

Mark Scheme (Results) January 2008

GCE

GCE Geography A (6461/01)

6461 Physical Environments

Question Number	Question	
1	(a) (i)	
	Answer	Mark
	1. Fold mountains (1) 2. Fissure volcano (1) 3. Rift valley (1)	(3)

Question Number	Question	
1	(a) (ii)	
	Answer	Mark
	Linear/curved line/chain (1) of volcanic islands(1).	(2)

Question Number	Question	
1	(a) (iii)	
	Answer	Mark
	Subduction of one oceanic plate as it converges with another due to descending convection currents. Leading edge of the subducting plate melts and, under pressure, magma is forced towards and through the sea bed building up to form volcanic islands in an arc along the plate margin. (2) Marks for convergence and Subduction. (2) Marks for explanation of rising magma/volcano formation. Limit to 1 if just a mention of vulcanism.	(4)

Question Number	Question	
1	(b) (i)	
	Answer	Mark
	Jagged/angular (1) pieces/fragments of rock (1).	(2)

Question Number	Question	
1	(b) (ii)	
	Answer	Mark
	Physical weathering by processes such as freeze thaw/frost shattering putting larger pieces of rock under stress/pressure causing them to break down into smaller fragments and fall to the base of the slope. (2-3) Marks, shows understanding of process and impact. (1) Mark, states weathering /a weathering process as the cause.	(3)

Question Number		Question
1.		(c)
Indicative content		
		<p>Main features include tors and the debris produced, such as blockfields, clitter, scree and growan.</p> <p>Description = appearance in the landscape. Explanation = role of weathering processes e.g. hydrolysis, freeze-thaw.</p> <p>Located example likely to be Dartmoor.</p> <p style="text-align: right;">(6)</p>
Level	Mark	Descriptor
3	6-5	Clear description of landscape features and accurate explanation of role of weathering with convincing locational detail.
2	4-3	Clear description of valid landscape feature(s) and some simple explanation of role of weathering with location stated, but not used.
1	2-1	Basic description of landscape feature(s) without any valid explanation of role of weathering. Location may not be stated or appropriate.

(Total marks 20)

Question Number	Question	
2.	(a) (i)	
	Answer	Mark
	0.087	(1)

Question Number	Question	
2.	(a) (ii)	
	Answer	Mark
	Portland, (Dorset).	(1)

Question Number	Question	
2.	(a) (iii)	
	Answer	Mark
	Carbonation and/or solution.	(1)

Question Number	Question	
2.	(a) (iv)	
	Answer	Mark
	Rainwater dissolves carbon dioxide in the atmosphere and forms a weak carbonic acid. When this falls on limestone the carbonic acid reacts with the calcium (carbonate) in the rock and dissolves it (as calcium bicarbonate or calcium hydrogen carbonate). (2) Marks for origins of acidity in rainwater (2) Marks for reaction with limestone.	(4)

Question Number	Question	
2.	(b)	
	Answer	Mark
	1. Plant/tree roots grow into cracks/joints in the rock and force them apart/widen them as they grow. This also allows water to enter encouraging freeze-thaw. Lack of vegetation cover exposes rock to temperature variations. 2. Temperatures fluctuate around zero causing water in cracks to freeze and force them apart as it expands. High diurnal range may cause expansion and contraction of rock and insolation weathering, breaking off fragments or layers. Extreme low temperatures may cause frost shattering as rocks contract. Increasing temperatures leading to the melting of ice causing pressure release on bedrock. In each case mark on range and/or depth.	(3) (4)

Question Number	Question	
2.	(c)	
	Indicative content	
	<p>Landscape impact from landforms including dykes, sills, lacoliths and batholiths. Allow extension into general comments about landscape eg radial drainage.</p> <p>Description = surface appearance/impact.</p> <p>Explanation = how this happened, including doming up by batholiths and subsequent exposure by weathering and erosion.</p> <p>Located example likely to be Arran or Dartmoor.</p> <p style="text-align: right;">(6)</p>	
Level	Mark	Descriptor
3	6-5	Clear description and accurate explanation of landscape impact with convincing locational detail.
2	4-3	Clear description and some simple explanation of landscape impact with location stated, but not used.
1	2-1	Basic description of landscape impact without any valid explanation. Location may not be stated or appropriate.

