

## **Mark Scheme for the Unit**

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**January 2009**

**H087/H487/MS/R/09J**

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by Examiners. It does not indicate the details of the discussions which took place at an Examiners' meeting before marking commenced.

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.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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**Advanced GCE Geology (H487)**

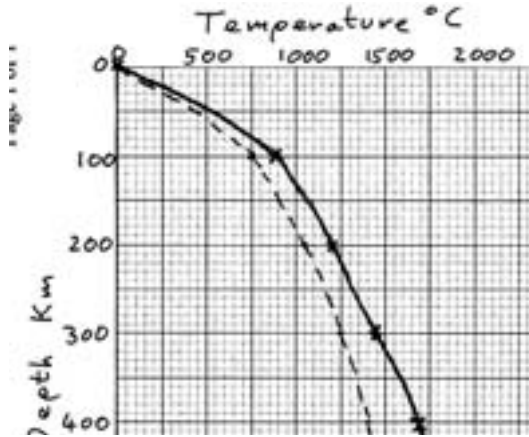
**Advanced Subsidiary GCE Geology (H087)**

### **MARK SCHEME FOR THE UNIT**

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# F791 Global Tectonics

Question			Expected Answers	Marks	Additional Guidance
1	a	i	<b>name of the discontinuity boundary</b> 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 change of composition ora 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, igneous and metamorphic rocks crust plus upper mantle mafic and silicic / basalt and granite 2.7 - 3.3 / density changes from top to bottom / lithosphere less dense than the underlying mantle lies above the asthenosphere / outer layer of the Earth thickness 10 -100 km	any 2	accept brittle instead of rigid accept top of mantle instead of upper accept sial and sima accept acid and basic accept any density in the range 2.7 – 3.3 accept floating on the asthenosphere accept correct reference to base of lithosphere at the 1300°C isotherm
		ii	(5%) partially molten low rigidity / ductile / plastic / rheid / flows allows the movement of the plates / contains convection cells peridotite / rock made <u>mainly</u> of olivine / ultramafic		accept ultrabasic

Question	Expected Answers	Marks	Additional Guidance
	<p>within the <u>upper mantle</u> / <u>part of the upper mantle</u> / lies beneath the lithosphere                      density 3.3                      thickness between 70 – 250 km                      P and S waves slow down / low velocity layer / LVZ</p>	any 2	accept less than 70 km below MOR / hot spot
c i	 <p>4/5 correct points = 1                      correct line plotted = 1</p>	1 1	points must be within a square from the correct point (+/- 50°C)
	ii	1	$\frac{750}{100} = 7.5$
	iii	1	$\frac{1400 - 750}{400 - 100} = \frac{650}{300} = 2.2$
	<p>iv 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</p> <p>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)</p>	1	or reverse argument
	<b>Total</b>	<b>14</b>	

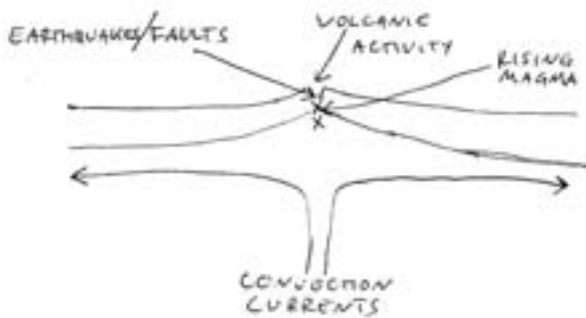
Question			Expected Answers	Marks	Additional Guidance
2	a	i	fold mountains / orogenic belts / large scale folds / faults / igneous features  trend of fold mountains can be matched to give a jigsaw like fit (allow alternative wording) / trend of fold mountains can be matched in South America and Africa / ages match up in South America and Africa	1  1	accept labelled diagram as text  (Caledonian orogeny matches Scandinavia and N America)
		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	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
		iii	( <i>Cynognathus</i> ) land reptile / ( <i>Mesosaurus</i> ) freshwater reptile / ( <i>Lystrosaurus</i> ) land reptile / ( <i>Glossopteris</i> ) land plant / corals  outcrop of fossil species match up across continents / they could not have swum across the Atlantic / corals form in subequatorial latitudes OR where fossil species / genres are the same, the continent was joined where the fossil species / genres are different, the continents have separated OR same fossil on different continents (max 1)	1  1 OR 2	accept just reptile allow trilobites  (trilobites) on either side of the Atlantic / Iapetus  1 mark for the specific fossil and 1 mark for the explanation
	b	i	Gondwanaland / Gondwana	1	must be spelled correctly with upper case.
		ii	Africa / South America / India / Australia / Antarctica                      any 2	1	must have two correct continents mark only the first 2 continents given

