Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2014

Geography

Assessment Unit AS 1

assessing

Physical Geography

[AG111]

THURSDAY 5 JUNE, AFTERNOON

MARK SCHEME

MARK SCHEMES

Foreword

Introduction

Mark Schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of 16- and 18-year-old students in schools and colleges. The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes therefore are regarded as a part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

The Council hopes that the mark schemes will be viewed and used in a constructive way as a further support to the teaching and learning processes.

Introductory Remarks

The assessment objectives (AOs) for this specification are listed below. Students must:

AO1 demonstrate knowledge and understanding of the content, concepts and processes;

AO2 analyse, interpret and evaluate geographical information, issues and viewpoints and apply understanding in unfamiliar contexts;

AO3 select and use a variety of methods, skills and techniques (including the use of new technologies) to investigate questions and issues, reach conclusions and communicate findings.

General Instructions for Markers

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all markers are following exactly the same instructions and making the same judgements so far as this is possible. Markers must apply the mark scheme in a consistent manner and to the standard agreed at the standardising meeting.

It is important to recognise that in some cases there may be other correct responses that are equally acceptable to those included in this mark scheme. There may be instances where certain judgements have to be left to the experience of the examiner, for example, where there is no absolute, correct answer.

Markers are advised that there is no correlation between length and quality of response. Candidates may provide a very concise answer that fully addresses the requirements of the question and is therefore worthy of full or almost full marks. Alternatively, a candidate may provide a very long answer which also addresses the requirements of the question and is equally worthy of full or almost full marks. It is important, therefore, not to be influenced by the length of the candidate's response but rather by the extent to which the requirements of the mark scheme have been met.

Some candidates may present answers in writing that is difficult to read. Markers should take time to establish what points are being expressed before deciding on a mark allocation. However, candidates should present answers which are legible and markers should not spend a disproportionate amount of time trying to decipher writing that is illegible.

Levels of Response

For questions with an allocation of six or more marks three levels of response will be provided to help guide the marking process. General descriptions of the criteria governing levels of response mark schemes are set out on the next page. When deciding about the level of a response, a "best fit" approach should be taken. It will not be necessary for a response to meet the requirements of all the criteria within any given level for that level to be awarded. For example, a Level 3 response does not require all of the possible knowledge and understanding which might be realistically expected from an AS or AL candidate to be present in the answer.

Having decided what the level is, it is then important that a mark from within the range for that level, which accurately reflects the value of the candidate's answer, is awarded.

General Descriptions for Marking Criteria

Knowledge and Understanding	Skills	Quality of Written Communication	Level
The candidate will show a wide-ranging and accurate knowledge and a clear understanding of the concepts/ideas relevant to the question. All or most of the knowledge and understanding that can be expected is given.	The candidate will display a high level of ability through insightful analysis and interpretation of the resource material with little or no gaps, errors or misapprehensions. All that is significant is extracted from the resource material.	The candidate will express complex subject matter using an appropriate form and style of writing. Material included in the answers will be relevant and clearly organised. It will involve the use of specialist vocabulary and be written legibly and with few, if any, errors in spelling, punctuation and grammar.	3
The candidate will display an accurate to good knowledge and understanding of many of the relevant concepts/ ideas. Much of the body of knowledge that can be expected is given.	The candidate will display evidence of the ability to analyse and interpret the resource material but gaps, errors or misapprehensions may be in evidence.	The candidate will express ideas using an appropriate form and style of writing. Material included will be relevant and organised but arguments may stray from the main point. Some specialist terms will be used and there may be occasional errors in spelling, punctuation and grammar. Legibility is satisfactory.	2
The candidate will display some accurate knowledge and understanding but alongside errors and significant gaps. The relevance of the information to the question may be tenuous.	The candidate will be able to show only limited ability to analyse and interpret the resource material and gaps, errors or misapprehensions may be clearly evidenced.	The candidate will have a form and style of writing which is not fluent. Only relatively simple ideas can be dealt with competently. Material included may have dubious relevance. There will be noticeable errors in spelling, punctuation and grammar. Writing may be illegible in places.	1

Section A

AVAILABLE MARKS

1 (a) The hazard selected should be relevant to the field study undertaken (as outlined in their attached report). The answer should be evaluative, as the candidate is required to reflect on the effectiveness of the actual risk minimisation strategies adopted.

