

4.5.2 Congruence Reasoning

Name: _____ Class: _____ Date: _____

KEY WORDS congruence

<!-- Session 2 native-skill companion -->

Objective

Practise congruence reasoning within the labelled native lessons. Public original tasks; locally authored answer guidance.

1 Key knowledge and worked examples

■ Triangle congruence and geometric proof · Foundation

Use SSS (three sides), SAS (two sides and their included angle), ASA (two angles and the corresponding side), or RHS (right angle, hypotenuse and one other side). Match vertices in the same order. AAA establishes similarity, not congruence. SSA generally permits more than one triangle. A proof needs a given fact, a valid criterion and a matching-part conclusion.

$$(a + b)^2 = 4\frac{ab}{2} + c^2 \implies a^2 + b^2 = c^2$$

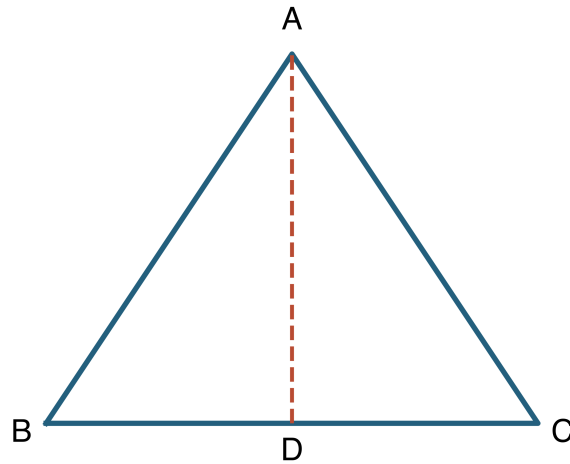
For an isosceles triangle ABC with AB=AC, let D be the midpoint of BC. Triangles ABD and ACD have AB=AC, BD=DC and shared AD, so SSS gives congruence. Matching base angles ABC and BCA are therefore equal; the two angles at D are equal and form 180°, so each is 90°. To derive Pythagoras, arrange four congruent right triangles with legs a,b around a tilted square of side c inside a square of side a+b. Area gives $(a+b)^2 = 4(ab/2) + c^2$, hence $a^2 + b^2 = c^2$. For a=3, b=4, $c^2 = 9 + 16 = 25$, so c=5. These arguments establish results independently of a scale drawing.

The SAS angle must lie between the named sides. RHS uses the hypotenuse, not two arbitrary sides. A proof diagram supports the argument; it cannot establish equality just by appearance.

AQA G5/G6 uses basic congruence criteria and simple geometric proofs, including isosceles base angles and Pythagoras. State every matching pair and explain which criterion applies.

Congruence proves equal base angles

$$AB = AC$$



$$BD = DC; AD \text{ shared} \rightarrow \text{SSS}$$

Original native-lesson illustration; labels belong to its worked example.

2 Practice

2.1 (Foundation) An isosceles triangle has apex angle 40° . Find either base angle.

2.2 (Foundation) Find c^2 for right-triangle legs 3 and 4.

2.3 (Foundation) Find each angle at the foot D in the isosceles proof.

3 Exam-style questions

3.1 Decide whether this claim is true. Justify with a concrete calculation or counterexample: Two triangles with equal angles must be congruent.

Solutions

2.1 The base angles agree, so $(180-40)/2=70^\circ$.

2.2 The area proof gives $c^2=3^2+4^2=25$.

2.3 Congruence makes them equal; a straight line sums to 180° .

3.1 False. Equilateral triangles of sides 1 and 2 have equal 60° angles but different side lengths. They are similar, not congruent.

Local review guidance: show the chosen method; give the checked result; explain the condition or failed shortcut. This is authored classroom guidance.