Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2019

Geography

Assessment Unit AS 1

assessing

Physical Geography

[SGG11]

TUESDAY 14 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- 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

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1 (a) Land cover changes in the Olifants drainage basin have clearly altered the hydrological characteristics of this open system. Results reveal that from 2000 to 2013, a 31% decrease in rangeland and a concomitant increase in agricultural land use (20%) and urban areas (10%) led to an increase in the generation of surface runoff from 30.91 mm to 45.43 mm.

The reduction of interception and infiltration in the urban area as a result of the expansion of impervious surfaces and the installation of gutters and drainage systems facilitates the more voluminous transfer of precipitation as surface runoff. Decreased interception storage within the urban catchment, as well as the declining rangeland shrub communities also results in greater surface runoff within the drainage basin.

The decline in natural infiltration reduces the soil moisture store and subsequent recharge of the ground water store via percolation. Thus the ground water store exhibits a decline of 12.7 mm over the 13 year period.

The overall increase in evapotranspiration from 518.4 mm to 531.4 mm can possibly be explained by the slight increase in forest cover and agricultural crops which take up water for photosynthesis and transpiration purposes with increased loss to the atmosphere. Furthermore, the voluminous transfer of water via surface runoff within the basin provides a higher potential for evaporation loss to the atmosphere.

Use of resources

Award up to [3] for a description of the data presented in **Resource 1A**. General trends in land use change should be depicted as well as alterations in the hydrological characteristics of the drainage basin. For 3 marks at least three accurate values should be quoted using both resources.

Explanation

Level 3 ([5])
The candidate provides a detailed, insightful and coherent explanation for the data presented. The reasoning displays a sound understanding of the inter-relationship between land use change and the three altered hydrological variables. Appropriate specialist terminology such as 'infiltration' is employed.

Level 2 ([3]–[4])
Geographical reasoning is mostly complete and includes some relevant credit-worthy detail. A fairly sound understanding of the inter-relationship between the land use and hydrology of the catchment is evident with some specialist terminology employed.

Level 1 ([1]–[2])
A more generalised; simplistic explanation is presented with only a limited understanding of the inter-relationship between land use change and the hydrology of the drainage basin. Few specialist terms may be employed.

Award [0] for an answer which presents no accurate creditworthy material.

[8]

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(b) The most obvious characteristics of this feature include the waterfall itself which plunges to a depth of 22 m, the gorge which extends for a distance of 700 m, the protruding overhang which is comprised of igneous rock, the deeply eroded sedimentary layers beneath the cap rock and the deep plunge pool containing deposited debris.

Two key factors are responsible for the formation of High Force, and indeed all waterfalls.

- River energy/discharge, which controls the intensity of the erosion process
- Rock type which determines the differential rate of erosion

As evident in High Force, the waterfall is comprised of contrasting bands of resistant (igneous Whin Sill) rock and less resistant sedimentary strata. The less resistant rock erodes more rapidly as a result of abrasion, solution and hydraulic action. The existence of the resistant cap rock (Whin Sill) results in the protrusion of an overhang which may eventually collapse and release debris into the hollow plunge pool. The plunge pool hollow at the base of the waterfall is deepened as a result of the swirling action of the debris (corrasion). The continuous erosion of the less resistant rock and the subsequent collapse of the cap rock causes the retreat of the waterfall upstream, producing a steep sided gorge.

Level 3 ([6]–[7])
The characteristic features of High Force waterfall are coherently described. A thorough explanation of all relevant formation factors is presented with a confident and impressive use of specialist terminology.

Level 2 ([4]–[5])
Some of the characteristic features are described with a fairly sound explanation of the relevant formation factors. There may be some minor gaps in completion, terminology or a more limited depth at this level.

Level 1 ([1]–[3])
Fewer features may be identified/described with only isolated elements of geographical reasoning provided. Fewer specialist terms may be included.

