CLASS 10 MATHS NCERT SOLUTIONS

NCERT Solutions for Class 10 Maths Chapter 6: Triangles – Free PDF Download

Chapter 6 — Triangles is a geometry-heavy chapter in the current 2026-27 CBSE Class 10 Maths syllabus, spanning three exercises (6.1, 6.2, 6.3) after the 2023 rationalisation removed the older Exercises 6.4-6.6. Below are complete, original, step-by-step solutions covering similar figures, the Basic Proportionalit...

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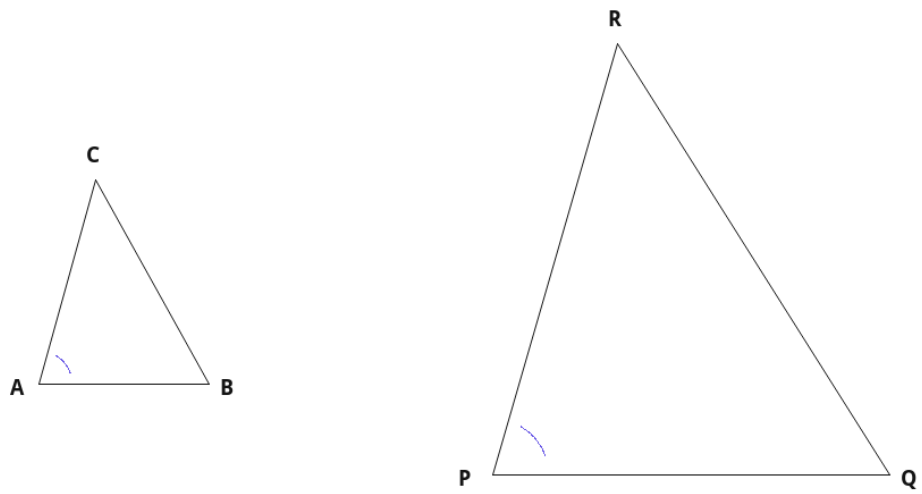


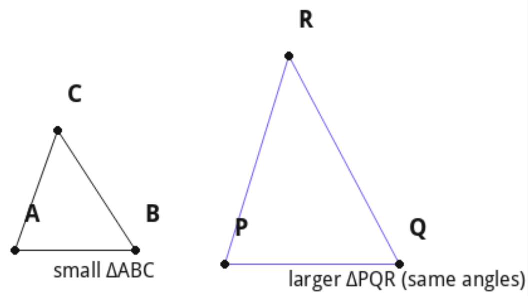
Triangle ABC ~ Triangle PQR: corresponding angles are equal and corresponding sides are in the same ratio.

Reference figure — similar triangles

NCERT Solutions for Class 10 Maths Chapter 6: Triangles

Exercise 6.1 — Similar Figures

Q1. Fill in the blanks:
(i) All circles are **similar**.
(ii) All squares are **similar**.
(iii) All **equilateral** triangles are similar.
(iv) Two polygons of the same number of sides are similar if (a) their corresponding angles are **equal** and (b) their corresponding sides are **proportional**.



Similar triangles: equal corresponding angles, proportional side

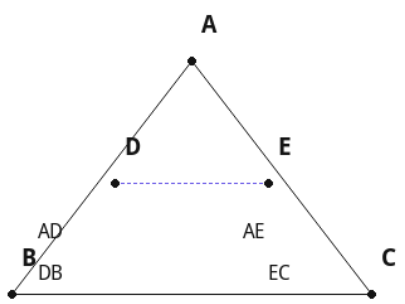
Q2. Give two different examples of pairs of (i) similar figures (ii) non-similar figures.
(i) Similar figures: any two equilateral triangles of different side lengths; any two squares of different side

lengths.
(ii) Non-similar figures: a circle and a square; a rectangle and a rhombus (equal angles are not guaranteed alongside proportional sides, or vice versa).

