

Mark Schemes for the Units

January 2009

3884/7884/MS/R/08J

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All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the Report on the Examination.

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Any enquiries about publications should be addressed to:

OCR Publications
PO Box 5050
Annesley
NOTTINGHAM
NG15 0DL

Telephone: 0870 770 6622
Facsimile: 01223 552610
E-mail: publications@ocr.org.uk

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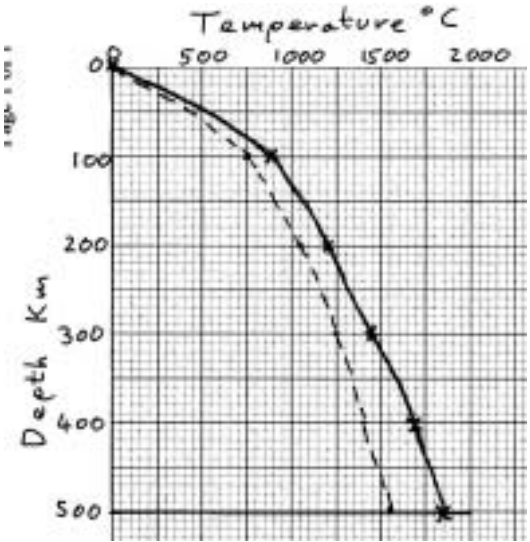
Advanced Subsidiary GCE Geology (3884)

MARK SCHEMES FOR THE UNITS

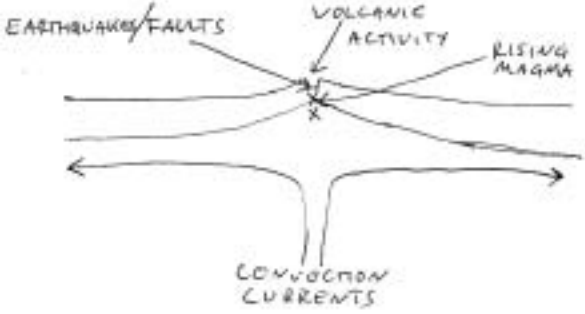
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2831 Global Tectonics and Global Structures

Question			Expected Answers	Marks	Additional Guidance
1	(a)	(i)	name of the discontinuity boundary Mohorovicic / Moho crust / mantle Gutenberg mantle / outer core	1 1	allow Taylor Gutenberg
		(ii)	approx 5100 +/- 100 km depth / phase boundary / a mix of solid and liquid in a broad zone / solid to liquid ora / seismic waves speed up as change in state / indistinct boundary / transitional / not sharp but gradual / change in composition	any 1	accept, Ni, Fe, Si, S to Ni, Fe for ora change in composition do not allow just Lehmann name
		(iii)	measuring the arrival times of seismic waves waves change velocity S waves stopped by liquid outer core waves are refracted / reflected P and / or S wave shadow zones / no P waves between 103° and 142° / no S waves from 103°	any 2	mark labelled diagrams as text not defracted
	(b)	(i)	solid / rigid layer makes up plates sedimentary rocks, igneous and metamorphic crust plus upper mantle crust plus the upper part of the mantle basic (mafic) and acid (silicic) / basalt and granite 2.7 - 3.3 g/cm ³ changes from top to bottom / lithosphere less dense than the underlying mantle lies above the asthenosphere / outer layer of the Earth thickness up to 10 - 100 km	any 2	accept brittle instead of rigid accept sial and sima accept top of mantle instead of upper accept any density in the range 2.7 – 3.3 accept floating on the asthenosphere accept correct reference to base of the lithosphere at 1300°C isotherm

Question	Expected Answers	Marks	Additional Guidance
	<p>(ii) (5%) partially molten low rigidity / ductile / plastic / rheid / flows allows the movement of the plates / contains convection cells peridotite / made <u>mainly</u> of olivine / ultrabasic / ultramafic <u>within</u> the <u>upper</u> mantle / <u>part of the upper</u> mantle / lies beneath lithosphere P and S waves slow down / low velocity layer / LVZ density 3.3 thickness between 70 – 250 km</p>	any 2	accept less than 70 km below MOR / hotspot
(c)	<p>(i)</p>  <p>4/5 correct points = 1 correct line plotted = 1</p>	2	points must be within a square from the correct point (+/- 50°C)
	(ii) 7.5°C / km +/- 0.5°C / km	1	$\frac{750}{100} = 7.5$

