Connected deductive arguments

6 questions | 16 marks

Equivalent correct methods earn the corresponding marks.

1. In triangle $ABC, AB = AC$. D is the midpoint of BC. Prove triangles ABD and ACD congruent. [3 marks]

$AB = AC$; $BD = CD$; AD is shared.

Apply SSS.

Answer: SSS congruence.

2. Use the previous conditions to prove $AD \perp BC$. [3 marks]

SSS gives $\angle ADB = \angle ADC$.

They total 180°, so each is 90°.

Answer: The two adjacent angles at D are 90°.

3. A proof says "$AB = CD$ because the picture looks symmetric." Explain why this is insufficient. [2 marks]

A sketch may not be to scale.

Prove symmetry or use a given equality.

Answer: Visual appearance is not a stated mathematical condition.

4. Prove that an angle in a semicircle is 90° using the centre-angle theorem. [3 marks]

A diameter subtends a 180° central angle.

The circumference angle on the same arc is 90°.

Answer: The inscribed angle is half 180°.

5. Triangles ABC and DEF are similar with correspondence $A \leftrightarrow D, B \leftrightarrow E, C \leftrightarrow F$. $AB = DE$. Prove they are congruent. [3 marks]

$\frac{AB}{DE} = 1$.

All corresponding lengths therefore match, so SSS congruence follows.

Answer: Their similarity scale factor is 1.

6. A student verifies a circle claim for three drawings and calls it proved. What is still needed? [2 marks]

Three cases do not cover every possible allowed configuration.

Answer: A general argument from valid definitions and theorems.