GCE A LEVEL MARKING SCHEME

SUMMER 2019

A LEVEL (NEW)
GEOLOGY - COMPONENT 3
A480U30-1

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 A LEVEL GEOLOGY - COMPONENT 3

SUMMER 2019 MARK SCHEME

Instructions for examiners of A Level Geology when applying the mark scheme

1 Positive marking

It should be remembered that candidates are writing under examination conditions and credit should be given for what the candidate writes, rather than adopting the approach of penalising him/her for any omissions. It should be possible for a very good response to achieve full marks and a very poor one to achieve zero marks. Worthwhile answers that meet the requirements of the question, but do not appear on the mark scheme are to be given credit.

2 Tick marking

Low tariff questions should be marked using a points-based system. Each credit worthy response should be ticked in red pen. The number of ticks must equal the mark awarded for the sub-question. The mark scheme should be applied precisely using the marking details box as a guide to the responses that are acceptable. Do not use crosses to indicate answers that are incorrect.

3 Annotated diagrams

Where a candidate has answered a question wholly or partly by use of an annotated diagram, credit must be awarded to the annotations which form credit-worthy responses as outlined in the marking details box. Candidates must be credited only once for valid responses which appear both as annotations to diagrams and within a section of prose in the answer to the same question.

4. Banded mark schemes

Banded mark schemes are divided so that each band has a relevant descriptor. The descriptor for the band provides a description of the performance level for that band. Each band contains marks. Examiners should first read and annotate a learner's answer to pick out the evidence that is being assessed in that question. **Do not use ticks** on the candidate's response. Once the annotation is complete, the mark scheme can be applied. This is done as a two stage process.

Stage 1 – Deciding on the band

When deciding on a band, the answer should be viewed holistically. Beginning at the lowest band, examiners should look at the learner's answer and check whether it matches the descriptor for that band. Examiners should look at the descriptor for that band and see if it matches the qualities shown in the learner's answer. If the descriptor at the lowest band is satisfied, examiners should move up to the next band and repeat this process for each band until the descriptor matches the answer.

If an answer covers different aspects of different bands within the mark scheme, a 'best fit' approach should be adopted to decide on the band and then the learner's response should be used to decide on the mark within the band. For instance if a response is mainly in band 2 but with a limited amount of band 3 content, the answer would be placed in band 2, but the mark awarded would be close to the top of band 2 as a result of the band 3 content.

Examiners should not seek to mark candidates down as a result of small omissions in minor areas of an answer.

Stage 2 – Deciding on the mark

Once the band has been decided, examiners can then assign a mark. During standardising (marking conference), detailed advice from the Principal Examiner on the qualities of each mark band will be given. Examiners will then receive examples of answers in each mark band that have been awarded a mark by the Principal Examiner. Examiners should mark the examples and compare their marks with those of the Principal Examiner.

When marking, examiners can use these examples to decide whether a learner's response is of a superior, inferior or comparable standard to the example. Examiners are reminded of the need to revisit the answer as they apply the mark scheme in order to confirm that the band and the mark allocated is appropriate to the response provided.

Indicative content is also provided for banded mark schemes. Indicative content is not exhaustive, and any other valid points must be credited. In order to reach the highest bands of the mark scheme a learner need not cover all of the points mentioned in the indicative content but must meet the requirements of the highest mark band. Where a response is not creditworthy, that is contains nothing of any significance to the mark scheme, or where no response has been provided, no marks should be awarded.

