wjec cbac

GCE MARKING SCHEME

SUMMER 2019

GCE (LEGACY) GEOLOGY - GL4 1214/01

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INTRODUCTION

This marking scheme was used by WJEC for the 2019 examination. It was finalised 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 recognised 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

SUMMER 2019 MARK SCHEME

Question 1

(a)	(i)	On graph. 1 mark between each chilled/baked margins.	[2]
	(ii)	Upper baked margin. (1)	[1]
(b)	(i)	Description (with or without numbers) (1) Cooling at chilled margins (1) Larger crystals at base – cool slower or gravity settling (1)	[3]
	(ii)	Olivine first to crystallise (high crystallisation temp)(1) Reference to position in Bowens Reaction Series (1) Olivine more dense than other feldspar/augite (1) Olivine sinks in liquid magma/gravity differentiation (1) Olivine trapped at chilled margins/unable to differentiate (1) No turbulence/thermal convection (1) (Max 4 marks)	[4]
(c)	(i)	Columnar joints (1) Uniform cooling (1) Causes stresses towards equally spaced centres (1) To propagate from cooling surfaces (1) Water may be involved (1) (max 3)	[3]
	(ii)	Evaluation – not used/poor (1) Occur in sills & lava flows (and dykes) (1)	[2]

Total 15 marks

(i)	No genal spines (1) The pygidium is smaller than the cephalon (1)	[2]
(ii)	Thorax are free, pygidium are fused (1) Number of segments [1] Other e.g. shape etc.	[2]
Swimmer (nektonic/pelagic) (1) Evidence: Large eyes – to see beneath (1) Streamline shape/elongate body – ease through water (1)		
(i)	Correct plot Length – 20mm/Width – 30mm (or equivalent)	[1]
(ii)	Strongly positive (1) Distribution in clusters (R) Credit range giving values (2-22/5-32) (1)	[2]
(iii)	Y (1) Reasons - any two from: Clumping representing successive moults (1) Range from small (infant) to large (adults) (1) Shows steady growth (1) or X - Death Assemblage would give only one area of clustering/sorting (1) Z - Gradual evolution unlikely to be preserved on same bedding plane/wou show continuous development. (1) (3 max)	ıld [3]
Trilobites extinct or Fossil bivalves and brachiopods have modern living forms (1 max) Allowing direct comparisons to be made from modern to ancient or Uniformitarianism (Present is the key to the past) (1) (1 max)		[2]
	 (i) (ii) Swimr Evider Large Strean (i) (ii) (iii) (iii) Trilobi Fossil (1 max Allowin Uniford (1 max 	 (i) No genal spines (1) The pygidium is smaller than the cephalon (1) (ii) Thorax are free, pygidium are fused (1) Number of segments [1] Other e.g. shape etc. Swimmer (nektonic/pelagic) (1) Evidence: Large eyes – to see beneath (1) Streamline shape/elongate body – ease through water (1) (i) Correct plot Length – 20mm/Width – 30mm (or equivalent) (ii) Strongly positive (1) Distribution in clusters (R) Credit range giving values (2-22/5-32) (1) (iii) Y (1) Reasons - any two from: Clumping representing successive moults (1) Range from small (infant) to large (adults) (1) Shows steady growth (1) or X - Death Assemblage would give only one area of clustering/sorting (1) Z - Gradual evolution unlikely to be preserved on same bedding plane/wou show continuous development. (1) (3 max) Trilobites extinct or Fossil bivalves and brachiopods have modern living forms (1 max) Allowing direct comparisons to be made from modern to ancient or Uniformitarianism (Present is the key to the past) (1)

Total 15 marks

(a) (i)

(b)

	Fold element	Description	
	Fold type	Antiform/anticline	
	Symmetry		
	Orientation of the axial plane trace	• N-S	
	Direction of plunge of fold axis		
(ii)	Wavelength = shorter/ smaller (1) Symmetry = asymmetrical (1)		[2]
(iii)	Shale – incompetent, ductile/plastic b Sandstone – Competent – elastic, les (max 3 marks)	ehaviour (2 max) s ductile behaviour (2 max)	[3]
(i)	Dyke (1)		[1]
(ii)	Shale – centred (1), mirroring south o	f fault (1)	[2]

(c) (i) Slickensides (1)

[1]