Award [0] for a response which provides no relevant content. [7] 15

2 **(a)** Autotrophs are primary producers within the food chain, harnessing solar energy through the process of photosynthesis to produce a store of chemical energy at trophic level 1 within the food chain. By contrast, heterotrophs (consumers) rely directly, or indirectly, on autotrophs for their energy.

Award up to [2] for a clear and accurate comparison of the organisms. [2]

(b) **Resource 2A** provides evidence of biotic and abiotic change in the tundra ecosystem of North West Canada as a result of climate change over a 22-year period. While bare ground and lichen have declined by 9% and 4% respectively, other plant communities have manifest detectable increases. Shrubs have increased by 15%, herbaceous plants by 12% and conifers have exhibited a 1% increase. Abiotic change is evident in the soil profile with the melting of the permafrost layer and the development of a deeper topsoil layer. Apart from resource analysis, candidates need to describe biotic and abiotic changes as a result of climate change in their selected Tundra case study location. Biotic changes may include reference to vegetation communities, biodiversity, bird-life, marine species, terrestrial

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animals, indigenous peoples, etc. Abiotic elements may include changes to soil, climate, growing season, drainage conditions, atmospheric gases etc

Level 3 ([6]–[8])
The candidate presents a coherent, analytical discussion of biotic and abiotic evidence from **Resource 2A**, as well as insightful and detailed factual description from a named Tundra case study location. The quality of written communication is excellent.

Level 2 ([3]–[5])
A fairly sound analysis of the resource is presented as well as the inclusion of relevant case study material. Alternatively, an excellent case study without resource use can achieve Level 2. The answer may lack balance and focus on either biotic or abiotic elements of change. There may be fewer case study details, but the quality of written communication is good.

Level 1 ([1]–[2])
The candidate presents a more simplistic answer, with some credit worthy material. The answer may fail to address all aspects of the question and the quality of written communication may be basic. Answers which only deal with the resource will be here.

Award [0] for a response which provides no relevant content. [8]

(c) (i) A variety of characteristics of chernozem soils are provided for selection.

A. **Surface – Deep Sod Layer**. The extensive root systems of the natural temperate grassland species such as bluestem, buffalo grass etc extend deep into the ground and tightly form a dense mat at the soil surface in the upper A horizon.

B. **Colour** – **Dark Brown/Black**. The distinctive deep brown/black colour is due to humus enrichment from the mull humus produced when the grasses die back in winter, when temperatures fall below zero degrees.

C. **Depth – 1m or greater.** The depth can be explained by the rapid weathering of the loess, calcium rich parent material, as well as the organic material produced from the decomposition of the natural grasses.

D. **PH** – **6–7**. The slightly alkaline/neutral PH is due to the incorporation of the mull humus from the grassland species which die back in winter as well as the general lack of leaching which only occurs temporarily in spring.

E. **Texture** – **Clay/Loam**. The clay/loam granular texture is produced from the deep and rapid weathering of the calcium rich loess bedrock.

Award up to [2] for a logical explanation of the selected topsoil characteristic. [2]

(ii)
- **Arrow 1** indicates the downward movement of soil water in Spring as a result of snow melt. This process causes leaching of the topsoil which becomes temporarily acidic.
- **Arrow 2** indicates capillary action, the upward movement of water during the Summer months. This re-evaporation process results in the upward movement of soil minerals, particularly calcium which concentrates in the form of nodules which are deposited in the lower A/C horizon.

