Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2015

Geography

Assessment Unit AS 1

assessing

Physical Geography

[AG111]

MONDAY 15 JUNE, 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 to 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) Candidates are required to clarify any **two** stages of enquiry associated with data processing. These stages must follow on from fieldwork data collection and form a prerequisite to the final conclusion. Obviously graphical presentation is not acceptable as it is printed on the chart. Appropriate steps include:

- Laboratory analysis
- Data tabulation
- Data analysis/description
- Statistical analysis – accept two named statistical techniques for [2]
- Statistical interpretation
- Data interpretation/explanation

Award [1] for each appropriate stage
(2 × [1]) [2]

(ii) Processes:

- **Selection of suitable location**

Why? It is important to select a suitable geographical location to meaningfully explore the aim of the study and fulfil all aspects of the investigation. Candidates may recognise the importance of specific human/physical site characteristics, health and safety characteristics, land permission/access issues etc.

How? Candidates need to address how a suitable site was selected as part of fieldwork planning. They may select their location as a result of map work, preliminary site visits, prior knowledge, secondary research, class discussion etc.

- **Risk Assessment**

Why? Candidates need to recognise the importance of a health and safety conscious approach to fieldwork. The assessment of risk may be essential to plan several aspects of fieldwork such as sampling (pragmatic), safety equipment, suitable footwear/clothing etc.

How? Candidates need to outline how their risk assessment was completed and the method selected may involve a risk identification survey, a pre-site visit, a guidance talk/lecture etc. Do not accept how risk management was implemented.

- **Pilot Testing**

Why? Candidates need to realise that a fieldwork trial is important for reliable and accurate data collection. It may be conducted to ensure that any potential data collection problems can be identified and modifications/adjustments incorporated into the methodology.

How? The process of pilot testing will differ according to the type of fieldwork. It may involve a preliminary test to trial data collection equipment or procedures and the implementation of potential modifications. Alternatively, in survey based studies, it may involve the trial run of a questionnaire on a small percentage of the target population.

- **Sampling**

Why? Sampling is planned when the total population is too large for study. It is completed to allow valid and meaningful inferences to be gained when applied to a representative portion of the total population.

How? Candidates may discuss how a particular sampling method or design of sample size was planned as part of their fieldwork. The method described will depend on the fieldwork and it may be pragmatic, systematic, stratified or random.

For each selected process:

Award [3]–[4] for an answer which considers both **why** and **how** the process was completed. There must be explicit and convincing links to the actual fieldwork, at least once in answer **(ii)**.

Award [1]–[2] if the answer addresses both aspects of the question, but with limited depth. Alternatively the answer may address only one element of the question. Reference of fieldwork may be very superficial or indeed neglected.
(2 × [4]) [8]

(iii) As requested in the question, the method described must relate to primary data with tabulated evidence submitted.

Award [3]–[4] for a detailed and accurate methodology with explicit reference to the actual equipment (if relevant) and techniques employed in the field.

Award [1]–[2] for a less detailed, less explicit or incomplete methodology.
Max [1] if answer is restricted to relevant sampling process.

Max [2] for a description of how a soil sample was extracted without any additional analysis (e.g. laboratory testing) to determine the specified characteristic (e.g. moisture, pH, nutrient status etc.) [4]

(iv) Evaluation, which can relate to any aspect of the investigation, involves review or reflection. The process may provide an insight into the strengths, limitations, potential improvements or modifications of the field study. Do not accept hypothesis testing as evaluation.

Award [3] for an answer which demonstrates a sound awareness of the purpose of evaluation with specific reference to one aspect of the individual fieldwork.

Award [1] or [2] for a more limited understanding of the purpose of evaluation. There may be little/no relevant reference to individual fieldwork. [3]

(b) (i) The candidate must present a graph relevant to the aim of the fieldwork and accurately plot values displayed in their submitted table. The breakdown is as follows.

Title [1] – must relate specifically to the variables plotted, or strongly implied.

Conventions [2] – marks are awarded for the labelling of axes, appropriate scaling or the provision of a key if necessary.

Accuracy [3] – candidates are awarded these marks for the precise and accurate plotting of values from the table.