 (ii) Direction of grooves shows orientation of movement. (1) Not always clear in which of two possible directions (1) (Credit smooth feel in direction of movement) (1) Reactivation possible (1) Slickensides only record the LAST direction of fault movement (1) (Max 3 marks) [3]

Total 14 marks

(a)	(i)	Palaeozoic correctly indicated (1)	[1]
	(ii)	Palaeozoic (1)	[1]
	(iii)	Cambrian fauna static – low (1) Palaeozoic fauna dominates up to End-Permian (1) Modern fauna dominates after P/T extinction (1) Numbers given (1) (maximum 3 marks)	[3]
(b)	(i)	700 - 600 = 100 (1) method <u>100</u> * 100 = 14% (accept range 13-15) (1) 700	[2]
	(ii)	Dinosaurs (1) Ammonites (1) (Credit appropriate alternatives)	[2]
	(iii)	Two outlined from: Sea level variations (2) Climatic change (2) Volcanicity (2) Meteorite impact (2) Other appropriate answer (2)	[4]
(c)	Graph based on sampling subject to error. Only exceptional preservation shows true diversity Fossil record is biased (in favour of marine organisms, hard parts, low energy environments, rapid burial) Fossil record is incomplete (natural processes of bacterial decay, predation/scavenging, diagenesis/tectonic/metamorphism, weathering/erosion. Number of faunal families not the only measure of diversity.		[3]

Total 16 marks

(a)					
	4986	49	Infilled ground (1)		
	4946	44	Solution hollow/swallow hollow (1)		
	(2 mar	ks)		[2]	
(b)	Quality Scale (Dolon Uncon Uncon (max 5	/ of dr (1) nitic) o formit formit 5 mark	rawing (2) conglomerate identified (MMMF) (1) ty labelled(1) ty explained (cross cutting/time gap/erosion etc)(1R) ks)	[5]	
(c)	(i)	irregular (1) surrounds the Carb. Lmst. (1) unconformable/cross cutting,(1) associated/infilling current valleys (1) ribbon-like /tongues/lobes (1) other sensible (max 2 marks)			
	(ii)	Figu • c • p • b (max	re 5 evidence (must explain) coarse-grained – high energy coorly sorted – rapid deposition preccias/conglomerate – river (flash flood) deposit x 2 marks)		
		Map • li • (• ((max	evidence (must explain) rregular tongues - valleys Cross cutting relationships – unconformity Carboniferous valleys drain anticline before Triassic x 2 marks)		
		(max	x 3 marks in total)	[3]	

Total 12 marks

(a) (i)

Direction	Ν	NE	E
Tally	HH HH II	++++ 1111	<i>III</i>
Total number of dip arrows	12	9	3

(All correct 2 marks)

[2]

(ii)



1 mark per correct sector – related to students answer only in (a)(i) (max 2 marks if all correct) [2]

(b) Correct (1) (i) Dome- Dip arrows are orientated in all directions/outwards from centre (1) Plunging - Outcrop V's to W and E (1) Fold wider W-E along axis thus elongated (1) (Max 4 marks) [4] Does not distinguish between anticlines/synclines(1) (ii) Does not give dip amount or variation (1) Depends upon the availability of dip arrow observations available thus bias (1) Other (size of grouping, symmetry, data that falls on the line, etc) (Max 2 marks) [2] (c) (i) Average dip angle: ~23 degrees (accept >18 to 28) Throw: ~ 300m (accept 250 – 350) Hanging wall: North Type of fault: Thrust/Reverse fault (low angle) [4] Yes (1) (ii) σ max is N-S (1) W=E trend of axial plane (1) reverse/thrust faults indicating crustal shortening N-S (1) (max 3 marks) [3]

Total 17 marks

(a)	Limestone - CaC0 ₃ , rain and ground water is acidic, limestone is dissolved by acid provides a pathway for water to further erode. (max 3 marks)	[3]
(b)	No drift (1) Aquifer near the surface (1) Near fault – fractured rock Other sensible (max 2 marks for 2 geological advantages)	[2]
(c)	Holistic Surface subsidence associated with solution Rock strength reduced – surface deposits only thin. Subsidence associated with lead mining/landfill Removal of potential mineral (Pb) waste pollution from mines Pollution of water courses by surface runoff and aviation fuel leakage Landfill waste removal and gases problems Faults - fault reactivation/water pathways Other sensible (max 6 marks)	[6]

Total 11 marks