

**Geology**

Advanced GCE F791

Global Tectonics

**Mark Scheme for June 2010**

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

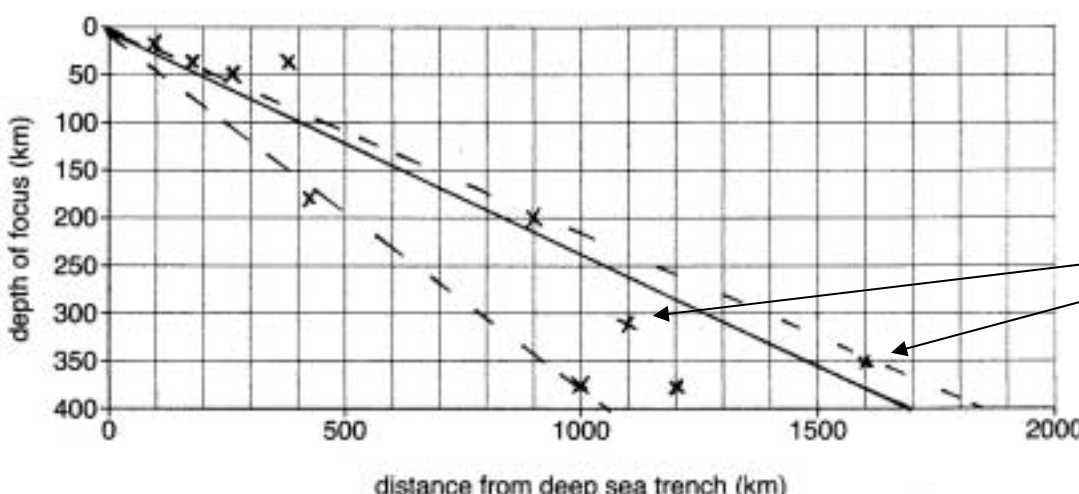
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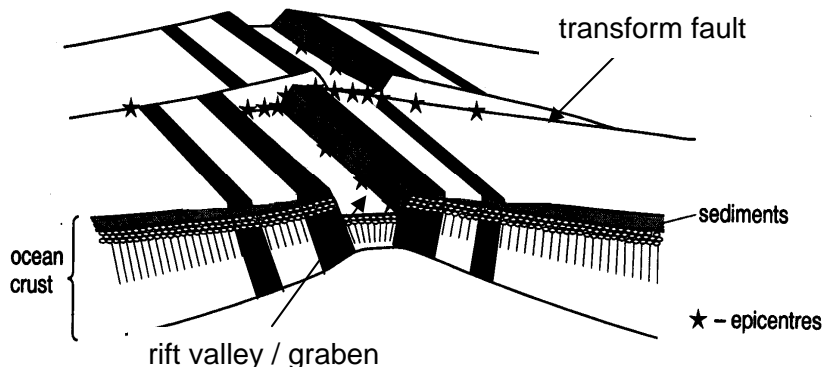
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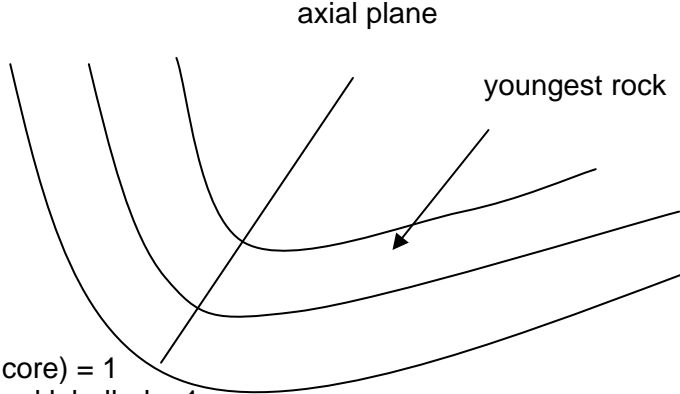
Question			Expected Answers	Marks	Additional Guidance
1	a	i	point where the seismic waves originate / point where the energy is released / <i>point (immediately) below the epicentre</i>	1	
		ii	very deep / narrow / linear feature / 6-12 km depth / V-shaped / steep sided  parallel to the plate edge / parallel to the edge of the continent / <i>parallel to the edge of an island arc</i>	1	any <b>two</b> descriptors for one mark or any one for one mark accept 'alongside' instead of 'parallel'
	b	i	 <p>4 - 6 correct points = 1 7 - 8 correct = 2 accurate line = 1</p>	3	already plotted so do not count as correct points when allocating marks  within the range above <b>line must go through the origin</b>
		ii	Benioff (zone)	1	spelling must be correct
		iii	due to subduction / oceanic crust being forced / sinking beneath the continent / landmass friction at the top of the plate / plates get stuck and move suddenly	1  1	max=1 if ecf for (ii) above

