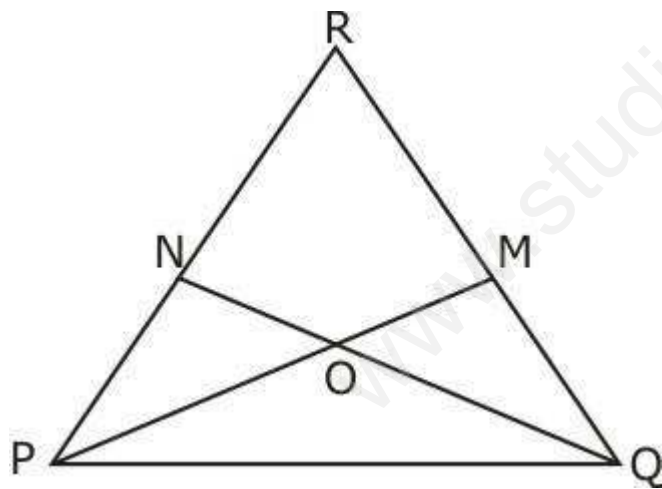
Q 19 Fill in the blanks:

(i) Sides opposite to equal angles of a triangle are ……

(ii) In an equilateral triangle all angles are …… and of …… degree.

(iii)In right triangles ABC and DEF, if hypotenuse AB = EF and AC = DE, then $\triangle ABC \cong \triangle$ …

(iv)If altitudes CE and BF of a triangle ABC are equal, then AB =…

(v)In triangle ABC if A = C then AB =…

Q 20 State true or False

(i)   If the altitude from one vertex of a triangle bisects the opposite side, then the triangle may be isosceles.

(ii)   The bisectors of two equal angles of a triangle are equal.

(iii)   If the bisector of the vertical angle of a triangle bisects the base, then the triangle may be isosceles.

(iv)   The two altitudes corresponding to two equal sides of a triangle need not be equal.

(v)   Two right triangles are congruent if hypotenuse and a side of the triangle are respectively equal to the hypotenuse and the side of the other triangle.

Q 21 Show that in a right angled triangle, the hypotenuse is the longest side.

Q 22 Prove that any two sides of a triangle are together greater than twice the median drawn to the third side.
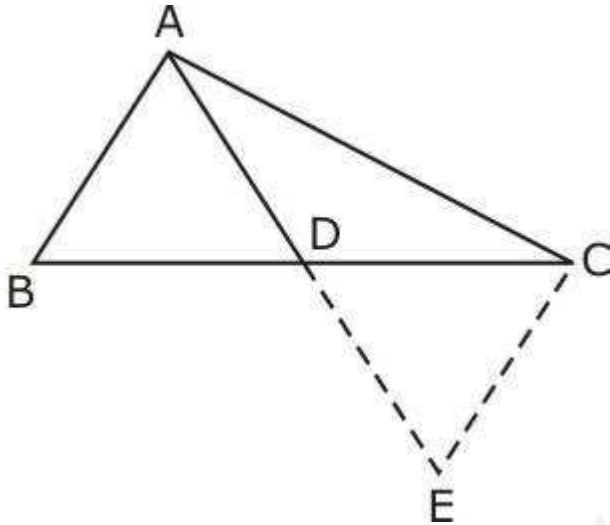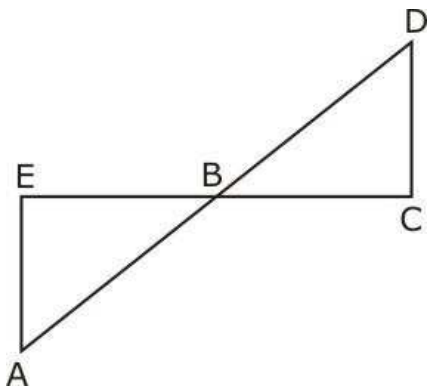

