Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2017

Geography

Assessment Unit AS 1

assessing

Physical Geography

[AG111]

TUESDAY 16 MAY, 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) (i) The type of sampling method selected (random, systematic, pragmatic or stratified) will depend on the fieldwork undertaken.
The breakdown is as follows:
Award up to [2] for a **description** of the chosen sampling method in relation to the actual fieldwork undertaken.
Award up to [2] for an awareness of the strengths of the method specified.
Award up to [2] for an awareness of the limitations of the method selected.
Do not credit material/evaluation relating to sample size.
Some guidance material is outlined below for each sampling method.

Random Sampling		
Description	Advantages	Disadvantages
Random sampling involves the selection of a sample using a random number generator, e.g. a random number table or the random number function on a calculator. Theoretically every member of the total population should have an equal chance of being selected.	The procedure is totally objective and should thus be unbiased. If the sample size is sufficiently large, the data should be representative of the total population (reflecting the normal distribution). Random numbers are easily generated for pre-fieldwork planning.	It does not take into account any underlying strata, or subsets, within the population. Therefore one grouping may be under, or over, represented. The sample can produce “bunching” which is unsuitable for studies which aim to investigate a progressive spatial or temporal dimension.

Systematic Sampling		
Description	Advantages	Disadvantages
Systematic sampling involves the selection of data using a predetermined interval. As with all sampling methods, this process can involve points, areas, lines or belts, e.g. it may involve interviewing every second householder along a street or studying soil at every 10 m interval along a hill slope transect.	This method is relatively simple, easy to employ and allows for well-organised data collection in the field. It is particularly appropriate for studies which require an even coverage over time or distance, as it affords the researcher a degree of control over the data selection process.	There is a higher chance of bias as the individual controls the interval and not all points/areas have an equal chance of selection. It is possible that an underlying pattern could be missed and thus the total population may be misrepresented.

AVAILABLE MARKS

Stratified Sampling		
Description	Advantages	Disadvantages
Stratified sampling is useful when subgroups, or subsets, are clearly identified within the total population. This method should ensure proportional representation of each subgroup in relation to the total population.	Conclusions are likely to be more valid when geographical subgroups have been represented. The method allows for flexibility as random, or systematic sampling can be used to select the data within the proportional subgroups.	If a multitude of subgroups are inherent in the total population, then stratified sampling can become rather complex. If strata are inappropriately identified, then the sample will not be truly representative and conclusions will be erroneous.

Pragmatic Sampling		
Description	Advantages	Disadvantages
Although an improper procedure, a pragmatic approach is sometimes employed when significant constraints exist within the physical or human environment. Such constraints may include the occurrence of hazardous sites, the lack of landowner permission or restricted access. A pragmatic approach may thus involve the selection of a more flexible model which may be necessary to avoid such constraints. In a river study a pragmatic approach may involve the selection of only safe or accessible sites downstream.	Although limited advantages exist, it may be necessary to deviate from more rigorous sampling methods for practical reasons such as risk avoidance. If the study objectives are adhered to, a pragmatic approach should yield data which can be processed and subsequently it may be possible to make reasoned judgements or estimations.	Selection bias is an obvious problem as the sample is controlled by the researcher on the basis of certain characteristics. The approach thus lacks absolute objectivity as sites are generated in a non-random way. As this method is less rigorous, data accuracy, validity and thus statistical reliability are compromised. There can be no assurance that data will be representative as it is highly probable that results may be influenced by distortion.

[6]

AVAILABLE MARKS

(ii) There are several additional aspects of planning which may be selected and worthy of credit. Such processes may include:

- Risk Assessment
- Pilot Testing
- Site Selection
- Research

For a valid process:

Award ([3]–[4]) for an answer which addresses both aspects of the question with explicit and convincing links to the fieldwork undertaken.

Award ([1]–[2]) if both aspects of the question are addressed but depth is lacking. Alternatively the answer may address only one aspect of the question. There may be little/no reference to fieldwork at the lower mark boundary. [4]

(iii) A relevant graph must be presented using the graph paper provided and the tabulated data submitted. The breakdown of marks is as follows:
Title [1] – This must relate to the variables/data plotted
Conventions [2] – Normal graphical conventions must be adhered to.
Marks may be lost if

- Axes labels are incomplete
- Scaling issues are evident
- The dependent and independent variables are confused etc.

Accuracy [3] – Marks are awarded for accurate and precise plotting of values.
Method [1] – for the selection of an appropriate graphical technique. (linegraphs require continuous data on the *x*-axis). [7]

(iv) **Strength**: Any graph will visually depict the data which will help geographers visualise trends and patterns in relation to the aim/hypothesis. This method of data processing thus aids analysis and interpretation.