Question			Expected Answers	Marks	Additional Guidance
		(iii)	2.2°C / km +/- 0.2°C / km	1	$\frac{1400 - 750}{400 - 100} = \frac{650}{300} = 2.2$
		(iv)	decrease	1	
		(v)	region B has a higher geothermal gradient / area A has a lower heat flow / lower geothermal gradient / reaches higher temperatures than A / B is always at a greater temperature than A. 0 – 100 km has a higher geothermal gradient than 100 – 400 km / geothermal gradient decreases with depth / 0 – 100 km temperature increases rapidly and 100 – 400 increase slows down / numeric difference between c(ii) and c (iii)	1	or reverse argument
		(vi)	top of subduction zone / trench / ocean floor / continental shield / craton	1	
	(d)		decay of radioactive elements / residual heat from earth formation / radiogenic minerals / latent heat of crystallisation as inner core crystallises	1	
			Total	17	

Question	Expected Answers			Marks	Additional Guidance
2	(a)	(i)	<p>constructive Mid Atlantic Ridge / East Pacific Rise / Iceland / Red Sea / North American and Eurasian / African and S American / any appropriate example</p> <p>destructive oceanic v continental Andes / west coast of South America / Rockies / west coast of South America / Nazca and South American plates / Pacific and South American / Juan de Fuca and North American / any appropriate example</p> <p>destructive continental v continental Himalaya / Karakoram / Indian and Eurasian plates / India colliding with Asia Indo-Australian plate and Eurasian plate/ Alps</p>	<p>1</p> <p>1</p> <p>1</p>	
		(ii)	 <p>shape of ridge (in cross-section) including axial rift drawn axial rift in centre labelled arrows showing plates moving apart / convection currents magma rising / or magma chamber labelled volcanoes in rift area labelled detail of oceanic crust / pillow lavas / dolerite dykes / gabbro labelled sediments getting thicker away from the MOR labelled normal faults / transform faults (if in plan view) labelled magnetic stripes parallel to MOR labelled</p>	any 4	<p>max 2 marks if only a plan</p> <p>ecf if destructive plate margin example in (a) (i)</p> <p>max 2 subducting plate / direction of plate movement - / Benioff zone / trench / fold mountains / island arc / rising magma / batholiths / volcanoes / ophiolites</p>

Question			Expected Answers	Marks	Additional Guidance
	(b)	(i)	age of oceanic crust crust gets older away from MOR ora new crust is created at MOR / age of rocks can be 0Ma at MOR age is symmetrical about the MOR	any 2	no evidence to MOR max 1
		(ii)	magnetic reversals rocks are magnetised at MOR as magma cools iron particles aligned North or South Earth magnetism flips causing changes in polarity / from North to South strips of normal and reversed polarity parallel to MOR pattern is symmetrical about the MOR	any 2	no reference to MOR max 1 accept labelled diagram as text
	(c)	(i)	fold mountain / orogenic belts scale / large scale folds / faults / igneous features trend of fold mountains can be matched to give a jigsaw like fit (allow alternative wording) / trend of fold mountains can be matched in South America and Africa / ages match up in South America and Africa	any 2	(Caledonian orogeny matches Scandinavia and N America accept labelled diagram as text
		(ii)	coal / coral <u>limestone</u> / desert sandstone indicate equatorial / tropical / sub equatorial / arid tropical latitudes glacial deposits / till / striations indicate high latitudes / matching up of Gondwanaland glacial deposits similar sedimentary sequences in Africa and S. America / change from terrestrial to marine sequences in W Africa and S America during Jurassic – Cretaceous craton areas of ancient metamorphic rocks same trend / same age / same rocks / between Africa and South America	any 2	match a specific rock type with an explanation for 2 marks 1 mark for the specific rock type and 1 mark for the explanation

Question			Expected Answers	Marks	Additional Guidance
		(iii)	<p>(<i>Cynognathus</i>) land reptile / (<i>Mesosaurus</i>) freshwater reptile / (<i>Lystrosaurus</i>) land reptile / (<i>Glossopteris</i>) land plant / corals</p> <p>outcrop of fossil species match up across continents / they could not have swum across the Atlantic / corals form in sub equatorial latitudes</p> <p>OR</p> <p>where fossil species / genres are the same the continent was joined</p> <p>where the fossil species / genres are different the continents have separated</p> <p>OR</p> <p>same fossil on different continents (max 1)</p>	any 2	<p>accept just reptile allow trilobites</p> <p>(trilobites) on either side of the Atlantic / Iapetus</p> <p>1 mark for the specific fossil and 1 mark for the explanation</p>
			Total	17	