Award [3] for the identification of a specific hazard and an evaluative response which recognises the strengths/weaknesses of two chosen mitigation strategies.

Award [1]–[2] for a less focussed response which may relate to a more general hazard with more tenuous links to the fieldwork. The candidate may refer to one strategy only or the evaluative element may be neglected. [3]

(b) As Resource 1 indicates, all processing stages are essential in the exploration of the aim and the verification of the hypotheses enabling a valid conclusion to be formed.

Graphical Representation
Graphs and charts can be produced to visually display quantitative data in relation to the hypothesis or aim of the study. A graph will allow for the depiction of observable patterns or trends, or the identification of anomalous values. As their interpretation can be open to subjectivity, they cannot allow a hypothesis to be reliably verified. Nonetheless they summarise the data visually and can aid analysis and interpretation. Reference should be made to the graph work completed and its purpose within the investigative study.

Statistical Testing
The process can aid interpretation as complex lengthy raw values can be simplified and summarised into a concise mathematical form. Statistical analysis can provide an objective measure of significance which will provide a sound basis for reliable conclusions. Reference should be made to the type of statistical analysis employed and their value within the investigative process.

Data Analysis/Interpretation
Data analysis involves a description of the quantitative data in relation to the aim of the study while interpretation can involve the application of logical reasoning. It should involve a scrutiny, or inspection, of the data, tabulated or graphically presented, to detect patterns or trends in relation to the hypothesis or research aim. In such a commentary, results are summarised and the process aids the formulation of a meaningful conclusion. Reference should be made to the actual fieldwork data analysed and interpreted and the precise purpose of these processes.

Evaluation of Data
This stage involves a critical reflection of the actual data. It should involve an assessment of the validity of the data and possibly an exploration of factors which may have influenced its reliability. Again this stage is vital in the formulation of a meaningful conclusion. Reference should be made to the actual data evaluated during the enquiry process and the value/purpose of the process should be recognised.

Award [3] if the candidate coherently discusses the role of the selected process in the investigation and makes **explicit links** to the individual fieldwork.

Award [1]–[2] if the role of the selected process is more simplistically discussed with limited or no linkage to the field study.
(2 × [3]) [6]

(c) (i) The mark breakdown is as follows.

Title [1] – must make specific reference to the variables plotted

Conventions [2]
- for accurate labelling of axes (explicitly annotating variables and units)
- for appropriate scaling
- for the provision of a key (if relevant)
- for correctly plotting dependent and independent variables on correct axes

Accuracy [3] – for the accurate and precise plotting of selected values (from the submitted table)

Method [1] – for the selection of an appropriate graphical technique or an appropriate graph in relation to their aim/hypothesis [7]

T – 1
C – 2
A – 3
M – 1

(ii) Description [2]
Award up to [2] for accurate description of the graph in relation to the aim/hypothesis. The quotation of relevant values is essential for full marks.

Explanation [4]
Award [3]–[4] for coherent, detailed explanation of the graph. The answer should include relevant theoretical concepts and specialist terms.

Award [1]–[2] for explanation which may be less complete, less detailed or more simplistic. There may be limited reference to theory and few specialist terms. [6]

(d) Answers will obviously vary depending on the field work undertaken and the factors selected. Candidates are required to critically review their primary data collection in relation to the factor selected and explore how it may have influenced, positively or negatively, the data collection and ultimately the conclusion formulated.

Level 2
Award [3]–[4] for a coherent answer which displays a sound awareness of how the selected factor influences the reliability of the primary data. There should be a clear and convincing reference to the actual fieldwork.
For [4] reference to conclusion is essential.