Q3. State whether the given quadrilaterals are similar.
Two polygons are similar only when *both* conditions hold at once — corresponding angles equal **and** corresponding sides proportional. In the figure given in this question, the two quadrilaterals satisfy at most one of these two conditions, not both together, so they are **not similar**. This is the standard trap of Exercise 6.1: equal angles alone, or proportional sides alone, is never enough on its own.

Exercise 6.2 — Basic Proportionality Theorem (BPT / Thales' Theorem)

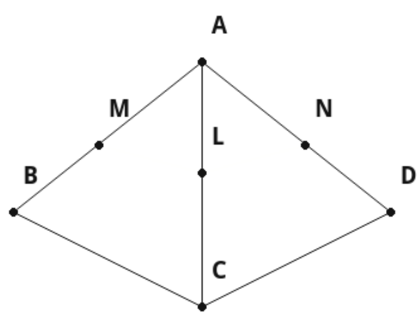
Q1. In Fig. 6.17, DE ∥ BC. Find EC in (i) and AD in (ii).
(i) AD = 1.5 cm, DB = 3 cm, AE = 1 cm. By BPT: AD/DB = AE/EC → 1.5/3 = 1/EC → **EC = 2 cm.**
(ii) DB = 7.2 cm, AE = 1.8 cm, EC = 5.4 cm. By BPT: AD/DB = AE/EC → AD/7.2 = 1.8/5.4 → **AD = 2.4 cm.**



DE || BC → by BPT, AD/DB = AE/EC.

Q2. E, F are on PQ, PR of ΔPQR. State whether EF ∥ QR:
(i) PE=3.9, EQ=3, PF=3.6, FR=2.4: PE/EQ=1.3, PF/FR=1.5 — unequal, so **EF is not parallel to QR.**
(ii) PE=4, QE=4.5, PF=8, RF=9: PE/QE=8/9, PF/RF=8/9 — equal, so **EF ∥ QR.**
(iii) PQ=1.28, PR=2.56, PE=0.18, PF=0.36: EQ=1.28−0.18=1.10, FR=2.56−0.36=2.20. PE/EQ≈0.1636, PF/FR≈0.1636 — equal, so **EF ∥ QR.**

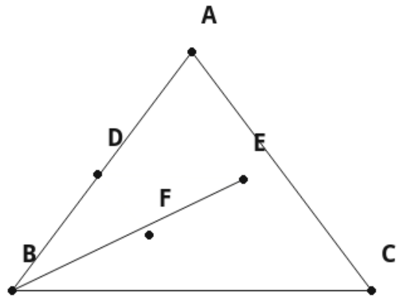
Q3. In Fig. 6.18, LM ∥ CB and LN ∥ CD. Prove AM/AB = AN/AD.
In ΔABC, LM∥CB ⇒ by BPT, AL/LC = AM/MB …(1). In ΔACD, LN∥CD ⇒ AL/LC = AN/ND …(2). From (1),(2): AM/MB = AN/ND. Taking reciprocals and adding 1 to both sides: (MB+AM)/AM = (ND+AN)/AN ⇒ AB/AM = AD/AN ⇒ **AM/AB = AN/AD.** Proved.



LM||CB in ΔABC, LN||CD in ΔACD → AM/AB = AN/AD.

Q4. In Fig. 6.19, DE ∥ AC and DF ∥ AE (D on AB, E on BC, F on BE). Prove BF/FE = BE/EC.

In ΔABE, DF∥AE ⇒ by BPT, BF/FE = BD/DA ...(1). In ΔABC, DE∥AC ⇒ BD/DA = BE/EC ...(2). From (1),(2): **BF/FE = BE/EC.** Proved.



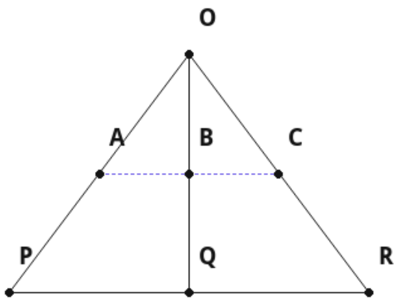
DE||AC, DF||AE (F on BE) → BF/FE = BE/EC.