Question			Expected Answers	Marks	Additional Guidance
3	(a)	(i)	the appropriate equipment was not available before magnitude scale devised few historical records	any 1	
		(ii)	the (amount) of <u>energy</u> released amplitude of <u>seismic</u> / <u>earthquake</u> waves	any 1	
		(iii)	there were no prior warnings buildings were not earthquake resistant dense / large population unconsolidated ground large magnitude earthquake no emergency services any valid point	any 2	
	(b)	(i)	an exceptionally high wave large wave hitting land generated by a submarine earthquake or landslip / a giant wave caused by an earthquake large wave due to an underwater volcanic eruption	any 1	do not accept tidal wave without an explanation
		(ii)	ground movement displaces / moves huge volumes of water fault movement displaces / moves water landslip displaces / moves water	any 1	
	(c)	(i)	damage caused / effect on people and objects / intensity	1	
		(ii)	XII / 12	1	

Question			Expected Answers	Marks	Additional Guidance
		(iii)	damage depends on the nature of the ground / extends along river valleys lower intensity / damage on solid rock higher intensity / damage on unconsolidated rock liquefaction people are inconsistent in reporting the effects	any 2	
		(iv)	A point south of San Francisco in centre of intensity 8 area	1	If epicentre is clearly marked but no label accept
		(v)	San Andreas Fault / Hayward Fault	1	any other correct answer
	(d)		focus point where the energy is released origin of the seismic waves point where the earthquake originates / starts point where the fault moves	1	
			epicentre point on the <u>Earth surface</u> directly above the focus point of maximum destruction/intensity	1	
	(e)		seismic gap theory locate a gap along the fault plane where no recent earthquakes have occurred radon gas levels tend to increase prior to an earthquake animal behaviour animals may behave in a strange manner prior to an earthquake ground water levels tend to rise prior to an earthquake ground levels change due to deformation of the ground / tilt meters electrical conductivity increases prior to earthquake	2	any 1 method = 1 correct description = 1
			Total	16	

Question			Expected Answers	Marks	Additional Guidance
4			folds formed by ductile deformation synforms (downfold) / synclines antiforms (upfold) / anticlines overfolds recumbent folds / (sub-) horizontal axial plane and limbs nappes / cut by a thrust domes / basins isoclinal	any 4	1 mark for a labelled diagram / additional detail on description 1 mark for definition and description such as <ul style="list-style-type: none"> • fold symmetry • fold attitude • interlimb name and correct but unlabelled diagram max 1 2 marks max for each structure
			cleavage cleavage forms parallel to the axial plane of a fold / 90° to the stress	1	1 mark for a labelled diagram / additional detail on description 1 mark for definition and description name and correct but unlabelled diagram max 1 2 marks max for each structure
			tectonic joints fracture with no relative movement form on fold hinge / at the crest oblique / cross-joints form on the limbs	1	1 mark for a labelled diagram / additional detail on description 1 mark for definition and description name and correct but unlabelled diagram max 1 2 marks max for each structure


Question			Expected Answers	Marks	Additional Guidance
			reverse faults hanging wall is upthrown / footwall is downthrown crustal shortening / thickening thrusts thrust is a low angle reverse fault / less than 30° dip fault plane horst formed by reverse faults graben / rift valley formed by reverse faults	any 4	1 for labelled diagram / additional detail on description 1 for definition and description name and correct but unlabelled diagram max 1 2 marks max for each structure
			fold mountains / orogenic belts made by folding and faulting / may contain ophiolites / contains granite batholiths / contains metamorphic rocks / linear high mountain chain convergent plate boundary oceanic v oceanic convergent plate boundary oceanic v continental convergent plate boundary continental v continental	1	1 for a labelled diagram / additional detail on description 1 for definition and description name and correct but unlabelled diagram max 1 2 marks max for each structure fold mountains, subduction zone, ophiolites can only be awarded once
			max 4 if no diagrams max 6 if no diagrams		

Question			Expected Answers	Marks	Additional Guidance
			Total	8	
<p>Quality of Written Communication</p> <p>2 mark (technical terms) Answers are structured clearly and logically, so that the candidate communicates effectively, uses a wide range of specialist terms with precision and spelling, punctuation and grammar are accurate.</p> <p>1 mark (organisation) There are shortcomings in the structure of the answer, however, the candidate is able to communicate knowledge and ideas adequately, a limited range of specialist terms are used appropriately and spelling, punctuation and grammar are generally accurate with few errors.</p> <p>0 marks There are severe shortcomings in the organisation and presentation of the answer, leading to a failure to communicate knowledge and ideas. There are significant errors in the use of language, spelling, punctuation and grammar, which makes the candidate's meaning uncertain.</p> <p>[quality of written communication max 2]</p>					
			Total	10	