Question		Expected Answers	Marks	Additional Guidance
	iii	changes due to erosion or deposition edge of continental shelf (200 m) is a better fit or edge of plate 500 m below sea level is a better fit or edge of plate 1000 m below sea level is a better fit or edge of plate coastline changes as sea level changes	any 1	
c	i	<b>age of oceanic crust</b> crust gets older away from MOR ora new crust is created at MOR / age of rocks can be 0 Ma at MOR age is symmetrical about the MOR	any 2	no reference to MOR max 1
	ii	<b>magnetic reversals</b> rocks are magnetised at MOR as magma cools iron particles aligned North or South Earth magnetism flips causes changes in polarity / from North to South stripes 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
		<b>Total</b>	<b>13</b>	

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 / 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 generated by a submarine earthquake or landslip / 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	
		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	
	c	i	damage caused / effect on people and objects / intensity	1	
		ii	XII / 12	1	



Question		Expected Answers	Marks	Additional Guidance
	iv	a point south of San Francisco in centre of intensity 8 area	1	if epicentre is clearly marked but no label accept
	d	<p><b>focus</b>  point where the energy is released  origin of the seismic waves  point where the earthquake originates / starts  point where the fault moves</p> <p><b>epicentre</b>  point on the <u>Earth surface</u> directly above the focus  point of maximum destruction / intensity</p>	<p>any 1</p> <p>any 1</p>	
<b>Total</b>			<b>13</b>	

Question			Expected Answers	Marks	Additional Guidance
4	a	i	<p><b>divergent</b> Mid Atlantic Ridge / East Pacific Rise / Iceland / Red Sea / North American and Eurasian / African and S American / any appropriate example</p> <p><b>convergent oceanic v continental</b> Andes / West coast of South America / Rockies / West coast of North America / Nazca and South American plates / Pacific and South American / Juan de Fuca and North American / any appropriate example</p> <p><b>convergent continental v continental</b> Himalaya / Karakoram / Indian and Eurasian plates / India colliding with Asia / Indo-Australian and Eurasian plates / Alps</p>	1  1  1	
		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 sediment getting thicker away from 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><b>ecf</b> if convergent plate margin example given in (a) (i)</p> <p>subducting plate / direction of movement / Benioff zone / trench / fold mountains / island arc / rising magma / batholiths / volcanoes / ophiolites <b>max 2</b></p>
	b	i	4500 – 5000 Ma	1	needs units within this range

Question		Expected Answers	Marks	Additional Guidance
				allow 4.5 – 5 billion
	ii	Initial cloud of dust and gas collapsed under gravity / material collided and coalesced / joined together formed a rotating disc / spinning around a central point gravity drew material to the centre to form the Sun other planets formed by accretion of material / planets coalesced from nebular cloud denser material formed the inner planets less dense material formed the gas giants asteroid belt is the material that failed to form a planet / remains of a planet	any 3	
	iii	Jupiter / Saturn / Uranus / Neptune	1	any 2 spelled correctly upper case essential
		<b>Total</b>	<b>12</b>	

Question	Expected Answers	Marks	Additional Guidance
5	<b>folds</b> formed by ductile deformation synforms (downfold) / synclines antiforms (upfold) / anticlines overfolds recumbent folds / (sub-) horizontal axial plane nappes / cut by a thrust domes / basins isoclinal	any 4	1 for labelled diagram / additional detail on description 1 for definition and description such as <ul style="list-style-type: none"> <li>• fold symmetry</li> <li>• fold attitude</li> <li>• interlimb angle</li> </ul> Name and correct but unlabelled diagram max 1 2 marks max for each structure
	<b>cleavage</b> cleavage forms parallel to the axial plane of a fold / $90^0$ to the stress	1	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
	<b>tectonic joints</b> fracture with no relative movement form on fold hinge / at the crest oblique / cross-joints form on the limbs	1	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
	<b>reverse faults</b> hanging wall is upthrown / footwall is downthrown crustal shortening / thickening <b>thrusts</b> thrust is a low angled reverse fault / less than $30^{\circ}$ 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
	<b>fold mountains / orogenic belts</b> 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	any 3	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, subduction zone, ophiolites can only be awarded once
	max 4 if only diagrams max 6 if no diagrams		
	<b>Total</b>	<b>8</b>	

# Grade Thresholds

Advanced GCE Geology (H487)  
Advanced Subsidiary GCE Geology (H087)

January 2009 Examination Series

## Unit Threshold Marks

Unit		Maximum Mark	a	b	c	d	e	u
F791	Raw	60	45	40	35	30	26	0
	UMS	90	72	63	54	45	36	0

For a description of how UMS marks are calculated see:  
[http://www.ocr.org.uk/learners/ums\\_results.html](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 15<sup>th</sup> 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](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

<b>Locations:</b>	<b>Date:</b>
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.*

<b>Location:</b>	<b>Date:</b>
London	Sat 15 May 10

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