Award up to [3] for an explanation of the selected process and its impact within the soil profile. [3]

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3 **(a)** The effect of continentality is clearly evident from the analysis of the annual temperature regime for San Diego (a coastal location) compared to Dallas (a continental interior), both of which are found at a similar latitude. San Diego exhibits a **lower** temperature range of 9 °C compared to Dallas with a **higher** temperature range of 22 °C. Land and water surfaces differ in their ability to absorb and retain radiation. Land surfaces are heated to a shallow depth more quickly compared to water surfaces which have a higher specific heat capacity, as solar radiation penetrates transparent water to a substantial depth. In Summer, continental interiors heat up intensely, e.g. Dallas reaches 30 °C in July and August, whereas coastal areas are thermally modified by cooler sea breezes, e.g. San Diego reaches a maximum temperature of 23 °C in August.
In Winter, continental interiors cool down more rapidly, e.g. temperatures fall to 8 °C in January in Dallas compared to San Diego which experiences 14 °C in January. This is because the Pacific Ocean acts as a thermal reservoir and prevailing coastal winds modify coastal temperatures.

Level 3 ([5]–[6])
A detailed description and explanation is presented for the contrasting thermal patterns with specific resource reference and the inclusion of specialist terminology. The answer displays a sound understanding of how continentality influences and modifies temperature.

Level 2 ([3]–[4])
There may be a lack of balance between description and explanation. Description may depict general trends with a lack of relevant values quoted. A partial or less detailed explanation may be offered with some valid points of reasoning and some specialist terminology included.

Level 1 ([1]–[2])
There is a more basic or superficial consideration of the contrasting thermal patterns with deficiency in terms of analysis/interpretation. Few specialist terms may be discernible and some inaccuracy may be identified.

Award [0] for an answer which includes no accurate analytical or interpretative statements. [6]

(b) **(i)** Candidates should exhibit map skills when describing the predicted path of Hurricane Irma using **Resource 3B**. Descriptions should include:

- Directions of movement (using the compass displayed).
- Distance values (using the scale).
- Locational details (using the lines of latitude and longitude or country/state names).

Award up to [3] for a detailed and accurate description of the hurricane's predicted path [3]

(ii) **Resource 3C** provides evidence of a variety of hurricane protection measures employed by residents in Florida in preparation for the arrival of Hurricane Irma in 2017. These measures include evacuation planning, the use of sand bags to guard against flooding, the purchase of survival resources such as water as well as boarding up windows of buildings to prevent destruction. Apart from the resource identification, candidates must describe how protection strategies were employed to reduce loss of life and damage to property in their chosen case study location. An evaluation of the methods is not a requirement.
No credit for post-hurricane measures.

Level 3 ([5]–[6])
Candidates describe a wide range of hurricane protection measures, making effective use of **Resource 3C** as well as their own case study. Description should display an insight into how strategies provide a purposeful attempt to reduce loss of life and damage to property.

Level 2 ([3]–[4])
Candidates present a less detailed answer displaying a more limited insight into the purpose of protection measures in reducing death and property damage.

Level 1 ([1]–[2])
The answer displays a superficial insight into hurricane protection measures. The answer may lack explicit reference to a case study. Answers which only have resource use will be here.

Award [0] for an answer which provides no relevant content. [6]

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15
45

Section A

Section B

AVAILABLE MARKS

4 A myriad of river management methods may be considered as part of a catchment management scheme, all of which can be discussed in terms of the environmental sensitivity and sustainability. Candidates may classify methods as hard engineering (those which involve structural engineering) and soft engineering (those which do not alter the natural river processes). Hard engineering channelisation methods such as dredging, re-sectioning, realignment and river bank protection produce less aesthetic river channels which are biologically less biodiverse. These strategies tend to be economically less sustainable since they deflect the erosion and flooding problems downstream within the catchment.
By contrast, soft engineering methods such as afforestation, washlands, restoration, zoning, etc, offer more environmentally sensitive riverine environments which retain biodiversity and the natural aesthetic quality of the catchment. As they manage flooding through increased storage of water within the catchment, they do not tend to exacerbate flood management, and thus economic problems, downstream.
A good answer should display an insight into a range of river management methods, as well as provide a wide range of illustrative examples for exemplification purposes.

Level 3 ([11]–[15])
A range of river management methods are discussed in relation to environmental sensitivity and sustainability. The answer provides detail, good insight and an impressive range of illustrative examples. The answer is coherent, well structured and the level of written communication is excellent.