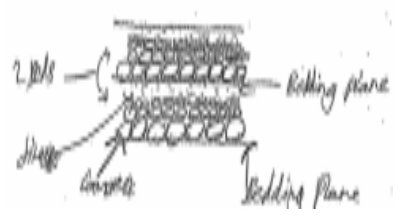
2832 The Rock Cycle - Processes and Products

Question			Expected Answers	Marks	Additional Guidance
1	(a)	(i)	sill	1	
		(ii)	parasitic cone / secondary cone / vent	1	If named as vent in (ii) no credit in (iii) or (iv)
		(iii)	crater / vent	1	If named as vent in (iii) no credit in (ii) or (iv)
		(iv)	dyke/ vent / pipe / feeder	1	If named as vent in (iv) no credit in (ii) or (iii)
	(b)	(i)	linear fracture produces fluid lavas / basic / basaltic lava / long flows / rapid flows /pillow lavas under oceans effusive / gentle activity / non explosive / frequent eruptions link to plateau basalts / mainly under the oceans / at divergent margins / constructive margins / at mid ocean ridges on flanks of shield volcanoes	any 2	

Question		Expected Answers	Marks	Additional Guidance
	(ii)	<p>shield have gentle slopes (2° to 10°), strato are steep sided (5° at base to 45° max near have summit)</p> <p>shield are composed of lava flows, strato are composed of lava flows and pyroclastics / shield low viscosity lava flows, strato high viscosity lava</p> <p>shield are composed of basic rocks, strato are composed of intermediate / acid rocks</p> <p>shield effusive, strato have explosive eruptions</p> <p>shield are wider / have greater volume than strato</p> <p>shield found mainly at oceanic islands / hot spots / constructive margins strato mainly on continents / island arcs / destructive margins</p> <p>shield crater contains lava lake, strato crater contains lava dome / caldera</p> <p>two characteristics of one type of volcano</p>	<p>any 2</p> <p>max 1</p>	
	(c) (i)	<p>partial melting of oceanic crust / mantle</p> <p>rising magma from mantle plume / from convection cell / at mid ocean ridge</p>	any 1	
	(ii)	<p>partial melting of oceanic plate</p> <p>at a subduction zone / destructive plate margin / convergent plate margin</p> <p>melting of some continental material</p> <p>mixing of magmas makes it intermediate / water lowers melting point facilitating partial melting</p>	any 2	
	(d)	<p>ejection of superheated water / steam / water forcibly ejected</p> <p>water heated by magma / where groundwater is heated</p> <p>gas pressure builds up / confined vent</p> <p>occurs irregularly minutes / hours / days / years / not continuous</p> <p>in active or recently active volcanic regions</p>	any 2	NOT hot water

Question		Expected Answers	Marks	Additional Guidance
	(e)	<p>labelled diagrams to show caldera formation;</p>  <p>volcano supported by magma in chamber beneath violent eruption / magma level in the chamber drops magma chamber not full / partly empty / there is a cavity / void / space unsupported volcano collapses into void left by magma / cone / top / falls into space below</p>	<p>1</p> <p>any 3</p>	<p>Labelled diagram marked as text</p> <p>Max 3 if no diagram</p>
		Total	17	

Question			Expected Answers	Marks	Additional Guidance
2	(a)	(i)	A= desiccation cracks / mud cracks B= dune bedding / cross bedding C= ripple marks / asymmetrical ripple marks	1 1 1	NOT cross stratification NOT ripples
		(ii)	B	1	
		(iii)	shows truncation / erosion at top when right way up / beds cut off laminae are concave upwards when right way up flattens out at the bottom / ora / beds thinner at base / ora	any 2	
		(iv)	from left to right	1	
	(b)	(i)	(hot) desert / arid / dune environment	1	
		(ii)	evaporation of water from sediment / contraction of surface / mud causes cracks / splitting / shrinkage of sediment due to drying out / mud deposited by water dries out / evaporation greatest near surface / greatest water loss near surface cracks infilled by sediment / (wind blown) sand deposited in the cracks	any 2	
		(iii)	current / wind / running water on side of sand dune / in river channel / in shallow sea asymmetrical means unidirectional current sand grains moved up windward side and dropped down leeward side	any 2	

