GCE A LEVEL MARKING SCHEME

SUMMER 2024

A LEVEL
GEOLOGY – COMPONENT 1
A480U10-1

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.

EDUQAS GCE A LEVEL GEOLOGY

COMPONENT 1 - GEOLOGICAL INVESTIGATIONS

SUMMER 2024 MARK SCHEME

Specimen E = Gypsum
Specimen C = Cornish Granite
Specimen K = Cockle
Specimen G Coal

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)	Augite (1)	**1**			**1**		**1**
		(ii)	Gabbro (1)		**1**		**1**		**1**
		(iii)	Mineral S Single Chain (1) Plagioclase Feldspar Framework (1)		**2**		**2**		
	(b)	(i)	Forsterite (1)	**1**			**1**		**1**
		(ii)	1420-1460 (1) / 39-43 (1) 90-94 (1) 1240 – 1280 (1) / 80-84 (1)		**5**		**5**	**5**	**5**
	(c)	(i)	Zone 1 more forsterite (Mg) rich (1) **Any two x (1) from:** • centre/zone 1 of crystal formed first (at a high temperature) • Mg locked in crystal centre • liquid becomes more Fe rich • cooling too quick for complete exchange between crystal and melt		**3**		**3**		
		(ii)	Groundmass cooled at too fast a rate (1) For exchange of iron and magnesium to occur (1)		**2**		**2**		
			Question 1 total	**2**	**13**	**0**	**15**	**5**	**8**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
2	(a)	(i)	Crust/Mantle Boundary at Peridotite/Gabbro (1)		**1**		**1**		
		(ii)	Normal faults (1) **Any one x (1) from:** • footwall moved up/hanging wall moved down • extensional		**2**		**2**		
		(iii)	Reduction in pressure/decompression melting (1) **Any one x (1) from:** • peridotite rises • lowers melting point of peridotite • allowing partial melting to take place • crustal thinning has taken place		**2**		**2**		
	(b)		**Must have an element of comparison for each mark** **Any two x (1) from:** • both have basaltic lavas outcropping • only basaltic lavas crop out on Figure 2a • basaltic lavas are discontinuous on Figure 2b but not on Figure 2a • dolerite crops out on Figure 2b but not on Figure 2a • gabbro crops out on Figure 2b but not on Figure 2a • peridotite crops out on Figure 2b but not on Figure 2a **Any two x (1) from:** • both figures show normal faulting • faults penetrate the dykes on Figure 2b but not on Figure 2a • Figure 2b has a large-scale fault but Figure 2a does not	**4**			**4**		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(c)		**Indicative content** Magnetic data can be collected using a magnetometer. Field stronger when normal polarity, field weaker when reversed polarity. This data enables magnetic stripes to be drawn. Stripes would be symmetrical for plates diverging at the same rate. Stripes would be asymmetrical for plates diverging at different rates. Magnetic reversal data could be used as a proxy for age. Comparison of magnetic reversals with the known ages of reversals from continental lavas Age/Distance from ridge could be used to calculate the rate of plate movement using the equation speed=distance/time Drilling would enable sediment thickness to be measured. Symmetry of sediment thickness can be used to compare spreading rates Drilling could reveal the structure to compare to Figure 2a and Figure 2b e.g. drilling to find if depths are constant laterally (symmetrical spreading) or if key depths vary laterally (asymmetrical spreading) Drilling could enable the collection of microfossils which could then be used for biostratigraphy which could determine an age of the sediment Dating of the oldest ocean sediments, and distance from the ridge enables calculation of rate of plate movement.	**6**			**6**		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