Section A

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
1	(a)	(i)	Gravel coarser or mudstone finer (1) Gravel deposited under higher energy conditions/mudstone deposited under lower energy conditions (1)	**2**			**2**		
		(ii)	Permeable gravels (1) Provide pathway for pollution (1) or Impermeable mudstone (1) Keeps water close to surface (1) or River polluted (1) Flow of 'pollution' through permeable gravels (1) or Groundwater polluted (1) because of permeable gravels(1) or Erosion by river (1) Could undermine landfill site (1) or Flooding of the landfill site by the river (1) Evidenced by previous floodplain deposits (1)		**2**		**2**		
	(b)		**Any two x (1) from:** • Reduced stability • Gravels are loose/unconsolidated • Higher pore water pressure • Forces grains apart • Increased risk of flow/movement of grains	**2**			**2**		
	(c)	(i)	Pumping/locally reduced water table (1) Pumping rate greater than flow of leachate (1) Cone of depression (1)		**3**		**3**		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
		(ii)	**Two of the follow sections** *Impermeable cap* **Any two x (1) from** • Reduces water flow in waste less leachate, • Lower water table in waste, • Controls release of methane *Vent* **Any two x (1) from** • Provides pathway for methane gas • Prevents build-up of flammable gas • Allows gas to be vented safely *Impermeable barrier* **Any two x (1) from** • Prevents lateral flow of leachate • Contains leachate under landfill • Reduces groundwater flow under landfill	**4**			**4**		
	(d)		**Any two x (1) from:** • Subsidence/Ground Instability • Contamination of the ground by toxic chemical materials/ • Groundwater pollution • Methane gas release/explosion	**2**			**2**		
			Question 1 total	**10**	**5**	**0**	**15**	**0**	**0**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
2	(a)		Dextral/right-lateral (1) Strike-slip (1)	**2**			**2**		
	(b)	(i)	$\frac{1999-1939}{9} = 6.7\ years$ (accept 6.6-6.7) (1) for working i.e. years/no of events in the working (1)		**2**		**2**	**2**	**2**
		(ii)	**Any two x (1) from:** • Earthquakes move westward, • Overlap between surface displacement • Anomalies [1951 or 1992] identified • Extent of displacement decreases/varies over time • Anomalies [e.g.1942 or 1951 or 1992] • Extent of displacement decreases westward • Anomalies [e.g.1992] identified	**2**			**2**		
		(iii)	**Any two x (1) from:** • Stress transferred along fault • Movement of only one part of the fault • Lateral movement of the plates • Locked sections of the faults • Reduction in stress over time • As energy is released during earthquakes		**2**		**2**		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(c)	(i)	4.0 metres or 0.1-4.1 metres		**1**		**1**	**1**	**1**
		(ii)	Part of the fault may be locked/more stress stored in some parts of fault or Different lithologies along fault plane or Water along fault plane or Angle of fault to stress or Rock competence In each case (1) for statement +(1) for development.	**2**			**2**		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(d)		**Credit any point from 1-3 marks. Maximum of 4 marks for the whole question** • Frequent earthquakes along fault • Istanbul is to the west of last earthquake • However, epicentre may be to south of Istanbul • Use of return period calculation • Cannot predict exact time or place of earthquake • Not definite that an earthquake will occur in this timeframe, • Not clear position of fault under water. • Reference to current situation of earthquakes. Credit other reasonable answers. In each case (1) for statement + up to 2 further marks for development			**4**	**4**		
			Question 2 total	**6**	**5**	**4**	**15**	**3**	**3**

