



GCE A LEVEL MARKING SCHEME

SUMMER 2024

**A LEVEL
GEOLOGY – COMPONENT 2
A480U20-1**

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 A LEVEL GEOLOGY
COMPONENT 2 - GEOLOGICAL PRINCIPLES AND PROCESSES
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)	(i)	Fossil A: trace fossil/burrow Fossil B: brachiopod Fossil C: plant/leaf All three correct 2 marks Any two correct 1 mark	2			2		
		(ii)	Any three x (1) from: • predation may distort/destroy fossil evidence • scavenging may distort/destroy fossil evidence • bacterial decay may distort/destroy fossil evidence • weathering may distort/destroy fossil evidence • erosion/high energy may distort/destroy fossil evidence • diagenesis may distort/destroy fossil evidence • bias towards hard parts being preserved/soft parts liable to decay • plant/fossil C is not a marine fossil • fine grained/low energy sediments preserve detail of fossils • well preserved (whole) fossils enable accurate interpretation of marine modes of life • sample size is too small to be representative • Jurassic limestone facies do not represent all marine Jurassic environments			3	3		
		(iii)	Any three x (1) from: • derived fossil • eroded from Carboniferous shale • reference to unconformity • redeposited in (Jurassic) breccia		3		3		3

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(b)		Indicative content Stage 1 burial in sediment decay of soft parts formation of cavity/mould Stage 2 lithification of sediment to form sedimentary rock solution of calcite shell formation of (external) mould Stage 3 precipitation of quartz crystals / cement from (siliceous) ground waters forming (external) cast 5–6 marks There is a clear response which describes all three stages of the fossilisation process. All the evidence is interpreted competently. The sequence of the fossilisation process is appreciated. The formation of both moulds and casts is described competently. <i>There is a sustained line of reasoning which is coherent, substantiated and logically structured. The information included in the response is relevant.</i>	6			6		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
			3–4 marks The response describes at least two stages of the fossilisation process. Most of the evidence is interpreted coherently. The sequence of the fossilisation process is partly appreciated. The formation of both moulds and casts is partially developed. <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> 1–2 marks The response describes at least one stage of the fossilisation process. The evidence is discussed with only rather superficial comment and there is a lack of relevance in places. <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> 0 marks No attempt made or no response worthy of credit						
			Question 1 total	8	3	3	14	0	3

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
2	(a)		Any two x (1) from: - decreases from 0-40km - increases from 40-100km - credit correct use of temperature values	2			2	2	2
	(b)	(i)	4 or 5 points plotted correctly (2) or 3 points plotted correctly (1) Line correctly joining the plotted points (1)	3			3	3	3
		(ii)	Any one x (1) from: - geotherm crosses the melting point curve for wet peridotite - temperature exceeds melting point for wet peridotite - wet peridotite has a lower melting point than dry peridotite/flux melting has occurred with wet but not dry peridotite Any one x (1) from: - geotherm does not cross the melting point curve for dry peridotite - temperature does not exceed melting point for dry peridotite			2	2		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(c)	(i)	C (1) Any two x (1) from: - enclave is rounded in shape / xenolith is angular in shape - enclave was once molten / xenolith has not assimilated - enclave is igneous (andesite) / xenolith is metamorphic (hornfels) - enclave contains included phenocrysts from the granite	1	2		3		
		(ii)	Any four x (1) from: - magmatic differentiation (during ascent) - gravity settling (leading to magma becoming more silicic) - magma mixing (of mafic/intermediate/silicic magmas) - contamination by assimilation (of continental crust) - partial melting (of continental crust or mantle peridotite) - some magma originates from the mantle, and some originates from the crust (+1 for development of any point)		4		4		
			Question 2 total	6	6	2	14	5	5

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)	Value correctly plotted (1)	1			1	1	1
		(ii)	$L-M = 14.5 \pm 0.1\text{cm} = 85\text{m}$ (1) $\% = [(125 - 85) / 125] * 100 = 32\%$ (1) ecf if initial answer incorrect		2		2	2	2
		(iii)	Any three x (1) from: - limestone has undergone brittle deformation - stress exceeds fracture point of limestone - limestone is competent - stress mainly in hinge of folds - due to compressional stress/crustal shortening - during an orogenic event		3		3		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(b)	(i)	Correct position of fold axis (1)		1		1		1
		(ii)	Anticline – unable to draw a conclusion due to lack of way-up information (1) Plunging – correct as dip data are not parallel to one another (1) Tight – incorrect as interlimb angle is too great (1) Axial plane dips to ENE – incorrect as axial plane dips in a westward direction (1)			4	4	4	4
	(c)	(i)	Correct plot of axial plane trace (1) Allow ecf from Q3(b)(i)		1		1	1	1

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
		(ii)	Mineral veins only found in limestones (1) Predominantly located in the Ecton Limestone (1) Any three x (1) from: • may be related to joint systems • the mineral veins are mainly located around the major anticline • some veins are parallel to the axial planar trace of the folding • some veins are perpendicular to the axial planar trace of the folding • some veins follow the trend of the faulting • some veins show no relationship to structure / are randomly orientated • acidic fluids dissolve limestone and create pathways for hydrothermal fluids • limestones neutralise acidic hydrothermal fluids leading to precipitation of ore minerals To a max of 4 marks			4	4		4
			Question 3 total	1	7	8	16	8	13

