TRIANGLES

MAIN CONCEPTS AND RESULTS

** Two figures having the same shape but not necessarily the same size are called similar figures.

** All the congruent figures are similar but the converse is not true.

** Two polygons of the same number of sides are similar, if

(i) their corresponding angles are equal and

(ii) their corresponding sides are in the same ratio (i.e., proportion).

** If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then the other two sides are divided in the same ratio.

** If a line divides any two sides of a triangle in the same ratio, then the line is parallel to the third side.

** If in two triangles, corresponding angles are equal, then their corresponding sides are in the same ratio and hence the two triangles are similar (AAA similarity criterion).

** If in two triangles, two angles of one triangle are respectively equal to the two angles of the other triangle, then the two triangles are similar (AA similarity criterion).

** If in two triangles, corresponding sides are in the same ratio, then their corresponding angles are equal and hence the triangles are similar (SSS similarity criterion).

** If one angle of a triangle is equal to one angle of another triangle and the sides including these angles are in the same ratio (proportional), then the triangles are similar (SAS similarity criterion).

QUESTIONS FROM NCERT BOOKS

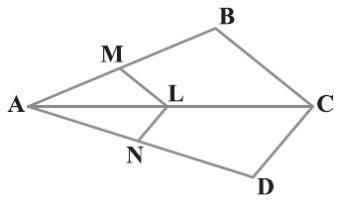
1. E and F are points on the sides PQ and PR respectively of a Δ PQR. For each of the following cases, state whether EF || QR :

(i) PE = 3.9 cm, EQ = 3 cm, PF = 3.6 cm and FR = 2.4 cm

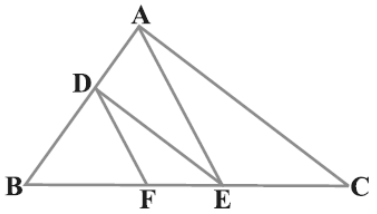
(ii) PE = 4 cm, QE = 4.5 cm, PF = 8 cm and RF = 9 cm

(iii) PQ = 1.28 cm, PR = 2.56 cm, PE = 0.18 cm and PF = 0.36 cm

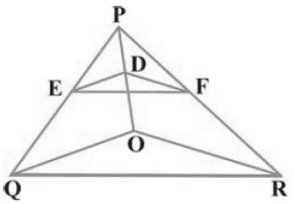
2. In the given figure, if LM || CB and LN || CD, prove that $\frac{AM}{AB} = \frac{AN}{AD}$.



3. In the given figure, DE || AC and DF || AE. Prove that $\frac{BF}{FE} = \frac{BE}{EC}$.

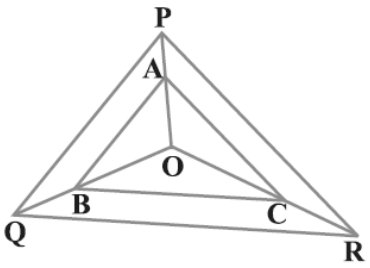


4. In the given figure, DE || OQ and DF || OR. Show that EF || QR.



5. In the given figure, A, B and C are points on OP, OQ and OR respectively such that AB || PQ and AC || PR.

Show that BC || QR.



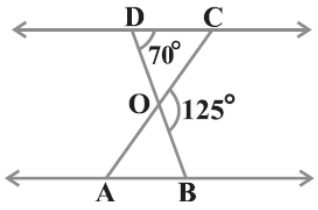
6. ABCD is a trapezium in which AB || DC and its diagonals intersect each other at the point O.

Show that $\frac{AO}{BO} = \frac{CO}{DO}$.

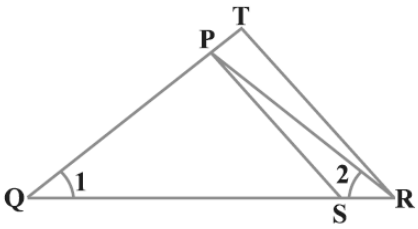
7. The diagonals of a quadrilateral ABCD intersect each other at the point O such that $\frac{AO}{BO} = \frac{CO}{DO}$.

Show that ABCD is a trapezium.

8. In the given figure, Δ ODC ~ Δ OBA, ∠BOC = 125° and ∠CDO = 70°. Find ∠DOC, ∠DCO and ∠ OAB.

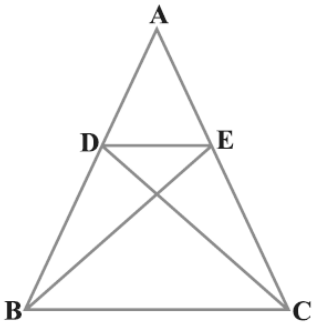


9. In the given figure, $\frac{QR}{QS} = \frac{QT}{PR}$ and ∠1 = ∠2. Show that Δ PQS ~ Δ TQR.



10. S and T are points on sides PR and QR of Δ PQR such that ∠P = ∠ RTS. Show that Δ RPQ ~ Δ RTS.

11. In the given figure, if Δ ABE ≅ Δ ACD, show that Δ ADE ~ Δ ABC.



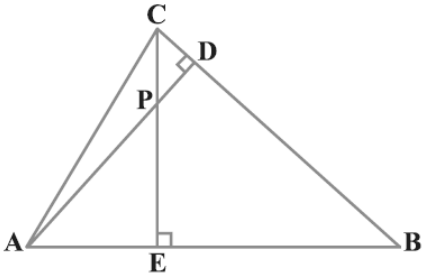
12. In the given figure, altitudes AD and CE of Δ ABC intersect each other at the point P. Show that:

