MATHS BASEMAKER

Class 10 CBSE — Chapter 6: Triangles (Similar Triangles)

Practice Questions

Q1. In triangle ABC, DE is parallel to BC intersecting AB at D and AC at E. If AD = 3 cm, DB = 5 cm, and AE = 4.5 cm, then the length of EC is:

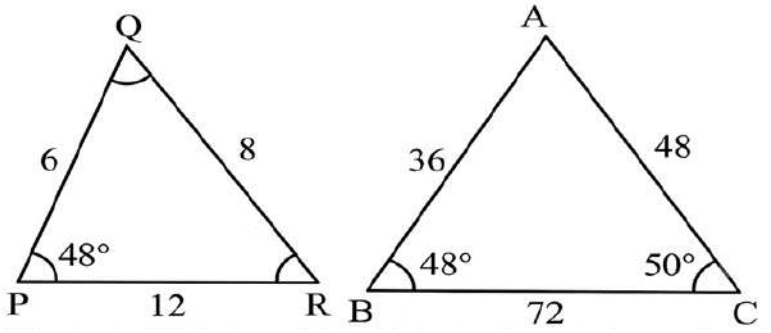
(a) 7.5 cm
(b) 6.5 cm
(c) 8.0 cm
(d) 9.0 cm

Q2. If triangle ABC is similar to triangle EDF, and triangle ABC is not similar to triangle DEF, then which of the following is not true? [CBSE Sample Paper]

(a) BC * EF = AC * FD
(b) AB * EF = AC * DE
(c) BC * DE = AB * EF
(d) BC * DE = AB * FD

Q3. In the given figure, measures of angle Q and R are respectively:

(a) 48°, 50(b) 50°, 48 (c) 82°, 48 (d) 82°, 50



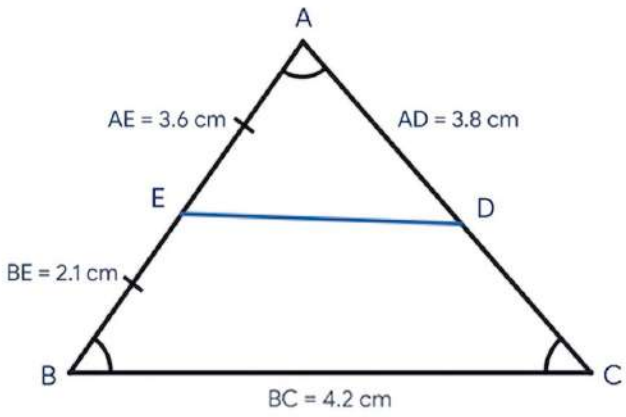
Q4. In the given figure, points E and D lie on sides AB and AC of triangle ABC respectively such that angle ADE = angle B. If AE = 3.6 cm, BE = 2.1 cm, AD = 3.8 cm, and BC = 4. 2 cm, then the length of DE is:

(a) 2.6 cm

(b) 2.8 cm

(c) 3.2 cm

(d) 3.6 cm

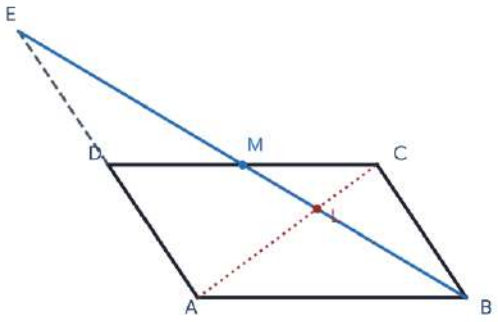


Q5. In triangle ABC, points D and E lie on sides AB and AC respectively such that AD = (x - 2) cm, DB = (x - 1) cm, AE = (x + 2) cm, and EC = (x + 5) cm. If x = 4, verify whether DE is parallel to BC or not. Also, state the theorem used.

Q6. Diagonals AC and BD of a trapezium ABCD with AB parallel to DC intersect each other at point O. Using a similarity criterion for two triangles, show that OA / OC = OB / OD.