Limitation: The analysis of any graph can be subjective and fail to provide the objective proof which is required for scientific hypothesis testing.
Award [1] for an awareness of one advantage of their graph in relation to the fieldwork aim/hypothesis.
Award [1] for one limitation/weakness of their graph in relation to the aim/hypothesis. [2]

(v) It may be necessary to reject a hypothesis on the basis of statistical analysis and interpretation. A statistical significance test eliminates the possibility that the results arise by chance and thus provides objective proof that the hypothesis cannot be verified. Statisticians commonly advise a critical threshold probability value of 0.05, 0.01 or 0.001, which correspond to 95%, 99% or 99.9% levels of significance. A 95% significance level is commonly required to accept a hypothesis and thus is a threshold significance level. If the data fails to achieve this level of significance, the hypothesis can be rejected.

Award up to [3] for an explanation of the role of statistical analysis in the rejection of a hypothesis. [3]

If there is no reference to statistical analysis, award maximum [1] if candidate realises that data/trend conflicts with aim/hypothesis.

(b) The answer requires both **discussion** of the main fieldwork findings as well as geographical **explanation** of one key aspect of the study.

AVAILABLE MARKS

Discussion – [4]

The discussion component of the answer demands a clear and precise summary of the main findings of the fieldwork in relation to the aim of the study. Although this discussion requires considerable breadth in terms of the general outcomes, there should be some reference to the data tabulated and the key trends depicted. All key areas of the fieldwork should be addressed and cross-referencing with the report and tabulated data will be essential. [4]

Level 2 ([3]–[4])
The main findings of the fieldwork are presented in relation to the aim of the study. There is specific reference to the key trends and values/data collated.

Level 1 ([1]–[2])
A more limited or incomplete discussion of the key fieldwork finding is presented. Key trends and figures may be more limited or omitted.

Explanation – [4]

Geographical reasoning or explanation is required for any **one** of the main fieldwork conclusions. Theoretical knowledge should be made evident as well as explicit reference to geographical concepts/theories relevant to the individual fieldwork. Specialist terminology should be integrated into the explanation presented. [4]

Level 2 ([3]–[4])
Sound explanation is presented for any one fieldwork area presented in relation to the aim/hypothesis of the study. There is specific reference to the key trends and values/data collected.

Level 1 ([1]–[2])
Simplistic reasoning is presented with a less effective inclusion of theoretical concepts and specialist terminology.

(2 × [4]) [8] 8

Section A **30**

Section B

AVAILABLE MARKS

2 **(a)** Candidates may select any one of the valid options outlined below.

- Evaporation
- Transpiration
- Evapotranspiration
- Discharge output to the sea
- Sediment
- Energy [1]

(b) **(i)**

Sediment size (mm)	Velocity (cm/sec)	Name of process
10	10	**Deposition [1]**
0.01	10	**Transportation [1]**

[2]

(ii) Clay sized particles below 0.005 mm in diameter require velocities above 1000 cm/s for erosion to occur. The explanation relates to the cohesiveness of clays as they stick together because of electrical bonding. Thus higher energy levels are required to dislodge or erode them.
Clay particles appear to have no settling velocity on the Hjulstrom curve graph. These particles can remain afloat in suspension as they are extremely light and can thus be transported at velocities below 1 cm/s.

Mark Breakdown as follows:
- Valid explanation of high erosion velocity for clay [1]
- Valid explanation of settling velocity for clay [1]
- Quotation of velocity value from the Hjulstrom graph [1] [3]

(c) On the **outside** of the meander bend a **river cliff** or a **river bluff** is evident as a result of lateral erosion or undercutting of the channel. High river velocity, due to the position of the thalweg, typifies this section of the channel where water depth is greater and friction lower. Erosional processes including hydraulic action, corrasion (abrasion) and solution (corrosion) operate to cause the degradation of the outer bank of the channel.
By comparison, the **inside** of the meander bend is characterised by lower velocities due to a higher level of frictional contact with the river bed. There is less efficient transportation of sediment and deposition occurs in these low energy conditions. Sediment aggradation results in the formation of **point bar deposits** and a gentle **slip-off slope**.

Identification of river meander features. [2]
Explanation of fluvial conditions and processes operating at the OUTSIDE bend. [2]
Explanation of fluvial conditions and processes operating at the INSIDE bend. [2] [6]

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AVAILABLE MARKS

3 (a) (i) Decomposers (mainly consumers such as bacteria and fungi) are essential in the nutrient cycling process as they break down the litter and release the resultant organic compounds or nutrients back into the soil. They are thus essential in the functioning or stability of the ecosystem.