Level 1
Award [1]–[2] for a less insightful answer which may fail to address both elements of the question. The answer may be less evaluative, lack depth or may lack convincing, or explicit, reference to fieldwork.
(2 × [4]) [8]

Section A

AVAILABLE MARKS
30
30

Section B

AVAILABLE MARKS

2 (a) **Attrition** is a fluvial **erosion** process which involves the disintegration of the **load** of the river as the particles strike each other and the channel as they are being transported downstream.
Suspension, by contrast, is a fluvial **transportation** process as sediment is carried in the flow, or current, of the river.

Award up to ([1] × 2) for an accurate definition of each key term. [2]

(b) (i) Marks are awarded for description of delta growth from Resource 2B only.
Award [3] for a detailed description of delta growth. Relevant resource evidence is extracted and figures are accurately quoted.
Award [1]–[2] for a less detailed description of delta expansion. Resource evidence is more limited and the quotation of relevant values may be omitted. [3]

In 1973 the Omo delta, at the northern end of Lake Turkana, was entirely contained within the boundaries of Ethiopia. By 2006 the southernmost point of the delta had moved approximately 12–20 km south and had developed across the Ethiopian-Kenyan border. Deltas are formed when river sediment (alluvium) enters and is deposited into a water body (in this case Lake Turkana). In the Omo drainage basin, where population expansion and agricultural activity have accelerated soil erosion, increased sediment loads have led to the rapid progradation and growth of the delta. The flocculation of clay particles and their deposition causes the aggradation of sediment beds and the expansion of the delta. The process of plant colonisation and the reduction in bare ground (from 551 ha to 443 ha) aids the stabilisation of the sediment and the formation of habitable land.

(ii) Explanation is required and candidates need to demonstrate an understanding of the geographical processes which cause the formation of the delta as well as the contributory human and physical site factors.

Award [5] for a detailed answer which coherently explains the formation of the Omo delta. The answer displays a sound understanding of all geographical processes and integrates relevant explanatory site factors from the resources. Specialist terminology is employed with accuracy.

Award ([3]–[4]) for a less detailed explanation of delta formation. Although there may be obvious omissions, the answer displays a reasonable understanding of the delta formation processes and some attempt is made to include relevant resource information.

Award ([1]–[2]) for a more simplistic explanation of delta formation, There is a more limited understanding of delta formation processes and there may be little/no resource inclusion. Few, if any specialist terms are employed. [5]

(c) A range of beneficial effects are worthy of credit.

Agricultural Productivity – increases as silt deposition fertilises the soil.

Groundwater Recharge – provides an invaluable source of fresh water which can benefit domestic supplies or agricultural requirements especially in semi-arid zones which rely on irrigation.

Fishing – becomes more lucrative as flooding extends the aquatic ecosystem creating breeding pools across the inundated flood zones.

Disease Control – flood water can wash out pathogens from urban areas with poor hygiene and sanitation and thus health benefits can be gained.

Award up to [2] for an explanation of one beneficial effect of flooding. Candidates may include a named example, or make reference to their case study but this is not essential for full marks. [2]

AVAILABLE MARKS

12

3 (a) (i) Tissue fallout [1]. Allow leaf-fall, leaf drop.
Decomposition [1]. Allow decay, rotting, humification or fermentation. [2]

(ii) Under natural conditions in the mid-latitude grassland ecosystem, the soil contains the largest nutrient store, as the nutrient inputs clearly exceed the outputs. Explanation may also relate to the **relative** size of the litter and biomass stores.

- Winter temperatures, which can fall below zero, cause the native grasses to die back, contributing humus and nutrients to the soil store.
- The presence of efficient micro-bacteria speeds up litter decomposition process releasing nutrients to the soil store.
- The climate facilitates the effective physical and chemical weathering of the calcium rich bedrock releasing nutrients to the soil.
- The low rainfall and only mild leaching in spring aids the retention of nutrients within the soil store.

Award ([3]–[4]) for a well communicated, detailed answer which displays a sound understanding of the nutrient store in this ecosystem. The answer should include key terminology.

