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Rewarding Learning

ADVANCED SUBSIDIARY (AS)
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Geography

Assessment Unit AS 1

assessing

Physical Geography

[AG111]

MONDAY 14 JANUARY, AFTERNOON

MARK SCHEME

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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.

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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.

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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

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Section A

AVAILABLE MARKS

1 **(a)** Answers will depend on the fieldwork undertaken and the actual planning factor selected.

Award [3] for an answer which coherently addresses both the importance and role of the selected factor and makes convincing and explicit links to the individual fieldwork.

Award [1]–[2] for a more simplistic response which may fail to address both the importance and the role of the factor selected. Fieldwork links may be omitted or less convincing. [3]

(b) Candidates may select random, systematic, pragmatic or stratified sampling. (see attached table providing guidance)
The mark breakdown is as follows.
Award up to [2] for a description of the method selected in relation to the fieldwork submitted.
Award up to [2] for an awareness of the advantage(s) of the chosen sampling method.
Award up to [2] for an awareness of the limitation(s). [6]

Method	Random	Systematic	Stratified	Pragmatic
Description	Random sampling involves selecting 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. In spatial studies, sites can be located using a random number generator.	Systematic sampling involves the selection of data using a pre-determined 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 10m interval along a hill slope transect.	Stratified sampling is useful when sub-groups, or subsets, are clearly identified within the total population. This method should ensure proportional representation of each subgroup in relation to the total population, e.g. In a landuse survey, where it is known that 70% of the study area is comprised of sandy soil and 30% clay soil, if 100 points are surveyed, 70 should be in the sandy zone and 30 on the clay.	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.
Advantages	• 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.	• 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	• Conclusions are likely to be more valid when geographical sub-groups have been represented • The method allows for flexibility as random, or systematic sampling can be used to select the data within the proportional sub-groups	• 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.
Disadvantages	• 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	• There is a higher chance of bias as the individual decides 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	• If a multitude of sub-groups 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	• 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.

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	AVAILABLE MARKS

(c) (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 submitted report.

Measures of Central Tendency/Dispersion
Calculation of mean [2]
Calculation of median [2]
Identification of mode [1]
Calculation of range [2]

Spearman's Rank Correlation or Nearest Neighbour Analysis
- Accuracy of calculation [5]
  (Maximum of [3] if Spearman's Rank is performed with less than 7 ranked pairs)
- Statistical Interpretation [2]

N.B. Maximum 4 marks if selected statistical technique is inappropriate for the testing of the specified aim/hypothesis. [7]

(ii) The answer requires geographical reasoning in relation to the calculated statistical result. Relevant geographical theories or concepts should be developed to support the interpretation. The reasoning provided will depend on the fieldwork undertaken and the actual hypothesis tested statistically. No marks should be awarded for a statistical summary/ conclusion.

Level 3 ([5]–[6])
Sound reasoning is presented and relevant geographical/theoretical concepts are integrated in an effective manner. Specialist terminology enhances the level of written communication.

Level 2 ([3]–[4])
Explanation is generally accurate but the answer may lack depth. There is less evidence of geographical theory and specialist terminology.

Level 1 ([1]–[2])
Explanation is simplistic, superficial and lacking in depth. Some inaccuracy may be evident and the language employed may be basic. [6]

(d) Candidates need to critically reflect on their fieldwork in relation to their selected factors. Obviously the material presented will depend on the factors selected and the actual fieldwork undertaken. A wide range of responses would be anticipated and candidates may highlight the positive or negative influence of the factor selected.

Award [3]–[4] for a coherent, well expressed answer which displays a sound understanding of how the chosen factor influences both results and conclusions. The answer displays insight and convincing reference to fieldwork.

Award [1]–[2] for a less insightful evaluation which may lack depth and there may be less convincing linkage to fieldwork, e.g. a hypothetical situation. The answer may focus on either results or conclusions.
2 × [4] [8] | 30

Section A | **30**

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Section B

AVAILABLE MARKS

2 **(a)** A drainage basin with steep slopes of 30° is more likely to produce a flash flood hydrograph characterised with a short lag time, a high peak discharge and steep rising and recession limbs. This is because precipitation in contact with the land is less perpendicular and a higher gravitational pull force results in a larger volume and speed of transfer to the channel via surface runoff. Conversely more gentle slopes of 5° is more likely to produce a non-flash flood hydrograph with a lower peak discharge and a more delayed lag response as infiltration is more likely and thus the volume of surface runoff is reduced.

Award [3]–[4] for a coherent, well developed answer which displays a full understanding of the influence of relief on drainage basin hydrology **and** hydrograph shape. Key terminology is used with accuracy.

