



---

# **GCE AS MARKING SCHEME**

---

**SUMMER 2024**

**AS  
GEOLOGY - COMPONENT 2  
B480U20-1**

---

## About this marking scheme

The purpose of this marking scheme is to provide teachers, learners, and other interested parties, with an understanding of the assessment criteria used to assess this specific assessment.

This marking scheme reflects the criteria by which this assessment was marked in a live series and was finalised following detailed discussion at an examiners' conference. A team of qualified examiners were trained specifically in the application of this marking scheme. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners. It may not be possible, or appropriate, to capture every variation that a candidate may present in their responses within this marking scheme. However, during the training conference, examiners were guided in using their professional judgement to credit alternative valid responses as instructed by the document, and through reviewing exemplar responses.

Without the benefit of participation in the examiners' conference, teachers, learners and other users, may have different views on certain matters of detail or interpretation. Therefore, it is strongly recommended that this marking scheme is used alongside other guidance, such as published exemplar materials or Guidance for Teaching. This marking scheme is final and will not be changed, unless in the event that a clear error is identified, as it reflects the criteria used to assess candidate responses during the live series.

---

**GCE AS GEOLOGY**  
**COMPONENT 2 - FOUNDATION GEOLOGY**  
**SUMMER 2024 MARK SCHEME**

**Instructions for examiners of A Level Geology when applying the mark scheme**

**1 Positive marking**

It should be remembered that candidates are writing under examination conditions and credit should be given for what the candidate writes, rather than adopting the approach of penalising him/her for any omissions. It should be possible for a very good response to achieve full marks and a very poor one to achieve zero marks. Worthwhile answers that meet the requirements of the question, but do not appear on the mark scheme are to be given credit.

**2 Tick marking**

Low tariff questions should be marked using a points-based system. Each credit worthy response should be ticked in red pen. The number of ticks must equal the mark awarded for the sub-question. The mark scheme should be applied precisely using the marking details box as a guide to the responses that are acceptable. Do not use crosses to indicate answers that are incorrect.

**3 Annotated diagrams**

Where a candidate has answered a question wholly or partly by use of an annotated diagram, credit must be awarded to the annotations which form credit-worthy responses as outlined in the marking details box. Candidates must be credited only once for valid responses which appear both as annotations to diagrams and within a section of prose in the answer to the same question.

**4. Banded mark schemes**

Banded mark schemes are divided so that each band has a relevant descriptor. The descriptor for the band provides a description of the performance level for that band. Each band contains marks. Examiners should first read and annotate a learner's answer to pick out the evidence that is being assessed in that question. **Do not use ticks** on the candidate's response. Once the annotation is complete, the mark scheme can be applied. This is done as a two stage process.

## **Stage 1 – Deciding on the band**

When deciding on a band, the answer should be viewed holistically. Beginning at the lowest band, examiners should look at the learner's answer and check whether it matches the descriptor for that band. Examiners should look at the descriptor for that band and see if it matches the qualities shown in the learner's answer. If the descriptor at the lowest band is satisfied, examiners should move up to the next band and repeat this process for each band until the descriptor matches the answer.

If an answer covers different aspects of different bands within the mark scheme, a 'best fit' approach should be adopted to decide on the band and then the learner's response should be used to decide on the mark within the band. For instance if a response is mainly in band 2 but with a limited amount of band 3 content, the answer would be placed in band 2, but the mark awarded would be close to the top of band 2 as a result of the band 3 content.

Examiners should not seek to mark candidates down as a result of small omissions in minor areas of an answer.

## **Stage 2 – Deciding on the mark**

Once the band has been decided, examiners can then assign a mark. During standardising (marking conference), detailed advice from the Principal Examiner on the qualities of each mark band will be given. Examiners will then receive examples of answers in each mark band that have been awarded a mark by the Principal Examiner. Examiners should mark the examples and compare their marks with those of the Principal Examiner.

When marking, examiners can use these examples to decide whether a learner's response is of a superior, inferior or comparable standard to the example. Examiners are reminded of the need to revisit the answer as they apply the mark scheme in order to confirm that the band and the mark allocated is appropriate to the response provided.