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)	The Australian continent has moved north / to lower latitudes (1) Antarctica has remained at the same latitude (1)	2			2		
		(ii)	Stage of the Wilson Cycle at 65Ma - young stage (1) Presence of a narrow sea between two continents with some continent still connected (1) Stage of the Wilson Cycle at 20Ma - mature stage (1) Presence of a wider/deeper sea (1)		4		4		4
	(b)	(i)	Any three x (1) from: - onset of growth of Antarctic ice sheet occurred when CO₂ concentrations were highest 45.5Ma ago - accelerated growth of Antarctic ice sheet occurred when CO₂ concentrations were still very high 34Ma ago - onset of fall in Antarctic seawater temperature occurred at time of rising CO₂ concentrations 55Ma ago - no information is provided between 26Ma and 37Ma ago so conclusions cannot be drawn regarding seawater temperatures - overall decrease in Antarctic seawater temperature led to growth in Antarctic ice sheet - however, from 45.5Ma ago CO₂ concentration tends to decrease as Antarctic seawater temperature falls			3	3		3

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
		(ii)	Any three x (1) from: - opening of these seaways changed the flow of currents around Antarctica - this stopped warm waters reaching Antarctica - cold Antarctic circumpolar current encircled and isolated Antarctica - this led to the cooling of the Antarctic continent and subsequent growth of the ice sheet		3		3		
		(c)	Any three x (1) from: - high reflectivity of ice / albedo effect - reflects solar radiation back into space - less solar radiation is absorbed by the Earth's surface - results in positive feedback cooling		3		3		
			Question 4 total	2	10	3	15	0	7

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)	-0.4 ϕ to -0.5 ϕ (1) 1.3mm to 1.42mm (1) Allow ecf if answer to first part is incorrect	2			2	2	2
		(ii)	$[(-0.1) - (-0.8)] / 2$ (1) Coefficient of sorting = 0.35 (1)		2		2	2	2
		(iii)	Well sorted (1) Allow ecf if answer to 5(a)(ii) is incorrect	1			1		
		(iv)	B (1) Any two x (1) from: - dune sands have undergone significant transport/erosion and are therefore well sorted - dune sands have undergone significant transport/erosion and are therefore more mature - dune sands have undergone significant transport/erosion/were deposited by wind and are therefore medium grained - orthoquartzite is typical of dune sands - scree sediments have undergone less transport/erosion and are therefore poorly/moderately sorted/less mature/coarse(r) grained - lake sediments are deposited in low energy conditions and are therefore fine(r) grained		3		3		3

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(b)	(i)	Correct position of 4 or 5 plots on the x axis (1) Correct position of 4 or 5 plots on the y axis (1)	2			2	2	2
		(ii)	Indicative content Mineralogy mineralogically sub-mature indicating the sediment has undergone some transport/erosion presence of feldspar indicates lack of significant transportation/erosion moderate % of quartz indicates some transport/erosion low % of rock fragments indicates some transportation/erosion low % of clay indicates relatively high energy levels during transport Texture moderate to poor sorting indicates relatively rapid deposition during a flood event median/modal pebble grain size indicates high energy/limited transport/erosion (sub)rounded grains indicate some transportation/erosion of the sediment Sedimentary structures presence of cross bedding indicates deposition by a current presence of graded bedding indicates gradual reduction in current velocity/energy levels during a flood event			6	6		6

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
			5-6 marks There is a clear response which uses evidence from each of the mineralogy, texture, and sedimentary structures to interpret the environment of deposition. All the evidence is interpreted competently. <i>There is a sustained line of reasoning which is coherent, substantiated and logically structured. The information included in the response is relevant.</i> 3-4 marks The response uses evidence from at least two of the mineralogy, texture, and sedimentary structures to interpret the environment of deposition. Most of the evidence is interpreted coherently but interpretations may only be partially developed. <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> 1-2 marks The response describes evidence from at least one of the mineralogy, texture, and sedimentary structures. The evidence is discussed with only rather superficial comment and there is a lack of relevance in places. <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> 0 marks No attempt made or no response worthy of credit.						
			Question 5 total	5	5	6	16	6	15

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
6	(a)	(i)	Left hand box ← and right hand box → (1)	1			1		
		(ii)	F_{CD} (continental drag) F_{SO} (slab and overriding plate drag) F_{OD} (ocean drag) or, F_{RR} (ridge resistance) (1) Force acts in opposite/different direction to plate motion (1)	2			2		
	(b)	(i)	Convection currents (1) In asthenosphere/mantle (1) Drag overlying lithospheric plates (1)		3		3		
		(ii)	Any two x (1) from: - denser oceanic lithosphere subducts - pulls remainder of plate along with it - due to gravity/weight/momentum	2			2		
	(c)	(i)	$(600-0) / (2021-2000) = 28.6\text{mm yr}^{-1}$ or equivalent values (1)		1		1	1	1
		(ii)	Reference to $\cos 55$ (or $\sin 35$) (1) Resultant velocity = $50-51\text{ mm yr}^{-1}$ (1)		2		2	4	4
		(iii)	Resultant velocity is constant (1) Forces that drive and oppose its motion are balanced/equal (1)		2		2		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(d)		Any two x (1) from: - measuring the magnetic inclination - of the remanent magnetism in rocks / alignment and locking in of magnetic minerals - enables changes in latitude of a continent to be determined in relation to magnetic North	2			2		
			Question 6 total	7	8	0	15	5	5
			Paper Totals	29	39	22	90	24	48