GCE A LEVEL MARKING SCHEME

AUTUMN 2021

A LEVEL
GEOLOGY – COMPONENT 3
A480U30-1

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 3 - GEOLOGICAL APPLICATIONS

AUTUMN 2021 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.

Section A

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
1	(a)	(i)	Increases to east (1) Quantified (1)	**2**			**2**		
		(ii)	Channel gets narrower (1) Channel gets shallower (1)	**2**			**2**		
	(b)		**Any one x (1) from:** • landslide • earthquake • meteorite impact	**1**			**1**		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(c)	(i)	4 times	**1**			**1**		
		(ii)	Point correctly plotted	**1**			**1**		**1**
		(iii)	**Any two x (1) from:** • boulder too large • maximum storm wave height too low to transport boulder • tsunami waves more powerful than storm waves • other suitable explanation		**2**		**2**		**2**
		(iv)	**Any one x (1) from:** • tsunami deposits • marine erosion higher than present sea level • more modern deposits not aligned • historical records (+1) for development	**2**			**2**		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(d)		**Any four x (1) from:** • large coastal settlements at risk • wave height high enough to cause damage/loss of life • description of tsunami defences: - monitoring systems - warning sirens - evacuation routes - sea walls - other reasonable • high cost of defences • low chance of hazard • coastline & channel depth still could build a tsunami wave • low frequency events • no reoccurrence since			**4**	**4**		
			Question 1 total	**9**	**2**	**4**	**15**	**0**	**3**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
2	(a)		**Any one x (1) from:** • subsidence • micro-seismicity + (1) for description of problem	**2**			**2**		
	(b)	(i)	**Any two x (1) from:** • reduce height of slope • catch falling blocks • other sensible suggestion	**2**			**2**		
		(ii)	**Any one x (1) from:** • slope stabilization methods (netting, shotcrete) • drainage control • retaining structures (e.g. retaining wall, rock bolts/anchors) + (1) for development	**2**			**2**		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(c)	(i)	use of tan function (1) opposite = 12m, adjacent = 25 m (1) for measurements $tan^{-1}\frac{12}{25} = 25.6°$ (1)		**3**		**3**	**3**	**3**
		(ii)	**Any three x (1) from:** • mine waste unconsolidated • dug to stable friction angle • high permeability/effect of lubrication • sandstone & shale cemented • dip of sandstone & shale into slope		**3**		**3**		
	(d)		**Any one x (1) from:** • ground levelling and surveying; • monitoring of microseismic events • borehole distortion • ground deformation (creep, strain, tilt) • groundwater pressures • use of electronic distance measurement (EDM) • satellite and GPS techniques. + (2) for explanation of **one** of these techniques	**3**			**3**		
			Question 2 total	**9**	**6**	**0**	**15**	**3**	**3**