			5-6 marks Magnetic data is **well** explained. Ocean drilling data is **well** explained with reference to either measuring sediment thickness OR the collection of microfossils. An explanation is given as to how at least one of described methods can be used to determine the rate of sea floor spreading. *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** **Either** of magnetic data or ocean drilling **well** explained or **both** discussed in **limited detail** and related to how rate of plate movement could be determined. *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** **One** or **both** of magnetic data or ocean drilling methods superficially considered with regards to how the data is collected and/or how the data could be used. *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	**10**	**5**	**0**	**15**	**0**	**0**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)	<table><tr><td></td><td>Silky/Pearly (1)</td></tr><tr><td>Scratch with fingernail (1)</td><td>Scratched by fingernail (1)</td></tr></table> Credit 'Observe habit' (1) Fibrous (1)		**2**	**1**	**3**		**3**
		(ii)	Gypsum (1)		**1**		**1**		**1**
	(b)		**Any three x (1) from:** • hot/low latitude/near equator/tropical • arid/low rainfall • (rapid) evaporation • coastal/shallow marine/salt lake/saline	**3**			**3**		
			Question 3 total	**3**	**3**	**1**	**7**	**0**	**4**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
4	(a)		**Any three x (1) from:** • crystalline • coarse/>3mm • porphyritic/phenocrysts or equicrystalline • crystal shape	**3**			**3**		**3**
	(b)		Pluton (1) Coarse crystals suggest slow cooling at depth in a large body (1) **Any one x (1) from:** • discordant on Map 1 • size >2km • irregular shape/rounded/non-linear • offshoot dyke			**3**	**3**		**3**
	(c)		**Any three x (1) from:** • feldspar weathers • hydrolysis/chemical weathering • in a warm/wet climate • produces kaolinite • physical weathering also breaks down granite/feldspars but does not form china clay • credit reference to requirements to be economic deposits			**3**	**3**		**3**
			Question 4 total	**3**	**0**	**6**	**9**	**0**	**9**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
5	(a)		Scale (1) Shape (1) Detail (2) e.g. Any two of muscle scars, pallial line, teeth, sockets, crenulated margin, ribs		**4**		**4**	**1**	**4**
	(b)		Bivalve (1) Valve is asymmetrical/inequilateral (1)		**2**		**2**		
	(c)		<table><tr><td>Non-burrower/lived on or just below the seabed (1)</td><td>**Any two x (1) from:** • ribbed/thick shell offers protection on the seabed • rounded shape suggests non- burrower • lack of pallial sinus (indicates short siphon)</td></tr><tr><td>Burrower (1)</td><td>Thin/smooth/slightly elongate shell facilitates burrowing (1) Pallial sinus indicates siphon (1)</td></tr></table>			**6**	**6**		**6**
			Question 5 total	**0**	**6**	**6**	**12**	**1**	**10**

