



ADVANCED SUBSIDIARY (AS)
General Certificate of Education
January 2012

Geography
Assessment Unit AS 1
assessing
Physical Geography
[AG111]

WEDNESDAY 18 JANUARY, MORNING

**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 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| <p>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.</p> | <p>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.</p> | <p>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.</p> | 3 |
| <p>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.</p> | <p>The candidate will display evidence of the ability to analyse and interpret the resource material but gaps, errors or misapprehensions may be in evidence.</p> | <p>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.</p> | 2 |
| <p>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.</p> | <p>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.</p> | <p>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.</p> | 1 |

| Section A | | AVAILABLE MARKS |
|-----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| 1 (a) | <ul style="list-style-type: none"> • Relevant Geographical Research – This stage is vital to equip the candidate with the knowledge base required for a thorough investigation. It may involve reading around the specific topic or the gathering of supporting or relevant data from a variety of secondary sources. Research may relate to information in statistical, written or cartographic form and may be essential at varying stages throughout the investigation. Candidates need to make reference to the research methods used, the type of information collected and discuss its purpose in their fieldwork. • Risk Assessment – This is important in the management of safety as it allows for the identification of potential hazards and the consideration of relevant risk minimisation strategies. A risk assessment can be carried out as a preliminary survey in advance of primary data collection and allows the geographer to focus attention and resources where they are needed. Reference needs to be made to the actual risk assessment method carried out and its importance in the fieldwork study • Formulation of Aim/Hypotheses – The formulation of a precise aim is the first essential step in fieldwork planning. It provides a focus for the study and may necessitate the clarification of discrete hypotheses which allow for scientific or empirical testing. Hypotheses direct the course of the investigation and allow for manageable and relevant data collection. Reference must be made to the actual aim and hypotheses devised and their importance within the enquiry. • Selection of suitable location – Candidates need to discuss the importance of site selection. This may involve consideration of relevant site factors which make the chosen area appropriate to test the aim of the study, e.g. size of area, relief, climate, population, transport etc. Specific reference must be made to the locational context of the enquiry, its selection and justification. • Pilot Testing – This is necessary to ensure that the intended methods, or equipment, will provide ultimate accuracy. It generally involves a trial run of various aspects of the investigation in advance of the fieldwork to identify possible amendments or modifications. Reference must be made to the pilot testing conducted and its purpose in the fieldwork. • Sampling Design – A consideration of both sampling method and sampling size is vital to ensure accurate and representative inclusion of the “total population”. Reference must be made to the type of method(s) selected (Random, Systematic, Stratified or Pragmatic) as well as size in relation to the individual fieldwork. | |

For each selected element

Award [3] if the candidate clearly discusses the role of the chosen element, with accurate and explicit links made to individual fieldwork.

Award [1]–[2] if the explanation is more simplistic or if links to fieldwork are missing or less convincing.

(2 × [3]) [6]

(b) (i) The statistical analysis performed will depend on the chosen technique, but it must be relevant to the aim/hypothesis of the investigation. Therefore cross-referencing is essential with the report submitted.

Measures of Central Tendency/Range

Calculation of mean [2]

Calculation of median [2]

Identification of mode [1]

Calculation of range [2]

| AVAILABLE MARKS |
|-----------------|
| [7] |
| [6] |
| [6] |
| [6] |
| [5] |
| 30 |
| 30 |

Spearman's Rank Correlation or Nearest Neighbour Analysis

Accuracy of calculation [5]

(Maximum of [4] if error in ranks results in incorrect r_s)

(Maximum [3] if Spearman's Rank is performed with less than 7 ranked pairs)

Statistical interpretation [2]

N.B. Maximum [4] if selected statistical technique is inappropriate to the aim/hypotheses stated in the report. [7]

(ii) An explanatory discussion is essential to support the statistical outcome and must include geographical factors or theories. Candidates are provided with the opportunity to apply their geographical or theoretical knowledge of the topic to their data, as well as display their command of specialist terminology.

Marks cannot be provided for statistical interpretation, or unacceptable "excuses" such as inadequate rigour during data collection.