Section B

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
3	(a)		**749380 –** Cleavage (1) **737396 –** Outer limit of metamorphic aureole (1)	**2**			**2**		**2**
	(b)	(i)	Mineral veins - Youngest Pluton P Mylor Slate (MrSl) – Oldest (3 correct = 2 marks, 1 correct = 1 mark)			**2**	**2**		**2**
		(ii)	**Any two x (1) from:** • metamorphic aureole of granite • cuts the Dolerite • Dolerite Devonian / Granite Pluton Q Carboniferous		**2**		**2**		**2**
		(iii)	**Max 3 marks from:** 1. Geological map - **max two x (1) from:** • same rock, • close proximity, • metamorphic aureole continues around both, 2. Bouguer map - **max two x (1) from:** • low gravity anomaly extends to the north. • reference to shape of anomaly		**3**		**3**		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(c)	(i)	3cm * 500m = 1500m (1.5km) (1) (1)		**2**		**2**	**2**	**2**
		(ii)	Dip of the granite explained in a diagram. (1) Steeper dip – narrower outcrop & vice versa (1)		**2**		**2**		**2**
		(iii)	**Any one x (2) explained from:** • thermal conductivity of country rock • effect of fluids from granite • variations in permeability (porosity/fracturing) • other sensible		**2**		**2**		
	(d)		**Any three x (1) from:** • cleavage orientation possibly deflected by intrusion • cleavage outside met aureole, as well as within • cleavage/slate = regional met not contact. • cleavage not cut by the granite.			**3**	**3**		
			Question 3 total	**2**	**11**	**5**	**18**	**2**	**10**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)	10 accurately plotted on **both** sectors of the rose diagram (1)	**1**			**1**	**1**	**1**
		(ii)	**6** (1) **-2**, 4, 0.5 (1) (note follow on error)	**1**	**1**		**2**	**2**	**2**
		(iii)	Rejected (1) χ^2 value is greater than critical value (1)		**2**		**2**	**2**	**2**
	(b)		**Any three x (1) from:** • sampling area may not be representative • sample size • only 2 dimensions considered • need to consider every orientation • long axis not always easy to identify if square crystal • other sensible			**3**	**3**		**3**
			Question 4 total	**2**	**3**	**3**	**8**	**5**	**8**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)	35m (or 3m - 38m) (1) Strike slip (1)	**2**			**2**	**1**	**1**
		(ii)	**Any three x (1) from:** • slickensides (1) • explained – linked to direction • offset of mineral veins • offset of other markers beds/structures			**3**	**3**		**3**
	(b)		**Any two x (1) from:** • larger faults/more fractured • greater density of faults • ref to fault shatter zone of weakness • fault breccia zone		**2**		**2**		
			Question 5 total	**2**	**2**	**3**	**7**	**1**	**4**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
6	(a)	(i)	**Any two x (1) from:** • granite • radioactive mineral breakdown • large body • permeability allows flow of hot water from below		**2**		**2**		
		(ii)	4500 x 0.040 +12 = 192°C (1) (1) Credit 180°C (1)		**2**		**2**	**2**	**2**
	(b)	(i)	1.9×10^{-14} m^2		**1**		**1**	**1**	**1**
		(ii)	**Any two x(1) from:** • water pumped in under hydraulic pressure • opens fractures • fracking • other sensible e.g. explosives/drilling	**2**			**2**		
		(iii)	**Max 5 marks - to include max 3 marks from a max two environmental issues:** Assessment/evaluation - (min 2 marks) **1.** Radon Gas emissions • granite source – radiogenic • radon soluble in water – easily transferred • fractures/fluid flow provide pathways to surface • carcinogenic effect only if trapped in concentration/indoors • (disposal of low level radioactive drill core)			**5**	**5**		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
			2. Interference with the hydrological system • water use – significant during development, less after • resulting possible surface water pollution issues • groundwater pollution – low risk of contamination in sealed boreholes – less so in PTF • groundwater table impact (lowering) – springs/wells drying **3.** Seismic activity • fracturing induces seismics • possible fault reactivation/lubrication of faults • low magnitude/low intensity events (below 0.5 mag) • little major impact – significance depends upon perception and legislation						
			Question 6 total	**2**	**5**	**5**	**12**	**3**	**3**