Indicative content is also provided for banded mark schemes. Indicative content is not exhaustive, and any other valid points must be credited. In order to reach the highest bands of the mark scheme a learner need not cover all of the points mentioned in the indicative content but must meet the requirements of the highest mark band. Where a response is not creditworthy, that is contains nothing of any significance to the mark scheme, or where no response has been provided, no marks should be awarded.

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
1.	(a)		Iron (1) Silicon (1)	2			2		
	(b)	(i)	Granite/gneiss/schist/breccia/conglomerate/arkose (1)		1		1		
		(ii)	<p><b>Any three x (1) from:</b></p> <ul style="list-style-type: none"> <li>• both clastic/granular/fragmented</li> <li>• A better sorted than B</li> <li>• A more well rounded/spherical</li> <li>• B contains coarser grains</li> <li>• Both are sand sized/medium grain size</li> <li>• A more pore space/B less pore space or ref to more cement in B</li> </ul> <p>N.B. each needs to be a <b>comparative</b> statement, not simply a description of one rock.</p>	3			3		3
	(c)	(i)	Porosity is percentage space within a rock (1) Permeability is the ability for fluid to <b>move/flow</b> through a rock (1)	2			2		

Question		Marking details	Marks Available					
			AO1	AO2	AO3	Total	Maths	Prac
	(ii)	<p><b>Indicative content</b></p> <p>Grain size affects permeability but not porosity            Poorly sorted rocks (rock B) are less porous and permeable than better sorted rocks (rock A)            More rounded grains (rock A) may increase porosity and permeability            Reference to packing of grains            Degree of cementation – more cementation between the grains reduces porosity and permeability (rock B)            Degree of compaction – more compaction of the grains reduces porosity and permeability (rock B)            Degree of pressure solution – more pressure solution reduces porosity and permeability (rock B)</p> <p>Link to Rock A being more porous and permeable than rock B.            Credit diagrams.</p> <p><b>5–6 marks</b>            The response describes and explains <b>at least three</b> aspects of sediment size, shape, sorting, cementation and compaction and the effect each has on porosity and permeability. The answer may make links to Figure 1b.  <i>There is a sustained line of reasoning which is coherent, substantiated and logically structured.</i>  <i>The information included in the response is relevant.</i></p>		6		6		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
			<p><b>3–4 marks</b> The response describes and explains <b>at least two</b> aspects of sediment size, shape, sorting, cementation and compaction and the effect each has on porosity and permeability. <i>There is a line of reasoning which is partially coherent, supported by some evidence and with some structure. Mainly relevant information is included but there may be some irrelevant information or minor errors.</i></p> <p><b>1–2 marks</b> The response describes and explains <b>at least one</b> aspect of sediment size, shape, sorting, cementation and compaction and the effect it has on porosity and permeability. <i>There is a basic line of reasoning which is not coherent, supported by limited evidence and with very little structure. There may be significant errors or the inclusion of much irrelevant information.</i></p> <p><b>0 marks</b> <i>No attempt made or no response worthy of credit.</i></p>						
			<b>Question 1 total</b>	<b>7</b>	<b>7</b>	<b>0</b>	<b>14</b>	<b>0</b>	<b>3</b>

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
2.	(a)	(i)	186 Ma (1)		1		1	1	1
		(ii)	Reference to half-life (1) The ratio of parent to daughter isotopes in a sample is measured (1) The ratio can then be converted into half-lives and a sample dated (1)  <i>Credit use of numbers / ratios to explain</i>	3			3		
	(b)		<b>Any three x (1) from:</b> <ul style="list-style-type: none"> <li>• rapid evolution / short timespan</li> <li>• widespread</li> <li>• facies independent</li> <li>• easily preserved</li> <li>• easily recognisable</li> <li>• abundant</li> </ul>	3			3		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(c)	(i)	Ceratites (1)		1		1		
		(ii)	<p><b>Any four x (1) from:</b></p> <ul style="list-style-type: none"> <li>• Nautiloids span multiple periods so less useful</li> <li>• Nautiloids less useful as fewer families</li> <li>• only Nautiloids can be used to date the Cenozoic</li> <li>• Ceratites most useful as shortest time period</li> <li>• Ceratites, goniatites and ammonites all have many different families so more useful</li> <li>• cannot be used to date older than Devonian</li> <li>• reference to dating where the cephalopod groups overlap</li> <li>• individual species are used as zone fossils rather than families, not shown on Figure 2</li> <li>• we do not know how many species are in each family on Figure 2</li> <li>• we do not know the duration of each species on Figure 2.</li> </ul>			4	4		
			<b>Question 2 total</b>	<b>6</b>	<b>2</b>	<b>4</b>	<b>12</b>	<b>1</b>	<b>1</b>

