GCE AS MARKING SCHEME

SUMMER 2022

AS
GEOLOGY - COMPONENT 2
B480U20-1

INTRODUCTION

This marking scheme was used by WJEC for the 2022 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 AS GEOLOGY

COMPONENT 2 - FOUNDATION GEOLOGY

SUMMER 2022 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)	**Any three x (1) from:** • crystalline • size – quoting numbers • random orientation • anhedral/subhedral • porphyritic	**3**			**3**		**3**
		(ii)	Granite (1)		**1**		**1**		
	(b)	(i)	**Any two x (1) from:** • clay minerals • ions in solution • mineral fragments/quartz fragments	**2**			**2**		
		(ii)	Hydrolysis (1) development of hydrolysis (1) **or** Oxidation (1) development of oxidation (1) If there is detail of the processes, credit up to 2 marks if hydrolysis or oxidation are not actually named	**2**			**2**		
	(c)		**Any two x (1) from:** • biological weathering • 'root' action or equivalent • development of the impact of root action • minerals broken down by organic acids/chelation		**2**		**2**		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(d)		**Any three x (1) from:** • takes place in tidal areas/marine/saline • dissolved ions in sea water neutralise surface charge • clay particles able to coalesce • clays become large enough to be deposited	**3**			**3**		
			Question 1 total	**10**	**3**	**0**	**13**	**0**	**3**

<table>
<tr><th colspan="3" rowspan="2">Question</th><th rowspan="2">Marking details</th><th colspan="6">Marks Available</th></tr>
<tr><th>AO1</th><th>AO2</th><th>AO3</th><th>Total</th><th>Maths</th><th>Prac</th></tr>
<tr><td>2</td><td>(a)</td><td>(i)</td><td>A – Single Chain (1)
B – Framework (1)</td><td>2</td><td></td><td></td><td>2</td><td></td><td></td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Single chain silicates develop 2 good lines of cleavage (1)
Grain A breaks up more readily due to weak bonds/cleavage (1)
No cleavage in grain B (1)
Framework silicates have strong bonds (1)</td><td></td><td>4</td><td></td><td>4</td><td></td><td></td></tr>
<tr><td></td><td>(b)</td><td></td><td>Augite (1)</td><td></td><td>1</td><td></td><td>1</td><td></td><td>1</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td><table><tr><th>Grain</th><th>Flow velocity at deposition (cms^{-1})</th></tr><tr><td>A</td><td>13.5 (13.2-13.8)</td></tr><tr><td>B</td><td>32 (31.7-32)</td></tr></table>Both correct for (1)</td><td>1</td><td></td><td></td><td>1</td><td>1</td><td>1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Shape (1)
Density (1)</td><td>2</td><td></td><td></td><td>2</td><td></td><td></td></tr>
</table>

