

# Congruence and geometric reasoning

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**Pearson Edexcel GCSE Mathematics 1MA1**

L027 • Geometry and measures

60 minute lesson | learner resources

# The goal and the evidence

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Connect & Check → Share → Present → Apply → Recall & Review

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

**Explain, apply and check independently.**

# Starting-point diagnostic

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**R1–R3 • Attempt without notes**

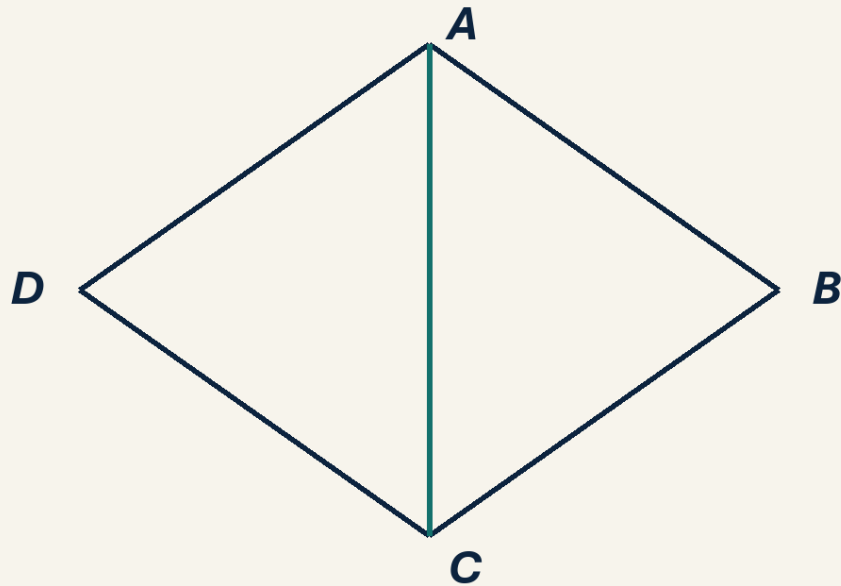
**Find the third triangle angle when two are  $50^\circ$  and  $70^\circ$ .**

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

**State an opposite-angle property of a parallelogram.**

# See the geometry

Use the diagram and practical sheet.



Teaching sketch • not to scale

*$AB = AD$  and  $BC = DC$*

*$AC$  is shared.*

*Match  $ABC$  with  $ADC$ .*

*Which congruence criterion?*

# Worked example and your turn

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## D1 • Explain each step

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

**Try the paired problem; check independently.**

# Worked example and your turn

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## D2 • Explain each step

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

**Try the paired problem; check independently.**

# Worked example and your turn

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## D3 • Explain each step

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.

**Try the paired problem; check independently.**

# Worked example and your turn

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## D4 • Explain each step

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

**Try the paired problem; check independently.**

# A method you can explain

Name the fact or construction at each step.

**Check against the original question.**

# Diagnostic pause

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**Choose and explain before moving on.**

Two triangles have equal corresponding angles only. Congruent? A always, B not necessarily.

**Use your explanation to decide the next step.**

# Careful variation

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## A1 • Show your reasoning

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

**Explain your decisions and check the result.**

# Independent application

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## A2 • Show your reasoning

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

**Explain your decisions and check the result.**

# Use the method in context

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## A3 • Show your reasoning

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

**Explain your decisions and check the result.**

# Intentional practice feedback

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**Read after attempting A3**

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

**Correct one step and explain the change.**

# A claim to test

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## C1 • Show your reasoning

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

**Explain your decisions and check the result.**

# Deepen the reasoning

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## C2 • Show your reasoning

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

**Explain your decisions and check the result.**

# Retrieval without notes

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**Q1–Q3 • Numeric answers**

**Number of matching side pairs in SSS**

**Degrees in a right angle**

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

# Retrieval without notes

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**Q4–Q6 • Numeric answers**

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

**Triangle scaled 2: length 7 becomes**

**Regular hexagon exterior in degrees**

# Independent exit evidence

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## **P1 • Without notes • Teacher review**

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

**Show working and check your answer.**

# Independent exit evidence

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## **P2 • Without notes • Teacher review**

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

**Show working and check your answer.**

# Feedback and next steps

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## **P3 • Completion is not mastery**

Explain one error you have corrected.

**Set a fresh question and a delayed check.**

# Before the next lesson

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## **L028: Constructions and loci**

Complete F1 tomorrow without notes.

**Attempt F2 and bring one question.**

## Optional stretch

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

Show a method. Explain a check or counterexample.

## Optional deep challenge

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

Show a method. Explain a check or counterexample.

# L027 Recall & Review

Congruence and geometric reasoning



## **Fresh evidence: prove the objective**

Solve a new question without prompts. Explain one check, then correct one error in your working.

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

Write the next practice step before you leave. It must test the method again, not simply copy today's example.

# Feedback language

Use the full phrases before the abbreviations.

## What Went Well (WWW)

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

Identify the mathematical method, representation, reasoning or check that improved.

## 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.

Set one precise next-step action and test it on a fresh question.

# Extension route

Choose this route only after the core evidence is secure.

## 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?

Explain your reasoning clearly enough that another learner could check it.