Section B

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
3	(a)	(i)	**Any three x (1) from:** • Oval shaped • Discontinuous • Offset by faults • Varying in width Credit other suitable answers	**3**			**3**		
		(ii)	Laterally discontinuous beds thin out (1) Variation in vertical thickness deposited; 0-30m. (1) Accept reference to facies change		**2**		**2**		
	(b)	(i)	200m (accept range 150 – 250m) (1) credit working within range e.g. 4mm * 50 or 0.4cm * 500 (1)		**2**		**2**	**2**	**2**
		(ii)	credit working sin Θ = t/w (1) sin Θ = 30/(answer given in b(i)) (1) $\sin^{-1}$ 30/(answer given in b(i)) (1)		**3**		**3**	**3**	**3**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(c)		**Any two x (1) from:** • Shallow dip angle • Effect of topography • Dip close to slope angle • Effect of faulting Credit other suitable answers			**2**	**2**		**2**
			Question 3 total	**3**	**7**	**2**	**12**	**5**	**7**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
4	(a)	(i)	Brachiopod (1) Bilateral symmetry <u>through valves</u> (not bilateral alone) or equilateral or inequivalve (1)	**1**	**1**		**2**		
	(b)	(i)	**Any three x (1) from:** • little transport prior to burial • fossils complete, • valves articulated, • some in growth position, • unsorted/range of sizes/ages • random alignment		**3**		**3**		**3**
		(ii)	**Any three x (1) from:** • Too small a sample to be accurate • Fossil record is biased only hard body parts preserved • Soft bodied animals decay, require rapid burial/low energy (this is high energy environment) • Natural processes distort (predation, scavenging) • Effects of diagenesis, weathering, erosion on preservation		**3**		**3**		
			Question 4 total	**1**	**7**	**0**	**8**	**0**	**3**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
5	(a)	(i)	40 / 225 (Accept range 220 – 230) Both correct for (1)		**1**		**1**	**1**	**1**
		(ii)	Answer in (a) (i) correctly plotted Angle (1) Azimuth (1)	**2**			**2**	**2**	**2**
		(iii)	**Any one x (1) from:** • Does not show fold type (antiform or synform) – just direction of dips. • Does not differentiate more than one structure - may be more than one fold.		**1**		**1**		**1**
	(b)		**Any three x (1) from:** • Inclined axis – greater dip angle of limb to SW so not upright • Open – fold interlimb angles are large • Anticline – oldest rock in the centre • Axis is NW – SE PLUS **Any one x (1) from:** • It does not plunge to the SW because outcrop closes to the SE and NW • It does not only plunge to the SE - elongated dome/pericline Credit statements without justification up to a max of 2 marks			**4**	**4**		**4**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(c)	(i)	**Any two x (1) from** • Radial • All directions • Preferred orientation to NE or SW • From centre (few crossing) of anticline • Faults of different lengths Credit other suitable answers	**2**			**2**		
		(ii)	For: hanging wall has moved up/formed by crustal shortening/compression/ reverse fault (1) Against: angle of dip is too great/> 45°(1)		**2**		**2**		**2**
	(d)		YES - antiform/dome with NW-SE axis (1) YES - thrust (1) NO - normal faults result from tension (1)			**3**	**3**		
			Question 5 total	**4**	**4**	**7**	**15**	**3**	**10**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
6	(a)	(i)	Woolhope Limestone Formation (WoL) (1)		**1**		**1**		**1**
		(ii)	Bronsil Shale Formation (BSh) (1) Working must be credited for full marks Evidence of • correct scale used (1cm:200m) (1) • correct formulae (1500/200 = 7.5cm) (1)		**3**		**3**	**2**	**2**
	(b)		**Six x (1) (including max 4 from either section) from:** • Antiform/anticline • Possible hydrocarbon trap • Source Rock – potentially Ordovician shales • Reservoir rocks- sandstones/limestones • Caprock/seal – potentially Ludlow Shale • Fault traps However • Rocks not buried to sufficient depth/ insufficient maturation/ buried too deep • Hydrocarbon lost • Through faults • Migrated before trap formed • Erosion of anticline seal • Reserve may not be economic Credit other sensible answers			**6**	**6**		**6**
			Question 6 total	**0**	**4**	**6**	**10**	**2**	**9**