Question			Expected Answers	Marks	Additional Guidance
	(c)		<p>labelled diagram to show grain size</p>  <p>larger / coarser / heavier grains deposited first finer / smaller / lighter grains deposited later as velocity / current / energy decreases settling of sediment in water deposited from turbidity current / submarine avalanche / density flow</p>	any 3	<p>Labelled diagram marked as text</p> <p>Max 2 if no diagram</p>
	(d)		<p>6 breakdown 1 hydrolysis 5 reaction of minerals with carbonic acid / accept solution 3 frost shattering</p>	2	4 / 3 correct = 2, 2 / 1 correct = 1
			Total	17	

Question			Expected Answers							Marks	Additional Guidance																																			
3	(a)	(i)	<table><tr><td></td><td>D</td><td>E</td><td>F</td><td>G</td><td>H</td><td>J</td></tr><tr><td>metamorphic rocks</td><td></td><td>✓</td><td></td><td>✓</td><td>✓</td><td>✓</td></tr><tr><td>unfoliated metamorphic rocks</td><td></td><td>✓</td><td></td><td></td><td>✓</td><td></td></tr><tr><td>rocks produced by regional metamorphism only</td><td></td><td></td><td></td><td>✓</td><td></td><td>✓</td></tr><tr><td>one parent rock and the resultant metamorphic rock</td><td>✓</td><td></td><td></td><td></td><td>✓</td><td></td></tr></table>								D	E	F	G	H	J	metamorphic rocks		✓		✓	✓	✓	unfoliated metamorphic rocks		✓			✓		rocks produced by regional metamorphism only				✓		✓	one parent rock and the resultant metamorphic rock	✓				✓		2 1 1 2	top line 3 / 4 correct = 2, 1 / 2 correct = 1 line 2 both correct for 1 line 3 both correct for 1 (or 1 mark is 1 correct on each line) 1 mark for each Deduct mark for each tick over the correct amount per line
	D	E	F	G	H	J																																								
metamorphic rocks		✓		✓	✓	✓																																								
unfoliated metamorphic rocks		✓			✓																																									
rocks produced by regional metamorphism only				✓		✓																																								
one parent rock and the resultant metamorphic rock	✓				✓																																									
		(ii)	show foliation / mineral alignment / dark and light banding of minerals / produced by pressure / at right angles to stress direction garnet produced in regional metamorphism / <i>porphyroblastic texture</i>							any 2																																				
	(b)	(i)	K= spotted rock / spotted slate / andalusite slate L= hornfels							1 1																																				
		(ii)	limestone / chalk / oolite							1																																				
		(iii)	fine at edge and coarse in centre due to rapid cooling against cold country rocks / due to heat loss into cold country rock crystals become larger due to slower cooling / insulated							1 1 1																																				
		(iv)	heat is conducted from the igneous rock to the country rocks country rocks changed / metamorphosed by heat / heated > 200°C / metamorphic aureole produced changes in country rock depend on distance from intrusion amount of recrystallisation greatest close to the intrusion / partial further away so recrystallisation in spots							any 2	NOT 'baked' NOT 'thermal metamorphism' which is in the question																																			
		Total								16																																				

Question			Expected Answers	Marks	Additional Guidance
4			compaction		
			mass of overlying sediment/ hydrostatic pressure /load pressure /compression	1	
			squeezes fluids from pore spaces	1	
			porosity reduced/ no pore spaces	1	
			close packing of grains/ volume reduction/ density increase	1	
			grain contact solution eliminates porosity	1	
			primarily affects clays	1	
			diagram for compaction	1	Diagrams marked as text
			cementation		
			fluids pass through pore spaces	1	
			minerals carried in solution	1	
			minerals precipitate in pore spaces/ name minerals/ crystallise out /deposited in pore spaces	1	NOT mineral glue
			porosity reduced further / more / by greater amount	1	NOT just repeat of 'porosity reduced' ALLOW 'porosity reduced' if not already stated for compaction
			reduced permeability	1	
			pressure welding/ pressure solution	1	
			primarily affects quartz /sand grains	1	
			diagram for cementation	1	Diagrams marked as text
			compaction / cementation affect sediments/ is a diagenetic process/ leads to lithification of sediments /lead to sediment becoming rock/ lithification is process by which sediment becomes rock	1	