Maximum Level 2 if calculation is incomplete, unattempted or inappropriate to aim.

Level 3 ([5]–[6])

The answer displays sound geographical reasoning of the statistical outcome in relation to the aim of the study with relevant and effective integration of theoretical concepts and terminology.

Level 2 ([3]–[4])

The answer is less detailed with only tenuous reference to geographical concepts. Integration of specialist terminology is limited.

Level 1 ([1]–[2])

The explanation is simplistic and displays a very limited geographical understanding of the statistical outcome. Specialist terminology is largely neglected. [6]

(c) Answers will vary depending on the fieldwork. Marks are awarded for candidates' ability to reflect on their chosen factor and consider how it may have influenced the results obtained **as well as** the nature of the geographical conclusions formulated. Candidates may reflect on their chosen factor positively or negatively in the context of the question.

Award [3] for an answer which provides a critical reflection of the chosen factor in relation to the fieldwork results and conclusions. There must be convincing reference to the actual fieldwork.

Award [1]–[2] for a more general response which may fail to consider the influence on both results and conclusions. There may be less convincing links to the individual fieldwork.

(2 × [3]) [6]

(d) Answers will vary according to the fieldwork chosen.

Mark Breakdown

Award up to [2] for the description of a valid, focused and realistic extension to the current fieldwork.

Award up to [3] for a coherent and relevant explanation of the extension in relation to the further development of the proposed aim and the enhancement of geographical knowledge. [5]

Section B

AVAILABLE
MARKS

2 (a) Resource 2A illustrates that significant development and land-use change has taken place within the watershed – particularly notable is the conversion of forest to urbanised land (especially high density residential and commercial land).

Forestry declined from 20% in 1973 to approximately 8% in 1991. In the same period high density residential land doubled from 15% to 30% and commercial land-use increased from 8% to 16%. Resource 2B indicates the change in runoff within the catchment between 1973 and 1991. The trend line indicates that the volume of surface runoff increased steadily from 18 cm in 1973 to approximately 27 cm in 1991.

Obviously the land surface characteristics have influenced the hydrological storage and transfer of water within the catchment. The increased proportion of impermeable surfaces reduces infiltration and the storage capacity of the soil, with a subsequent increase in surface runoff. Storm drains and canalised channels which are part of the urbanised infrastructure also maximise runoff. The reduction in vegetation cover reduces interception storage and transpiration loss to the atmosphere – which adds to the volume of runoff.

Level 3 ([5]–[6])

For a detailed answer which includes thorough description of both resources and a logical explanation of the hydrological trend. There is a confident use of specialist terminology.

Level 2 ([3]–[4])

For a less detailed answer which may include a less thorough description and a more generalised explanation. Alternatively an answer at this level may lack balance in terms of description and explanation. Fewer key terms may be included.

Level 1 ([1]–[2])

For a more simplistic answer which lacks depth and may only include a description or explanation. Some inaccuracy may be evident and the quality of written communication may be poor. [6]

(b) Natural river levees are depositional landforms comprised of ridges of sediment along the banks of a river in its middle or lower course. They are formed as a result of repetitive flooding when the river overtops its banks and spills out across the floodplain. The subsequent friction experienced, and loss of energy and competence, results in the deposition of alluvium (sorted or graded in size with the largest particles deposited first). A cross-sectional diagram or diagrams is a requirement with relevant annotation and the inclusion of a key if applicable. The explanation of formation may be presented in the form of detailed annotation which is acceptable and worthy of credit.

Level 3 ([5]–[6])

The candidate produces a well annotated diagram and clearly explains, using specialist terminology, the process involved in the formation of the feature.

Level 2 ([3]–[4])

The candidate produces a less well annotated or poorly drawn diagram and explanation which is less thorough or to some extent lacking specialist terminology.

Level 1 ([1]–[2])

The candidate may fail to produce a diagram and explanation may be limited. There may be gaps or inaccuracies evident. Specialist terminology may be neglected. [6]

Maximum [4] can be awarded for an excellent explanation with no appropriate diagram.

