Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2016

Geography

Assessment Unit AS 1

assessing

Physical Geography

[AG111]

THURSDAY 9 JUNE, AFTERNOON

MARK SCHEME

MARK SCHEMES

Foreword

Introduction

Mark Schemes are published to assist teachers and students in their preparation for examinations. Through the mark schemes teachers and students will be able to see what examiners are looking for in response to questions and exactly where the marks have been awarded. The publishing of the mark schemes may help to show that examiners are not concerned about finding out what a student does not know but rather with rewarding students for what they do know.

The Purpose of Mark Schemes

Examination papers are set and revised by teams of examiners and revisers appointed by the Council. The teams of examiners and revisers include experienced teachers who are familiar with the level and standards expected of 16- and 18-year-old students in schools and colleges. The job of the examiners is to set the questions and the mark schemes; and the job of the revisers is to review the questions and mark schemes commenting on a large range of issues about which they must be satisfied before the question papers and mark schemes are finalised.

The questions and mark schemes are developed in association with each other so that the issues of differentiation and positive achievement can be addressed right from the start. Mark schemes therefore are regarded as a part of an integral process which begins with the setting of questions and ends with the marking of the examination.

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all markers are following exactly the same instructions and making the same judgements in so far as this is possible. Before marking begins a standardising meeting is held where all the markers are briefed using the mark scheme and samples of the students' work in the form of scripts. Consideration is also given at this stage to any comments on the operational papers received from teachers and their organisations. During this meeting, and up to and including the end of the marking, there is provision for amendments to be made to the mark scheme. What is published represents this final form of the mark scheme.

It is important to recognise that in some cases there may well be other correct responses which are equally acceptable to those published: the mark scheme can only cover those responses which emerged in the examination. There may also be instances where certain judgements may have to be left to the experience of the examiner, for example, where there is no absolute correct response – all teachers will be familiar with making such judgements.

The Council hopes that the mark schemes will be viewed and used in a constructive way as a further support to the teaching and learning processes.

Introductory Remarks

The assessment objectives (AOs) for this specification are listed below. Students must:

AO1 demonstrate knowledge and understanding of the content, concepts and processes;

AO2 analyse, interpret and evaluate geographical information, issues and viewpoints and apply understanding in unfamiliar contexts;

AO3 select and use a variety of methods, skills and techniques (including the use of new technologies) to investigate questions and issues, reach conclusions and communicate findings.

General Instructions for Markers

The main purpose of the mark scheme is to provide a uniform basis for the marking process so that all markers are following exactly the same instructions and making the same judgements so far as this is possible. Markers must apply the mark scheme in a consistent manner and to the standard agreed at the standardising meeting.

It is important to recognise that in some cases there may be other correct responses that are equally acceptable to those included in this mark scheme. There may be instances where certain judgements have to be left to the experience of the examiner, for example, where there is no absolute, correct answer.

Markers are advised that there is no correlation between length and quality of response. Candidates may provide a very concise answer that fully addresses the requirements of the question and is therefore worthy of full or almost full marks. Alternatively, a candidate may provide a very long answer which also addresses the requirements of the question and is equally worthy of full or almost full marks. It is important, therefore, not to be influenced by the length of the candidate's response but rather by the extent to which the requirements of the mark scheme have been met.

Some candidates may present answers in writing that is difficult to read. Markers should take time to establish what points are being expressed before deciding on a mark allocation. However, candidates should present answers which are legible and markers should not spend a disproportionate amount of time trying to decipher writing that is illegible.

Levels of Response

For questions with an allocation of six or more marks three levels of response will be provided to help guide the marking process. General descriptions of the criteria governing levels of response mark schemes are set out on the next page. When deciding about the level of a response, a "best fit" approach should be taken. It will not be necessary for a response to meet the requirements of all the criteria within any given level for that level to be awarded. For example, a Level 3 response does not require all of the possible knowledge and understanding which might be realistically expected from an AS or AL candidate to be present in the answer.

Having decided what the level is, it is then important that a mark from within the range for that level, which accurately reflects the value of the candidate's answer, is awarded.