Question			Expected Answers	Marks	Additional Guidance
			diagrams marked as text	1	
			diagram for compaction	1	
					If only one described (including diagram) max 6 If no diagrams max 6
				8	
			Answers are structured clearly and logically, so that the candidate communicates effectively, uses a wide range of specialist terms with precision and spelling, punctuation and grammar are accurate.	2	QWC
			There are shortcomings in the structure of the answer, however, the candidate is able to communicate knowledge and ideas adequately, a limited range of specialist terms are used appropriately and spelling, punctuation and grammar are generally accurate with few errors.	1	
			There are severe shortcomings in the organisation and presentation of the answer, leading to a failure to communicate knowledge and ideas. There are significant errors in the use of language, spelling, punctuation and grammar which makes the candidate's meaning uncertain.	0	
			Total	10	

2834 Palaeontology

Abbreviations, annotations and conventions used in the Mark Scheme	/	=	alternative and acceptable answers for the marking point
	;	=	separates marking points
	NOT	=	answers which are not worthy of credit
	()	=	words which are not essential to gain credit
	<u> </u>	=	(underlining) key words which <u>must</u> be used to gain credit
	ecf	=	credit
	AW	=	error carried forward
	ora	=	alternative wording or reverse argument

Question	Expected answers	Marks
1 (a) (i)	A = belemnite / belemnoid / coleoid (<i>reject cephalopods</i>) B = gastropod C = bivalve D = ammonoid / ammonite / ceratite	1 1 1 1
(ii)	recognisable drawing of fossil any two labels from ornament / septa / <i>septal neck</i> / siphuncle / suture / saddle / lobe / body chamber / <i>chamber</i> / aperture / venter / keel / sulcus / protoconch / umbilicus / <i>ribbing</i> allow ecf	1 any 2
(iii)	marine / swimming <i>or nektonic</i> / jet propulsion / moving tentacles /directing funnel / <i>can control buoyancy</i> / <i>predator</i> <i>ecf</i>	any 2
(b) (i)	animals live in water column / fall to sea bed; anoxic / reducing bottom waters; bacterial action / sulphur bacteria; reduce sulphate ions in water to sulphide; sulphide reacts with <i>iron</i> ; <i>iron / pyrites replaces the original material</i> ; easily deposited in or on organic remains	any 3
(ii)	anaerobic conditions / no decay; <i>antiseptic</i> ; fast burial / easily enveloped in resin / resin flows trapping animals/ <i>resin on tree branches or trunks</i> no scavenging; fine grained nature of resin preserves detail / maybe 3D preservation; washed into sediments and so preserved <i>resin hardens into amber</i>	any 2
(iii)	tar or <i>asphalt</i> / Burgess Shale / obrution deposit / Lagerstätten deposit / Ediacaran / Charnian / Soom Shale / Chiang Jiang / other valid named deposit / <i>mammoths in ice</i>	1

- (c) (i) biogenic remains;
evidence of fossil behaviour;
evidence of life processes or life being there;
organisms activity not organism itself;
suitable example / track / trail / burrow / *prints / impressions* etc any 2

Question	Expected answers	Marks
(ii)	energy level of environment; <i>water depth of environment</i> ; sedimentation rate; food available / <i>type of food available</i> ; evidence of aerobic environment / <i>suitable for life</i> ; <i>borings suggest hard substrate / burrows or walking traces suggest soft substrate</i> ; <i>footprints suggest terrestrial environment</i> ; <i>large trace fossils suggest environment able to support large organisms</i>	any 2
(iii)	burrow / walking tracks / <i>footprints</i> / resting traces / rootlets / etc any other suitable example	1

20

Question
2 (a) (i)

Expected answers

Marks

features	options		
has a test composed of calcite plates	crinoids	echinoids	both
has five fold radial symmetry	crinoids	echinoids	both
has spines for defence and movement	crinoids	echinoids	both
has an anal tube	crinoids	echinoids	both
has ossicles and a holdfast	crinoids	echinoids	both
has tube feet	crinoids	echinoids	both

max 5

1 mark per row

(ii) tubercle

area of attachment for spines;
soft tissues / muscle attachment;
allows the spines to move for walking;
allows the spines to be used for protection;
larger tubercles means larger spines

any 2

pore pairs

for protrusion of tube feet;
respiration / water vascular system;
pore pairs on the ambulacra only;
movement / *digging burrows / clinging / walking / feeding /*
attachment