Q7. In right triangle BAC, right-angled at A, AD is drawn perpendicular to hypotenuse BC. Prove that:
(i) triangle DBA is similar to triangle ABC
(ii) AD^2 = BD X CD
(iii) AB^2 = BC X BD

Q8. In the given figure, through the mid-point M of side CD of a parallelogram ABCD, the line BM is drawn intersecting diagonal AC at L and side AD produced to E. Prove that EL = 2 BL. [CBSE Board Classic]



Q9. CD and GH are respectively the medians of triangle ABC and triangle FEG. If triangle ABC is similar to triangle FEG, prove that:
(i) triangle ADC is similar to triangle FHG
(ii) CD / GH = AB / FE

Q10. A girl of height 120 cm is walking away from the base of a lamp-post at a speed of 1.5 m/s. If the lamp is 4.8 m above the ground, find the length of her shadow after 10 seconds.

Wathc video solutions on youtube :
https://youtu.be/sl4Dk6Vm5OI

HINTS & STEPS

Q1. Solution & Steps

Hint: By Basic Proportionality Theorem (BPT / Thales Theorem), AD / DB = AE / EC.

AD / DB = AE / EC

3 / 5 = 4.5 / EC

EC = (4.5 * 5) / 3 = 1.5 * 5 = 7.5 cm.

Answer: (a) 7.5 cm

Q2. Solution & Steps

Hint: From triangle ABC similar to triangle EDF, write the proportion of corresponding sides: AB / ED = BC / DF = AC / EF.

From AB / ED = BC / DF => AB * DF = BC * DE (Option d is true).

From BC / DF = AC / EF => BC * EF = AC * DF (Option a is true).

From AB / ED = AC / EF => AB * EF = AC * DE (Option b is true).

Now check option (c): BC * DE = AB * EF. Since BC * DE = AB * DF and DF is not equal to EF, this statement is NOT true.

Answer: (c) BC * DE = AB * EF

Q3. Answer: (c) 9 cm n triangle ABC: Angle A = 180° - (Angle B + Angle C) Angle A = 180° - (48° + 50°) = 180° - 98° = 82°

1. **Checking ratio of sides: PQ / AB = 6 / 36 = 1/6**

QR / AC = 8 / 48 = 1/6

PR / BC = 12 / 72 = 1/6

Since all three pairs of corresponding sides are in the same ratio: Triangle PQR ~ Triangle BAC (by SSS similarity criterion)

2. **Matching corresponding angles: Angle P = Angle B = 48°**

Angle Q = Angle A = 82°

Angle R = Angle C = 50°

Therefore, (d) angle Q = 82° and angle R = 50°.

Q4. Solution & Steps

- ***Total side AB = AD + BD = 3.8 cm + 1.9 cm = 5.7 cm***
- ***In triangle ADE and triangle ABC:***
  - ***Angle A = Angle A (Common)***
  - ***Angle ADE = Angle B (Given)***
  - ***Therefore, triangle ADE ~ triangle ABC (AA similarity)***
- ***Ratio: AD / AB = DE / BC***
- ***3.8 / 5.7 = DE / 4.2***
- ***2 / 3 = DE / 4.2***
- ***DE = (2 / 3) * 4.2 = 2.8 cm***
- ***Correct Option: (b) 2.8 cm***

Q5. Solution & Steps

- *x = 4*
- *AD = x - 2 = 4 - 2 = 2 cm*
- *DB = x - 1 = 4 - 1 = 3 cm*
- *AE = x + 2 = 4 + 2 = 6 cm*
- *EC = x + 5 = 4 + 5 = 9 cm*

Step 1: Calculate the ratios of the line segments

- *AD / DB = 2 / 3*
- *AE / EC = 6 / 9 = 2 / 3*

Since: AD / DB = AE / EC = 2 / 3

Conclusion: *Yes, DE is parallel to BC. Converse of BPT*

Q6. Solution & Steps

Hint: In trapezium ABCD, AB is parallel to DC. Consider triangle OAB and triangle OCD.