Section C Option 1 Quaternary Geology

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
7	(a)	(i)	**Any one x (1) from:** • Raised beaches, • Elevated sea cliffs • Marine fossils	**1**			**1**		
		(ii)	**Any two x (1) from:** • ^{14}C dating, • Of marine shells/organic material or • Dating volcanic ash • Isochronous layers in beach sediments or • Marker features on the coast/GPS Re-measuring over time	**2**			**2**		
	(b)	(i)	Rearranging equation (1) $\frac{3300\ x\ 800}{917}$ (1) = 2.9 kilometres (1)		**3**		**3**	**3**	**3**
		(ii)	**Any two x (1) from:** • Assumes crust is in equilibrium • Uplift continuing • Credit reference to eustatic changes • Measurement only from end of glacial period, not its maximum		**2**		**2**		**2**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
	(c)		**Any four x (1) from:** • Erosion lowered valley bottom lower than current sea level • Sea level dropped during glacial episode • Uplift less than 100m • Eustatic sea level rise • Due to ice melt • More than isostatic uplift			**4**	**4**		
			Question 7 total	**3**	**5**	**4**	**12**	**3**	**5**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
8	(a)	(i)	5 (1)	**1**			**1**		**1**
		(ii)	120 ka – 135 ka (1)	**1**			**1**		**1**
		(iii)	**Any three x (1) from:** • Milankovitch cycles, • Variations in orbit • Change in solar insolation • Alters seasonal contrast • Eccentricity/obliquity/precession	**3**			**3**		
		(b)	**Any two x (1) from:** • High degree of correlation • Positive or equivalent • Credit exemplar values • CO_2 is smoother record		**2**		**2**		
		(c)	**Any three x (1) from:** • ^{18}O: ^{16}O ratio is higher when it is warmer/lower when colder • ^{18}O is heavier than ^{16}O • ^{18}O is requires more energy/^{16}O requires less energy • To be taken up by evaporation from the oceans • ^{18}O Requires higher temperatures/^{16}O lower temperatures • To be incorporated into ice by condensation/precipitation	**3**			**3**		

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
		(d)	**Any two x (1) from:** • Different thicknesses of snow, • Varying amounts of precipitation with time • Compression of snow • Loss of snow/snow melt/snow blown away			**2**	**2**		
			Question 8 total	**8**	**2**	**2**	**12**	**0**	**2**

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
9			**Indicative content:** • Oceanic circulation can transfer heat to higher latitudes and colder temperatures to lower latitudes. • Atmospheric circulation can also transfer heat and precipitation around the globe. • Continents act as barriers to global oceanic circulation • As continents move and join the pattern of global oceanic circulation will change over time. • Examples; North Atlantic Drift & Labrador current affect climates around the North Atlantic Ocean. Aghulas current in East Africa. • Changing position of North Atlantic Drift linked to Quaternary climate change in Europe. • Joining of North & South America by central American isthmus changed oceanic circulation • Opening of Drake Passage • Mountains act as a barrier to atmospheric circulation. • Growth of mountain belts changes distribution of temperature and precipitation. • Examples: Himalaya causing monsoon/Tibetan desert and/or other mountain belts e.g. Rocky Mountains, Alps etc. • Continents at poles can influence global cooling	6					

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
			5-6 marks: A thorough understanding of how both oceanic and atmospheric circulation affects climates in different places over time. Supported by examples of how climate has changed by the changing location of continents and mountains over time. *The candidate constructs a relevant, coherent and logically structured account including all key elements of the indicative content. A sustained and substantiated line of reasoning is evident and scientific conventions and vocabulary are used accurately throughout.* **3-4 marks:** Some understanding of **both** oceanic and atmospheric circulation and its influence on climate. Supported by evidence from current climates. There may be an imbalance of comments related to oceanic and continental circulation *The candidate constructs a coherent account including many of the key elements of the indicative content and little irrelevant material. Some reasoning is evident in the linking of key points and use of scientific conventions and vocabulary is generally sound.*						

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
			1-2 marks: A partial understanding of **either** oceanic or atmospheric circulation and its influence on climate, supported by an example from the climate of a place at present. The candidate attempts to link at least two relevant points related to either oceanic or atmospheric circulation in the indicative content. *Coherence is limited by omission and/or inclusion of irrelevant material. There is some evidence of appropriate use of scientific conventions and vocabulary.* **0 marks:** *The candidate does not make any attempt or give an answer worthy of credit.*						
			Question 9 total	**6**	**0**	**0**	**6**	**0**	**0**