Question		Expected Answers	Marks	Additional Guidance
	<b>c i</b>	<p>ground movement may shear the ground / L-waves / lateral / sideways movement / ground may move in waves / description of damage to infrastructure</p> <p>liquefaction if the rocks are unconsolidated and saturated / causes collapse of buildings</p> <p>landslips / <i>landslide</i> / <i>rockfall</i> on steep slopes / especially if saturated in water / description of hazard</p> <p>aftershocks already weakened structures may fall / hampers rescue</p> <p>tsunami due to ground movement displacing water / due to submarine landslides displacing water</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>max 2</p>	<p>name and linked description = 1</p> <p>allow damage to structures parts of building separate from each other / especially if made from inflexible material / concrete / brick / floors separate / building moves off foundations / service pipes separate</p> <p>any 2 pairs of name and description = 2 max</p> <p>if two hazards named only = 1 max</p>

Question	Expected Answers	Marks	Additional Guidance
c ii	<p>flexible pipes / electricity cables prevents pipes from fracturing / stops fires</p> <p>cross-bracing / bird caging / <u>shear</u> walls to strengthen building / reduces torsion / reduces twisting</p> <p>weight on roof of tall buildings / (passive) damping acts as a counterbalance as the building sways</p> <p>pyramid-like structure / wider base more stable / less likely to fall</p> <p>flexible structure / flexible supports / wooden structures absorbs energy / allows building to sway</p> <p>base isolation / rubber / Teflon / springs / sliders / ball bearings / rollers between building and foundations to absorb ground vibrations / separate building from ground / building stationary while ground moves</p> <p>building on a solid concrete raft / deeper / wider / piled foundations / strengthen building foundations / reinforced foundations to provide greater support / stops shearing from foundations</p> <p>sufficient planning / risk assessment build on solid rock where possible / don't build on fault lines or other risk areas</p>	max 4	<p>name = 1 mark accept the name as part of the explanation</p> <p>description / explanation / recognisable diagram = 1 mark</p> <p>can give tank of water as an example of weight on roof</p> <p>max 2 for each method need 2 methods so <math>2 \times 2 = 4</math> max</p> <p>'shock absorbers' max =1 'rubber foundations' max =1</p>
	<b>Total</b>	<b>14</b>	

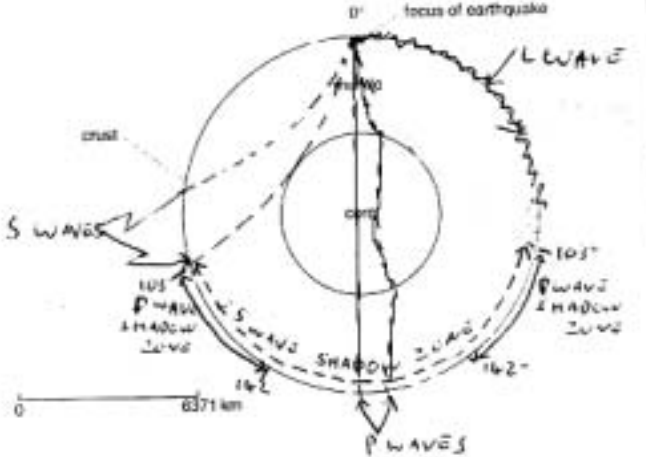
Question			Expected Answers	Marks	Additional Guidance
2	a	i	when the north and south poles reverse / flip / reversal of (magnetic) field convection cells in the liquid (outer) core / movement of the iron changes due to weakening of the field (and changing direction) change of direction of convection currents / Chandler wobble self exciting dynamo / dynamo effect	any 2	
		ii	iron minerals align parallel to the magnetic field rock cools fixes / freezes minerals for field at that time / below Curie point	1 1	
	b	$\frac{1.36}{10}$  = 0.136	1  1	If divided by 11, allow 0.124 for 1 mark  correct answer = 2 marks	
	c	magnetic stripe formed and moved apart stripes are parallel to the Mid Ocean Ridge pattern of stripes are symmetrical about the MOR	any 2		
	d	i		1  1	as on the diagram