In triangle OAB and triangle OCD:

angle OAB = angle OCD (Alternate interior angles, since AB is parallel to DC)

angle OBA = angle ODC (Alternate interior angles)

Therefore, triangle OAB is similar to triangle OCD (by AA similarity criterion).

Since corresponding sides of similar triangles are proportional:

OA / OC = OB / OD. (Hence Proved)

Answer: OA / OC = OB / OD (Proved)

Q7. Solution & Steps [HOTS]

Hint: Use AA similarity on the triangles formed by the altitude drawn to the hypotenuse of a right triangle.

(i) In triangle DBA and triangle ABC:

angle BDA = angle BAC = 90 degrees

angle B = angle B (Common angle)

Therefore, triangle DBA is similar to triangle ABC (by AA similarity criterion).

(ii) From triangle DBA similar to triangle ABC (from part i):

DB / AB = AB / BC => AB^2 = BC * BD. (Hence Proved)

(iiI) Similarly, in triangle DAC and triangle ABC: angle CDA = angle CAB = 90 degrees and angle C = angle C (Common) => triangle DAC is similar to triangle ABC.

Since triangle DBA is similar to triangle ABC and triangle DAC is similar to triangle ABC, we have triangle DBA similar to triangle DAC.

Corresponding sides: BD / AD = AD / CD => AD^2 = BD * CD.

Answer: All three parts proved

Q8. Solution & Steps

Hint: In triangle BMC and triangle EMD: MC = MD (M is midpoint of CD), angle BMC = angle EMD (vertically opposite), and angle BCM = angle EDM (alternate angles).

1. Triangle BMC is congruent to triangle EMD (by ASA criterion) => BC = ED.
2. In parallelogram ABCD, BC = AD. Therefore, AE = AD + DE = BC + BC = 2 BC.
3. Now in triangle AEL and triangle CBL:

   angle ALE = angle CLB (vertically opposite angles)

   angle EAL = angle BCL (alternate interior angles, since AE is parallel to BC)
4. Therefore, triangle AEL is similar to triangle CBL (by AA similarity criterion).
5. EL / BL = AE / BC = (2 BC) / BC = 2 / 1 => EL = 2 BL. (Hence Proved)

Answer: EL = 2 BL (Proved)

Q9. Solution & Steps

Hint: Given triangle ABC is similar to triangle FEG, so AB / FE = BC / EG = AC / FG and angle A = angle F, angle B = angle E, angle C = angle G.

Since CD and GH are medians to AB and FE respectively, D and H are midpoints:

AD = AB / 2 and FH = FE / 2 => AD / FH = AB / FE.

Since triangle ABC is similar to triangle FEG => AC / FG = AB / FE.

Therefore, AD / FH = AC / FG.

In triangle ADC and triangle FHG: AD / FH = AC / FG and angle A = angle F.

Therefore, triangle ADC is similar to triangle FHG (by SAS similarity criterion).

From similarity, CD / GH = AC / FG = AB / FE. (Hence Proved)

Answer: Both parts proved

Q10. Solution & Steps

*Hint: Distance covered by the girl in 10 seconds = Speed * Time = 1.5 * 10 = 15 m.*

Height of lamp-post AB = 4.8 m.

Height of girl CD = 120 cm = 1.2 m.

Distance from base of lamp-post BD = 15 m. Let length of shadow DE = x m.

In right triangles triangle ABE and triangle CDE:

angle B = angle D = 90 degrees and angle E = angle E (Common angle).

Therefore, triangle ABE is similar to triangle CDE (by AA similarity criterion).

AB / CD = BE / DE

4.8 / 1.2 = (15 + x) / x

4 = (15 + x) /

4x = 15 + x => 3x = 15 => x = 5 m.

Answer: Length of shadow = 5 m

watch video solution on youtube :

https://youtu.be/sl4Dk6Vm5OI