<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>6.</td><td></td><td></td><td>Indicative content: see table below

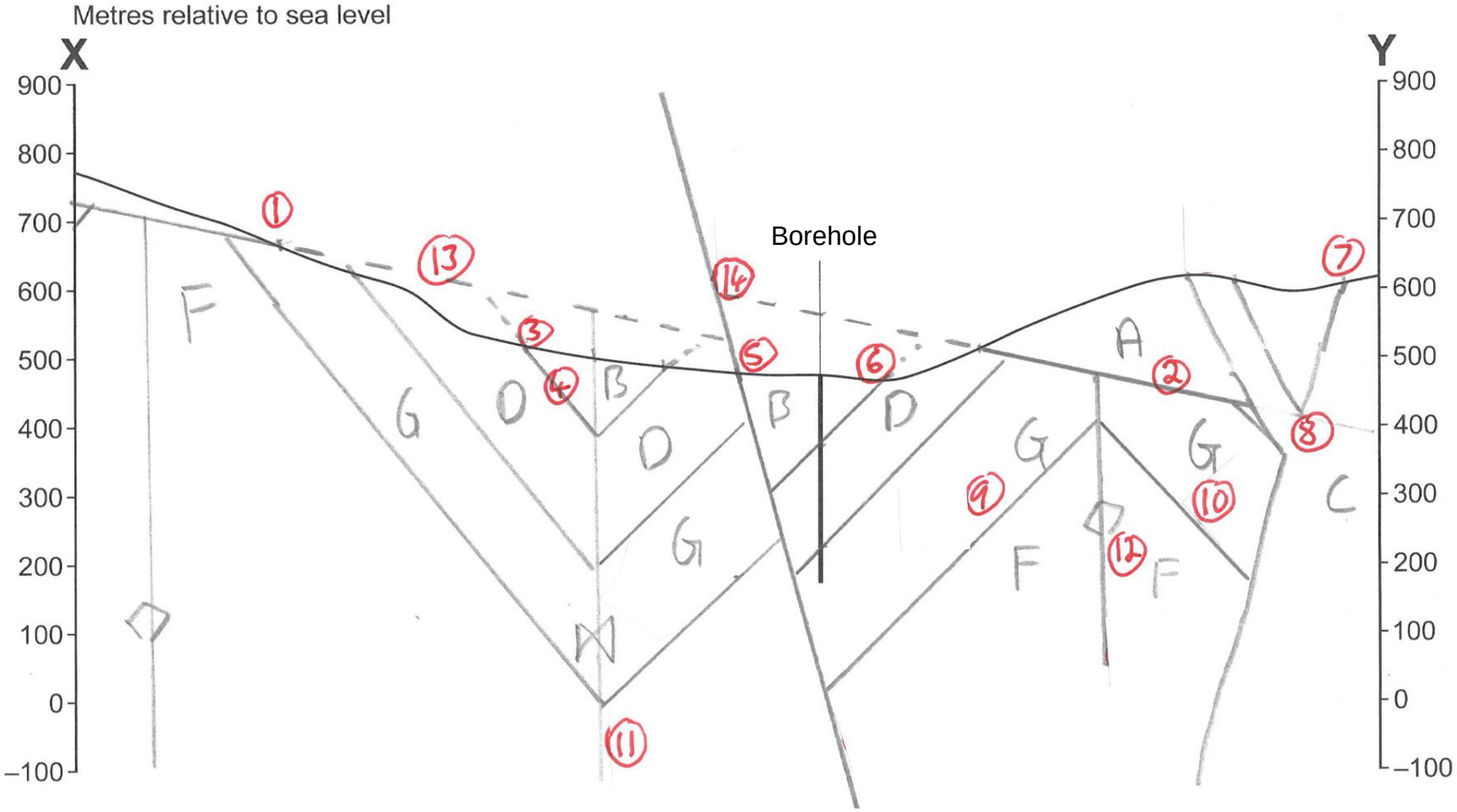
<table>
<tr><th>Observation suggested</th><th>Justification</th></tr>
<tr><td>Measure grain size</td><td>To determine energy level of environment.</td></tr>
<tr><td>Measure bed thickness</td><td>To determine depositional rates.</td></tr>
<tr><td>Describe grain shape and sorting</td><td>To determine the distance travelled.</td></tr>
<tr><td>Look for sedimentary structures</td><td>To determine environmental conditions.</td></tr>
<tr><td>Make a sedimentary log</td><td>To determine environmental changes.</td></tr>
<tr><td>Look for fossils</td><td>To determine environmental conditions.</td></tr>
<tr><td>Measure direction of the footprints</td><td>To determine the direction of travel, toes point in the direction the dinosaurs moved.</td></tr>
<tr><td>Measure the depth of the footprints</td><td>To determine the weight of dinosaurs, greater the depth the bigger the dinosaur.</td></tr>
<tr><td>Measure the distance between the footprints</td><td>To determine the speed, greater the distance between the footprints the faster the dinosaur.</td></tr>
<tr><td>Investigate the ratio of footprint length to the distance between the footprints</td><td>To determine the speed.</td></tr>
<tr><td>Measure the shape of the footprints</td><td>To determine the species of dinosaur.</td></tr>
<tr><td>Measure the size of the footprints</td><td>To determine the size of the dinosaur.</td></tr>
<tr><td>Measure the number of toes on the footprint</td><td>To determine the mode of life of the dinosaur (herbivore/carnivore).</td></tr>
<tr><td>Other sensible</td><td></td></tr>
</table></td><td></td><td></td><td>9</td><td>9</td><td></td><td>9</td></tr>
</table>