Section C Option 1 Quaternary Geology

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
7	(a)		**Any one x (1) from:** • adaptations to different climates • wooliness of mammoths • analogy to modern animals/uniformitarianism • large animal volume:surface area ratio +(1) for development	**2**			**2**		
	(b)	(i)	**Any two x (1) from:** • still water/pond/low energy • cold climate • silty bottom • mammoths living nearby	**2**			**2**		
		(ii)	**Any two x (1) from:** • decomposition of mammoth carcass • exposed at surface • other mammoths in area • skull contained dung		**2**		**2**		
	(c)		**Any two x (1) from:** • clastic material • no organic matter to date • may be too old		**2**		**2**		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(d)		**Any four x (1) from:** • statement is correct • limited numbers of mammoths • rarely fossilised • large size, not buried rapidly • a sequence of change not seen with mammoths • mammoths extinct • beetles abundant & diverse • specific definition of habitat • small size, easily preserved • shows sequence of climatic fluctuation • rapid response of beetles to climatic change Credit other sensible points + (1) for each development MAX 4 marks			**4**	**4**		
			Question 7 total	**4**	**4**	**4**	**12**	**0**	**0**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
8	(a)	(i)	**Any two x (1) from:** • 250 – 925 metres • 675 metre range • other sensible description	**2**			**2**	**2**	**2**
		(ii)	Positive skew (1R) **Any one x (1) from:** • tail to right • mean > median	**2**			**2**	**2**	**2**
	(b)		**Any three x (1) from:** • prevailing wind blows snow to north east • snow blown off higher areas • on leeward side of mountains • north facing slopes have less melting • glaciers build up over time. • high altitude where temperatures are lower		**3**		**3**		
	(c)		**Any two x (1) from:** • terminal/recessional moraine ridge • ice melts/ablation • deposits clasts at snout of glacier • accumulates if snout is stationary • rate of melting = rate of movement		**2**		**2**		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(d)		**Any three x (1) from:** • till only deposited under or on edge of ice sheet • cannot determine height of ice • other evidence (such as ice polishing) could be used • may be result of several glaciations • last glaciation may destroy evidence of earlier ice sheets • periglacial deposition forms above upper ice limit			**3**	**3**		
			Question 8 total	**4**	**5**	**3**	**12**	**4**	**4**

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
9			**Indicative content:** • Low energy sedimentary environment in deep ocean • Sedimentary record not lost through erosion • Evidence from microfossils in sediments • Oxygen isotopic composition of shells varies with climate • Depleted in ^{16}O during glacials as water gets trapped in continental ice • Continuous cyclic nature of climate change • Terrestrial record fragmentary. • Successive glaciations can destroy sediments deposited in previous events **5-6 marks:** A thorough understanding of how oceanic sediments provide geological evidence for climatic change. Knowledge of the difference in preservation of sediments from terrestrial environments. Discussion of the effect of energy of the sedimentary environment to preserve a complete record through time. *The candidate constructs a relevant, coherent and logically structured account including all key elements of the indicative content. A sustained and substantiated line of reasoning is evident and scientific conventions and vocabulary are used accurately throughout.*	**6**			**6**		

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
			3-4 marks: A sound understanding of how oceanic sediments provide geological evidence for climatic change. Knowledge of terrestrial environments preserving fragments of the sedimentary record. Supported by limited discussion of the geological record. *The candidate constructs a coherent account including many of the key elements of the indicative content and little irrelevant material. Some reasoning is evident in the linking of key points and use of scientific conventions and vocabulary is generally sound.* **1-2 marks:** A partial understanding of how oceanic sediments provide geological evidence for climatic change. Awareness of continuous record from oceanic sediments**.** Supported by generic examples of geological evidence. *Coherence is limited by omission and/or inclusion of irrelevant material. There is some evidence of appropriate use of scientific conventions and vocabulary.* **0 marks:** *The candidate does not make any attempt or give an answer worthy of credit.*						
			Question 9 total	**6**	**0**	**0**	**6**	**0**	**0**

