wjec cbac

GCE MARKING SCHEME

SUMMER 2017

GEOLOGY GL4 1214/01

INTRODUCTION

This marking scheme was used by WJEC for the 2017 examination. It was recognized after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognized at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

GCE GEOLOGY GL4

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- (ii) Holistic
 - 1. Size range large and small/2 different sizes (not fine) (1)
 - 2. Age first last (1)
 - 3. Rate slow or fast (1)
 - Porphyritic/phenocrysts/groundmass Liquid melt with space to grow Depth consideration and cooling rate (max 4 marks)

(b) (i)

order of	minerals crystallising	temperature
crystallisation	at 0.2 Gpa	(°C)
first to crystallise	hornblende	955 (945 – 965)
	biotite	845
last to crystallise	orthoclase feldspar	710 (705 – 715)

[4]

[4]

(ii) Holistic:

As pressure increases

- Biotite/hornblende (mafic min) crystallisation temp. INCREASES (1)
- Orthoclase/quartz/plagioclase crystallisation temp. DECREASES (1) Must refer to specific minerals (max 2 marks) [2]

(c) Holistic

In experiments

- Hornblende first to crystallise out
- Orthoclase feldspar is the last to crystallise out
- at lowest temperature for a given pressure
- Conflict with Shap granite
- Orthoclase should have smaller/anhedral crystals
- Hornblende (or other minerals) larger/anhedral crystals
- As orthoclase less room and hornblende more room to grow. Or visa versa (max 3 marks)

[3]

Total 15 marks

2.	(a)	Order		[1]
	(b)	(i) (ii)	Pelvis (1) Attachment of hindlimbs/support/locomotion (1)	[2]
	(c)	Holisti beak/s eyes o tail sp plates large l unequ bird-hi Other Minim (max 4	c: small teeth – herbivore eating vegetation on side of head – no 3D vision needed by a hunter ikes (no claws) – used to defend rather than attack on back – might be used as protection against attack body size – more difficult for predator to attack ial limb size - could not run fast enough to catch prey ipped pelvis/ Order <i>ornithischian</i> – only herbivores/grazers sensible. uum of 2 explained well. 4 marks if explained)	[4]
	(d)	(i)	1. 0.5m (1) 2. Trotting (1) 3. Running (1)	[3]
		(ii)	Shoulder height e.g. $2.2 = 2/s$ OR s= $2/2.2$ (1) = 0.91m (1)	[2]
		(iii)	Holistic At greater velocity = Larger stride lengths. Limbs of different lengths Forelimbs would be trotting/running compared with walking hindlim <i>Stegosaurus</i> would find it increasingly difficult at greater acceleration to maintain co-ordination between both sets of limbs Reference to energy required to move a large mass off ground while running (max 3 marks)	bs. ons Ist [3]

Total 15 marks

3. (a)

(i)

Different dips of limbs intersecting surface (1) Wider outcrop/shallower the dip (1)	
(Accept changes in thickness around the fold) (max 1 mark)	

(b)



Marks 5 and 6 – two beds offset in same direction (1) both offset to SE (1) (max 6 marks)

(c) Scale: large (~5mm) and smaller (1)
 Foliation: groundmass (drawn) (1)
 Euhedral: garnet(s) porphyroblast (drawn) (1)
 Mineralogy: garnet and mica both labelled and crystalline texture drawn (1)

[4]

[1]

[6]

(d) Boundary is a fault/thrust (1R) Age relationships clearly explained: Two NW-SE faults do not cross into the schist/are cut by X-X (1) X-X is younger/later than faults and therefore the Silurian beds (1) If an unconformity the two faults would be after the unconformity and therefore cut the schist (1) (max 3 marks R +2) (zero credit if argue as an unconformity) [3]