General Descriptions for Marking Criteria

Knowledge and Understanding	Skills	Quality of Written Communication	Level
The candidate will show a wide-ranging and accurate knowledge and a clear understanding of the concepts/ideas relevant to the question. All or most of the knowledge and understanding that can be expected is given.	The candidate will display a high level of ability through insightful analysis and interpretation of the resource material with little or no gaps, errors or misapprehensions. All that is significant is extracted from the resource material.	The candidate will express complex subject matter using an appropriate form and style of writing. Material included in the answers will be relevant and clearly organised. It will involve the use of specialist vocabulary and be written legibly and with few, if any, errors in spelling, punctuation and grammar.	3
The candidate will display an accurate to good knowledge and understanding of many of the relevant concepts/ ideas. Much of the body of knowledge that can be expected is given.	The candidate will display evidence of the ability to analyse and interpret the resource material but gaps, errors or misapprehensions may be in evidence.	The candidate will express ideas using an appropriate form and style of writing. Material included will be relevant and organised but arguments may stray from the main point. Some specialist terms will be used and there may be occasional errors in spelling, punctuation and grammar. Legibility is satisfactory.	2
The candidate will display some accurate knowledge and understanding but alongside errors and significant gaps. The relevance of the information to the question may be tenuous.	The candidate will be able to show only limited ability to analyse and interpret the resource material and gaps, errors or misapprehensions may be clearly evidenced.	The candidate will have a form and style of writing which is not fluent. Only relatively simple ideas can be dealt with competently. Material included may have dubious relevance. There will be noticeable errors in spelling, punctuation and grammar. Writing may be illegible in places.	1

Section A

AVAILABLE MARKS

1 (a) Tasks (A)

A1. **Individual Research**

How? This may involve the extraction of relevant data (qualitative or quantitative) from sources such as textbooks, journals, Internet websites etc.
Why? Research may be required for a number of reasons depending on the study undertaken. Although it is most likely that research may involve the study of theoretical concepts to aid interpretation and the formulation of conclusions, it may relate to any stage of the investigation process.

A2. **Development of appropriate fieldwork skills**

How? Candidates may discuss how efforts were made to develop appropriate fieldwork skills in the classroom prior to data collection or in the field itself. They may allude to the completion of a pilot study.
Why? Fieldwork skills may include communication skills, teamwork skills, recording skills, observational skills, technical measuring skills etc. Obviously such skills are essential to ensure the collection of accurate and reliable data.

A3. **Group Organisation**

How? Although the discussion will be influenced by the fieldwork undertaken, there may be a description of how tasks were rotated or allocated during fieldwork at the study sites.
Why? It is often essential to devise groups to ensure that fieldwork can be undertaken efficiently, safely and within a specified time allocation. It is often essential to work in groups to ensure the coverage of an area through the completion of a sampling process.

Tasks (B)

B1. **Sampling Design**

How? The discussion may relate to any sampling method (systematic, stratified, random or pragmatic) or sample size. Candidates should detail how it was conducted in the field.
Why? Sampling is essential when it is impossible or impractical to study the "total population" and thus it is essential to select a representative portion of that population to ensure reliable conclusions. Candidates may attempt to justify a selected sampling method or a chosen sample size.

B2. **Consideration of Health and Safety**

How? Candidates may discuss pre-fieldwork activities such as prior site visits, risk assessment surveys or strategies adopted in the field to avoid hazards.
Why? Candidates need to display an awareness of the importance of a health and safety conscious approach to fieldwork. Obviously risk management is essential to minimise, or eliminate, potential hazards during fieldwork.

B3. **Selection of suitable geographical site**

How? This may be completed through site visits, research of secondary sources, discussion, map work or, indeed, prior knowledge.
Why? The selection of a suitable geographical site is essential if the aim of the investigation is to be explored reliably and meaningfully.

AVAILABLE MARKS

For each selected task:

Award [3] if the candidate displays a sound awareness of how and why the task was completed with explicit and convincing reference to individual fieldwork.