(Total marks 20)

Question Number	Question	
3.	(a) (i)	
	Answer	Mark
	A. Slip-off slope/point bar/river beach	(1)
	B. River cliff	(1)

Question Number	Question	
3.	(a) (ii)	
	Indicative content	
	Velocity of river flow is lower on the inside bend of the meander as centrifugal force forces water to the outside of the bend where the thalweg (line of maximum velocity) is found. Slower velocity on the inside leads to a reduction in energy and the deposition of sediment. Some sediment is carried down stream in helical flow having been eroded from the previous meander bend river cliff.	
	(4)	
Level	Mark	Descriptor
2	4-3	Developed explanation of process of deposition, explaining the reduction in energy.
1	2-1	Basic idea of deposition on the inside of the bend.

Question Number	Question	
3.	(a) (iii)	
	Answer	Mark
	Levee (1) to reduce the risk of flooding/increase channel capacity (1).	(2)

Question Number	Question	
3.	(b)	
	Indicative content	
	<p>Shape may refer to cross-section, plan view, long profile, symmetry etc. e.g. Valleys are V shaped in the upper course, due to vertical erosion, becoming progressively more open with lower sides and a wider, flatter valley floor. Open V shape in the middle course, as lateral erosion dominates, and wide/flat (with bluffs, perhaps) in the lower course, where deposition dominates.</p> <p>Description = the shape/appearance</p> <p>Explanation = the dominant river processes involved, perhaps with references to sub-aerial and mass movement processes as well.</p> <p style="text-align: right;">(6)</p>	
Level	Mark	Descriptor
1	1-2	Basic description of valley shape without any valid explanation.
2	4-3	Clear description and some simple explanation of valley shape. Aware of processes.
3	6-5	Clear description and accurate explanation of valley shape. Provides detail of processes involved.

Question Number	Question	
3.	(c) (i)	
	Answer	Mark
	The transfer of moisture, in any form, (1) from the atmosphere to the ground surface (1).	(2)

Question Number	Question	
3.	(c) (ii)	
	Answer	Mark
	<p>The sun heats the ground. The air above is heated by (re-radiation from) the ground. The heated air is less dense than the surrounding air and so rises. As it rises it cools, becomes saturated (at dew point) and condensation occurs forming clouds. Allow 2 if condensation process correct even if mechanism of cooling incorrect.</p> <p>(2) marks for detail of heating/rising. (2) marks for the condensation process.</p>	(4)

(Total marks 20)

Question Number	Question	
4.	(a) (i)	
	Answer	Mark
	Regime	(1)

Question Number	Question	
4.	(a) (ii)	
	Answer	Mark
	3.5 (please accept between 3.4 and 3.6) No need to mention units (cumecs)	(1)

Question Number	Question	
4.	(a) (iii)	
	Answer	Mark
	3.4 (Please accept between 3.2 and 3.6) No need to mention units (cumecs)	(1)

Question Number	Question	
4.	(a) (iv)	
	Answer	Mark
	Little variation/flat (1) winter max/summer min (1) some anomalies/variations in rate of change (1) use of numeric data e.g. max/min (1) Identifies max/min months (January and August) (1) Any 3 x 1	(3)

Question Number	Question	
4.	(a) (v)	
	Indicative content	
	1. More foliage on vegetation in summer/more uptake during growing season so more storage/loss and lower discharge. Also, higher rates of transpiration and interception storage have the same effect. Vice versa in winter.	(3)
	2. Rates of change suggest that antecedent conditions maybe dry as a result of low and evenly distributed rainfall. Ground is dry and water table low so any additional inputs of rainwater are able to infiltrate/percolate and move slowly through underground route ways.	(3)
Level	Mark	Descriptor
2	3	Role of factor clear and linked to THIS pattern.
1	2-1	Awareness of factor and its role, probably generic rather than specific to THIS pattern.

Question Number	Question	Mark
4.	(b) (i)	
	Answer	
	Cross sectional area (CSA) divided by wetted perimeter or CSA/WP or width x (mean) depth divided by wetted perimeter etc (1) mark if two correct variables, but incorrectly related.	(2)

Question Number	Question	Mark
4.	(b) (ii)	
	Indicative content	
	Hydraulic radius generally increases downstream, although not necessarily in an even pattern. The chosen example may have anomalies, however. Describe = how does it change Explain = why does it change. Reasons should relate to change in channel shape, reduction in channel roughness etc. but could include human activity. Limit to 4 if candidate discusses channel efficiency with no reference to hydraulic radius.	(6)
Level	Mark	Descriptor
3	6-5	Clear description and accurate explanation of downstream changes with convincing locational detail.
2	4-3	Clear description and some simple explanation of downstream changes with location stated, but not used.
1	2-1	Basic description of downstream changes without any valid explanation. Location may not be stated or appropriate.