any 2

(iii) crinoid = sessile

1

echinoid = vagrant

1

(b) (i) petaloid ambulacra labelled on aboral view
labrum on oral view

1

1

Question	Expected answers	Marks
(iii)	<p>anus moves posteriorly; channelled into anal tube / sanitation / increase distance between mouth and anus;</p> <p>anus moves out of apical system / apical system no longer radial; anus away from entrance to burrow</p> <p>sub anal fasciole becomes broader; houses more cilia for current movement / improves waste disposal; ora</p> <p>mouth moves anteriorly; more efficient feeding / no longer sub central;</p> <p>labrum becomes more pronounced / moves forward / closer to anterior groove; more efficient channelling of food / feeding;</p> <p>anterior groove deepens / development of heart shape; easier channelling of food towards mouth / more efficient feeding;</p> <p>petaloid ambulacra get longer / more distinct; more tube feet for efficient gas exchange / improves respiration;</p> <p>plastron increases in size / tubercles increase / <i>spines increase</i>; dig burrows deeper / faster / more efficient movement;</p> <p>test gets broader and higher / highest and or broadest moves posteriorly AW / becomes more streamlined; sits higher in burrow / <i>increased</i> respiration / <i>burrowing easier</i>;</p> <p>Any two pairs</p>	max 4
Total		17

Question	Expected answers	Marks
3 (a) (i)	graptolite / graptoloidea / <i>Graptolithina</i> / <i>Hemichordata</i>	1
(ii)	scleroprotein / protein	1
(iii)	nema = <i>allow extension to graptolite at top of diagram or central projection on lower part of diagram</i> ,	1
	stipe = main central part of organism	1
	theca = one compartment on either side of stipe	1
(iv)	pendant	1
(v)	fossil F	1
(vi)	H = youngest F G = oldest 2 in correct order = 1 mark 3 in correct order = 2 marks	2 max
(b) (i)	planktonic / floating / surface waters / lived in water column; <i>perhaps nektonic</i> ; <i>attached to some kind of float</i> ; colonial / shared common canal; zooids protruded to feed / filter feeder; low energy dwellers, (as fragile)	any 3
(ii)	any correct contemporary pelagic fossil eg orthocone nautiloid or pelagic/nektonic trilobite	1

Question	Expected answers	Marks
4 (a) (i)	way-up structure suitable diagrams to illustrate description of formation; explanation of how upper is distinguished from lower; suitable example (eg desiccation cracks / rootlets / burrows / grading / sole structures / pillow lavas / <i>cross bedding</i>)	1 any 2
	cross- cutting relationships suitable diagrams to illustrate description of formation; explanation why cross cut rock is older ora; suitable example (eg dyke / unconformity / <i>faults</i>)	1 any 2
	<i>mark diagrams as text</i>	
(ii)	included fragments	1
(b) (i)	robust or resistant fossil; <i>weathered or eroded</i> out of rocks; transported; re-deposited in younger rocks	any 2
(ii)	appears with younger fossils / may give older date for younger sediments ora / confuses ranges of zone fossils	1
(c) (i)	suitable example eg ammonite to correlate sequences / <i>valid appropriate argument</i>	1 1
(ii)	geographically widespread; robust; easily identifiable; <i>high preservation potential</i> ; numerous / <i>common</i> ; fast evolving / <i>short ranges</i> ; facies / environmentally independent	any 3

Question	Expected answers	Marks
5 (a)	morphology	
1	tabulae always present	1
2	dissepiments (sometimes) present	1
3	bilateral symmetry	1
4	has axial complex / columella	1
5	septa present / well developed	1
6	colonial or solitary	1
7	horn shaped / description of solitary form	1
8	description of colonial forms	1
9	large corallites	1
10	don't have mural pores	1
11	description of the septal growth	1
	suitable labelled diagram of rugose forms	1
	very detailed labelled coral	max 4
	morphology	max 8
	conditions needed for growth	
12	tropical conditions / equatorial;	1
13	high energy / well oxygenated water;	1
14	normal salinity / 30 – 40 parts per thousand / fully marine;	1
15	low amount of detritus/ far from river mouths;	1
16	shallow / <i>continental shelf</i> / in photic zone;	1
17	<i>accurate depth described / less than 30m</i> ;	1
18	ref to symbiotic relationship in modern corals.	1
19	zooxanthellae	1
20	23 - 29°C	1
	conditions	max 6
	no diagrams	max 10
Total		11