Section C Option 2 Evolution of Britain

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
10	(a)		Rocks from early Precambrian to Neogene/Cenozoic in age (1) Rocks get younger from north west to southeast or equivalent (1)	**2**			**2**		
	(b)	(i)	Correctly marked as syncline (1) Rocks youngest along axial plane trace/get older away from axial plane trace (1)		**2**		**2**		
		(ii)	Correctly marked with symbols 2 x (1) Axial plane traces only (1) max		**2**		**2**		
		(iii)	**Any four x (1) from:** • incorrect statement • despite axial planes with similar trends • similar orientation of tectonic stress • rocks are different ages • South Wales – Variscan Orogeny • Southeast Britain – Alpine Orogeny • unconformity between rocks affected in different locations • specific ages of rocks affected			**4**	**4**		
			Question 10 total	**2**	**4**	**4**	**10**	**0**	**0**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
11	(a)	(i)	**Any two x (1) from:** • from 17 km^3Ma^{-1} • to 35 km^3Ma^{-1} • 18km^3Ma^{-1} • other sensible description	**2**			**2**	**2**	**2**
		(ii)	Positive skew (1R) **Any one x (1) from:** • tail to right • mean > median	**2**			**2**	**2**	**2**
	(b)		**Any two x (1) from:** • increased rate of sea floor spreading • opening of Atlantic Ocean/ break up of Pangaea at faster rate • climate change/increased temperatures/Cretaceous hothouse • increased CO_2 • chalk deposition		**2**		**2**		
	(c)		**Any three x (1) from:** • rifting extended northwards • crustal tension • decompression partial melting • mantle plumes • unzipping of North Atlantic • other sensible explanation		**3**		**3**		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(d)	(i)	**Any two x (1) from:** • clastic sediments early in sequence • clastic sediments get finer over time • biological sediments (chalk) later in sequence	**2**			**2**		
		(ii)	**Any three x (1) from:** • shows decrease in energy • clastic sediments suggest source from land • higher energy environment early in sequence • chalk deposited in quieter seas • rifting in North Sea area			**3**	**3**		
			Question 11 total	**6**	**5**	**3**	**14**	**4**	**4**

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
12			**Indicative content:** • Caledonian Orogeny • Convergent plate boundary • Structural evidence: e.g. faults in Scotland (GGF, HBF, SUF etc), folds in Cumbria & Wales, accretionary wedge in S. Scotland • Igneous evidence: e.g. granite plutons (Scotland & Cumbria), island arc volcanic activity • Fossil evidence: convergence of trilobites & graptolites • Metamorphic evidence • Knowledge of palaeomagnetic evidence. **5-6 marks:** A thorough understanding of at least three aspects of the geological evidence for the Caledonian Orogeny (structural, igneous, fossil, metamorphic and magnetic). Supported by a variety of examples from Britain's geology (fossil convergence, intrusion of plutons, folding & faulting). *The candidate constructs a relevant, coherent and logically structured account including all key elements of the indicative content. A sustained and substantiated line of reasoning is evident and scientific conventions and vocabulary are used accurately throughout.*	**6**			**6**		

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
			3-4 marks: A sound understanding of at least two aspects of the geological evidence for the Caledonian Orogeny. Supported by limited evidence from the geology of Britain. Awareness of different types of evidence. *The candidate constructs a coherent account including many of the key elements of the indicative content and little irrelevant material. Some reasoning is evident in the linking of key points and use of scientific conventions and vocabulary is generally sound.* **1-2 marks:** A partial understanding of orogenic processes. Awareness of the Caledonian Orogeny**.** Supported by generic examples of at least one aspect of the geological evidence *Coherence is limited by omission and/or inclusion of irrelevant material. There is some evidence of appropriate use of scientific conventions and vocabulary.* **0 marks:** *The candidate does not make any attempt or give an answer worthy of credit.*						
			Question 12 total	**6**	**0**	**0**	**6**	**0**	**0**