Section C Option 2 Evolution of Britain

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
10	(a)	(i)	**one** description of shape [elongated northeast – southwest, 3 low points/] (1) **one** description of size [20-30km wide, approximately 170km long] or -20 milligals (1)	**2**			**2**		
		(ii)	**Any two x (1) from:** • Low density granite • Density contrast with country rock • Lower gravitational pull	**2**			**2**		
	(b)	(i)	Width 16-24 km (1) $T = 0.75 \times 20^{0.7}$ (1) = 5.22- 6.93 km (1)		**3**		**3**	**3**	**3**
		(ii)	Plotted to correct depth (1) Under lowest gravity anomaly (1)	**2**			**2**		
	(c)		**Any three x (1) from:** • Rocks are in alignment with Variscan trend • Granites form in orogenic belt • Cross-cutting Variscan fold structures • So younger than Devonian/Carboniferous • Intruding pre-Variscan rocks • Late Carboniferous age of Bodmin granite. • Age of granite corresponds to Variscan Orogeny			**3**	**3**		
			Question 10 total	**6**	**3**	**3**	**12**	**3**	**3**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
11	(a)	(i)	**Any two x (1) from:** • Clastic • Coarse or grain size noted • Sub-rounded /sub-angular • Poorly-sorted • Matrix supported	**2**			**2**		**2**
		(ii)	**Any two x (1) from:** • High energy • Flow from Mercian highlands • Alluvial fan • Sudden reduction of gradient Credit other reasonable answer		**2**		**2**		**2**
	(b)		B (1) Only sequence within zone to deposit K salts (1)		**2**		**2**		
	(c)	(i)	**Any three x (1) from:** • Modern deserts found at 15-20˚N • Arid deposits • Red beds • Dunes • Hypersaline conditions • Evaporite cycles.			**3**	**3**		
		(ii)	**Any three x (1) from:** • Palaeomagnetism • Remnant magnetism • Inclination of magnetic field • Credit (1) for further development of any points above	**3**			**3**		
			Question 11 total	**5**	**4**	**3**	**12**	**0**	**4**

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
12			**Indicative content:** • Formed in early Palaeogene (60.5-54.5 Ma). • Period of crustal extension in Britain. • Orientation of dykes (NW-SE). • Predominantly mafic igneous activity linked to processes at constructive plate margins in oceans. • Examples of plutons; Skye, Mull, Rum. • Examples of intrusions: Drumadoon Sill (Arran), dyke swarms. • Examples of extrusive igneous rocks: Skye, Mull & Antrim lavas. **5-6 marks:** A thorough understanding of the igneous activity in the Palaeogene was given. Clear explanation of the relationship between processes generating mafic magma at constructive plate margins and the Palaeogene geological record using examples of different igneous bodies. Addresses issues raised by anomalous bodies. *The candidate constructs a relevant, coherent and logically structured account including all key elements of the indicative content. A sustained and substantiated line of reasoning is evident and scientific conventions and vocabulary are used accurately throughout.*	6					

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
			3-4 marks: A sound understanding of **the link**s between the processes associated with the opening of the North Atlantic Ocean and the rocks of the Palaeogene Igneous Province using examples of different igneous bodies. *The candidate constructs a coherent account including many of the key elements of the indicative content and little irrelevant material. Some reasoning is evident in the linking of key points and use of scientific conventions and vocabulary is generally sound.* **1-2 marks:** A partial understanding of constructive plate margins and igneous activity. The candidate attempts to link at least two relevant points related to either processes and associated igneous rocks in the indicative content. Use of an example from the geology of the Palaeogene Igneous Province to support the explanation of the processes. *Coherence is limited by omission and/or inclusion of irrelevant material. There is some evidence of appropriate use of scientific conventions and vocabulary.* **0 marks:** *The candidate does not make any attempt or give an answer worthy of credit.*						
			Question 12 total	**6**	**0**	**0**	**6**	**0**	**0**