Level 2 ([6]–[10])
Some river management methods are introduced but comments may be less insightful. Although fairly sound understanding is evident, discussion may be partial or less detailed. The answer may be more theoretical. The level of written communication is good. An answer which is purely theoretical can score a maximum of [8].

Level 1 ([1]–[5])
Although the answer may have some good qualities, there may be more simplistic, or generalised, discussion offered. Fewer river management methods may be considered and illustrative examples may be neglected. The quality of written communication may be basic.

Award [0] for a response which provides no valid or relevant context. [15]

5 The answer requires knowledge of succession and the evolutionary process of change within a small/regional scale locational setting. The case study selected will determine the actual detail provided. Some may describe sand dune succession (a psammosere), a salt marsh (a halosere), a woodland, etc. Good candidates will explain the autogenic process of change, recognising the inter-relationship between the biotic and abiotic components of the ecosystem and clarify actual seral stages within the transition. Abiotic variables should include an understanding of both soil and micro-climatic change, which provide the conditions for species replacement and associated changes in biodiversity.

Level 3 ([11]–[15])
An appropriate vegetation succession case study is selected and a well structured, detailed explanation of seral succession is presented, with the inclusion of impressive case study details. There is a sound understanding of the inter-relationship between a range of ecological variables within the ecosystem and specialist terminology is competently employed.

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	Level 2 ([6]–[10]) An appropriate vegetation succession case study is introduced but a less detailed explanation of succession is presented and case study details are less discernible. Some attempt is made to explain the interaction of the relevant ecological variables and the process of autogenic change. Alternatively, maximum [8] for a detailed description of changes in all seral stages. The level of written communication may be reasonable **Level 1 ([1]–[5])** A more simplistic answer is presented with a more generic and superficial understanding of successional change. Few ecological variables are explained within the process of succession and their inter-relationship is less well understood. Few case study details may be discernible and the specialist terminology is less evident. The overall level of written communication may be basic. Award [0] for an answer which provides no relevant or accurate information. [15]	
6	A mid-latitude depression forms as a result of cyclogenesis, where warm Tropical Maritime air from the North Atlantic meets a cold Polar Maritime air mass along a front between 30° and 60° in latitude. The westerly flowing polar jet stream in the upper atmosphere plays a vital role in the anticlockwise uplift of air which produces a well defined warm front, a warm sector and a cold front. As the upper air jet moves upwards, from a trough to a ridge, it accelerates, diverges and draws air upwards creating a low pressure centre at the ground surface with an anticlockwise pattern of winds. The path of the depression, or low, follows the westerly movement of the jet stream and is generally associated with a sequence of weather with the passage of the warm front, warm sector and finally the cold front. Annotated diagrams are a welcome inclusion and worthy of credit, if accurate and relevant. Maximum [7] for formation only, [4] if no interaction. Maximum [8] for explanation of weather system only – three stages. Maximum [4] for description only. **Level 3 ([11]–[15])** The candidate demonstrates a detailed understanding of the meteorological processes involved in the formation of a mid-latitude depression. A sound explanation is provided for the sequence of weather associated with the passage of the warm front, warm sector and cold front. The answer displays balance and information is communicated coherently and specialist terms are used with confidence. **Level 2 ([6]–[10])** There may be a lack of balance between the description of formation and the explanation of the weather associated with a low pressure weather system. Although there is a fairly sound understanding of meteorological processes, the answer may lack depth with some evidence of minor completion or inaccuracy. Some specialist terminology may be employed and the level of written communication may be reasonable. **Level 1 ([1]–[5])** A more general or incomplete answer is produced which displays only a simplistic understanding formation and/or the weather associated with the passage of the system. The level of the written communication may be basic with few specialist terms discernible. Award [0] for an answer which provides no valid information relevant to the question. [15]	30
	Section B	**30**
	Total	**75**