



GCE A LEVEL MARKING SCHEME

AUTUMN 2021

A LEVEL GEOLOGY – COMPONENT 1 A480U10-1

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INTRODUCTION

This marking scheme was used by WJEC for the 2021 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

GCE A LEVEL GEOLOGY

COMPONENT 1 - GEOLOGICAL INVESTIGATIONS

AUTUMN 2021 MARK SCHEME

Specimens

Specimen B = Basalt Specimen C = Millstone Grit Specimen D = Calymene Specimen M = Slate

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.

)		Marking dataila			Marks	s Available)	
<u>ر</u>	luestic	on	Marking details	A01	AO2	AO3	Total	Maths	Prac
1	(a)		Middle Carboniferous shales (1) Middle Carboniferous sandstones (1) Upper Carboniferous clays (1) Anticline (1)	4			4		
	(b)		 Any three x (1) from: Microfossils can survive the drilling process/small so likely to be found in drill core Fossils can be identified by observing through a microscope. If the fossils are the same then the rocks are the same age Microfossils are abundant Credit named microfossils 	3			3		
	(c)	(i)	$ h_1 = 0.1m \qquad h_2 = 0.3m \qquad (1) \\ area = \pi r^2 \qquad 3.14 \ x \ 0.05m \ x \ 0.05m \qquad (1) \\ 0.0079m^2 \qquad (1) $		3		3	2	3
		(ii)	Correct substitution (1) Correct re-arrangement (1) 0.4 (accept 0.379) (1) Allow error carried forward from (c) (i) and ignore any minus sign.		3		3	3	3

Question	Marking dataila			Marks	s Availabl	9	
Question		AO1	AO2	AO3	Total	e Maths Prac	Prac
(iii)	 Any three x (1) from: Lower in the Eakring field Due to sandstone having undergone diagenesis Sandstone has been buried to at least 1.5km So more compaction More cementation May be higher in sandstone due to fracturing 	3			3		3
	Question 1 total	10	6	0	16	5	9

	Juontia		Marking dataila	Marks Available					
	Luesu	211		A01	AO2	AO3	Total	Maths	Prac
2.	(a)	(i)	 Any three x (1) from: Increased Non-uniform/fluctuates Most rapidly during the last 200 years/recently Credit use of numbers 	3			3	3	3
		(ii)	 Any three x (1) from: From 20,000 to 12,000 years both CO₂ and temperature increase However from 12,000 years to 200 years temperature falls and CO₂ increases. During the last 200 years both CO₂ and temperature increase rapidly Explanation of another cause of temperature rise apart from CO₂ levels Increased temperature may cause increase CO₂ levels 			3	3		3
	(b)	(i)	Arrow on temperature line at the start of the recent rapid increase (1) The rapid increase in temperature is due to human activity (1)		2		2		

0	unatia	2	Marking dataila			Marks	Available	9	
G	uestio	n	Marking details	A01	AO2	AO3	Total	Maths	Prac
		(ii)	Indicative Content			6	6		
			Radioactive Material Widespread distribution. Potential to be incorporated into the geological record. Anthropogenic in nature. Long half-life will ensure it exists for a long period of time. Requires specialist equipment to measure and record. Difficult to access.						
			Plastics Abundant. Easily recognisable. Anthropogenic in nature. Take a long time to break down. Not widely distributed. Only found near human populations. May be extracted in the future.						
			Volcanic Ash Widely distributed. The event took place during widespread human activity. Not anthropogenic in nature. Not the only volcano to have erupted. Eruption took place after the start of the Anthropocene. Restricted to the Northern Hemisphere.						