Award [1]–[2] for an answer which fails to address the essential demands of the question outlined above. The discussion of the task may be general/simplistic or incomplete. Links to fieldwork may be missing or less convincing.
Selecting two tasks from the same box is a rubric violation. Award only the higher.
(2 × [3]) [6]

(b) (i) Statistical analysis, such as Nearest Neighbour Analysis or Spearman's Rank Correlation, is essential to provide objective proof to reliably inform the interpretation of data and the formulation of reliable conclusions. Statistical measures, such as the mean, median and mode, are often used to condense raw values into a meaningful form as part of data analysis.

Award up to **[3]** for a theoretical awareness of the purpose of statistical analysis within an investigation. [3]

(ii) The method of statistical analysis selected will depend on the fieldwork undertaken, but it must be relevant to the aim/hypothesis of the investigation. Therefore, cross-referencing is essential with the submitted report.

N.B. Maximum [4] if the selected statistical technique is inappropriate to the aim/hypothesis of the study.

Measures of Central Tendency/Dispersion
Calculation of mean [2]
Calculation of median [2]
Identification of mode [1]
Calculation of range [2]
Award [1] for each if the technique is inappropriate.

Spearman's Rank Correlation or Nearest Neighbour Analysis

- Accuracy of calculation [5]:
  For Spearman's Rank
  Rank (x) = [1]
  Rank (y) = [1]
  Column (d) = [1]
  Column (d^2) including accurate $\sum d^2$ = [1]
  Equation = [1]

- Statistical Interpretation [2]
  Interpretation of r_s – full marks available for wrong r_s only if it is between –1 and 1.
  If significant:
  Significance recognised with level, e.g. 95% [1]
  Positive/negative trend or statement to identify relationship type [1]

  If non-significant:
  Statement to recognise lack of significance [1]
  Accurate justification in relation to critical value [1]

		AVAILABLE MARKS
	N.B. Award maximum [4] for an accurate calculation if an error in ranking results in an incorrect rs value. Award maximum of [3] if Spearman's Rank is performed with less than 7 ranked pairs. [7]	
(iii)	Geographical reasoning is required to support the statistical outcome and the discussion should integrate relevant theoretical concepts or models, as well as specialist terminology. The geographical reasoning provided will depend on the specific aim/hypothesis, the topic or theme investigated and the statistical outcome attained. Marks cannot be awarded for statistical interpretation or excuses which lack credibility. If statistics are incomplete/not attempted, maximum L2 (if variables can be identified from answer). **Level 3 ([7]–[8])** The answer displays sound geographical reasoning with the effective integration of relevant theoretical concepts and terminology. The explanation provided is relevant to the aim of the study as well as the statistical outcome. **Level 2 ([4]–[6])** A less detailed geographical reasoning is presented with only tenuous integration of theoretical concepts. The inclusion of specialist terminology may be less well developed or more limited. **Level 1 ([1]–[3])** Explanation may be more simplistic or less complete. Specialist terminology may be very limited or neglected. Answers which only describe the aim/hypothesis will be at this level. [8]	
(c)	The fieldwork method selected must relate to a primary source and must be evidenced in the table submitted. The answer requires a description of the actual procedure conducted in the field, as well as a reflective review and potential modification of the process. Marks should be allocated as follows: • **Description of Method/Procedure [4]** **Award [3]–[4]** for a detailed description of the primary data collection procedure. There should be explicit reference to the equipment used or the laboratory method employed if relevant. **Award [1]–[2]** for a more simplistic description of the primary data collection procedure. The description may lack completion and the equipment employed may not be specified fully. Candidate may refer only to sampling procedure [1]. • **Reflective Evaluation [1]** **Award [1]** for a critical review of the procedure adopted, using Resource 1D as a guidance model/tool. A limitation of the original method. • **Modification [1]** **Award [1]** for the consideration of a realistic modification to the fieldwork method. (3 × [2]) [6]	30
	Section A	**30**