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
3.	(a)	(i)	No significant correlation (1) Similar numbers of mantle plume hot spots on plate boundaries as not / credit use of examples (1)		2		2		
		(ii)	Mantle plumes increase subsurface temperatures by 500°C/shift the geotherm to the right (1) Causing the geotherm to cross the melting point curve / reaching the temperature to melt rocks (1) Resulting in partial melting / credit reference to decompression melting (1)	3			3		
	(b)	(i)	<b>Any four x (1) from:</b> <ul style="list-style-type: none"> <li>the area below Hawaii has lower seismic velocity</li> <li>area of lower seismic velocity originates at &gt; 2500km / core: mantle boundary</li> <li>reference to narrow column of low seismic velocity</li> <li>mantle plumes are areas of 'super-heated' mantle</li> <li>seismic wave velocities at mantle plumes depend on the rigidity/incompressibility of the rocks they are passing through</li> <li>where a mantle plume is present the rocks rigidity is lowered</li> <li>mantle plumes cause seismic waves to slow down</li> </ul>		4		4		
		(ii)	4750/60 (1) 79.2 (1) km Ma <sup>-1</sup> (1)		3		3	3	3

Question		Marking details	Marks Available					
			AO1	AO2	AO3	Total	Maths	Prac
	(iii)	<p>Magnetic reversals (1)</p> <p><b>Any two x (1) from:</b></p> <ul style="list-style-type: none"> <li>• date magnetic reversals through comparison with terrestrial lavas / reversals or obtain age from global magnetostratigraphic chart</li> <li>• magma formed at ridge / anomaly moves away from the ridge</li> <li>• measure distance to known reversal to calculate speed</li> </ul>	3			3		
	(c)	<p><b>Any three x (1) from:</b></p> <ul style="list-style-type: none"> <li>• explanation of slab pull / link between slab pull and subduction</li> <li>• explanation of ridge push</li> <li>• slab pull is the dominant process when subduction is occurring</li> <li>• ridge push is the dominant process when subduction is not apparent</li> </ul>	3			3		
		<b>Question 3 total</b>	<b>9</b>	<b>9</b>	<b>0</b>	<b>18</b>	<b>3</b>	<b>3</b>

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
4.	(a)	(i)	2 antiforms and 2 synforms visible in sketch (1) Fault in correct location (1) Folds asymmetrical and drawn correctly (1)		3		3	1	3
		(ii)	Correct location of fold axis (1) Correct symbol on fold axis (1)		2		2		
	(b)		Agreement that folds are asymmetrical (1) Symmetry is a function of limb length and limbs are different lengths (1) Hinges rounded not angular (1)			3	3		
	(c)	(i)	Stress – force per unit area (1) Strain – deformation as a result of stress (1)	2			2		
		(ii)	<b>Indicative content</b>  Elastic deformation is non-permanent up to the elastic limit / yield point and is not visible in rocks Folds and reverse fault formed due to compressional forces Folding occurs after the rocks elastic limit / yield point has been reached Folding occurs in the plastic zone of the model Faulting occurs due to brittle failure when the rock reaches the fracture point (X) Figure 4a matches this as the fault cuts across the folds and therefore happened after the folding			6	6		6

