

# Congruence and geometric reasoning

Pearson Edexcel GCSE Mathematics 1MA1 • L027  
Foundation and Higher • 60 minutes • Lesson resources

REACH FOR THE STAR | GCSE MATHEMATICS

Select a valid triangle congruence criterion and use corresponding parts to build a short proof.

No calculator is needed. Length totals can be checked, but congruence requires reasons, not numerical output.

Follow the task-specific calculator guidance below. Write on the lines or replace them with typed answers. Attempt before reading intentional practice feedback.

## Connect & Check

Congruent: same shape and size. Corresponding: matching position in the two figures. Included angle: between two specified sides. Hypotenuse: side opposite a right angle. Proof: a justified chain of statements.

### R1

Find the third triangle angle when two are  $50^\circ$  and  $70^\circ$ .

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### R2

An isosceles triangle has base angles  $65^\circ$ . Find its apex.

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### R3

State an opposite-angle property of a parallelogram.

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**Share |** In pairs, predict the first step for this problem: SSS fixes all three sides; SAS fixes two sides and their included angle; ASA fixes two angles and the side between them. RHS fixes a right angle, hypotenuse and another side. A rig Compare your reasons before using the worked model.

## Present through worked examples

SSS fixes all three sides; SAS fixes two sides and their included angle; ASA fixes two angles and the side between them. RHS fixes a right angle, hypotenuse and another side. A rigid movement can then match the triangles. AAA fixes shape but permits different sizes. SSA is not a general congruence test.

### D1

Model: matching side triples 3,4,5 cm prove SSS. Now both triangles have sides 5,6,7 cm. Name the criterion.

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### D2

Model: sides 4,6 cm and included  $50^\circ$  prove SAS. Now sides 5,8 cm and included  $70^\circ$  match.

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### D3

Model: angles  $40^\circ, 60^\circ$  and their included 7 cm side prove ASA. Now angles  $35^\circ, 80^\circ$  and their included 6 cm side match.

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### D4

Model: right triangles with hypotenuse 13 cm and leg 5 cm satisfy RHS. Now hypotenuse 10 cm and leg 6 cm match.

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## Apply with less support

Write vertices in corresponding order. List each equality with its given reason, name the criterion, then deduce equal matching parts. A shared side equals itself; a picture is not proof.

### A1

Classify: (i) three matching sides (ii) two sides and included angle (iii) right angle, hypotenuse and one side.

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### A2

ABCD is a parallelogram with diagonal AC. Explain why triangles ABC and CDA are congruent.

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### A3

$AB=AD$  and  $BC=DC$  in a kite ABCD. Diagonal AC is drawn. Prove angle BAC equals CAD.

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Optional support: Mark what is known.

No calculator is needed. Length totals can be checked, but congruence requires reasons, not numerical output.

## Apply and extend reasoning

### C1

Two equilateral triangles have sides 3 cm and 5 cm. What does this show about AAA?

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### C2

Why is saying the triangles look equal not a proof? Improve the statement using the kite in A3.

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### Intentional practice feedback — read after attempting

A1: SSS; SAS; RHS.

A2:  $AB=CD$  and  $BC=DA$ , opposite sides of a parallelogram; AC shared; SSS.

A3:  $AB=AD$ ,  $BC=DC$ , AC shared; ABC and ADC congruent by SSS, so matching angles BAC and CAD are equal.

C1: Both have  $60^\circ$  angles but different sizes; AAA does not prove congruence.

C2: Drawings may be inaccurate. Use the three stated/shared equal side pairs and SSS.

Correct one response and explain your change. Stretch is available to either tier; temporary support needs do not determine entry tier.

## Recall & Review through retrieval

Work without notes. Six retrieval points; this attempt does not establish mastery. Equivalent exact numeric forms are accepted. Where accuracy is requested, also state the requested form in your written work.

**Q1** Number of matching side pairs in SSS

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**Q2** Degrees in a right angle

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**Q3** Third angle after  $35^\circ$  and  $80^\circ$ , degrees

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**Q4** Triangle sides 5, 5, 6 cm: perimeter in cm

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**Q5** Triangle scaled 2: length 7 becomes

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**Q6** Regular hexagon exterior in degrees

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### Intentional retrieval feedback

Q1 3; Q2 90; Q3 65; Q4 16; Q5 14; Q6 60. Correct and retry tomorrow, then in one week.

## Prove independently and improve

P1–P2: five minutes without notes; 4 marks. Your teacher reviews explanations and method marks.  
P3 has no mark.

### P1

Triangles ABC and DEF have  $AB=DE$ ,  $BC=EF$  and  $AC=DF$ . Name the criterion and the angle corresponding to ABC. [2]

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### P2

Right triangles have equal hypotenuses and one equal corresponding leg. Explain why they are congruent. [2]

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### P3

Explain one corrected error. Record a fresh question and a date to check it without support.

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Teacher feedback: \_\_\_\_\_

Fresh question and retry date: \_\_\_\_\_

Delayed independent evidence: \_\_\_\_\_

## Prepare for the next lesson

L028: Constructions and loci

### F1

Tomorrow give one reason AAA does not establish congruence.

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### F2

Before L028, explain what equidistant from A and B means.

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## Read and prepare

A perpendicular bisector is the set of points equally distant from two fixed points. Equal-radius compass arcs from the endpoints identify two such points; joining them creates the line.

Digital workbook: save locally where available; export a JSON backup before closing or moving the file. Restore only this lesson/version. Printing records answers, not mastery. Live browser checks remain pending; use Word/PDF if required.

## Optional extension activities

Allow 10–15 minutes for learners who have secured the main practice. Show a method, explain a check and justify your conclusion.

### Stretch

State a valid congruence test for sides 5, 7, 8 cm in two triangles and explain.

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### Deep challenge

Two triangles have equal side lengths 5 and 7 cm and a non-included equal angle. Must they be congruent?

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# Recall & Review: feedback and extension integration

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## Lesson L027: Congruence and geometric reasoning

Objective: Select a valid triangle congruence criterion and use corresponding parts to build a short proof.

### Timing for a 60-minute lesson

0-7 Connect & Check; 7-14 Share; 14-25 Present/model; 25-44 Apply route choice/practice; 44-52 independent exam-style check; 52-60 Recall & Review, WWW/EBI and next step.

### Recall & Review evidence

At the end of the lesson, solve a fresh question without prompts, explain one check, correct one error and record the next practice step.

### What Went Well (WWW)

I selected the correct geometric fact, theorem, formula or transformation and used a clear diagram with appropriate labels and units.

### Even Better If (EBI)

I will name the fact or theorem, show the substitution or construction step and check whether the size, direction and units of the result are reasonable.

### Integrated stretch and deep challenge

Stretch: State a valid congruence test for sides 5, 7, 8 cm in two triangles and explain.

Deep challenge: Two triangles have equal side lengths 5 and 7 cm and a non-included equal angle. Must they be congruent?

### My next-step response

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