(Total marks 20)

Question Number	Question	
5.	(a) (i)	
	Answer	Mark
	WEST to EAST (Do not accept right to left)	(1)

Question Number	Question	
5.	(a) (ii)	
	Answer	Mark
	Beach extends/sand piles up next to the groyne/at E or wave crests approaching from West.	(1)

Question Number	Question	
5.	(a) (iii)	
	Answer	Mark
	How = swash and backwash movements (2). Why = direction of prevailing wind pushing waves diagonally and pull of gravity back down the beach (2). If partial how and why then 2.	(4)

Question Number	Question	
5.	(a) (iv)	
	Answer	Mark
	To reduce rates of longshore drift/prevent movement of beach material (1) in order to..... retain a good size beach to ensure tourists are attracted (1) to benefit the local economy (1) OR maintain a good size beach to prevent/reduce coastal erosion (1) as waves break on the beach and lose/reduce energy (1)	(3)

Question Number	Question	
5.	(b) (i)	
	Answer	Mark
	Increasing (global) temperature (1) causes melting of ice sheets/glaciers, adding more water to the ocean store (of the hydrological cycle) and raising sea levels (1). At higher temperatures the sea water also expands occupying a larger volume and again increasing sea level (1) OR specifies cause of increasing temperature (1).	(3)

Question Number	Question	Mark
5.	(b) (ii)	
	Answer	
	Increasing depth of water in ports/harbours (1) allowing larger vessels and greater/more efficient trade (1). OR Submergence of coastal lowlands (1) creating wetland environments that attract tourists (1) etc	(2)

Question Number	Question	Mark
5.	(c)	
	Indicative content	
	Description = On-shore bars are ridges of beach material extending across an indent in a coastline, and joined to the mainland at both ends. Explanation = either longshore drift and the extension of a spit OR migration of off-shore sediments during a (post-glacial, possibly) sea level rise. Examples likely to include Slapton. Limit to 2 if off-shore bar described and explained without mechanism of migration on-shore.	(6)
Level	Mark	Descriptor
3	6-5	Clear description of appearance and accurate explanation of formation with process detail
2	4-3	Clear description and some simple explanation with valid process reference.
1	2-1	Basic description of appearance without any valid explanation. May confuse with tombolo or off-shore bar.

(Total marks 20)

Question Number	Question	
6.	(a) (i)	
	Answer	Mark
	1. Trimingham	(1)
	2. 0.2 m/yr (allow 0.17 to 0.23). No need to mention units	(1)
	3. $0.375 \times 20 = 7.5$ m (allow 6.5 to 8.5). No need to mention units	(1)

Question Number	Question	
6.	(a) (ii)	
	Answer	Mark
	Hydraulic action / corrosion / abrasion / pounding / corrosion / solution / attrition (1) and appropriate outline (1).	(2)

Question Number	Question	
6.	(a) (iii)	
	Answer	Mark
	1. Rock is weak/easily eroded/not resistant (1) due to lines of weakness (cracks/joints etc) or weak bonds between particles or chemical composition (1).	(2)
	2. Waves are destructive (1) with high energy or backwash>swash (1)	(2)

Question Number	Question	
6.	(b) (i)	
	Answer	Mark
	The bending of wave fronts (1) around protrusions/headlands on irregular coastlines (1)	(2)

Question Number	Question	
6.	(b) (ii)	
	Answer	Mark
	Orthogonals/wave energy (1) is concentrated on the sides of headlands (1) leading to higher rates of erosion here compared to in bays or on the end of the headland (1).	(3)

Question Number	Question	
6.	(c)	
	Indicative content	
	<p>Describe = changes in species type, density, height, diversity... Explain = mainly (autogenic) changes as the succession itself leads to an amelioration/improvement in conditions. Plants/roots trap sediment causing the marsh to become higher and drier. Dead plant matter adds to the soil and increases its fertility. External (allogenic) change may also be relevant e.g. human activity. Examples likely to be Keyhaven, Gower, Morfa Harlech etc. Locational detail may include place names, species names etc. Limit to 2 if succession described and explained for wrong ecosystem eg psammosere.</p> <p style="text-align: right;">(6)</p>	
Level	Mark	Descriptor
3	6-5	Clear description and accurate explanation of succession with convincing locational detail. Temporal emphasis.
2	4-3	Clear description and some simple explanation succession with location stated, but not used. May take spatial view via a transect.
1	2-1	Basic description of succession, or transect without any valid explanation. Location may not be stated or appropriate.

(Total marks 20)