

Similar Triangles, Proportions and Indirect Measurement

Grade 10 – Geometry math · Test Answer Key · Standards: G-SRT.B.4, G-SRT.B.5

Each solution shows the proportion, the work and the scoring split. For a proof, any complete and correct chain of reasons earns full credit.

Standards: G-SRT.B.4, G-SRT.B.5 · **Level:** Grade 10 Geometry

Question 1 Similar triangle ratios (2 points)

The scale factor is $XY \div PQ = 15 \div 9 = 5/3$. Then $YZ = (5/3)(12) = 20$.

k = 5/3; YZ = 20

Scoring: 1 point per part.

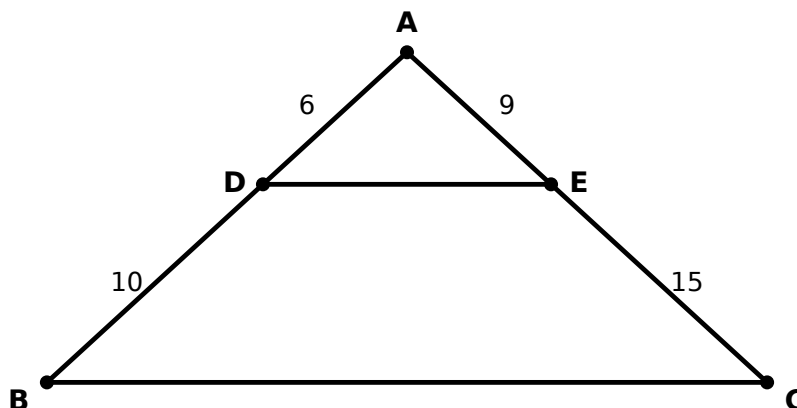
Question 2 Choose the criterion (3 points)

- Triangle 1 has angles 55° , 80° , 45° . Triangle 2 has angles 55° , 45° , 80° . Similar by AA.
- Ratios: $6/4 = 1.5$, $9/6 = 1.5$, $13.5/9 = 1.5$. Similar by SSS ~.
- $5/10 = 0.5$ but $8/12 \approx 0.667$. The included sides are not proportional, so the triangles are not similar.

(a) similar (AA), (b) similar (SSS ~), (c) not similar

Scoring: 1 point per part.

Question 3 Side-splitter lengths (3 points)



Solved figure for Question 3.

- $6/10 = 9/EC$, so $EC = 90 \div 6 = 15$.
- $AC = 9 + 15 = 24$.
- $AB = 16$, and $\triangle ADE \sim \triangle ABC$ gives $DE/32 = 6/16$, so $DE = 12$.

EC = 15; AC = 24; DE = 12

Scoring: 1 point per part.

Question 4 Converse of the side-splitter theorem (2 points)

$4.5/6 = 0.75$ and $6/8 = 0.75$. The two sides are divided proportionally, so by the converse of the Side-Splitter Theorem, $DE \parallel BC$.

Yes, parallel

Scoring: 1 point for the two equal ratios, 1 point for the conclusion with the theorem.

Question 5 Altitude to the hypotenuse (3 points)

- Area = $\frac{1}{2} \cdot 9 \cdot 12 = 54 = \frac{1}{2} \cdot 15 \cdot h$, so $h = 108 \div 15 = 7.2$.
- $9^2 \div 15 = 5.4$ and $12^2 \div 15 = 9.6$; they add to 15.
- $5.4 \cdot 9.6 = 51.84$ and $7.2^2 = 51.84$.

h = 7.2; pieces 5.4 and 9.6

Scoring: 1 point per part.

Question 6 Prove similar triangles (3 points)

Statement	Reason
1. $AB \parallel DE$	Given
2. $\angle A \cong \angle D$ and $\angle B \cong \angle E$	Alternate interior angles (parallel lines)
3. $\triangle ABC \sim \triangle DEC$	AA similarity

Scoring: 1 point for each correct pair of angles with the reason, 1 point for the AA conclusion.

Question 7 Mirror measurement (2 points)

The two right triangles are similar, so $h/40 = 1.5/3$. Then $h = 40 \cdot 1.5 \div 3 = 20$.

The tower is 20 meters tall

Scoring: 1 point for the proportion, 1 point for the height.

Question 8 Parallel lines and transversals (2 points)

Parallel lines divide transversals proportionally: $80/120 = 70/x$. So $x = 70 \cdot 120 \div 80 = 105$.

105 meters

Scoring: 1 point for the proportion, 1 point for the answer.