Award [1]–[2] for an answer which displays a more simplistic understanding of relief. The answer may be incomplete as it may fail to include some of the following:

- Reference to both drainage basins
- Explanation of how relief influences runoff speed or volume
- Explanation of how relief influences hydrograph shape
- Key terminology [4]

(b) Award up to [2] for a logical factor which influences the **rate** of erosion either positively or negatively. A range of factors may be proposed and may include rock type, fluvial factors, human influence, river management etc. [2]

(c) **(i)** Candidates need to recognise the **positive correlation** [1] between the number of deaths due to flooding and the average population exposed to risk. Notable exceptions exist:

- Countries such as Morocco, Somalia, Nepal, Afghanistan, Venezuela etc lie at a distance **above** the trendline (indicating **more** deaths in relation to the average population exposed to risk).
- Countries such as Germany, Myanmar, Uzbekistan, Indonesia etc are exceptional as they lie a considerable distance **below** the trendline (indicating **fewer** deaths in relation to the average population exposed to risk).

For full marks the quotation of accurate values is required as well as the identification of general trends and anomalies. The question does not require explanation and thus no credit should be given for any proposed reasoning. [4]

(ii) Candidates need to describe any **one** human benefit of flooding within their selected spatial context. Such advantages may include;

- Silt deposition which enhances soil fertility for farmers.
- Increased fish yields and thus employment for fishermen.
- Improved diet from the increased fish stocks.
- Improved health resulting from pollution control.
- Increased land for habitation resulting from delta growth.

N.B. Maximum [1] if the beneficial effect outlined lacks an appropriate spatial context. [2]

12

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AVAILABLE MARKS

3 (a) (i) **Stage A =** Pioneer Community [1]
Stage B = Climatic Climax Vegetation [1] [2]

(ii) Candidates may recognise several changes in vegetation characteristics which are evident on the resource. Answers may refer to obvious trends in plant species, height, cover, stratification, density, biomass, replacement rate, abundance etc. over time.
3 × [1] [3]

(iii) Plant colonisation produces a progressively modified abiotic environment as a result of the autogenic successional processes. Candidates may explain any **two** of the following edaphic or microclimatic (abiotic) changes:
- **Soil Changes** – may include an explanation of depth, colour, PH, texture, moisture status, nutrient status, stability etc.
- **Microclimatic Changes** – may include an explanation of exposure, wind speed, shelter, air temperature, humidity etc.
- Award maximum [1] if 2 abiotic changes stated without explanation.

2 × [2] [4]

(b) **Decomposers** are organisms, e.g. bacteria, fungi etc., which cause the breakdown or decay of organic material in the ecosystem and facilitate the recycling of nutrients from the litter to the soil store. As they have a vital role in the nutrient cycling process, they are essential for the functioning and stability of the ecosystem.

Award up to [3] for an explanation of the role of decomposers within a case study context.
Maximum [2] if no relevant spatial context is included. [3] 12

4 (a) (i) The relationship is an inverse one as the relative humidity of the air increases as the temperature decreases. At any given temperature air can contain a certain amount of water vapour. Warm air can hold more moisture than colder air. The resource illustrates that as the air is gradually cooled, while maintaining the same water vapour content, the relative humidity will rise until it reaches its dew point temperature. At this point saturation level, as illustrated in Box C, will have reached 100%.

Mark breakdown as follows:
- Award [1] for an accurate recognition of the relationship between air saturation and temperature.
- Award up to [2] for an explanation of this inverse trend. Good candidates should introduce, with relevance, the concept of relative humidity. [3]

(ii) Precipitation is most likely to occur in **Box C** as the process of condensation occurs at the dew point temperature. At dew point the air becomes unstable and water vapour is changed to water droplets as a result of cooling. Condensation results in the formation of cloud and the possibility of precipitation.

Award up to [2] for an explanation of the condensation process in precipitation formation [2]

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		AVAILABLE MARKS
(b)	Wind is an important horizontal heat transfer mechanism in the maintenance of the global energy balance. An energy surplus is experienced between 40ºN and 40ºS of the Equator and a deficit is experienced between 40º and 90º in the Northern and Southern hemispheres. The movement of air molecules in the global wind system allows essential heat exchange across the latitudes. There are many factors which influence wind direction. Candidates may explain wind direction as a result of the pressure gradient force, the Coriolis force etc. Mark breakdown as follows: • Award up to [2] for an awareness of the importance of wind in the global exchange of heat energy. • Award up to [2] for an explanation of one factor which influences global wind direction. [4]	
(c)	Award 3 × [1] for each accurate **difference** between the weather systems. Answers may compare visibility, cloud cover, precipitation patterns, the presence/absence of fronts, wind speed etc. Do not credit variables stated on Resource 4B. 3 × [1] [3]	12
	Section B	**36**

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Section C

AVAILABLE MARKS

5 The candidate should be awarded up to [6] for each river feature. The explanation of each feature should display an understanding of river processes. Credit should be given for well annotated diagrams, which may incorporate explanation.