Section C Option 3 Geology of the Lithosphere

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
13	(a)		Correct label (1) Reference to thrusting/reverse fault (1) **Any one x (1) from:** • Large scale recumbent fold • Moved a distance greater than 2km	**1**	**2**		**3**		
	(b)		**(2 R x 1) + any one x (1) from:** Foredeep: deeper /steeper (R) narrower Forebulge: higher (R) steeper	**3**			**3**		
	(c)	(i)	Horizontal converging for sigma max and vertical diverging for sigma min. (1)		**1**		**1**		**1**
		(ii)	**Any two x (1) from:** • Subsiding foreland basin/increased sediment load • σ max is vertical • Normal fault Or accept • The normal faults were there before • Reactivation by crustal shortening maintaining normal sense of movement			**2**	**2**		**2**
	(d)		Mention of isostacy (or equivalent) (1) Erosion - orogenic belt rises/Moho rises (1) Deposition - basin deepens/Moho drops (1) or Credit Pratt hypothesis of lateral changes in density (2)	**3**			**3**		
			Question 13 total	**7**	**3**	**2**	**12**	**0**	**3**

Question			Marking details	Marks Available					
				AO1	AO2	AO3	Total	Maths	Prac
14	(a)	(i)	$5x10^6 * 7.5 = 3.75*10^7/1x10^5$ (1) = 375 km (1)		**2**		**2**	**3**	**3**
		(ii)	Accept a correct location at 375km on either side of the ridge axis (1)		**1**		**1**		
	(b)	(i)	Basic description (increase, decrease then increase) (1) Accurate use of numbers (depth or velocity) (1)	**2**			**2**		
		(ii)	**Any two x (1) from:** • Changes in rigidity and density • Reference to the asthenosphere • Less rigid asthenosphere or denser mantle = lower velocity	**2**			**2**		
		(iii)	Line drawn at ~25km (1)		**1**		**1**		**1**
	(c)		Location - "further out than B" (1) **Any three x (1) from:** • Lithosphere is thicker/deeper • Older/further from MOR • Colder/lower heat flow/heat is lost • Lithosphere denser • Depth to 1300°C increases			**4**	**4**		
			Question 14 total	**4**	**4**	**4**	**12**	**3**	**4**

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
15			**Indicative content:** • Ocean crust is denser (~3.00) – contains mafic mineral • Continental crust contains more silicic (felsic) minerals – less dense (~2.60) • Continental crust - more buoyant • Ocean crust is upper part of the oceanic lithospheric plate which is subducted beneath continental lithosphere • Least dense part of the subducting plate (sediments and parts of the ocean crust) may be scraped off (obduction) at a convergent plate boundary to produce accretionary wedge and ophiolites. • Ocean lithosphere is therefore recycled into the Earth whereas continental crust remains and recycling is restricted to surface processes (weathering, erosion, deposition). • Cycle of opening and closing of ocean lithosphere on about 200 Ma scale. **5-6 marks:** A thorough understanding of the differing composition of ocean and continental crust related to a density difference and to buoyancy. Reference may be made to obduction and accretionary wedges. Recycling by subduction restricted to ocean lithosphere whilst recycling of continents on a much longer timescale related to surface processes. Cycle of opening and closing of ocean lithosphere on about 200 Ma scale. *The candidate constructs a relevant, coherent and logically structured account including all key elements of the indicative content. A sustained and substantiated line of reasoning is evident and scientific conventions and vocabulary are used accurately throughout.*	**6**			**6**	**0**	**0**

Question			Marking details	Marks available					
				AO1	AO2	AO3	Total	Maths	Prac
			3-4 marks: A sound understanding of concept of subduction of ocean lithosphere relating to differences in density and buoyancy of ocean and continental lithosphere. Concept of recycling of ocean lithosphere understood. *The candidate constructs a coherent account including many of the key elements of the indicative content and little irrelevant material. Some reasoning is evident in the linking of key points and use of scientific conventions and vocabulary is generally sound.* **1-2 marks:** A partial understanding of concept of subduction of ocean lithosphere in which the candidate attempts to link differences in density or buoyancy of ocean and continental lithosphere to subduction. *Coherence is limited by omission and/or inclusion of irrelevant material. There is some evidence of appropriate use of scientific conventions and vocabulary.* **0 marks:** *The candidate does not make any attempt or give an answer worthy of credit.*						
			Question 15 total	**6**	**0**	**0**	**6**	**0**	**0**
			Paper Totals	**41**	**39**	**25**	**105**	**16**	**39**