Q5. In Fig. 6.20, DE ∥ OQ, DF ∥ OR. Show EF ∥ QR.

In ΔPOQ, DE∥OQ ⇒ PD/DO = PE/EQ ...(1). In ΔPOR, DF∥OR ⇒ PD/DO = PF/FR ...(2). From (1),(2): PE/EQ = PF/FR ⇒ by the **converse** of BPT in ΔPQR, **EF ∥ QR.** Proved.

Q6. A, B, C on OP, OQ, OR with AB ∥ PQ, AC ∥ PR. Show BC ∥ QR.

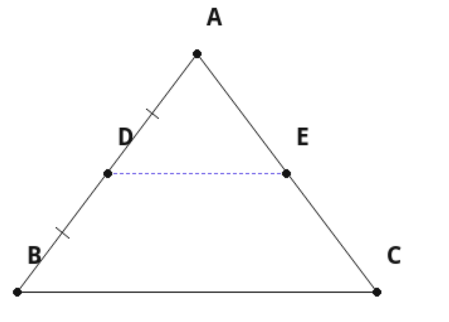
In ΔOPQ, AB∥PQ ⇒ OA/AP = OB/BQ ...(1). In ΔOPR, AC∥PR ⇒ OA/AP = OC/CR ...(2). From (1),(2): OB/BQ = OC/CR ⇒ by converse BPT, **BC ∥ QR.** Proved.



AB||PQ, AC||PR (A,B,C on OP,OQ,OR) → BC||QR.

Q7. Using BPT, prove a line through the midpoint of one side, parallel to another side, bisects the third side.

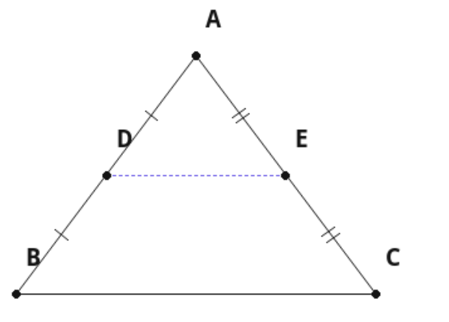
Let D be the midpoint of AB in ΔABC, and DE∥BC meeting AC at E. By BPT, AD/DB = AE/EC. Since AD=DB (D is midpoint), AD/DB=1, so AE/EC=1, i.e. AE=EC. **E is the midpoint of AC.** Proved.



D = midpoint of AB, DE||BC → E = midpoint of AC.

Q8. Using the converse of BPT, prove the line joining the midpoints of two sides is parallel to the third side.

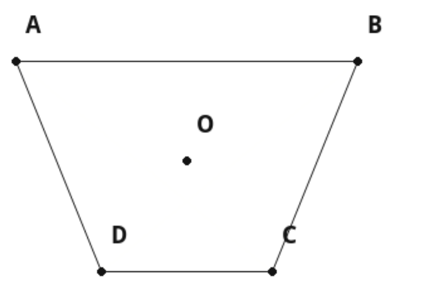
Let D, E be midpoints of AB, AC in ΔABC, so AD/DB=1=AE/EC. By the converse of BPT, **DE ∥ BC.** Proved.



D,E midpoints of AB,AC → DE||BC (converse of BPT).

Q9. ABCD is a trapezium with AB ∥ DC, diagonals meet at O. Show AO/BO = CO/DO.

In ΔOAB and ΔOCD: AB∥DC ⇒ ∠OAB=∠OCD and ∠OBA=∠ODC (alternate angles) ⇒ ΔOAB~ΔOCD (AA) ⇒ OA/OC = OB/OD ⇒ cross-multiplying, **AO/BO = CO/DO.** Proved.



AB||DC, diagonals meet at O → AO/BO = CO/DO.