AVAILABLE MARKS

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3 (a) (i) Candidates are asked to describe any two of the ecological changes which typify the early and late stages of succession with reference to their case study.

| | |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A | A comparative discussion of the biomass characteristics is required. (The living components which include flora and fauna) |
| B | A comparative description of stratification is required with exemplification of vegetation structure essential. |
| C | A comparative discussion of the time dimension is essential. Pioneer plants face rapid competition and their time duration for colonisation is more short-lived compared to more stable late seral communities. |
| D | A description of the floristic diversity is essential to display contrasts. |
| E | A description of the microclimatic environment should display contrasts in factors such as site shelter, shade exposure etc. |

For each of the selected characteristics, candidates should be awarded up to [2] for a comparative description in relation to their local scale case study.

Maximum [3] if no named study but other case study details given.

(2 × [2])

[4]

(ii) As succession proceeds many soil changes would be expected. These may include:

- **Soil Depth** – with more progressive weathering of bedrock and incorporation of organic matter, soil depth increases.
- **Fertility** – more efficient and effective nutrient cycling from more stable “climatic climax” communities releases chemical ions or nutrients into the topsoil. Therefore soil fertility increases.
- **Moisture Retention Capacity** – the incorporation of organic matter and increased humus production in later seral stages allows the soil to retain more moisture.
- **Colour** – soils tend to become darker in colour with the incorporation of more organic matter from the nutrient cycling from more stable climatic climax communities.
- **Maturity** – the soil profile characteristics indicate a higher level of maturity as more clearly distinguishable horizons develop as a result of the soil forming processes.
- **pH** – soils tend to become less alkaline and with slight evidence of acidity as nutrient cycling results in the release of humic acids.

Award up to [2] for an explanation of one accurate soil change. [2]

(b) Solar radiation enters the ecosystem through the process of photosynthesis. This energy is “fixed” in the autotroph populations and is subsequently transferred to the heterotrophs with progression through the trophic pyramid. As the energy values indicate, the process of energy transfer is not 100% efficient, as energy is lost as heat, respiration, decay and for metabolic processes. Therefore fewer organisms can be supported at successive trophic levels.

AVAILABLE
MARKS

Level 3 ([5]–[6])

The candidate makes specific reference to the resource, quoting values, and uses appropriate terminology to coherently explain energy transfer and loss throughout the aquatic ecosystem.

Level 2 ([3]–[4])

The candidate provides a less detailed answer with evidence of general understanding and some resource use.

Level 1 ([1]–[2])

The candidate provides a more simplistic discussion of energy flow with obvious gaps in detail and understanding. There may be very limited use of the resource and a lack of specialist terms.

[6]

12

4 (a) Candidates need to identify the inverse relationship between RH and temperature over the 24 hour period and quote values to exemplify the trend. The RH is the amount of water vapour in the air at a given temperature expressed as a percentage of the maximum amount that the air could hold at that temperature. Therefore the RH value increases when temperatures decrease as saturation levels rise. The value decreases when the temperature rises as the air could potentially hold more water vapour.

Award [3] for an answer which accurately describes the inverse relationship and provides an explanation which demonstrates an understanding of RH.

Award [1]–[2] if the description or explanation is more superficial. At this level the answer may be unbalanced with only one element of the question addressed.

[3]

(b) **Wind Direction**

Air moves from areas of high atmospheric pressure to low atmospheric pressure. Thus the direction of the wind is established by the pressure gradient, although its path can be modified by other forces such as friction, the Coriolis effect etc.

Award [3] for an answer which explains the importance of the pressure gradient force in establishing the direction of air molecule movement with a sound awareness of how their path can be modified by additional forces.

Award [1]–[2] for a less perceptive answer which focuses on the pressure gradient force with limited/no understanding of the influence of additional forces in the modification of air flow.

[3]

(c) The exposure of people, the economy and the environment to a hurricane event is influenced by a diverse range of factors. Thus the effects and devastation experienced as a result of an extreme weather event can be related to human and physical factors, which determine the level of vulnerability. A wide range of factors is presented in Resource 4B and therefore a wide range of responses is anticipated. Candidates need to select a factor and explain how it influenced, either positively or negatively, the effects of their chosen hurricane event. This is an opportunity for well prepared candidates to display their case study knowledge. One human and one physical factor must be considered.