Question	Marking details	Marks Available					
		AO1	AO2	AO3	Total	Maths	Prac
	<p><b>5–6 marks</b> The response refers to <b>all three</b> of elastic, plastic and brittle behavior, and links these to non-permanent strain, folding and faulting. The response may make reference to an order of deformational features shown on the photograph. <i>There is a sustained line of reasoning which is coherent, substantiated and logically structured. The information included in the response is relevant.</i></p> <p><b>3–4 marks</b> The response refers to <b>at least two</b> of elastic, plastic and brittle behavior, and links these to non-permanent strain, folding and faulting. The response may make reference to an order of deformational features shown on the photograph. <i>There is a line of reasoning which is partially coherent, supported by some evidence and with some structure. Mainly relevant information is included but there may be some irrelevant information or minor errors.</i></p> <p><b>1–2 marks</b> The response refers to <b>at least one</b> of elastic, plastic and brittle behavior, and links these to non-permanent strain, folding and faulting. <i>There is a basic line of reasoning which is not coherent, supported by limited evidence and with very little structure. There may be significant errors or the inclusion of much irrelevant information.</i></p> <p><b>0 marks</b> <i>No attempt made or no response worthy of credit.</i></p>						
	<b>Question 4 total</b>	<b>2</b>	<b>5</b>	<b>9</b>	<b>16</b>	<b>1</b>	<b>9</b>

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
5.	(a)	(i)	Trilobite (1)	1			1		
		(ii)	X – Cephalon Y – Thorax Z – Pygidium 3 correct = (2) 2 correct = (1) 1 or 0 correct = (0)	2			2		
		(iii)	Fossil accurately measured 12.7 cm (1) Length of fossil divided by 3 (1) Correct answer given with units 4.2 cm or 42mm (accept range 4.2cm - 4.3cm) (1)		3		3	3	3

Question		Marking details	Marks Available					
			AO1	AO2	AO3	Total	Maths	Prac
	(b)	<p>Credit up to three marks maximum</p> <p>Eyes on top of cephalon / eyes do not wrap around the cephalon (1) Explanation of why eyes suggest not pelagic (1)</p> <p>Fringe / shovel on cephalon (1) Explanation of why fringe suggests benthonic (1)</p> <p>Small glabella (1) Explanation of why small glabella suggests benthonic (1)</p> <p>Many segments (1) Explanation of why many segments suggests benthonic (1)</p> <p><i>Credit other sensible suggestions</i> Answer must include some evaluation for full marks – i.e. cannot get 3 marks without an evaluation indicating whether it is benthonic or pelagic</p> <p>Answer must have <b>at least one</b> explanation to get full marks.</p>		3		3		3
	(c)	<p>Pyritisation (1)</p> <p><b>Any two x (1) from:</b></p> <ul style="list-style-type: none"> <li>• mineral replacement</li> <li>• molecule by molecule change</li> <li>• under anaerobic environment</li> </ul>	3			3		
		<b>Question 5 total</b>	<b>6</b>	<b>6</b>	<b>0</b>	<b>12</b>	<b>3</b>	<b>6</b>

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
6.	(a)	(i)	Lava – basalt (1) Dykes – dolerite (1)	2			2		
		(ii)	X label in correct position at base of gabbro / top of mantle peridotite (1)		1		1		
		(iii)	6.2 – 2 = 4.2(1) 4.2/2 x100 (1) 210% (1)		3		3	3	3
		(iv)	Rigidity / incompressibility increases (1) At a greater rate than density (1)	2			2		
		(v)	<b>Any three x (1) from:</b> <ul style="list-style-type: none"> <li>• sediments older further from ridge</li> <li>• sediments thicker further from ridge</li> <li>• crust forms at ridge, no time for sediment to accumulate</li> <li>• older crust closer to continents and increased sediment input</li> </ul>	3			3		
	(b)	(i)	Olivine / garnet (1)	1			1		1
		(ii)	5.5 km s <sup>-1</sup> (1)	1			1	1	1

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
		(iii)	Y label in correct location – top of peridotite / base of lavas (1)	1			1		
		(iv)	Moho is the crust-mantle boundary in model 1 (1) Moho is the boundary between serpentinised mantle and unserpentinised mantle in model 2 (1)			2	2		
		(v)	Could be tested by ocean drilling projects such as that carried out by the Joides Resolution 360 project (1) Only way to prove lithology / cannot use remote sensing methods as they use inference (1)  Credit other sensible answers (1 mark for idea, 1 mark for explanation)	2			2		
			<b>Question 6 total</b>	<b>12</b>	<b>4</b>	<b>2</b>	<b>18</b>	<b>4</b>	<b>5</b>
			<b>Paper Totals</b>	<b>42</b>	<b>33</b>	<b>15</b>	<b>90</b>	<b>12</b>	<b>27</b>