Method [1] – for the selection of an appropriate graphical presentation technique. [7]

(ii) Although some analysis may be included as context, the focus of the question relates to explanation.

Level 3 ([5]–[6])
The answer displays sound explanation with relevant integration of theoretical and locational knowledge. There is a competent use of specialist terminology.

Level 2 ([3]–[4])
Explanation is more limited with a less effective inclusion of theoretical concepts or specialist terminology. Locational reference may be omitted.

Level 1 ([1]–[2])
Simplistic reasoning is provided with little/no attempt to integrate theoretical or locational knowledge. The quality of communication may also be poor.

Award max Level 2 if the graph is incomplete or missing. [6]
Award [1] for discussion of results (with at least one value quoted) without explanation.

Section A **30**

AVAILABLE MARKS

Section B

AVAILABLE MARKS

2 (a) (i) Urbanisation of Mercer Creek (75% of the catchment) has clearly altered the hydrological characteristics of this drainage basin. Construction of buildings and roads often involves the replacement of vegetation and permeable soils with impervious surfaces. The resultant reduction in interception and infiltration as well as the associated expansion of gutters and drainage systems facilitates the more rapid transfer of a higher volume of precipitation to the river. With a lower storage capacity of water in the drainage basin and greater surface runoff, a flash flood hydrograph is evident, characterised by a short approach segment, a short lag time, a steep rising limb and a high peak discharge of 0.65 m^3/sec cumecs.

The higher potential for infiltration in the Newaukum Creek catchment and lower rate and volume of surface runoff has produced a typical non flash flood hydrograph. This is characterised by a longer approach segment, a more gentle rising limb and a lower peak discharge of 0.25 m^3/sec cumecs.

Mark Breakdown:

Level 2 ([3]–[4])
Contrasting hydrological regimes are described using specific and accurate graphical references and coherently explained using specialised terminology.

Level 1 ([1]–[2])
The candidate provides a more simplistic explanation of the hydrological trends with little/no resource use evident. Alternatively the answer may refer to one stream only. The answer may be descriptive with no explanation. There may be an obvious lack of appropriate terminology. [4]

(ii) Newaukum Creek experienced higher discharge levels over this period due to slow release of the water stored in the drainage basin as through flow and base flow.

Award up to [2] for a logical explanation of Newaukum Creek's hydrological trend. [2]

(b) The most obvious features include the waterfall, the overhang, the plungepool and the steep sided gorge. Waterfalls are formed when alternating bands of resistant and less resistant rock are subjected to differential rates of erosion in the upper course of the river. The soft rock erodes most rapidly as a result of abrasion, solution and hydraulic action, producing a steepening effect which accelerates erosion. This results in an overhang of resistant cap rock which may eventually collapse due to a lack of support. A plunge pool at the base of the waterfall is formed and deepened as a result of corrasion/abrasion and hydraulic action. The continuous erosion of the soft rock and subsequent collapse of the cap rock causes the waterfall to retreat upstream producing a steep sided valley known as a gorge.

Level 3 ([5]–[6])
The candidate clearly describes the features of the waterfall and thoroughly explains their formation with specific reference to fluvial processes. There is a confident use of specialist terminology.

Level 2 ([3]–[4])
Fewer features may be described and the answer may lack the depth of knowledge with more general references to fluvial processes. Some terminology may be employed.

Level 1 ([1]–[2])
The answer may provide a more simplistic explanation with an obvious lack of depth and specialist terminology. The answer may lack completion with few features discussed. [6]

AVAILABLE MARKS

12

3 (a) (i) Biomass is the amount of living or organic matter present in an ecosystem (expressed as a dry weight per unit area).

Resource 3A clearly presents a trophic pyramid with biomass values decreasing with each successive trophic level (by a factor of 10), from 10,000 g/m^2 at Trophic level 1 (producers), to 10 g/m^2 at Trophic level 4 (tertiary consumers).

As energy is lost (through processes such as movement, respiration, heat, metabolic cell processes, growth, excreta etc), fewer living organisms can be supported at each trophic level – thus producing the pyramid shape.