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
			7–9 marks The response is well-structured and justifies a range of observations/techniques to enable consideration of the **both** the sedimentary sequence and the dinosaur footprints. Most of the observations/techniques are well justified and described, showing that the candidate has a clear rationale for most of the observations that have been proposed. *There is a sustained line of reasoning which is coherent, substantiated and logically structured. The information included in the response is relevant*. **4–6 marks** The response is quite well-structured and includes a range of observations/techniques to enable consideration of the sedimentary sequence **and/or** the dinosaur footprints. Many but not all the observations are justified and described 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 sedimentary sequence **and/or** the dinosaur footprints. 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.* **0 marks** No attempt made or no response worthy of credit.						
			Question 6 total	**0**	**0**	**9**	**9**	**0**	**9**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
7	(a)		Anthracite (accept Bituminous) (1) **For Anthracite** **Any two x (1) from:** • black • shiny/vitreous/glassy • hard • does not leave a residue on the fingers/clean **For Bituminous** **Any two x (1) from:** • black • banded/dull • leaves a residue on the fingers		**3**		**3**		
	(b)		Yes, has undergone burial (1) Not 100m as it is anthracite/bituminous coal which forms at depths greater than 100m/ there is a lack of recognisable plant material (1) **Any two x (1) from:** • not the sea, a swamp/terrestrial • yes, it was tropical • not oxygenated as vegetation would rot.			**4**	**4**		**4**
			Question 7 total	**0**	**3**	**4**	**7**	**0**	**4**

<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>8</td><td>(a)</td><td></td><td>2 Fold Axes in correct place to the West of F1 (1)
1 Fold Axis in correct place to the South of F2 (1)
All Fold Axes drawn with correct symbol (1)
Unconformity correct (1)</td><td></td><td>4</td><td></td><td>4</td><td>3</td><td>3</td></tr>
<tr><td></td><td>(b)</td><td></td><td><table><tr><td></td><td>90 (1)</td></tr><tr><td>Dip-slip (1)</td><td>Strike-slip (1)</td></tr></table></td><td></td><td>3</td><td></td><td>3</td><td>3</td><td>3</td></tr>
<tr><td></td><td></td><td></td><td>Question 8 total</td><td>0</td><td>7</td><td>0</td><td>7</td><td>6</td><td>6</td></tr>
</table>

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
9			Correct surface plots of A (both sides of fault) (1) Correct dip angle of A (7-17º) (on whatever has been drawn) (1) Correct surface plots of B/D boundaries and G/D boundary to west of fault (= 3 boundaries) (1) B/D boundaries dipping towards each other creating a synform to west of fault (1) Correct position, dip angle and dip direction of fault (1) Correct surface plot and dip angle of B/D to east of fault. Use of borehole gives an angle of 45º (accept between 35º and 50º) (1) Correct surface plot of pluton **and** dyke (1) Discordant nature of dyke **or** pluton (1) Correct true thickness of G (150m at one point at least) (1) Hidden limb of G in the antiform underneath A in the east (1) Synform fold axis correctly located and labelled to west of fault (in the middle of the fold they have drawn) (1) Either of antiformal fold axes in correct place and labelled (1) Cross-cut of G/D and B/D boundaries with the base of A (1) Cross-cut of A by Fault (1) See drawn cross-section on page 15		**1** **1** **1** **1** **1** **1**	**1** **1** **1** **1** **1** **1** **1** **1**	**14**	**14**	**14**
			Question 9 total	**0**	**6**	**8**	**14**	**14**	**14**



Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
10	(a)		Schist (1) **Any two x (1) from:** • foliated/schistocity • contains garnet • it has undergone medium grade regional metamorphism		**3**		**3**		**3**
	(b)	(i)	422*2/100 = 8.44 (1) 430 (1) do not accept 430.44		**2**		**2**	**2**	**2**
		(ii)	**Any two x (1) from:** • closed system e.g. no K or Ar have escaped • decay constants/half-lives of K are accurately known • no atmospheric Ar incorporated into the rock after its formation • no Ar present at the start • the quantities of Ar and K in the rock have been accurately determined • half life of K^{40} is 1 x 10^9 years so will only work with rocks that are at least 10Ma • reference to influences of metamorphism • credit reference to contamination	**2**			**2**		
	(c)	(i)	Cretaceous (1)			**1**	**1**		**1**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
		(ii)	It is older than Paleogene because intruded by rock Unit C so cannot be Neogene (credit 'C is younger than A **because** of cross-cutting relationship') (1) **Any one x (1) from:** • Figure 10 shows an included fragment so Rock A must be younger than 422 (430) Ma so cannot be Precambrian/Cambrian • Rock Unit A cross-cuts rock unit D, Rock Unit D contains vertebrate footprints so Rock Unit A must be younger than Precambrian/Cambrian			**2**	**2**		**2**
			Question 10 total	**2**	**5**	**3**	**10**	**2**	**8**
			Paper Totals	**20**	**48**	**37**	**105**	**28**	**72**