Question	Marking dataila	Marks Available				9	
Question	Marking details	A01	AO2	AO3	Total	Maths	Prac
	 5-6 marks There is a clear response which discusses all three proposed marker beds. There are references to strengths and weaknesses which are described coherently. All judgements are consistent with the information as analysed. There is a sustained line of reasoning which is coherent, substantiated and logically structured. The information included in the response is relevant. 3-4 marks There is a clear response which discusses at least two of the proposed marker beds. There are references to strengths and weaknesses which are described coherently. Most judgements are drawn that are consistent with the information as analysed. There is a line of reasoning which is partially coherent, supported by some evidence and with some structure. Mainly relevant information or minor errors. 1-2 marks At least one of the proposed marker beds is discussed. There may be a lack of relevance in places and judgements drawn concerning the strengths and weaknesses of the proposed marker beds are superficial, with simple comments on the nature of the marker beds. 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.						
	0 marks No attempt made or no response worthy of credit.						
	Question 2 total	3	2	9	14	3	6

	Question	Marking dataila	Marks Available						
	luesu	חכ	Marking details	AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)	Shape (1) Scale (1) Detail e.g. correct no. of thoracic segments, eyes etc. (2)		4		4	1	4
		(ii)	Cephalon correctly labelled (1)	1			1		
	(b)		 Benthonic/sea floor (1) Any two x (1) from: Crescent shaped eyes on top of the cephalon Non streamlined shape/lack of genal spines Position of eyes indicates they were prey 		3		3		3
	(c)		Calymene		1		1		1
			Question 3 total	1	8	0	9	1	8

	Question	Marking dataila			Marks	s Available	9	
	QUESTION		A01	AO2	AO3	Total	Maths	Prac
4	(a)	Fine crystal size/ <1mm/equicrystalline (1) Mafic/dark in colour/accept reference to named minerals (1)	2			2		2
	(b)	Pahoehoe/ropey lava (1)	1			1		
	(C)	Lava flow (1) Fine crystal size so cooled quickly, likely to be formed at the Earth's surface (1) Pahoehoe formed by the upper surface cooling quicker than the faster moving lava beneath/Pahoehoe only found in lava flows (1) Concordant/pinches out (1)			4	4		
		Question 4 total	3	0	4	7	0	2

	Jugatian	Marking dataila			Marks	Available	9	
, C	luestion	Marking details	A01	AO2	AO3	Total	Maths	Prac
5	(a)	 Any four x (1) from: Sketch to show units with correct dips amounts in both M and C. (1) Scale (1) Unconformity drawn and labelled (1) Rock Units M and C identified Orientation (1) 		4		4	1	4
	(b)	 Specimen C Erosion/Transportation (1R) Any two x (1) from: Deposition Lithification/Cementation Diagenesis Specimen M Regional Metamorphism (1R) Any two x (1) from: Deposition/burial of fine-grained sediment Orogenic Belt Low grade 		6		6		
		Question 5 total	0	10	0	10	1	4

	Vection	Marking dataila			Marks	s Available	9	
, u	luestion	Marking details	AO1	AO2	AO3	Total	Maths	Prac
6	(a)	Augite (1)	1			1		1
	(b)	Dolerite (1) Medium crystal size (1) Contains mafic minerals/olivine/augite (1)		3		3		1
	(c)	 Any three x (1) from: Calcium Carbonate formed by chemical precipitation at tropical temperatures Ooids require wave action = shallow marine Grain size indicates high energy conditions = shallow Reference to uniformitarianism 		3		3		
	(d)	Indicative ContentSee table below7-9 marksThe response is well-structured and justifies a range of observations/techniques to enable consideration of both the age of Rock Unit I relative to Rock Unit J, and Rock Unit H relative to Rock Units I/J. Reference is also made to where these observations should be directed. Most, or all of the observations/techniques are well justified showing that the candidate has a clear rationale for most of the observations 			9	9		9

Question	Mauking dataila			Marks	Available	Ð	
Question	Marking details	AO1	AO2	AO3	Total	Maths	Prac
	 4-6 marks The response is quite well-structured and includes a range of observations/techniques to enable consideration of at least one of the age of Rock Unit I relative to Rock Unit J, and Rock Unit H relative to Rock Units I/J. Reference is also made to where these observations should be directed. Many, but not all, of the observations are justified appropriately, showing that the candidate has a reasonable rationale for many of the observations/techniques that have been proposed. 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. 1-3 marks The response makes use of a few observations/techniques only with superficial comments with regards to the relative ages of Rock Units H/I/J. Justification for the observations is limited revealing that the candidate has a limited rationale for the observations/techniques proposed. 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. O marks No attempt made or no response worthy of credit						