Q 23 In the given figure PQR is a triangle and S is any point in its interior, show that SQ + SR < PQ + PR.
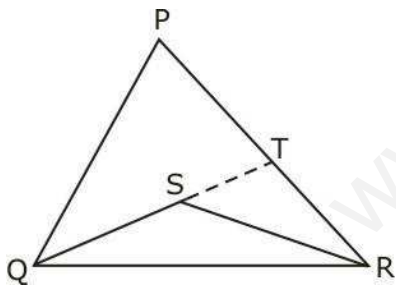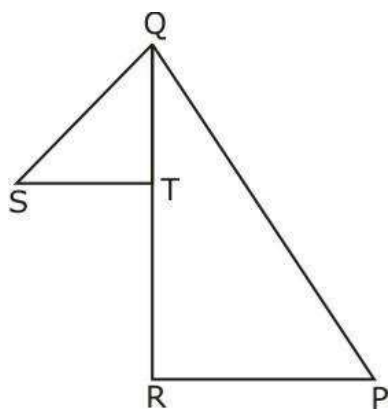

Q 24 Prove that the perimeter of a triangle is greater than the sum of the three medians.

Q 25 In the given figure $\angle E > \angle A$ and $\angle C > \angle D$. Prove that AD > EC.

Q 26 In the given figure T is a point on the side QR of $\triangle$PQR and S is a point such that RT = ST. Prove that PQ + PR > QS.
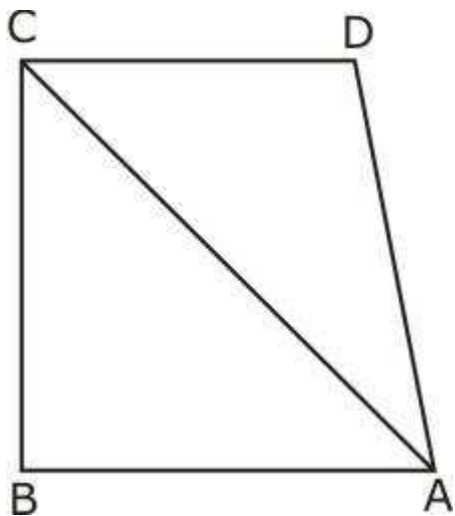
Q 27 Of all the line segments drawn from a point P to a line m not containing P, let PD be the shortest. If B and C are points on m such that D is the mid-point of BC, prove that PB = PC.
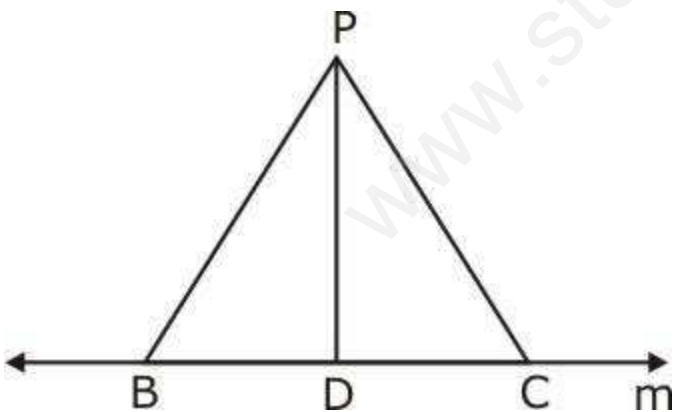
Q 28 In the given figure AC > AB and D is the point on AC such that AB =AD. Prove that BC > CD.
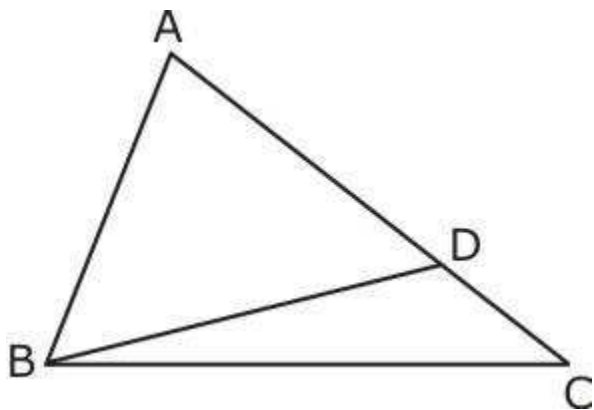
Q 29 In the given figure prove that CD +DA +AB +BC >2AC

Q 30 Fill in the blanks:

(i) In a right triangle the hypotenuse is the… side.

(ii) The sum of three altitudes of a triangle is... than its perimeter.

(iii) The sum of any two sides is …… than the third side.

(iv) If two sides of a triangle are unequal, then the larger side has ….. angle opposite to it.

(v) If two angles of a triangle are unequal, then the smaller angle has the ….. side opposite to it.