For each factor:

Award up to [3] for an insightful answer, which coherently explains how the chosen factor influenced the effects of a specific hurricane event.

(2 × [3])

[6]

12

Section B

36

Section C

AVAILABLE
MARKS

5 River erosion is the removal of mineral material from the bed and banks of the river channel. This process is clearly linked to the energy of the river or its discharge. There are various methods which should be discussed; corrosion, solution, attrition and hydraulic action. Deposition refers to the “settling” of particles which occurs when the river has insufficient energy to transport them. Meanders, the curving bends in the river channel, are produced as a result of fluvial erosion and depositional patterns. On the outer concave bank, flow velocities are higher indicated by the thalweg and high levels of river energy result in river erosion. The deep pool reduces the loss of energy through friction. Deposition occurs in the inside of the bend as river velocity is slower and increased friction reduces energy levels. Meanders are thus not static as a result of the continued effect of these processes – they can change shape and progressively “migrate” downstream. The question is thus twofold. Candidates need to display knowledge of erosional and depositional processes and explain their importance in meander formation.

Level 3 ([9]–[12])

The candidate clearly describes the processes of river erosion and deposition, the conditions under which they occur and explains how these processes lead to the formation of meanders. There is a confident use of specialist terminology.

Level 2 ([5]–[8])

The answer may lack the depth of knowledge required for all elements of the question. Alternatively it may lack balance and fewer specialist terms are evident.

Level 1 ([1]–[4])

The answer may provide a more simplistic explanation of the fluvial processes and meander formation. Alternatively only one aspect of the question may be addressed and some inaccuracies may be evident.

12

6 Candidates need to address both aspects of the question, although a balance should not be expected. They need to use case study material to discuss the problems associated with soil erosion and the human attempts to manage or conserve the soil. Although all of the following are not expected, some problems may include:

- The alteration of the natural chernozem soils (structure, texture, porosity, nutrient status etc.).
- The increased environmental degradation and increased vulnerability to wind erosion.
- The loss of topsoil, e.g. The Dust Bowl.
- The decreasing agricultural productivity/yields and associated decline in farming revenue.
- The need for research and implementation of conservation methods.

Human management methods may include an explanation of:

- Crop rotation
- Shelter belts
- Contour ploughing
- Terracing
- Mulching
- Establishment of nature reserves
- Etc.

Candidates need to explain how these management techniques attempt to address the soil erosion problems.

| | | AVAILABLE MARKS |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Level 3 ([9]–[12]) | The candidate uses relevant case study material and appropriate geographical terminology to coherently describe the problems created by soil erosion. They also explain in detail a range of human management methods. | |
| Level 2 ([5]–[8]) | The candidate produces a less detailed answer with less effective use of case study material. The answer may lack balance and fail to address both aspects of the question. The depth of knowledge and understanding is more limited. | |
| Level 1 ([1]–[4]) | A more superficial simplistic answer is produced which may lack reference to case study material. Very limited knowledge and understanding is evident. | 12 |
| 7 | The candidate is required to produce an annotated diagram to display the structure of a frontal depression. A cross-sectional or plan view is acceptable and full credit should be given for accurate annotation. In addition, candidates need to discuss the impact of the weather associated with depressions and include case study material to exemplify the human effects of such events. The human effects relating to heavy rainfall, poor visibility, thunderstorms, strong winds etc. require discussion. Candidates may decide to use an extreme storm event to exemplify the human effects, positive and/or negative. | |
| Level 3 ([9]–[12]) | The candidate uses a well annotated diagram to present clearly and/or describe the structure of a frontal depression. Relevant case study detail is included to illustrate the human effects of this weather system. | |
| Level 2 ([5]–[8]) | The candidate produces a less well annotated diagram and/or a less detailed description of the structure of a depression. Human effects of weather are less detailed and little or no case study material is included. | 12 |
| Level 1 ([1]–[4]) | The candidate produces a more limited or incomplete answer. They may fail to present a diagram and only superficial knowledge is evident. There may be no case study material included. | |
| Section C | | 24 |
| Total | | 90 |