Award ([1]–[2]) if some valid reasons are proposed but the answer lacks depth, thorough understanding and specialist terminology. [4]

(b) The rate of soil erosion in the North American Prairies, as a consequence of both water and wind mechanisms, has gradually declined over time. Soil erosion due to wind has decreased from 1.38 bn tons in 1982 to 0.77 bn tons in 2007. Similarly, soil erosion due to water decreased from 1.68 bn tons in 1982 to 0.96 bn tons in 2007. Prairie farmers now adopt a range of soil conservation methods to reduce the impact of wind and water erosion. Candidates should explain the purpose, and beneficial effects, of conservation techniques such as contour ploughing, mulching, crop rotation, cover crops, shelter belts, buffer strips, zero tillage etc.

Mark Breakdown

- Description [2]
  Award up to [2] for accurate description which provides an analysis of soil erosion with the quotation of relevant figures.

- Explanation [4] (2 × [2])
  Award up to [2] for an explanation of a valid soil conservation strategy. Answers should provide an explanation of how soil erosion is controlled/ minimised, or include a detailed description of the specified strategy. Award [1] for two accurately named strategies with no appropriate development.
  2 × [2] [6]

12

				AVAILABLE MARKS
4	**(a)**	**(i)**	Cell A – Hadley Cell [1] Cell B – Ferrel Cell [1] [2]	
		(ii)	The trade winds, which form the lower atmospheric circulation of the Hadley Cell, blow from the north-east in the Northern Hemisphere. Their direction is controlled by a global scale pressure gradient as well as the modifying influence of the Coriolis force. The sub-tropical high pressure system at 30°N, zone of air subsidence, and the low pressure zone of rising air at the ITCZ sets the trade winds in motion. These tropical winds are deflected to the right by the Coriolis force due to the Earth's rotation from west to east. Award up to [3] for an explanation of the direction of the trade winds in relation to the pressure gradient force and the Coriolis force. [3]	
		(iii)	An additional horizontal heat transfer mechanism may include: • Ocean currents • Hurricanes/Cyclones • Rossby Waves/Jet Stream [1]	
	(b)	**(i)**	Accurate labelling of : Warm **and** Cold Fronts [1] Credit correct symbols. Warm **and** Cold Sectors [1] [2]	
		(ii)	Frontal, or Cyclonic, rainfall occurs at A and B, where two contrasting air masses meet. At the warm front, the warm Tm air gradually rises over the cold Pm air. At the cold front however, the cold Pm air undercuts the warm Tm air and forces it to rise up rapidly. As the rising air expands and cools, the relative humidity increases and reaches saturation level at dew point temperature. Condensation and cloud formation occur and the air becomes unstable. Frontal rainfall occurs in the form of prolonged drizzle at the warm front but is generally associated with more intense rainstorms of shorter duration at the cold front. Award ([3]–[4]) for a coherent answer which displays a sound understanding of frontal rainfall formation. The processes are logically sequenced and specialist terminology is employed. Award ([1]–[2]) for a more simplistic response which displays some understanding of frontal rainfall formation. The processes may be incomplete and little, or no, specialist terminology may be included. [4]	12
			Section B	**36**

Section C

AVAILABLE MARKS

5 There are many variables associated with the drainage basin which can influence the storm hydrograph and ultimately river discharge. Obviously climatic characteristics are **not** a relevant inclusion. Possible variables are outlined below, although the list is not exhaustive.

Basin Shape and Size
Elongated basins are typified by a more prolonged hydrological response with a reduced peak discharge. By contrast water drains more rapidly from circular basins accentuating the flood peak and reducing the time lag in the main channel. A similar response is evident within a smaller basin as surface runoff has a shorter distance to travel to the main channel.

Geology
Porous or pervious bedrock facilitates percolation, ground water storage and groundwater flow, thus reducing surface runoff to the main channel. This reduces peak flow and delays the lag response compared to more impermeable rocks such as basalt.