Mark Breakdown
Accurate definition of biomass [1]
Specific resource reference [1]
Explanation of pyramid in relation to energy transfer and losses [2]

(ii) The pyramid should develop a wider base and a narrower apex because:

- An increase population/biomass of producers (grass) due to reduced consumption. [1]

- A decrease in population/biomass of secondary consumers (toads) due to the lower availability of food. [1]

Award max [1] for description of **both** trophic levels 1 and 3 with no proposed explanation.
Credit alternative changes to the trophic pyramid which may propose logical adaptations within the heterotrophic population.

(b) (i) Credit any accurate topsoil characteristic specific to the mollisol/ chernozem. The list below is not exhaustive but may include:

- Thick sod layer (in root zone at soil surface)/stabilised soil
- Mull humus (close to surface)
- Dark black/brown colour
- Deep humus layer (close to soil surface)
- Burrows from invertebrates (krotovinas)
- Crumb/granular soil structure
- Clay/loam soil texture
- pH 6–7 – neutral/slightly alkaline
- Nutrient rich (Mg, Na, K etc)/fertile

(2 × [1]) [2]

(ii) There are essentially two key aspects of water transfer to consider.

- **Downward – leaching**. October to March in temperate grassland environments can be snow covered. Rising spring temperatures and subsequent snow melt can result in temporary mild leaching. This can cause the downward transfer of soluble soil bases and the temporary acidification of the topsoil.
- **Upward – capillary action**. In summer, the high temperatures which can exceed 30 °C and low rainfall can cause the upward movement of water by capillary action. This process can cause the upward movement of bases particularly calcium resulting in the deposition of calcium nodules in the A/C horizon.

Mark Breakdown

- Downward transfer
  - Process in relation to climate [1]
  - Impact on soil profile [1]
- Upward transfer
  - Process in relation to climate [1]
  - Impact on soil profile [1]

[4]

Minimum [1] if candidate mentions **both** capillary action and leaching

12

4 (a) (i) Polar maritime frequency – 15%. Allow 14–16. [1]

(ii) The weather associated with an air mass is determined by the characteristics of the source region and its course travelled. The **Tm** air mass originates in subtropical latitudes near the Gulf of Mexico and travels from the SW across the warm Atlantic where it evaporates moisture before it reaches the UK. Tropical maritime air is thus warm (often reaching 20 °C) and moist. Consequently it is frequently unstable and thus associated with low cloud (stratus/stratocumulus) and drizzle.

Award [3] for an answer which clearly explains the temperature and moisture characteristics of Tm air in relation to the source region and its course travelled.

Award [1]–[2] for a less detailed answer or an incomplete answer.

Mark Breakdown

- warm and wet [1]
- explanation of temperature [1]
- explanation of moisture [1] [3]

AVAILABLE MARKS

(b) (i) Area A experiences strongest winds due to
- Higher pressure gradient
- Isobars more highly spaced (Map Evidence) [2]

(ii)

Explanation of weather conditions (Summer Anticyclone) **Not all are required**	Possible map information/evidence
• Anticyclones are areas of intense high pressure in which air subsides from the Polar Front jet stream or Rossby Wave. • As the air subsides it spirals gently downwards in a clockwise motion as a result of the centrifugal force. • As the air subsides, air molecules become compressed, warmed, relative humidity decreases and thus condensation is suppressed resulting in a lack of cloud cover. • This lack of cloud cover and clear night skies can result in early morning dew or fog as the earth chills the air above. • Temperatures reflect the fact that the synoptic chart relates to early morning – 6am in summer.	1024mb Wind direction/wind speed values Low cloud cover/clear skies Lack of rainfall Evidence of fog/mist Temperature values

Level 3 ([5]–[6])
The candidate provides a detailed and well developed explanation of the weather conditions with relevant and explicit resource reference to support points. There is a confident use of specialist terminology.

Level 2 ([3]–[4])
The candidate presents a valid but less detailed explanation of anticyclogenesis. The range of weather elements described may be more limited and some gaps may be evident in description and/or explanation. There is some attempt made to include specialist meterological terms.

Level 1 ([1]–[2])
A more basic/simplistic description/explanation may be presented with obvious and significant gaps in both content and specialist terminology. Max [2] for thorough description with resource reference to 3+ variables.