Q10. Diagonals of ABCD meet at O with AO/BO = CO/DO. Show ABCD is a trapezium.

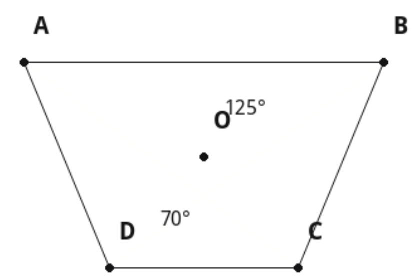
Rewriting the given ratio: AO/CO = BO/DO. In ΔAOB and ΔCOD, ∠AOB=∠COD (vertically opposite) and the sides about them are proportional ⇒ ΔAOB~ΔCOD (SAS) ⇒ ∠OAB=∠OCD (alternate angles) ⇒ **AB**

∥ DC, so ABCD is a trapezium. Proved.

Exercise 6.3 — Criteria for Similarity of Triangles

Q1. State which triangles are similar (with criterion):
(i) ∠A=60°,∠B=80°,∠C=40° and ∠P=60°,∠Q=80°,∠R=40° → **AAA, ΔABC ~ ΔPQR.**
(ii) AB/QR=BC/RP=CA/PQ=1/2 → **SSS, ΔABC ~ ΔQRP.**
(iii) LM=2.7,MP=2,LP=3 and DE=4,EF=5,DF=6 → ratios 2.7/4, 2/5, 3/6 are all different → **not similar.**
(iv) MN/QP = ML/QR = 1/2 with included ∠M = ∠Q = 70° → **SAS, ΔMNL ~ ΔQPR.**
(v) AB=2.5,BC=3,∠A=80° and DF=5,EF=6,∠F=80° — the given angle is not the *included* angle between the two given proportional sides in either triangle → **similarity cannot be concluded (not similar by any standard criterion).**
(vi) ΔDEF and ΔPQR each have angles 70°, 80°, 30° → **AAA similar** (match each equal angle to its corresponding vertex from the figure to write the correspondence correctly).

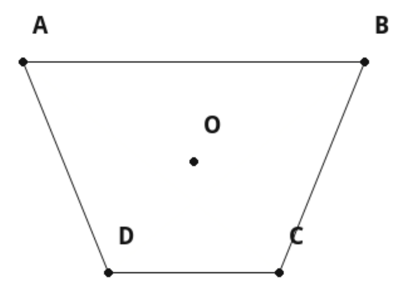
Q2. ΔODC ~ ΔOBA, ∠BOC=125°, ∠CDO=70°. Find ∠DOC, ∠DCO, ∠OAB.
B, O, D are collinear (diagonal), so ∠DOC = 180°−125° = **55°.** In ΔODC: ∠CDO+∠DOC+∠DCO=180° → 70+55+∠DCO=180 → **∠DCO = 55°.** Since ΔODC~ΔOBA (O↔O, D↔B, C↔A), ∠OAB corresponds to



ΔODC~ΔOBA, ∠BOC=125°, ∠CDO=70° → find the rest.

∠OCD → **∠OAB = 55°.**

Q3. Trapezium ABCD, AB∥DC, diagonals meet at O. Show OA/OC = OB/OD.
In ΔOAB, ΔOCD: AB∥DC ⇒ ∠OAB=∠OCD, ∠OBA=∠ODC (alternate angles) ⇒ ΔOAB~ΔOCD



AB||DC → ΔOAB~ΔOCD (AA) → OA/OC = OB/OD.

(AA) ⇒ **OA/OC = OB/OD.** Proved.