Soil Type
This controls the infiltration capacity, the amount of soil moisture storage and the rate of throughflow. Sandy soils offer a high storage potential and facilitate infiltration which contrasts greatly with clay soils which impede the process. Consequently in catchments dominated with impermeable soils, more rapid overland flow commonly produces a flash flood response in the river channel.

Relief and Topography
Steep gradients encourage rapid surface runoff and discourage infiltration and percolation, producing a steep rising limb, a high peak discharge and a short lag time.

Vegetation Cover
As vegetation intercepts rainfall and allows evapotranspiration loss back to the atmosphere, dense forested catchments thus enhance the basin's potential for reducing surface runoff. Consequently this results in a shorter time lag, gentler hydrograph limbs and lower peak flow. This contrasts dramatically with urbanised catchments which greatly increase the speed and transfer of surface runoff (due to impermeable surfaces as well as networks of storm sewers). Flash flood hydrographs with high peak flow, steep rising and recession limbs and short lag responses, typify such basins following a storm event.

Level 3 ([9]–[12]) Three relevant drainage basin characteristics are outlined and their influence on both the storm hydrograph and river discharge is thoroughly explained. The answer displays a sound understanding of hydrology and specialist terminology is used with accuracy.

Level 2 ([5]–[8]) The candidate produces a less detailed answer which may lack breadth or depth. The answer may present a reasonable explanation of all three drainage basin factors with reference to river discharge and the storm hydrograph. (Alternatively top Level 2 marks may be awarded for two relevant factors explained thoroughly and coherently.)

Level 1 ([1]–[4]) A more general, limited or incomplete answer is produced which displays only a simplistic understanding of drainage basin hydrology. There may be little, or no, attempt made to link the proposed factors to the storm hydrograph or river discharge. The level of written communication may be poor. (Alternatively top Level 1 marks may be awarded for one relevant factor explained thoroughly and coherently.) [12]

12

		AVAILABLE MARKS
6	The small/regional case study selected will determine the actual detail provided in the answer. The answer requires knowledge of succession and the autogenic processes of seral change in both the biotic or abiotic components of the ecosystem. Biotic change will undoubtedly involve a discussion of the vegetation communities which progressively compete and colonise the site. Abiotic change should include an understanding of the modified microclimatic or edaphic environment which provides the conditions for species replacement. Good answers should display an understanding of the inter-relationship of the biotic and abiotic components within the process of temporal successional change. **Level 3 ([9]–[12])** An appropriate vegetation succession case study is selected and a sound and detailed explanation of seral succession is presented. The complex inter-relationship of both biotic and abiotic components is understood and specialist terminology is competently employed. **Level 2 ([5]–[8])** An appropriate vegetation succession case study is introduced but a less detailed explanation of succession is presented. Some attempt is made to explain the biotic and abiotic changes and the level of written communication may be reasonable. **Level 1 ([1]–[4])** A more simplistic answer is presented with only a general or superficial understanding of successional change. Little attempt is made to classify biotic and abiotic components and case study depth and specialist terminology are largely neglected. The answer may address only one aspect of the question. There may be some misunderstanding or possible inaccuracies evident at this level. [12]	12
7	The details of the answer will depend on the selected hurricane/tropical cyclone case study. Protection or management strategies are likely to include forecasting, prediction, monitoring, public warning systems, evacuation, education, building code regulations, engineering strategies etc. The answer requires description and evaluation of the hurricane protection strategies. A good answer should provide a critical review of their effectiveness and highlight their strengths or recognise their possible failings. **Level 3 ([9]–[12])** An appropriate case study is introduced and used to describe, and thoroughly evaluate, a range of protective measures. The answer is well structured and includes relevant case study depth and detail. **Level 2 ([5]–[8])** An appropriate case study is introduced but used less effectively for exemplification. The range of protective measures described is more limited but some attempt is made to evaluate their effectiveness. The answer lacks case study detail and the level of written communication may be reasonable. **Level 1 ([1]–[4])** There is little or no case study material included and the range of protective measures may be fairly limited. The answer may be more descriptive rather than evaluative and the level of written communication may be poor. [12]	12
	Section C	**24**
	Total	**90**