GCSE
MATHEMATICS

Higher tier

Geometry and measures

Topic test – Congruent triangles

Mark Scheme

8300

Version 1.0

Glossary for Mark Schemes

GCSE examinations are marked in such a way as to award positive achievement wherever possible. Thus, for GCSE Mathematics papers, marks are awarded under various categories.

If a student uses a method which is not explicitly covered by the mark scheme the same principles of marking should be applied. Credit should be given to any valid methods. Examiners should seek advice from their senior examiner if in any doubt.

M	Method marks are awarded for a correct method which could lead to a correct answer.
A	Accuracy marks are awarded when following on from a correct method. It is not necessary to always see the method. This can be implied.
B	Marks awarded independent of method.
ft	Follow through marks. Marks awarded for correct working following a mistake in an earlier step.
SC	Special case. Marks awarded within the scheme for a common misinterpretation which has some mathematical worth.
M dep	A method mark dependent on a previous method mark being awarded.
B dep	A mark that can only be awarded if a previous independent mark has been awarded.
oe	Or equivalent. Accept answers that are equivalent. eg accept 0.5 as well as $\frac{1}{2}$
[*a*, *b*]	Accept values between *a* and *b* inclusive.
3.14 …	Allow answers which begin 3.14 eg 3.14, 3.142, 3.1416
Use of brackets	It is not necessary to see the bracketed work to award the marks.

Examiners should consistently apply the following principles

Diagrams

Diagrams that have working on them should be treated like normal responses. If a diagram has been written on but the correct response is within the answer space, the work within the answer space should be marked. Working on diagrams that contradicts work within the answer space is not to be considered as choice but as working, and is not, therefore, penalised.

Responses which appear to come from incorrect methods

Whenever there is doubt as to whether a student has used an incorrect method to obtain an answer, as a general principle, the benefit of doubt must be given to the student. In cases where there is no doubt that the answer has come from incorrect working then the student should be penalised.

Questions which ask students to show working

Instructions on marking will be given but usually marks are not awarded to students who show no working.

Questions which do not ask students to show working

As a general principle, a correct response is awarded full marks.

Misread or miscopy

Students often copy values from a question incorrectly. If the examiner thinks that the student has made a genuine misread, then only the accuracy marks (A or B marks), up to a maximum of 2 marks are penalised. The method marks can still be awarded.

Further work

Once the correct answer has been seen, further working may be ignored unless it goes on to contradict the correct answer.

Choice

When a choice of answers and/or methods is given, mark each attempt. If both methods are valid then M marks can be awarded but any incorrect answer or method would result in marks being lost.

Work not replaced

Erased or crossed out work that is still legible should be marked.

Work replaced

Erased or crossed out work that has been replaced is not awarded marks.

Premature approximation

Rounding off too early can lead to inaccuracy in the final answer. This should be penalised by 1 mark unless instructed otherwise.

Q	Answer	Mark	Comments
1	AAA	B1	
2	SAS	B1	oe eg side – angle – side
3	A and D	B1	Either order
4(a)	47°	B1	
4(b)	10 cm	B1	
5	180º – 65º – 48º = 67º or 180º – 67º – 48º = 65º	B1	
	Both triangles have the same three angles so congruent or similar.	B1	oe
	4.2 cm is opposite 48º in one and 65º in the other so not congruent, hence similar	B1	oe eg 4.2 cm is between two different angles so not congruent but similar
6	The triangles are congruent – true	B1	
	At least one of the triangles is isosceles – cannot tell	B1	
	The shape in the centre is a rhombus – true	B1	
	The shaded area is equal to the non-shaded area – cannot tell	B1	

Q	Answer	Mark	Comments
7	As the pentagons are congruent this means AE = HI.	B1	
	EI is a shared side to both triangles.	B1	
	$540 \div 5 = 108^\circ$ or as the pentagons are regular each angle is equal	M1	oe this may be implied
	Angles AEI and EIH are equal as they are both internal angles of congruent regular pentagons.	B1	oe eg Angle AEI = 108° Angle EIH = 108°
	Triangles are congruent by SAS.	B1	
8	**Alternative method 1**		
	OA = *OB* (radii)	B1	
	OC is common	B1	oe
	COB = $(180 - 2 \times 31)$	M1	
	118 and SAS	A1	
	Alternative method 2		
	OC is common	B1	oe
	OCA = $(180 - 118) \div 2$	M1	
	OCA = 31	A1	
	118 and 31 and ASA	A1	

Q	Answer	Mark	Comments
9	**Alternative method 1 (SAS)**		
	As triangle ABC is equilateral, AB = AC	B1	
	Since the line AD bisects the angle, angle DAB and DAC are the same.	B1	Allow 30° to be used for the bisecting angle coming from an angle of 60° in an equilateral triangle.
	AD is a shared side	B1	
	They are congruent due to SAS	B1	
	Alternative method 2 (RHS)		
	As triangle ABC is equilateral, AB = AC	B1	
	The line AD bisects the line BC so angles ADC and ADB are 90°	B1	Accept right angle in place of 90°
	Since the line AD bisects the angle, angle DAB and DAC are the same.	B1	Allow 30° to be used for the bisecting angle coming from an angle of 60° in an equilateral triangle.
	They are congruent due to RHS.	B1	
	Alternative method 3 (SSS)		
	As triangle ABC is equilateral, AB = AC	B1	
	Since the line AD bisects the angle, it also bisects the line BC and so BD = DC.	B1	
	AD is a shared side.	B1	
	They are congruent due to SSS.	B1	

Q	Answer	Mark	Comments
9 cont	**Alternative method 4 (ASA)**		
	Since the line AD bisects the angle, angle DAB and DAC are the same.	B1	Allow 30° to be used for the bisecting angle coming from an angle of 60° in an equilateral triangle.
	Angle ABD = angle ACD	B1	Allow 60° to be used for this angle
	As triangle ABC is equilateral, AB = AC	B1	
	They are congruent due to ASA	B1	