

Geology

Advanced Subsidiary GCE

Unit **F791**: Global Tectonics

Mark Scheme for January 2012

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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.

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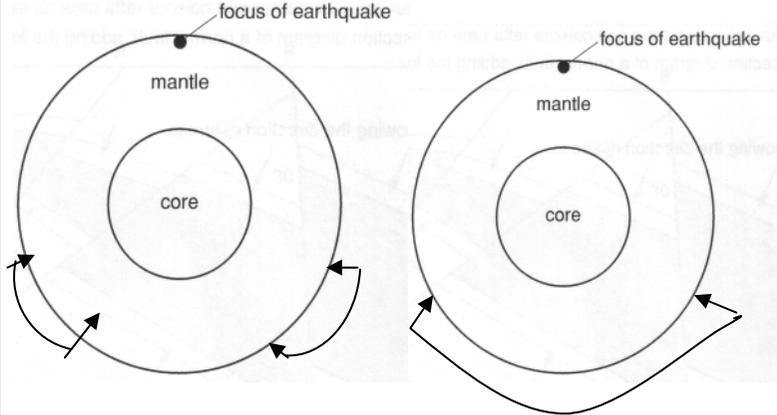
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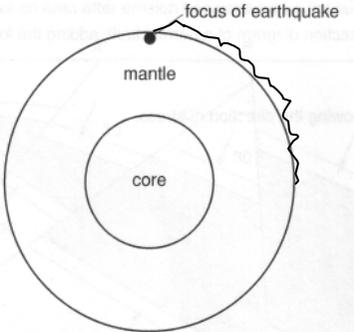
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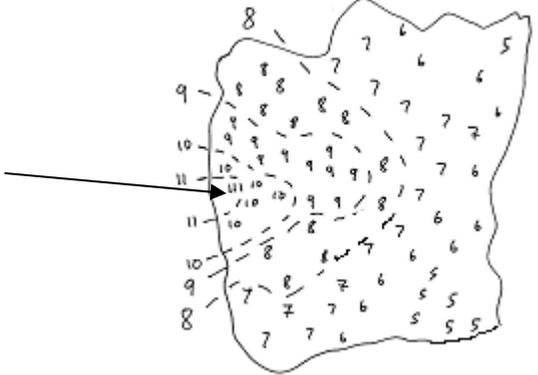
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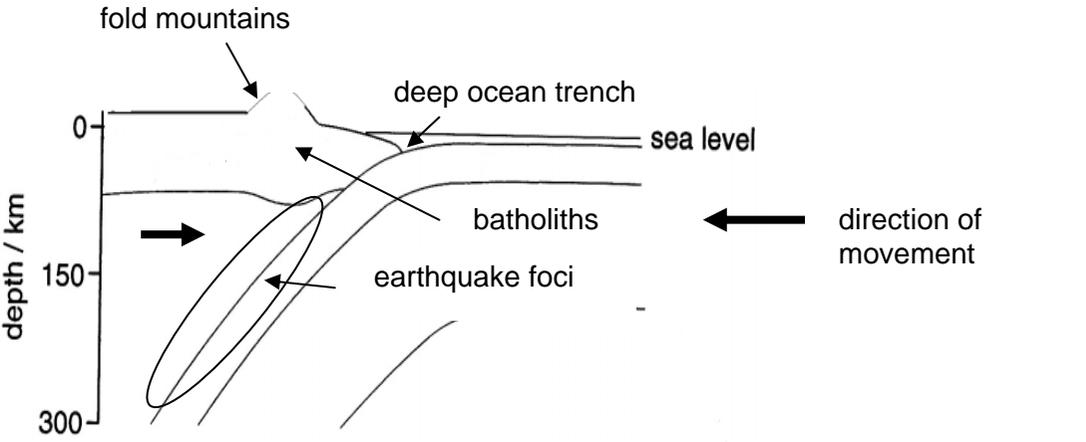
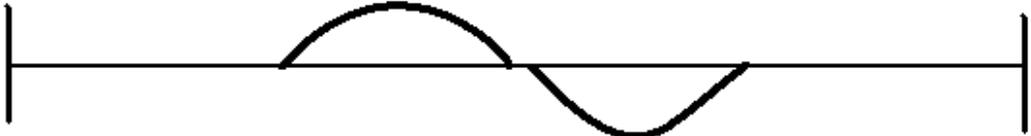
Annotations

Annotation	Meaning
✓	correct response
✘	incorrect response
bod	benefit of the doubt
nbod	benefit of the doubt not given
ECF	error carried forward
^	information omitted
I	ignore
R	reject