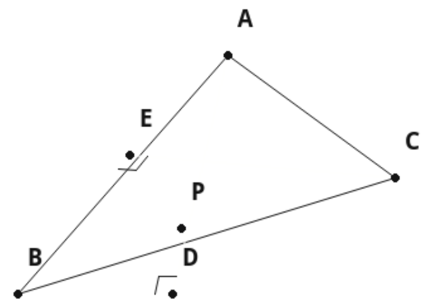
Q4. QR/QS = QT/PR and ∠1=∠2. Show ΔPQS ~ ΔTQR.
Since ∠1=∠2, PQ=PR (sides opposite equal angles in ΔPQR). So QR/QS = QT/PR becomes QR/QS = QT/PQ (since PR=PQ). In ΔPQS and ΔTQR: QR/QS = QT/PQ (shown) and ∠PQS = ∠TQR (common

angle Q) ⇒ **ΔPQS ~ ΔTQR (SAS).** Proved.

Q5. S, T on PR, QR with ∠P = ∠RTS. Show ΔRPQ ~ ΔRTS.
In ΔRPQ, ΔRTS: ∠RPQ = ∠RTS (given) and ∠R is common ⇒ **ΔRPQ ~ ΔRTS (AA).** Proved.

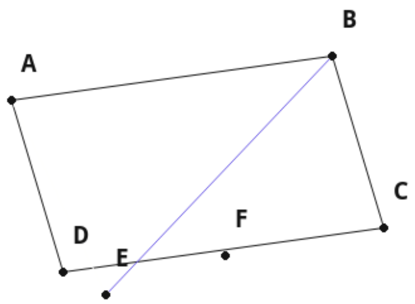
Q6. ΔABE ≅ ΔACD. Show ΔADE ~ ΔABC.
Since ΔABE≅ΔACD: AB=AC and AE=AD. So AD/AB = AE/AC (equal numerators over equal denominators pairwise) and ∠A is common ⇒ **ΔADE ~ ΔABC (SAS).** Proved.

Q7. Altitudes AD, CE of ΔABC meet at P. Show (i)-(iv):
(i) ∠AEP=∠CDP=90°, ∠APE=∠CPD (vertically opposite) ⇒ **ΔAEP~ΔCDP (AA).**
(ii) ∠ADB=∠CEB=90°, ∠ABD=∠CBE (common) ⇒ **ΔABD~ΔCBE (AA).**
(iii) ∠AEP=∠ADB=90°, ∠A common ⇒ **ΔAEP~ΔADB (AA).**
(iv) ∠PDC=∠BEC=90°, ∠C common ⇒ **ΔPDC~ΔBEC (AA).**



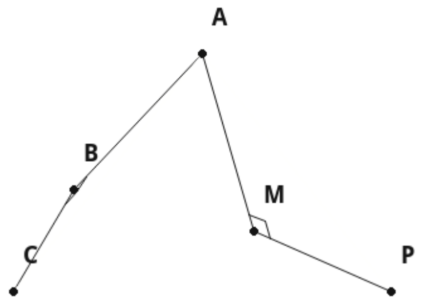
Altitudes AD⊥BC, CE⊥AB meet at P → ΔAEP~ΔCDP etc.

Q8. E on AD produced of parallelogram ABCD, BE meets CD at F. Show ΔABE ~ ΔCFB.
∠A = ∠C (opposite angles of a parallelogram are equal). AD∥BC and EB is a transversal ⇒ ∠AEB = ∠CBF (alternate angles) ⇒ **ΔABE ~ ΔCFB (AA).** Proved.



Parallelogram ABCD, E on AD produced, BE meets DC(produced) at F –

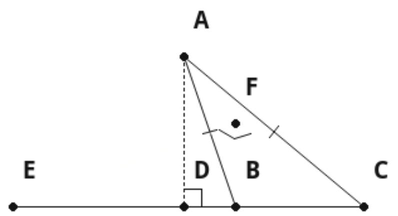
Q9. ABC, AMP right triangles at B, M. Prove (i) ΔABC~ΔAMP (ii) CA/PA=BC/MP.
(i) ∠ABC=∠AMP=90°, ∠A common ⇒ **ΔABC~ΔAMP (AA).**
(ii) From the similarity in (i), corresponding sides are proportional: **CA/PA = BC/MP** (along with AB/AM).