[6] 12

Section B **36**

AVAILABLE MARKS

Section C

AVAILABLE MARKS

5 The candidate must provide a locational context for their chosen drainage basin/ delta and examine **both** the positive and negative effects of flooding. Good candidates will exemplify the detrimental consequences of flooding using a specified flood event and demonstrate case study depth and detail. Such effects may relate to deaths, homelessness, damage to infrastructure, loss of farmland, outbreak of disease, unemployment etc. Beneficial effects may include soil enrichment, improved agricultural productivity, ground water recharge, expansion of aquaculture, improved fish stocks with associated dietary benefits etc.

Level 3 ([9]–[12])
The candidate presents a balanced answer which addresses both the beneficial and detrimental consequences of flooding on people within an appropriate spatial context. The answer is well structured, communicated coherently and includes case study depth and detail.

Level 2 ([5]–[8])
The answer may display a less detailed insight into the benefits and detrimental consequences of flooding within an appropriate spatial context. Alternatively there may be a lack of balance evident in the answer. The level of written communication may be reasonable.

Level 1 ([1]–[4])
The candidate provides a more general/simplistic answer which may display a lack of breadth, depth or balance. There may be no case study specified to reference the effects outlined. [12] 12

6 The biotic components described will obviously depend on the local scale ecosystem specified. Candidates may select a woodland, wetland, peatland etc. A diverse range of biotic components should be outlined – these may include the vegetation, animals, insects, birds etc with named species specified. Candidates must display a knowledge of nutrient cycling (between biomass, litter and soil stores) with a particular focus on the fundamental role of the biotic elements within this process. The flora and fauna which comprise the biomass store will release litter/tissue fallout to the litter store. The detritivores or micro-organisms have a key role in the decomposition process which releases nutrients into the soil store. The autotrophs are instrumental in the uptake of nutrients from the soil to the biomass store via capillary action. Although a sound theoretical knowledge should provide the framework or scaffold for the answer, there should be evidence of case study specifics throughout.

Level 3 ([9]–[12])
The candidate competently addresses all aspects of the question providing a detailed description of a wide range of the biotic components of the ecosystem as well as a sound understanding of their precise role within the nutrient cycling process. Key terminology is used with confidence.

Level 2 ([5]–[8])
A less detailed answer may be presented. The inclusion of case study material may be less effective and the theoretical knowledge of the nutrient cycling process may be more limited. The level of written communication may be reasonable.

Level 1 ([1]–[4])
The candidate presents an answer which is more generalised with little or no case study material included. Only superficial knowledge of nutrient cycling may be evident with an obvious lack of specialist terminology. [12]

AVAILABLE MARKS

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7 This question has two clear components. A number of conditions are necessary for the formation of a hurricane. Ocean temperatures in excess of 27 °C to an ocean depth of over 60 m is necessary to provide a sufficient amount of evaporation to sustain the storm. Hurricanes can only develop in latitudes between 5° and 20° North and South of the equator where the Coriolis force is sufficiently strong to cause the rotation of the low pressure system. They usually form on the Western side of the oceans where the descending air from the subtropical high pressure system is weaker allowing large scale upward convection to occur. An absence of wind shear is necessary to allow the hurricane to sustain its energy. The air humidity must exceed 80% to supply sufficient latent heat which boosts the rise of towering cumulonimbus clouds. An appropriate case study is required to exemplify the human effects of a specific event.

Level 3 ([9]–[12])
The candidate provides a detailed well written and balanced answer which coherently explains a range of conditions necessary for hurricane formation and effectively uses a case study event to demonstrate the effects on people.

Level 2 ([5]–[8])
The candidates provide a less detailed or unbalanced answer with a more limited inclusion of specialist terminology. A more narrow range of conditions may be discussed and explanation of factors may be less well developed. There may be less effective use of their case study to exemplify human effects.

Level 1 ([1]–[4])
The candidate may provide an incomplete or less balanced answer which reflects a more limited knowledge and understanding. A narrow range of conditions may be outlined with little or no meaningful explanation attempted. There may be no case study event specified and human effects may be general/simplistic. The quality of written communication may also be poor.

Maximum [6] if one aspect of the question is omitted. [12]

12

Section C **24**

Total **90**