Question			Answer	Marks	Guidance
1	(a)	(i)	 <p>P = 103° to 142°</p> <p>S = 103° to 103°</p>	1 1	<p>2 marks for correct angles written and drawn.</p> <p>ACCEPT 1 mark for correct angles written but very inaccurate drawing OR 1 mark for correct drawing but wrong angles written</p> <p>ACCEPT 100 – 105°, 140 - 143°</p>
		(ii)	liquid	1	
		(iii)	<p>S waves stop at the outer core OR form S wave shadow zone OR S waves cannot pass through liquid S waves stop at 2,900m OR stop at Gutenberg discontinuity P waves slow down OR P waves are refracted OR P wave shadow zone needs to be liquid to form the Earth's magnetic field</p> <p style="text-align: right;">any one</p>	1	must mention the particular wave type P or S
		(iv)	the size of the shadow zone is linked to the depth of the boundary OR there is a discontinuity at this depth OR stop at Gutenberg discontinuity OR shadow zone is at 103°	1	

Question	Answer	Marks	Guidance
(b) (i)	 <p>restricted to the surface OR mainly on surface</p>	1	<p>can go around the Earth no minimum epicentral angle</p> <p>DO NOT ACCEPT above the surface</p>
	<p>confined to the surface of the Earth has a long wavelength OR low frequency OR long duration large amplitude slowest of the waves OR arrive last move in a circular motion</p> <p style="text-align: right;">any two</p>	2	<p>ACCEPT not body waves surface waves</p> <p>DO NOT ACCEPT confined to crust OR near surface</p>
(iii)	<p>because they move in a circular manner OR confined to the surface OR large amplitude OR cause the most ground movement</p>	1	

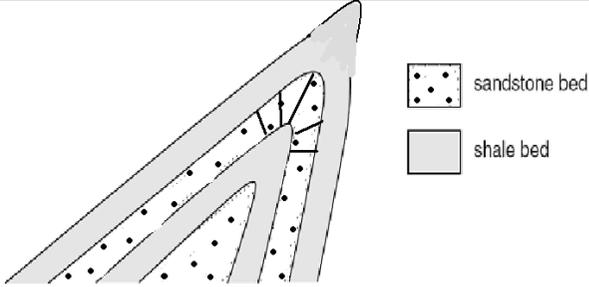
Question	Answer	Marks	Guidance
(c) (i)	the amount of damage caused OR the effects on objects and people	1	
(ii)	<p>epicentre</p>  <p>see the map 1-3 correct lines = 1 mark 4 correct lines = 2 marks</p>	2	<p>allow a circular pattern around II</p> <p>lines must go around the numbers and not through them</p> <p>lines must not cross</p>
(iii)	see the map OR close to point 11	1	must be labelled
(d)	<p>whole Earth density is 5.5 g/cm^3 direct measurement of surface rocks are $2.7 - 2.9 \text{ g/cm}^3$ density of the core and mantle must be therefore be high OR $12 - 15 \text{ g/cm}^3$ general idea that the crust density is less than average density of the Earth</p> <p style="text-align: right;">any two</p>	2	allow range $12-15 \text{ g/cm}^3$
Total		15	

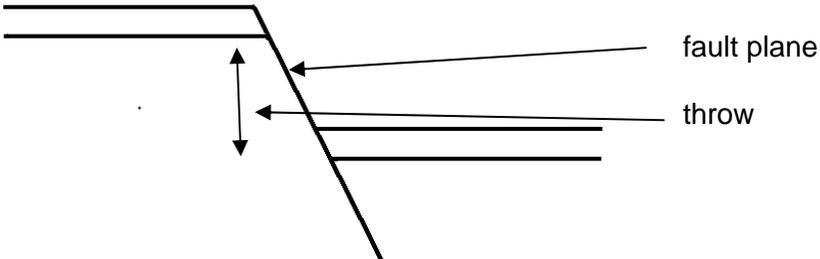
Question	Answer	Marks	Guidance
<p>2 (a)</p>	 <p>see cross-section deep ocean trench = 1 earthquake foci = 1 fold mountains in thicker continental crust = 1 batholiths = 1 directions of plate movement = 1</p>	<p>5</p>	<p>need to be annotated</p> <p>arrows must be within 1 mm of the feature labelled</p> <p>the subducting plate could be in the opposite direction</p> <p>batholith within the fold mountains</p> <p>need two correct arrows</p>
<p>(b) (i)</p>	 <p>high over the fold mountains OR volcanoes low over deep ocean trench</p>	<p>1</p>	<p>need both parts to be correct</p>
<p>(ii)</p>	<p>high over the mountains because of rising magma OR volcanoes OR rising hot convection currents OR partial melting low over the trench due to cold (sinking) plate OR cold sinking convection currents</p>	<p>1 1</p>	