Right angles at B and M, common ∠A → ΔABC~ΔAMP (AA).

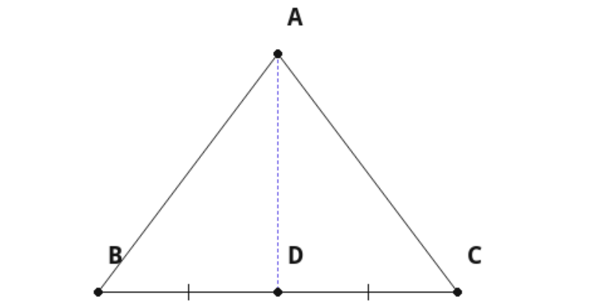
Q10. CD, GH bisect ∠ACB, ∠EGF; ΔABC~ΔFEG. Show (i) CD/GH=AC/FG (ii) ΔDCB~ΔHGE (iii) ΔDCA~ΔHGF.
Since ΔABC~ΔFEG: ∠A=∠F, ∠B=∠E, ∠ACB=∠FGE. The bisectors split these equal angles equally: ∠ACD=∠FGH and ∠BCD=∠EGH.
(iii) In ΔDCA, ΔHGF: ∠A=∠F and ∠ACD=∠FGH ⇒ **ΔDCA~ΔHGF (AA).**
(i) Follows directly: **CD/GH = AC/FG** (corresponding sides of the similarity just proved in (iii)).
(ii) In ΔDCB, ΔHGE: ∠B=∠E and ∠BCD=∠EGH ⇒ **ΔDCB~ΔHGE (AA).**

Q11. E on CB produced of isosceles ΔABC (AB=AC); AD⍰BC, EF⍰AC. Prove ΔABD~ΔECF.
∠ADB=∠EFC=90°. Since AB=AC, ∠ABC=∠ACB, i.e. ∠ABD=∠ACB. Since E lies on line CB extended, ray CE is the same ray as CB, and F lies on line AC, so ∠ECF is the same angle as ∠BCA=∠ACB. Hence ∠ABD=∠ECF ⇒ **ΔABD~ΔECF (AA).** Proved.



Isosceles ΔABC (AB=AC), E on CB produced, AD⊥BC, EF⊥AC → ΔABD

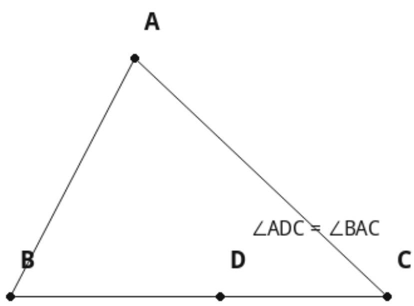
Q12. AB, BC, median AD of ΔABC proportional to PQ, QR, median PM of ΔPQR. Show ΔABC~ΔPQR.
D, M are midpoints of BC, QR, so BD=BC/2, QM=QR/2 ⇒ BD/QM=BC/QR. Given AB/PQ=BC/QR=AD/PM, so AB/PQ=BD/QM=AD/PM (all three sides of ΔABD, ΔPQM proportional) ⇒ ΔABD~ΔPQM (SSS) ⇒ ∠ABD=∠PQM, i.e. ∠B=∠Q. Now in ΔABC, ΔPQR: AB/PQ=BC/QR and ∠B=∠Q



AD = median to BC; matching median ratio → ΔABC~ΔPQR (SSS the

⇒ **ΔABC~ΔPQR (SAS).** Proved.

Q13. D on BC with ∠ADC=∠BAC. Show CA^2=CB·CD.
In ΔACD, ΔBCA: ∠ACD=∠BCA (common) and ∠ADC=∠BAC (given) ⇒ ΔACD~ΔBCA (AA) ⇒

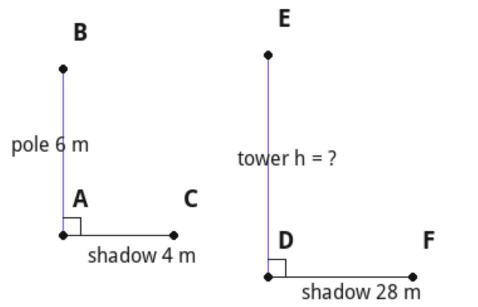


ΔACD~ΔBCA (AA) → CA^2 = CB·CD.