(i) Δ AEP ~ Δ CDP

(ii) Δ ABD ~ Δ CBE

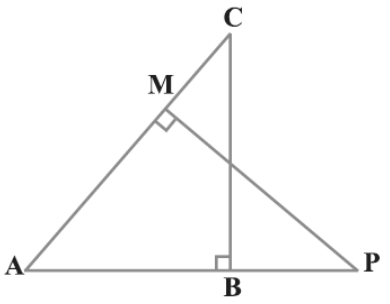
(iii) Δ AEP ~ Δ ADB

(iv) Δ PDC ~ Δ BEC



13. E is a point on the side AD produced of a parallelogram ABCD and BE intersects CD at F. Show that Δ ABE ~ Δ CFB.

14. In the given figure, ABC and AMP are two right triangles, right angled at B and M respectively. Prove that:



(i) Δ ABC ~ Δ AMP

(ii) $\frac{CA}{PA} = \frac{BC}{MP}$

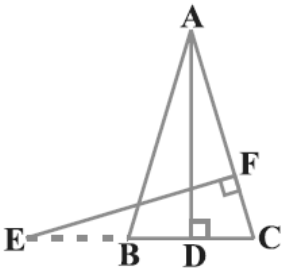
15. CD and GH are respectively the bisectors of ∠ACB and ∠EGF such that D and H lie on sides AB and FE of Δ ABC and Δ EFG respectively. If Δ ABC ~ Δ FEG, show that:

(i) $\frac{CD}{GH} = \frac{AC}{FG}$

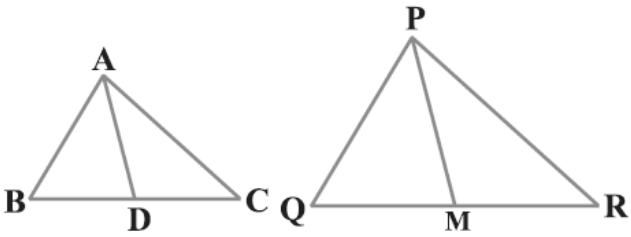
(ii) Δ DCB ~ Δ HGE

(iii) Δ DCA ~ Δ HGF

16. In the given figure, E is a point on side CB produced of an isosceles triangle ABC with AB = AC. If AD⊥ BC and EF ⊥ AC, prove that Δ ABD ~ Δ ECF.



17. In the given figure, sides AB and BC and median AD of a triangle ABC are respectively proportional to sides PQ and QR and median PM of Δ PQR . Show that Δ ABC ~ Δ PQR.



18. D is a point on the side BC of a triangle ABC such that ∠ADC = ∠BAC. Show that $CA^2 = CB.CD$.

19. Sides AB and AC and median AD of a triangle ABC are respectively proportional to sides PQ and PR and median PM of another triangle PQR. Show that Δ ABC ~ Δ PQR.

20. A vertical pole of length 6 m casts a shadow 4 m long on the ground and at the same time a tower casts a shadow 28 m long. Find the height of the tower.

21. If AD and PM are medians of triangles ABC and PQR, respectively where Δ ABC ~ Δ PQR, prove that $\frac{AB}{PQ} = \frac{AD}{PM}$.

ANSWERS

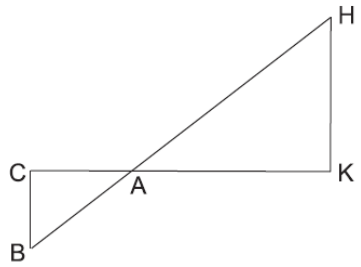
1. (i) No (ii) Yes (iii) Yes

8. 55°, 55°, 55°

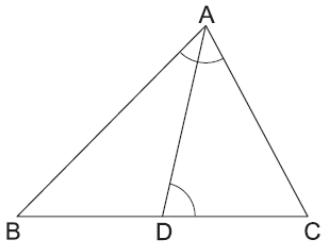
ADDITIONAL QUESTIONS

1. In the adjoining figure, ΔAHK is similar to ΔABC.

If AK = 10 cm, BC = 3.5 cm and HK = 7 cm, find AC.

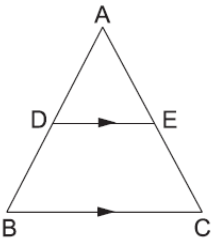


2. In the given fi gure, D is a point on the side BC of ΔABC such that $\angle ADC = \angle BAC$.
Prove that $CA^2 = CB \times CD$.

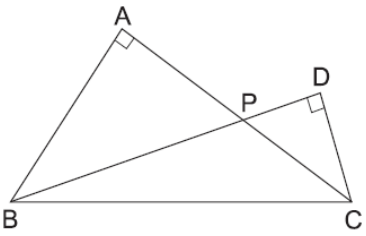


3. The perimeters of two similar triangles are 25 cm and 15 cm respectively. If one side of the fi rst triangle is 9 cm, find the corresponding side of the second triangle.

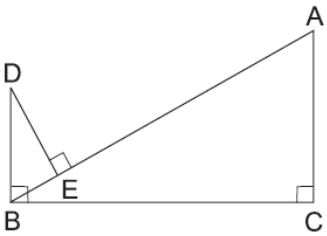
4. In the given figure, DE || BC, AD = 2 cm, BD = 2.5 cm, AE = 3.2 cm and DE = 4 cm. Find AC and BC.



5. Two right triangles ABC and DBC are drawn on the same hypotenuse BC and on the same side of BC. If AC and BD intersect at P, prove that $AP \times PC = BP \times PD$.



6. In the given figure, DB ⊥ BC, DE ⊥ AB and AC ⊥ BC.
Prove that $\frac{BE}{DE} = \frac{AC}{BC}$



ANSWERS

1. 5 cm. **3.** 5.4 cm. **4.** AC = 7.2 cm and BC = 9 cm.