Total 15 marks

(a)	(i)	Cretaceous box (G)	[1]
	(ii)	Precambrian box (S)	[1]
(b)	(i)	Holistic: No continent at North Pole (1) - permanent ice does not develop (1) - accessible to warm ocean currents (1) - low altitude (1) - specific heat/thermal capacity (1)	
		Large continent at the South Pole (1) - at coldest region of the Earth (1) - encourages development of continental ice (1) - limited influence of ocean currents/cont. climate/continentality (1) - positive feedback loops (1) - albedo (1) (max 4 marks)	[4]
	(ii)	 Described and explained: Milankovitch cycles – Orbit, Tilt, Precession Or other sensible answer e.g. Changes in long term carbon cycle – Methane/CO₂ greenhouse gases Volcanic activity (subduction, supervolcano eruption) Chemical weathering of silicates Meteorites (max 3 marks) 	[3]
(c)	(i)	Root	[1]
	(ii)	 Flooded quickly - plant is in life position/not had time to decay (1) Tropical forest - coal (1) Fluvial environment - sands/siltstone/shale shows fluctuating rive energy (1) (max 3 marks)) er [3]
(d)	Holisti	c: Icehouse condition = permanent Polar ice (as today) Joggins is on the Equator – tropical at that time Icehouse – mean global climate - Joggins – local Ref to changes in mean temp changes over Carboniferous (max 2 marks)	[2]
		Total 15 ma	rks

4.

5.	(a)	(i)	Limestone	[1]
		(ii)	Vertical thickness variation (1) Laterally discontinuous (1) Facies changes (1) Represent local energy conditions of the sea/water depth (1) Washout/erosion (1) (max 2 marks)	[2]
	(b)	12.7cn (2 mar	n (1) * 130m = 1651m (1) (accept range 12.6cm/1638 – 12.8cm/166 ks)	54) [2]
	(c)	(i)	Unconformity/erosional surface (1)	[1]
		(ii)	 Correct labels (K above ThtL)(1) Correct position for unconformity (not horizontal)(1) NNE (accept N, NE, E or equivalent bearing) (1) (3 marks) 	[3]
			Total 9 ma	rks
6.	(a)	1. 2.	antiform – Beds dip away from each other (1) anticline – Oldest rock in centre/youngest outside (1)	[2]
	(b)	APT of southern anticline drawn/correctly labelled (1) APT of either syncline drawn/correctly labelled (1) Both APTs drawn but incorrect labels (1 max) (2 marks) [2		
	(c)	Both/s Plunge Northe (3 mar	outhern anticline plunge to the NE (1) e - V shape/close to NE/ direction of plunge (1) ern anticline plunges both NE and SW (pericline – accept dome) (1R) ks)	[3]

Total 7 marks

- 7. (a) W (R)
 2 western faults are marked as reverse RF on map (1)
 Reverse Hanging wall moved up/footwall moved down (1)
 Normal Hanging wall moved down/footwall moved up (1)
 (max 3 marks R plus 2) [3]
- (b) (i) N-S = 4 NE-SW = 12 NW-SE = 30(max 2 for all 3 correct, 1 for 1 correct) [2]
 - (ii) Rose diagram correctly completed (using data provided) Shape (1) Accuracy (1) [2]



- (c) (i) Compression fault F = normal/tension (1) Fold = compression (1) Age – faults cut across the fold (1) Ref to orientation of principle stresses/direction of pressures (1) (max 3) [3]
 - (ii) Holistic

 NE SW faults are anomalous
 Some (3?) are reverse faults therefore indicates compression
 σ max direction (NW-SE) is same direction that caused the folding
 Faults strike in same direction as the axial plane.
 Credit reactivation
 (max 3 marks)
 [3]

Total 13 marks

8.	(a)	(i)	12 – 18 degrees (1)	[1]
		(ii)	Vertical section shows apparent dip or equivalent (1) Explained (1) (max 2 marks)	
	(b)	Holisti	c true dip/strike of named feature eg. beds, mineralogy/ textural variation (size, shape, sorting/rock type folding/fracturing/jointing/faulting/cleavage – needs development (eg. spacing or orientation) mapping outcrop porosity/permeability of rock types presence of mineral veins (particularly potential pollutants) degree of weathering (minimum of 2 described well) (max 4 marks)	[4]
	(c)	Advan	tages (max 3 marks) extensive shale – impermeable so prevents leakage flanks of a syncline - water does not run off no polluting mineral veins evident limestone competent rock so stable dam foundations NW side dipping in to slope so stable	
		Disadv	vantages (max 2 marks) potential leakage from faulting/jointing potential leakage from limestone/sandstone limestone collapse/sink holes SE 35° dip daylighting into reservoir so mass movement potential Fault reactivation so instability (maximum 4 marks)	[4]

Total 11 marks

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