Question	Expected answers	Marks
5 (b)	Permo–Triassic	

General Information

1	235 to 251 Ma before present	1
2	decline was gradual / over several Ma	1
3	largest decline in shallow sea dwellers / open sea dwellers less affected	1
4	evaporites / desert sediments <i>are poor conditions for life</i>	1
5	96% (allow 90 – 98%) marine invertebrate species extinct	1
6	extinction of marine life: eg. trilobites, corals (tabulate / rugose)	1
7	reduction in numbers of other fossils eg. ostracods, foraminifera, brachiopods, cephalopods, crinoids, bryozoans	1
8	extinction of terrestrial life: eg. large amphibians, 77% of tetrapods	1
9	reduction in numbers of 'coal measures' fauna / pteridophytes	1
10	diagram / graph to show number of species and extinctions	1

Causes / Evidence

11	assembly of supercontinent Pangaea	1
12	sea levels fell / regressions	1
13	related to large scale glaciations (eg. Australia, S America, S Africa, India, Antarctica)	1
14	seas hypersaline / <i>pH change</i>	1
15	lack of habitat / reduced shallow seas	1
16	large scale volcanicity (eg in Siberia)	1
24	poisonous gas emissions / named gases kill organisms	1
17	<i>acid rain / ash falls described</i>	1
18	led to fluctuations in climate / explanation of climate change with reason	1
19	<i>disruption to food chains</i>	1
20	possible methane hydrates (in sediments on sea bed)	1
21	plate tectonics / palaeomagnetic studies provides evidence for Pangaea	1
22	<i>possible iridium layer / possible meteorite impact</i>	1
23	<i>any other correct cause</i>	1
Total		12

QWC

2 marks	Answers are structured clearly and logically, so that the candidate communicates effectively, uses a wide range of specialist terms with precision and spelling, punctuation and grammar are accurate.
1 mark	There are shortcomings in the structure of the answer, however, the candidate is able to communicate knowledge and ideas adequately, a limited range of specialist terms are used appropriately and spelling, punctuation and grammar are generally accurate with few errors.
0 marks	There are severe shortcomings in the organisation and presentation of the answer, leading to a failure to communicate knowledge and ideas. There are significant errors in the use of language, spelling, punctuation and grammar which makes the candidate's meaning uncertain.

quality of written communication

max 2

Grade Thresholds

Advanced GCE (Geology) (3884, 7884)
January 2009 Examination Series

Unit Threshold Marks

Unit		Maximum Mark	A	B	C	D	E	U
2831	Raw	60	45	40	36	32	28	0
	UMS	90	72	63	54	45	36	0
2832	Raw	60	48	43	38	33	29	0
	UMS	90	72	63	54	45	36	0
2834	Raw	90	75	69	63	57	52	0
	UMS	90	72	63	54	45	36	0

Specification Aggregation Results

Overall threshold marks in UMS (i.e. after conversion of raw marks to uniform marks)

	Maximum Mark	A	B	C	D	E	U
3884	300	240	210	180	150	120	0
7884	600	480	420	360	300	240	0

The cumulative percentage of candidates awarded each grade was as follows:

	A	B	C	D	E	U	Total Number of Candidates
3884	10.0	27.5	50.0	80.0	97.5	100.0	40
7884	00.0	00.0	33.3	66.7	100.0	100.0	3

43 candidates aggregated this series

For a description of how UMS marks are calculated see:

http://www.ocr.org.uk/learners/ums_results.html

Statistics are correct at the time of publication.

INSET events for new GCE Geology

- for first teaching from September 2008

-

Get Started – *towards successful delivery of the new specification.*

These **full day** courses will give guidance and support to those planning to deliver the new AS/A level Geology (H087/H487) specification from September 2008.

Course dates and codes –

Wednesday 3rd June London OSCE 201

Monday 15th June Leeds OSCE 202

Fee – £130 including refreshments, lunch and course materials. £160 if you book within 7 days of the course date.

There will be some similarity to the half day *Get Ready* course already held but this full day course will look at the new specification in more depth, with emphasis on first delivery.

Places may be booked on these courses using the booking form available on-line (http://www.ocr.org.uk/training/alevel_inset_training.html). Please quote the course code in any correspondence.

Proposed courses for 2009/10

Get Ahead

Includes a consideration of the first year and focussing on fieldwork and units F793 and F796

Locations:	Date:
London	Wed 7 Oct 09
Leeds	Wed 21 Oct 09
Bristol	RYI
Birmingham	Thurs 12 Nov 09

Get Started – *towards successful delivery of the new specification.*

Location:	Date:
London	Sat 15 May 10

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

14 – 19 Qualifications (General)

Telephone: 01223 553998

Facsimile: 01223 552627

Email: general.qualifications@ocr.org.uk

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Facsimile: 01223 552553