CA/CB=CD/CA ⇒ **CA^2=CB·CD.** Proved.

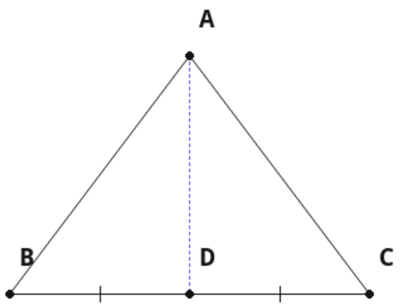
Q14. AB, AC, median AD of ΔABC proportional to PQ, PR, median PM of ΔPQR. Show ΔABC~ΔPQR.
Produce AD to E so that AD=DE, and PM to N so that PM=MN; join CE and RN. Since the diagonals of quadrilaterals ABEC and PQNR bisect each other (BD=DC and AD=DE, QM=MR and PM=MN), **ABEC and PQNR are parallelograms**, so CE=AB and RN=PQ. From the given AB/PQ=AC/PR=AD/PM and AE=2AD, PN=2PM, we get AC/PR=CE/RN=AE/PN, so ΔACE~ΔPRN (SSS), giving a matching pair of equal angles; a mirror argument on the other half of each parallelogram gives the second matching pair. Adding these two equal-angle results across ∠A and ∠P shows the full angle at A equals the full angle at P, i.e. ∠A=∠P. Combined with the given AB/PQ=AC/PR, **ΔABC~ΔPQR (SAS).** Proved.

Q15. A 6 m pole casts a 4 m shadow; a tower casts a 28 m shadow at the same time. Find the tower's height.
Same time → same angle of elevation → height/shadow ratio is constant: 6/4 = h/28 → **h = 42 m.**



Same angle of elevation → 6/4 = h/28 → h = 42 m.

Q16. AD, PM are medians of ΔABC, ΔPQR with ΔABC~ΔPQR. Prove AB/PQ = AD/PM.
Since ΔABC~ΔPQR: AB/PQ=BC/QR and ∠B=∠Q. D, M are midpoints, so BD=BC/2, QM=QR/2 ⇒ BD/QM=BC/QR=AB/PQ. In ΔABD, ΔPQM: AB/PQ=BD/QM and ∠B=∠Q ⇒ ΔABD~ΔPQM (SAS) ⇒



ΔABC~ΔPQR, AD/PM medians → AB/PQ = AD/PM.

AB/PQ = AD/PM. Proved.

Why This Chapter Matters for Boards

Triangles typically contributes 8-10 marks to the CBSE board paper, usually as at least one long-answer proof question directly from Exercise 6.3. The Basic Proportionality Theorem and its converse are the foundation for nearly every proof in this chapter and reappear in Chapter 10 (Circles) and Chapter 8/9 (Trigonometry), so getting comfortable with BPT-based reasoning here pays off across the rest of the syllabus.

CBSE Exam Weightage

This chapter falls under **Unit IV: Geometry** in the CBSE Class 10 Maths board exam syllabus. This unit typically carries around **15 marks (18.75%)** of the 80-mark theory paper, based on CBSE's published unit-wise weightage (Question Paper Design). CBSE sets weightage at the unit level rather than chapter-by-chapter, so the exact share from this specific chapter can vary a little between years and sample papers.

Class 10 Mathematics Chapter 6 – Notes and Extra Questions

Along with these NCERT Solutions, students can also use the Class 10 Mathematics Chapter 6 Extra Questions and Class 10 Mathematics Chapter 6 Revision Notes for quick revision and extra practice.