Questien	Marking dataila	Marks Available				e		
Question	Marking details	AC	D1	AO2	AO3	Total	Maths	Prac
	Observation suggested	Justi	ficat	ion				
	Look for way up sedimentary way up structures in Rock Units J and I	n Rock Enable application of superposition Enable application of superposition H Enable application of superposition. Enable not superposition. Enable not superposite not su						
	Look for cumulate layer in Rock Unit H							
	Look for palaeo weathered surface on Rock Unit H						nable natur	e of
	Look for chilled margins in Rock Unit H	Enabl	le na	ature of R	lock Unit	H to be de	duced	
	Look for baked margins in Rock Units I and J	Enabl applic	le na atio	ature of R n of supe	lock Unit	H to be de	duced/enat	ble
	Measure dip amounts and directions	Enabl	le ap	plication	of princip	le of supe	rposition	
	Look for included fragments/xenoliths	Enabl	le re	lative dat	ing to be	applied		
	Look for cross-cutting relationships between Rock Units H/I and H/J	its Enable relative dating to be applied Enable relative dating of rock units						
	Look for zone fossils within Rock Units I and J							
	Question 6 total	1	1	6	9	16	0	11

	Question	Marking dataila			Marks	Available	•			
	Juestion	Marking details	A01	AO2	AO3	Total	Maths	Prac		
7	(a)	V = 250m (accept 240-260) (1) VI = 200m (accept 190-210) (1)	2			2	2	2		
	(b)	Dip at VI is greater than dip at V / Dip at VI is 90° dip at V is 60° (1) The steeper the dip, the narrower the outcrop width (1) Credit reference to topography		2		2		2		
	(c)	(1) For each correctly located and labelled APT (max 2) Credit for 1 mark two correctly located (but incorrectly or not labelled APTs)		2		2		2		
	(d)	 Any three x (1) from: Plunging Inclined Antiformal Cannot determine if Anticline/Syncline Cannot determine symmetry 		3		3		3		
	(e)	F1 is sinuous/not a straight line (1) No offset of the vertical limb across F1 (1)			2	2				

Question		Marking details	Marks Available						
			AO1	AO2	AO3	Total	Maths	Prac	
	(f)	 90° (accept vertical) (1) Strike-Slip (1) Any one x (1) from: All rock unit boundaries/APTs have moved to the left Outcrop widths have stayed the same 		2	1	3			
		Question 7 total	2	9	3	14	2	9	

Question	Marking dataila	Marks Available						
Question	Marking details		AO2	AO3	Total	Maths	Prac	
8	$\begin{array}{c} c_{00} \\ c_{00} \\ s_{00} \\ s_{00$							
	The following points should appear on the cross-section				14	14	14	
	Base C horizontal next to X		1					
	 K/A boundary dipping at ~45° 		1					
	Surface plots of K in correct location near X		1					
	Any cross-cutting relationship shown by the base of C			1				
	K plotted vertically in middle of section		1					
	Surface plots of K in correct location near Y		1					
	E in correct location and discordant		1					
	Hidden base of C near Y			1				
	D/K boundary vertical beneath base of C near Y			1				
	APT and symbol for hidden antiform near Y			1				
	Use of borehole data			1				

Question		Marking dataila	Marks Available						
				AO2	AO3	Total	Maths	Prac	
		Correct location of 2 APTs			1				
		Correct symbols for APTs			1				
		Correct thickness of D in middle of section			1				
		Question 8 total	0	6	8	14	14	14	

Question	Marking details		Marks Available						
Question			AO1	AO2	AO3	Total	Maths	Prac	
9		E cuts C and F (1)	0	1				5	
		Pahoehoe in photograph 1 shows that the sequence is correct way up (1)							
		Therefore, principle of superposition states that F is younger (1)			4	5			
	Incorrect (1)	B is a lava flow so only the part of G deposited above B is younger than B (1)							
	Question 9 total		0	1	4	5	0	5	
	Paper Totals		20	48	37	105	26	68	

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