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(d)		Explanation of **Maximum of four x (1) from:** **Erosion (2 max)** • abrasion (1) and development (1) or • attrition (1) and development (1) **Transport (2 max)** • traction (1) and development (1) or • suspension (1) and development (1) or • saltation (1) and development (1)	**4**			**4**		
			Question 2 total	**9**	**5**	**0**	**14**	**1**	**2**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)	725/30 (accept 710-740) (1) 24.2 (23.6-24.7)°Ckm^{-1} (1) Must have appropriate units for full marks		**2**		**2**	**2**	**2**
		(ii)	120-75/75 (accept 117-123) x 100 (1) 60% (56-64%) (1)		**2**		**2**	**2**	**2**
		(iii)	Lines drawn extended (1) 60km (+/- 5km) (1)		**2**		**2**	**2**	**2**
		(iv)	**Any four x (1) from:** • thicker than average cont. crust / orogenic root • crustal rocks at higher temperatures/credit reference to quoted high temperature values • geotherm crosses melting point • partial melting occurs • melt rises as lower density than crust			**4**	**4**		
	(b)	(i)	Slate (1)		**1**		**1**		
		(ii)	**Any three x (1) from:** • regional metamorphism • low grade/relevant temperature and pressure • high pressure • recrystallisation • of a fine-grained sedimentary rock	**3**			**3**		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(c)		**Indicative content** Deformation is controlled by temperature Deeper rocks more likely to behave in a ductile manner Rocks at shallow depths more likely to behave in a brittle manner Reference to faults at shallow depth only Temperature increases with depth in the crust Deformation also influenced by other factors Folding observed throughout crust Rate of strain – increase rate of strain will lead rocks to behave in a more brittle manner Confining pressure – increased confining pressure will increase the yield strength of a rock and cause it to behave in a more ductile manner Competence – different lithologies will behave in different ways – credit examples Pore fluid pressure – increased pore fluid pressure will cause rocks to behave in a more ductile manner. Credit diagrams **5-6 marks** The response disagrees with the statement and explains the effect of temperature on deformation. The response describes and explains in detail **at least one** additional factor that has an effect on the way that rocks deform/respond to stress. *There is a sustained line of reasoning which is coherent, substantiated and logically structured. The information included in the response is relevant.*			**6**	**6**		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
			3-4 marks The response disagrees with the statement and explains the effect of temperature on deformation. The response describes and explains **at least one** additional factor that has an effect on the way that rocks deform/respond to stress. *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.* **1-2 marks** The response describes and explains the effect of temperature on how rocks deform. There is little evaluation and other factors may be described but not fully explored. *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 3 total	**3**	**7**	**10**	**20**	**6**	**6**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)	Umbo correctly labelled (1) Hinge line correctly labelled (1)	**2**			**2**		
		(ii)	Two lines of symmetry drawn correctly (1)	**1**			**1**		
	(b)		Width – (1.2 – 1.6cm) and length – (6.3 – 6.7cm) correctly measured (1) Ratio 1: 3.94 – 5.58 (1)		**2**		**2**	**2**	**2**
	(c)		Fossil C – brachiopod (1) Fossil D – bivalve (1)	**2**			**2**		
	(d)	(i)	2 (1) **Any two x (1) from:** • pallial sinus – burrower where siphon/foot retracted • elongate shell for ease of burrowing • smooth shell for ease of burrowing • lack of ribs/thin shell/not exposed at the surface • uniformitarianism		**3**		**3**		**3**
		(ii)	Specimen D is alive today but trilobites are extinct (1) Uniformitarianism cannot be applied to extinct fauna (1)	**2**			**2**		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
		(iii)	**Any three x (1) from:** • scavengers • tectonic activity • bias towards marine organisms (link to preservation) • bias towards organisms with hard parts (link to preservation) • metamorphism • erosion/low energy environments preserve more readily • periods of no deposition	**3**			**3**		
			Question 4 total	**10**	**5**	**0**	**15**	**2**	**5**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)	Two arrows drawn converging on the trench (1)		**1**		**1**		
		(ii)	Intermediate (1)	**1**			**1**		
		(iii)	Subduction (1) Partial melting (1) Of mantle wedge/subducting plate (1) Credit reference to the **effect** of water on the generation of magma for 1 mark		**3**		**3**		
	(b)		11 (accept 10-12) squares destroyed (1) 440,000m^2 /0.44km^2 (accept 400,000 – 480,000m^2) (1) Must include correct units		**2**		**2**	**2**	**2**
	(c)		**Indicative content** Hawaii located over a mantle plume Mantle plumes usually erupt mafic magma Mafic magma associated with less explosive eruptions Mafic magma less viscous Mafic magma contains less quartz Mafic magma hotter Mafic magma has lower gas content Intermediate magma more explosive Intermediate magma more viscous Intermediate magma contains more quartz Intermediate magma cooler Intermediate magma has higher gas content	**6**			**6**		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
			5-6 marks The response links both volcanoes to their tectonic setting and nature of their magma. The response describes and explains how **at least three of** composition, viscosity, gas content and temperature are linked to eruption type. *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** The response links both volcanoes to their tectonic setting and/or nature of their magma. The response describes and explains how **at least two of** composition, viscosity, gas content and temperature are linked to eruption type. *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.*						

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
			1-2 marks The response links one or both volcanoes to their tectonic setting and/or nature of their magma. The response describes and explains how **at least one of** composition, viscosity, gas content and temperature are linked to eruption type. *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 5 total	**7**	**6**	**0**	**13**	**2**	**2**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
6	(a)	(i)	**Any three x (1) from:** • clastic/granular/fragmented • size – 2cm – 1mm • poorly sorted • rounded clasts • reference to matrix	**3**			**3**		**3**
		(ii)	Conglomerate (1)		**1**		**1**		
	(b)		**Any three x (1) from:** • deposition of beds below boundary R • uplift/sea level change • erosion • deposition of younger beds		**3**		**3**		
	(c)	(i)	Normal (1) Footwall upthrown/hanging wall downthrown (1)		**2**		**2**		
		(ii)	Vertical displacement – 1.2cm (accept 1.1cm – 1.3cm) x2 = 2.4m (accept 2.2m – 2.6m)		**2**		**2**	**2**	**2**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(d)		Fault F1 and fault F2 both formed by extensional forces (1) because they are both normal (1) Fault 1 older than fault 2/faults are of different ages (1) Fault F1 displaced by fault F2 **or** Fault 2 younger than unconformity/Fault 1 older than unconformity (1)			**4**	**4**		**4**
			Question 6 total	**3**	**8**	**4**	**15**	**2**	**9**
			PAPER TOTALS	**42**	**34**	**14**	**90**	**13**	**27**