Award up to [2] for an explanation of the role of decomposers in the ecosystem. [2]

(ii) Although some of the inputs are fairly standardised and common to all ecosystems, others may be unique to the small scale ecosystem studied. Mark each answer on individual merit. Some of the inputs specified may include:

- Energy (Solar Radiation) required for energy fixation in green plants through the process of photosynthesis.
- Rock Weathering – releases minerals into the soil for plant growth.
- Inorganic Matter – decomposition releases nutrients into the soil for plant growth.
- Precipitation – provides water for plant uptake and photosynthesis.
- Animals – immigration, e.g. seasonal birds. These biotic components contribute to the energy flow and nutrient cycling processes.
- Plants – seed dispersal. These autotrophs are vital in the fixation of energy through photosynthesis.
- Atmospheric input of gases – e.g. carbon dioxide which is essential in the process of photosynthesis.
- Human inputs – e.g. chemical fertilisers, irrigation etc. may be appropriate.

If only energy or matter is discussed and there is no case study context, maximum [3]

Level 3 ([5]–[6])
Inputs encompass both energy and matter within a case study context. Geographical understanding of their role is evident. The answer is coherent; detailed and specialist terminology is employed.

Level 2 ([3]–[4])
A less diverse range of inputs is outlined. They may neglect to encompass both energy and matter. The discussion of their role may lack depth and may be theoretical with no specific case study context. The level of written communication may be reasonable.

Level 1 ([1]–[2])
A more limited understanding of ecosystem inputs is evident. There may be little or no discussion of the role of the inputs specified. Specialist terminology may be omitted and some inaccuracy may be included. [6]

(b) Candidates are invited to reflect on their case study of seral succession in relation to the theoretical characteristics which typify the early and late seral stages.

AVAILABLE MARKS

A	A comparative discussion of the contrasting environmental conditions is required. This may include reference to microclimatic characteristics such as shelter, windspeed, shade, etc.
B	A comparative discussion of the biomass is essential. This is the living component and should include animals and plants.
C	A comparative description of nutrient stores, transfers and losses is essential in both seral stages.
D	A description of the floristic diversity is essential to display contrasts.

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For each selected characteristic, candidates should be awarded up to [2] for a comparative description in relation to their small scale ecosystem case study.
(2 × [2])

Take Note: Candidates may recognise that their case study fails to exhibit the typical/theoretical characteristics outlined in Resource 3B. Such a situation may occur if plagioclimax has been arrested due to human interference. [4] 12

AVAILABLE MARKS

4 **(a)** Relative humidity is the amount of water vapour in the air at a given temperature as a percentage of the maximum amount of vapour that the air could potentially "hold" at that temperature. [1]

(b) Ocean currents play a key role in influencing temperatures as they help distribute heat and circulate massive amounts of warm and cold water around the Earth. Hopedale in Canada and Stornaway in Scotland are located at similar latitudes but annual temperature regimes exhibit significant contrasts. As the Canadian coastline is influenced by the cold Labrador Current, there is a greater temperature range (26.7 °C), as January temperatures fall to –16.2 °C and reach a maximum of 10.8 °C in August. By contrast, the North Atlantic Drift reduces the temperature range and modifies winter temperatures significantly in Stornaway (Scotland). With a minimum temperature of 4.5 °C in January and a maximum temperature of 13.1 °C in July, a lower temperature range of 8.6 °C is experienced.
Ocean currents play a key role in distributing heat energy to maintain the global energy balance. Warm currents carry less dense water from the Equator (a zone of surplus) to the Poles (an area of deficit). Cold deep currents carry denser water from the Poles to the Equator to maintain the stability of climatic weather systems.

Mark Breakdown
Description of the cold current influence on the temperature pattern of Hopedale [1]
Description of the warm current influence on the temperature pattern of Stornaway [1]
Quotation of relevant values from climate graphs [1]
Discussion of role of ocean currents in maintaining global energy balance [2] [5]

(c) As the cold front passes over London the weather is likely to change in many ways.

- The **temperature** is likely to decrease from 23 °C at present to approximately 16 °C as warm sector air will be replaced with cold sector air. The tropical maritime air mass will be replaced with the cooler polar maritime air mass.
- The **cloud cover** is likely to increase. Currently London is experiencing clear skies, but coverage of 5 or 6 oktas could be predicted. As the cold dense polar air moves anticlockwise, it undercuts the warmer tropical maritime air, forcing it to rise rapidly. As the warm unstable air rises it cools, relative humidity increases and condensation occurs at dew point temperatures producing clouds.
- **Precipitation** may accompany the cold front due to higher cloud coverage.
- **Wind speed and direction** is likely to change. Currently London experiences winds of 8–12 knots but this is likely to increase to 13–17 knots as the cyclonic nature of the system and uplift of warm air is associated with stronger winds (approaching generally from the west).