Section C Option 3 Geology of The Lithosphere

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
13	(a)		Graph A (1) because **Any one x (1) from:** • tail to right • mean > median	**2**			**2**	**2**	**2**
	(b)		**Max 3 marks. Any two x (1) from mean or range:** Ocean ridge/graph A (or vice versa for abyssal plain/graph B) **Mean** • young seafloor over active spreading centre • higher geothermal gradient/hot spot/rising convection cell • hydrothermal circulation maintains high mean • less/no sedimentary cover to absorb heat • thin lithosphere. **Range** • significant heat escapes at A by hot springs (hydrothermal vents/Black smokers) • heat is less constant/more variable/less time to reach equilibrium at A. • heat source at B is conduction through cooling lithosphere – more constant		**3**		**3**		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(c)	(i)	Line inserted accurately at 1300°C (1) Discussion of 1300°C boundary significance (1)	**2**			**2**		
		(ii)	**Any three x (1) from:** • ocean ridge younger/active/hotter – thinnest • ocean ridge divergent boundary – moves lithosphere from ridge which cools with time as it is removed from heat source • to maintain 1300°C boundary lithosphere thickens • loss of heat by conduction from the underlying asthenosphere, • which progressively cools and is transformed from asthenosphere to lithosphere. • sediment thickness increases with age.		**3**		**3**		
			Question 13 total	**4**	**6**	**0**	**10**	**2**	**2**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
14	(a)		~440 (1) ~160 (accept 150 – 170) (1)	**2**			**2**	**2**	**2**
	(b)		Both 1. Assembly plus 2. Breakup (1) 1. compressional forces/orogeny explained (1) 2. tensional forces/seafloor spreading explained (1)		**3**		**3**		
	(c)	(i)	**Any two x (1) from** • increases first • then decreases, • use of numbers	**2**			**2**		
		(ii)	**Any three x (1) from** • as supercontinent breaks up – cools (denser) • sinks - sea level rises • new ocean lithosphere – initially hot more buoyant – shallow oceans – sea level high • as ocean lithosphere gets older – cools (more dense), sinks creating deeper oceans – sea level falls			**3**	**3**		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(d)		**Any four x (1) from** Figure 14b shows: • young ocean opening (Rifting stage) • older deeper ocean development (Drifting stage) Figure 14b does not show: • narrowing/closure/subduction stage of older ocean • continental collision assembly stage Alternative points • Wilson cycle describes the periodic opening and closing of an ocean basin • from a single plate rift • Supercontinent cycle involves many openings and closings of many oceans. • Supercontinent cycle longer >400Ma • Wilson cycle shorter <200Ma			**4**	**4**		
			Question 14 total	**4**	**3**	**7**	**14**	**2**	**2**

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
15			**Indicative content** • Ophiolites – assumed to be ancient obducted oceanic lithosphere • Examples (Troodos, Lizard, Oman) • Ocean lithosphere has a layered structure from seismic surveys and ocean drilling of crust and mantle. • Ophiolites also show layering with similar composition and structure to that interpreted by seismics and gained by ocean drilling. • Layers 1 – 4 described (sediments, pillow lava, sheeted dykes, gabbro, peridotite) • Ophiolites are metamorphosed. • Seismic velocities through ophiolites are lower than ocean lithosphere. **5-6 marks:** A thorough understanding of the layered structure and composition of ophiolites. An attempt made to discuss the extent to which ophiolites are different from ocean crust (metamorphism) with possible reference to their different formations and other pieces of evidence (seismic or deep ocean drilling). *The candidate constructs a relevant, coherent and logically structured account including all key elements of the indicative content. A sustained and substantiated line of reasoning is evident and scientific conventions and vocabulary are used accurately throughout.*	**6**			**6**		

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
			3-4 marks: A sound understanding of the layered structure and composition of ophiolites in relation to the evidence identified in the ocean lithosphere (including sediments, pillows, dykes, basalt and peridotite). Recognition that ophiolites are metamorphosed. *The candidate constructs a coherent account including many of the key elements of the indicative content and little irrelevant material. Some reasoning is evident in the linking of key points and use of scientific conventions and vocabulary is generally sound.* **1-2 marks:** A partial understanding of the structure and/or composition of ophiolites in relation to layering and rocks involved. No attempt at discussing the differences between ophiolites and ocean lithosphere. *Coherence is limited by omission and/or inclusion of irrelevant material. There is some evidence of appropriate use of scientific conventions and vocabulary.* **0 marks:** *The candidate does not make any attempt or give an answer worthy of credit.*						
			Question 15 total	**6**	**0**	**0**	**6**	**0**	**0**
			Paper total	**40**	**38**	**27**	**105**	**18**	**33**