Question		Expected Answers	Marks	Additional Guidance
	d ii	2 reversals <i>marked on the top or the side</i>	1	exact number of reversals is not essential but stripes do need to be parallel to the MOR <i>can be marked in just one segment of the MOR</i>
	iii	movement along transform faults / <i>movement of the ocean crust in two different directions</i> movement along normal faults / graben / due to tensional forces movement of magma / rising magma	any 2	movement along un-named faults = 1
	e i	sediment basalt dolerite gabbro  2 or 3 correct = 1 4 correct = 2	2	
	ii	planktonic organisms / (radiolaria) settling out onto the sea floor / clay / red clay / oozes / microfossils / pelagic organisms / sinking to the sea floor on death / ash / debris from iceberg / turbidity currents	1	must have sinking organisms, clay or volcanic ash etc
<b>Total</b>			<b>16</b>	

Question			Expected Answers	Marks	Additional Guidance
3	a	i	 <p>syncline drawing = 1                      asymmetric = 1                      youngest rocks (in fold core) = 1                      fold axial plane drawn and labelled = 1</p>	<p>1 1 1 1</p>	<p>if anticline drawn then the youngest rock would have to be away from the core of the fold</p>
	b		reverse fault / thrust	1	
	c	i	<p>platy minerals / clay minerals have long axes                      caused by high pressures / compressive forces / directed stress                      minerals rotate / realign / lined up at 90° to the maximum pressure                      parallel to axial plane of fold                      mica (muscovite) forms (by recrystallisation)</p> <p>clear annotated diagram = 1</p>	<p>2 1</p>	<p>mark diagram as text                      could get 2 marks for text and 1 for diagram                      or                      2 marks for annotated diagram and 1 for text</p>
		ii	<p>sandstone has <i>rounded grains</i> / 3D minerals / <i>sand grains can't line up</i>                      sandstone is competent and shale is incompetent  <i>shale has platy minerals / 2D minerals / clay minerals can line up</i></p>	2	<p>max 1 if competent or incompetent not mentioned                      mark annotated diagrams as text</p>
<b>Total</b>				<b>10</b>	



Question			Expected Answers	Marks	Additional Guidance
4	a		layer or discontinuity Gutenberg inner core Lehmann mantle Moho outer core 1 / 2 correct = 1 3 correct = 2 4 / 5 correct = 3 6 correct = 4	4	
	b	i	seismometer / seismograph	1	must have the correct spelling <b>not 'seismogram'</b>

Question	Expected Answers	Marks	Additional Guidance
<p><b>b</b> <b>ii</b></p>	 <p>either a P wave which goes straight through the outer and inner core or refracted through the outer and inner core</p> <p>curves through the mantle and stops at the outer core or curves to the surface</p> <p>restricted to the crust or just on top of the crust</p>	<p>1</p> <p>1</p> <p>1</p>	<p>as on the diagram</p> <p>as on the diagram</p> <p>as on the diagram</p>
<p><b>c</b> <b>i</b></p>	<p>103° to 142° epicentral angle</p>	<p>1</p>	<p>allow 143°</p>
<p><b>ii</b></p>	<p>because the P waves are refracted P waves velocity reduces / slow down at the (liquid) outer core <i>due to loss of rigidity</i></p>	<p>any 2</p>	<p>not 'reflected', 'diffracted', 'defracted' [sic], or 'deflected'</p>
<p><b>iii</b></p>	<p>S waves stopped because the (outer) core is liquid / zero rigidity</p>	<p>1</p>	
<p><b>Total</b></p>		<p><b>12</b></p>	

Question	Expected Answers	Marks	Additional Guidance
5	<b>abyssal plain</b> deep ocean basin / 3-5 km deep aseismic flat basalt fine sediments / ooze / microfossils / turbidity deposits <i>ocean floor cooling / contracting / sinking as it moves away from MOR</i>	1 1 1 1 1 1 max 2	mark diagrams as text
	<b>continental shelf</b> approximately 200m depth of water relatively flat part of the continental crust clastic sediments (eg sandstone shale) / non clastic (eg limestone)	1 1 1 1 max 2	mark diagrams as text
	<b>continental slope</b> 200m to 3000m averages a 4° angle deep marine canyons <i>slope down which the turbidity currents flow</i>	1 1 1 1 max 2	mark diagrams as text
	<b>seamount</b> at least 1000m high submarine volcano / <i>extinct volcano</i> basalt may have an atoll / <i>may have an eroded top (guyot)</i>	1 1 1 1 max 2	mark diagrams as text
			diagrams to show all four features for 2 marks diagram showing three features for 1 mark
	<b>Total</b>	<b>8</b>	

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