Level 3 ([5]–[6])
A detailed description and explanation of weather changes, with specific resource reference. Specialist terminology is employed and the answer displays a sound understanding of cyclogenic processes associated with the passage of the cold front.

Level 2 ([3]–[4])
There may be a lack of balance between description and explanation. The range of weather elements considered may be more limited and explanation may be less detailed. Description may outline general trends and neglect to include specific resource values.

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Level 1 ([1]–[2])
A more simplistic answer is presented with deficiency in terms of breadth and/or depth. The answer may address only one aspect of the question and some inaccuracy may be evident. [6]

AVAILABLE MARKS
12
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Section B

Section C

AVAILABLE MARKS

5 Flooding, an extreme situation due to high levels of discharge and overflowing watercourses, can be caused by a range of natural and human factors. Obviously several inter-related and complex factors conspire to produce large-scale flood events. The causes presented will obviously depend on the large scale drainage basin or delta selected as a case study context. Possible physical factors may relate to climate, hydrological, topographic, geological or soil factors. Human factors may include reference to urbanisation, deforestation, river management, land drainage etc. Climate change, which may be considered human or physical, can be recognised as a potential cause of flooding.

Award [0] for an answer not worthy of credit.

Level 3 ([9]–[12])
The demands of the question are fully understood and a well structured, coherent answer is presented using specialist terms/vocabulary. A diverse range of factors are discussed encompassing both physical and human causes. Case study details are included to support the answer and display a depth of knowledge.

Level 2 ([5]–[8])
A reasonably clear answer may be presented for a named case study but a lack of breadth or depth may be evident. The answer may lack balance and focus on physical or human causes of flooding. The causes of flooding may be more theoretical with fewer case study details to support the answer. Although there may be a reasonable expression of ideas, fewer specialist terms may be evident.

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Level 1 ([1]–[4])
There is a more basic or superficial consideration of the causes of flooding with some understanding, but with a lack of depth. Specialist terminology and case study details may be less discernible or absent. [12]

12

		AVAILABLE MARKS
6	There are clearly two strands to this question, although a balance is not necessarily a requirement. Firstly candidates need to display an understanding of the negative impacts of human activity on the soils of their chosen mid-latitude grassland case study. Possible activities may relate to commercial farming practices such as monoculture, overgrazing, application of chemicals, mechanisation etc. Such activities can result in a deterioration of soil structure and fertility, increasing their fragility and susceptibility to water and aeolian erosion. There may be some reference to the Dust Bowl of the 1930s in the Southern Plains of the USA. Management techniques require explanation and may include farming strategies such as crop rotation, shelter belts, mulching, stubble retention, contour ploughing, restoration or conservation of native grasslands. Maximum L2 [6] for an answer which addresses only one aspect of a question within a case study context. Award [0] for an answer not worthy of credit. **Level 3 ([9]–[12])** The candidate presents a confident and well executed response which addresses both aspects of the question and effectively incorporates appropriate case study details. There is a sound and precise knowledge of the negative impacts of human activities on mollisols and a range of management techniques are explained. **Level 2 ([5]–[8])** The candidate presents a less detailed answer with more limited reference to their chosen case study location. The soil effects may be less well developed and there may well be a less diverse range of management techniques considered. Candidates may outline or describe the management techniques rather than explain them. **Level 1 ([1]–[4])** A more simplistic answer is presented which may fail to provide a spatial/ geographical context. Only one aspect of the question may be addressed and only simplistic knowledge and understanding is discernible. [12]	12

		AVAILABLE MARKS
7	A specific hurricane/cyclone case study event is specifically requested, as well as a knowledge of protection measures. The type of protection measures employed to minimise devastation to people and property depend on the case study selected. Protection strategies may include meteorological prediction, monitoring, forecasting, building code requirements, engineering solutions, evacuation procedures, public education etc. Candidates are required to "evaluate" the protection methods which necessitates a consideration of their strengths and limitations. There should be some evidence of critical reflection rather than simplistic description. Post-hurricane management strategies are not appropriate. Award [0] for an answer not worthy of credit. **Level 3 ([9]–[12])** An appropriate hurricane/cyclone case study is selected and a diverse range of protective measures are evaluated. The answer is well structured and coherent, with a good use of specialist terms and case study details. **Level 2 ([5]–[8])** The candidate engages with the question, but depth of knowledge may be more limited and reference to their case study may be less effective. The discussion of protective measures may be more descriptive rather than evaluative. **Level 1 ([1]–[4])** A more simplistic answer is presented which displays only a limited knowledge of hurricane/cyclone protective measures. The answer may lack evaluation, specialist terminology and supporting case study reference. [12]	12
	Section C	**24**
	Total	**90**