Question		Answer	Marks	Guidance
	(c)	very explosive OR high on VEI OR VEI greater than 3 dominated by pyroclastic material OR little lava pyroclastic flows OR ash clouds infrequent	1	
	(d)	due to subduction OR due to the subducting plate OR friction as plate sinks	1	DO NOT ACCEPT just friction
		Total	10	

Question		Answer	Marks	Guidance	
3	(a)	Mercury Venus Earth Mars Jupiter Saturn Uranus Neptune 4 in correct order = 1 all in correct order = 2	2	wwr = 1 mark max max mark cannot be given unless Saturn and Uranus spelled correctly QWC = 1 accept spelling without a capital	
	(b)	(i)	Mars and Jupiter	1	
		(ii)	the remains of a planet that failed to form OR exploded or disrupted planet OR remains of planetary material in the solar system OR strong gravitational pull of Jupiter stops formation	1	

Question		Answer	Marks	Guidance
	(c) (i)	relatively small relatively dense OR weaker gravity rocky OR made of silicates metallic core OR iron core relatively high surface temperatures OR closer to the Sun OR smaller orbit fixed surface features OR volcanoes OR canyons OR solid crust OR solid surface fewer moons OR fewer satellites crust, mantle, core structure any two	2	DO NOT ACCEPT Earth-like
	(ii)	relatively large low density OR stronger gravity mainly H OR He no fixed surface features OR mobile surface features rocky core relatively low surface temperatures OR further from the Sun OR larger orbit many moons OR many satellites OR ring systems any two	2	
	(d)	4500 Ma to 4600 Ma OR 4.5 billion years to 4.6 billion years any two	1	units essential
		Total	9	

Question			Answer	Marks	Guidance
4	(a)	(i)	the forces applied to the rock OR force per unit area OR pressure	1	DO NOT ACCEPT just tension OR shear OR compression
		(ii)	the deformation caused by the applied forces OR a change in volume OR a change in shape OR change in unit length OR change in length ÷ original length	1	
		(iii)	sandstone is brittle OR competent OR no plastic deformation OR fails under higher stress OR fails after lower strain	1	max 1 if only describe graph but with no explanation
			shale is plastic OR ductile OR incompetent OR fails under lower stress OR fails after higher strain	1	
		(iv)	decreases the strength of the rock OR brittle failure occurs later small amounts of stress cause more strain OR becomes more plastic OR increased ductility OR easier to deform	1	
	(b)	(i)	antiform OR anticline OR anticlinal	1	QWC: spelling of antiform OR anticline must be correct
			overfold or asymmetrical OR left limb at 40-45° OR right limb overturned OR 75-80° OR closed	1	
		(ii)	compressional OR compression	1	
		(iii)	 <p>see diagram in crest of fold within the sandstone</p>	1	need 2 or more correct joints

Question		Answer	Marks	Guidance
	(iv)	tension OR stretching	1	
(c)	(i)	flat minerals OR platy minerals OR clay minerals aligned due to compression OR reorientate due to compression forms parallel to the fold axis 90° to (maximum) pressure OR 90° to compression (arrows) any two crystallisation forms mica OR muscovite	any 3	ACCEPT one detailed diagram or two or more showing stages marks given for text or annotated diagram max 2 if no words
(d)		A is elliptical OR oval AND B is round OR spherical A has been deformed OR stretched OR compressed OR strained OR A is elliptical as it has been deformed B is round as it has not been deformed	1 1	2 alternative ways of gaining the marks
(e)		 <p>normal fault drawn correctly fault plane drawn and labelled throw drawn and labelled</p>	1 1 1	max = 2 if the wrong fault
Total			18	

Question	Answer	Marks	Guidance
5	<p>formation usually forms in igneous rocks can form in sediments containing iron minerals iron minerals OR magnetite minerals align with the Earth's magnetic field temperature drops below the Curie point remnant magnetism OR the magnetism is fixed OR magnetism is frozen</p>	1 1 1 1 1 1 max 4	ACCEPT lava OR magma DO NOT ACCEPT metallic minerals ACCEPT annotated diagrams as text
	<p>continental drift magnetic inclination 90° to surface at poles parallel to surface at equator OR 0° at the equator indicates palaeolatitude OR palaeomagnetic location is different from present location can be combined to construct a polar wandering curve OR either poles or continents have moved when two curves together indicates continents together when curves diverge indicates the continents have moved apart</p>	1 1 1 1 1 1 max 3	accept annotated diagrams as text
	<p>sea floor spreading magnetic stripes parallel to MOR symmetrical linked to poles reversing forms positive and negative (magnetic) stripes on the ocean floor OR normal or reversed stripes each matching pair formed at ridges at the same time</p>	1 1 1 1 1 max 3	accept annotated diagrams as text
	Total	8	

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
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