Levees – these are formed in the lower course of the river as a result of deposition and sediment aggradation. When river discharge exceeds "bankfull" level, the river floods, water spills out laterally across the floodplain. As the wetted perimeter increases, friction increases resulting in a lower level of river efficiency. As river energy decreases the river loses competence and larger, heavier particles are deposited first along the banks of the river channel. Deposited particles become increasingly smaller with distance from the channel and the smallest particles are deposited closer to the bluff line. There is a gradation evident in terms of particle size. A repetition of flooding and deposition produces the formation of raised banks or levees along the channel.

Deltas – as the gradient declines at the mouth of the river, velocity is reduced and this reduces river discharge and energy. The competence and capacity of the river are retarded and the finest particles of silt and clay are deposited out at sea, raining down onto the sea-bed in layers or strata. The process of flocculation takes place when clay particles coagulate and settle to form a platform of gently dipping layers of sediment. Candidates may recognise the three-fold sequence of sediment layers related to particle size and distance from the shoreline (the bottomset, foreset and topset beds). They may discuss the fluvial conditions prevalent for the formation of arcuate and bird's foot deltas.

For each feature:
Level 3 ([5]–[6])
The candidate produces a well annotated diagram and uses specialist terminology to explain the formation of the feature and the relevant river processes.

Level 2 ([3]–[4])
The candidate may produce a less well annotated diagram of the feature and/or a less detailed explanation of its formation. Alternatively an accurate and detailed explanation with no diagram may be awarded a Level 2 mark.

Level 1 ([1]–[2])
The explanation at this level may be simplistic, general, incomplete and may include some inaccuracies. A diagram may be poorly produced with little meaningful annotation or it may be omitted.

[6] × 2 [12] 12

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AVAILABLE MARKS

6 An appropriate spatial context should be outlined and a knowledge and understanding of ecosystem management displayed. There are two key strands to this question. Firstly candidates need to describe the management strategy and critically reflect on the effectiveness of the soil conservation method. Evaluation should display an awareness of the benefits/limitations of the chosen strategy. Management techniques may include contour ploughing, terracing, mulching, crop rotation, wheat stubble, cover crops, wind belts, restoration etc. There should be evidence of case study detail as well as an understanding of the chernozem/mollisols characteristics and properties.
Maximum Level 2 if evaluation is omitted. Maximum Level 2 if case study area is not specified.

Level 3 ([9]–[12])
The candidate produces a detailed answer which addresses both elements of the question and introduces a wide range of soil conservation methods. Case study detail is evident and specialist terminology is employed to develop a coherent answer.

Level 2 ([5]–[8])
Relevant soil conservation methods are introduced but descriptions and evaluations may lack detail. Reference to case study material may be less effective and the range of management techniques may be limited. The level of written communication may be reasonable.

Level 1 ([1]–[4])
Candidates display a very limited knowledge and understanding of soil conservation methods and reference to case study material may be less effective or non-existent. Few strategies may be considered and inaccuracies may be evident. The quality of written communication may also be poor. [12] 12

7 The question is clearly twofold and requires a knowledge and understanding of both hurricane structure and formation. Hurricanes are dynamic, three-dimensional features. These low pressure revolving storms have well defined structural elements. The structure is characterised by strong convergence at the lower surface, rapid upward movement in the vortex and divergence aloft. They can reach a diameter of 1000 km and recorded vertical heights of 12–14 km are not uncommon. At the heart of the hurricane is the central eye which can measure approximately 50 km in diameter. The eye is calm and characterised by descending air currents from the stratosphere. Surrounding the eye is the eye-wall, where strong anticlockwise winds, which may exceed 240 km/h, are like the chimney of the hurricane. Surrounding the eye-wall are bands of towering cumulo-nimbus cloud with an outer convective ring of cumulous clouds.
Hurricane formation requires a variety of conditions. In terms of hurricane formation, many factors require explanation. Seasonality is an influential formation factor as most hurricanes in the Northern Hemisphere occur between July and November to generate the required specific heat capacity of the ocean. High ocean temperatures (exceeding 26°C to a depth of approximately 60 m) are required to cause the overlying atmosphere to become unstable to sustain convection. High humidity levels are essential as the hurricane gains energy as it is fueled with rising air producing bands of clouds due to convection. A latitudinal location between 5–30° North and South of the Equator provides sufficient Coriolis force to trigger the vicious spiral at the centre of the hurricane.

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	AVAILABLE MARKS
Level 3 ([9]–[12]) The candidate addresses both elements of the question and effectively describes the structural elements of a hurricane using a well annotated diagram. A sound understanding of hurricane formation is also communicated effectively using specialist terminology. **Level 2 ([5]–[8])** The candidate provides a less detailed, or unbalanced, answer. A more limited range of structural elements are described and a less effective diagram, if any, is included. Explanation of hurricane formation lacks depth and fewer specialist terms are employed. **Level 1 ([1]–[4])** The candidate may fail to address both elements of the question and an annotated diagram may be omitted. Description and/or explanation is more superficial, general and some inaccuracies may be evident. The level of written communication may be also be poor. [12]	12
Section C	**24**
Total	**90**