Section B

AVAILABLE MARKS

2 (a) Resource 2A illustrates that significant land use change has taken place within the River Ciliwung drainage basin between 1990 and 2006. The most obvious change is the increase in the area of settlement from 20% in 1990 to 45% in 2006. Land use was dominated by forestry/plantation in 1990 (37%) but this decreased to approximately 29% in 2006. Similarly, agricultural land uses such as paddy fields and dry land farming (12% and 25% respectively in 1990) experienced a notable reduction in cover to 4% and 17% respectively in 2006. Open land and even surface water storage experienced a reduction in total cover. Land use changes contribute to unintended modifications to river flow and thus the incidence and frequency of flooding. The development of "settlement", or urbanisation, involves the conversion of woodland, shrub, open land or farmland to artificial urban surfaces. This results in an alteration of the hydrological flows and transfers. The increased proportion of impermeable surfaces reduces infiltration and the gradual sub-surface hydrological transfers to the river. Furthermore, the elaborate drainage networks (gutters and sewerage systems) also remove water quickly and efficiently to the channel as surface runoff. Thus, urban populations experience an increased exposure to flooding. The loss of forests and farmland reduces interception storage as well as transpiration loss to the atmosphere. The associated increase in the volume of surface runoff greatly increases flood risk.
If only one factor is used, maximum [3].

Level 3 ([5]–[6])
A clear, purposeful description of the resource is presented with a logical, detailed and relevant explanation. There is a confident use of specialist terminology.

Level 2 ([3]–[4])
Description may be less thorough and explanation may be more implicit or generalised. There may be a more hesitant, or tentative, use of hydrological terms.

Level 1 ([1]–[2])
A more simplistic answer may be presented which may lack depth, completion, balance and precise geographical terminology. Answers which are purely descriptive should be awarded from this level [6]

		AVAILABLE MARKS
(b)	Firstly candidates need to address both beneficial and detrimental economic effects of flooding. Secondly there should be exemplification from the Ciliwung drainage basin **(Resource 2B)** as well as their own case study. The detrimental economic effects of flooding may include the cost of damage to the social and economic infrastructure, loss of agricultural, commercial and business revenue, disruption of services, including transportation and communication systems, unemployment, loss of trade etc. Beneficial effects may include the expansion of aquaculture, improved farmland as a result of silt deposition, ground water recharge for irrigation and domestic use etc. **Level 3 ([5]–[6])** The answer is effectively structured and displays a secure and detailed knowledge of both beneficial and detrimental economic effects of flooding with relevant exemplification from Resource 2B and a selected case study. **Level 2 ([3]–[4])** The answer may be more generalised or fail to address all aspects of the question. The candidate may neglect to: • consider both positive and negative economic effects; • focus on the economic dimension of the question; and • include relevant exemplification from Resource 2B as well as their own case study. **Level 1 ([1]–[2])** A more simplistic answer may be provided lacking in depth/detail. Little or no exemplification material may be cited and the answer may display only a basic or superficial knowledge of the positive or negative economic effects of flooding. [6]	12

AVAILABLE MARKS

3 **(a)** The Glacier Bay region of Alaska illustrates a variety of changes in soil properties in relation to the broader features of vegetation change as a function of time. The table below outlines the main aspects of soil modification presented on Resource 3, with some suggested reasoning which cannot be considered as entirely definitive.

Description	Explanation
Soil Depth This has increased from 11 cm after 10 years to over 25 cm after 225 years.	The colonisation of new surfaces by plants will rapidly accelerate the rate of soil development. The increased number of plant species (from 10 species to 32 species after 225 years) and the development of more complex plant communities will increase surface litter accumulations and subsequent decomposition will increase soil depth. In addition, the weathering of the underlying parent material will also increase the rate of development and depth of a mineral soil.
Litter The accumulation of a distinct litter layer becomes evident after 70 years. It increased from a depth of approximately 2 cm to 3 cm after 225 years.	Litter, which is a product of "tissue fallout", is characterised by undecomposed animal and plant matter, e.g. leaves, cones, twigs, dead animals etc. The increased thickness of the litter residue over time can undoubtedly be attributed to the development of vegetation communities – both increased biodiversity and plant complexity. Taller species, such as shrubs and trees, with their associated bulk density and cover will increase the volume of tissue fallout and litter development.
Organic Matter The organic matter content of the soil increased quite dramatically from a depth of approximately 3 cm after 70 years to approximately 8 cm after 225 years.	The development of vegetation (biodiversity, complexity and bulk density) and associated increases in litter residue provides the organic material for decomposition. The characteristic increase in micro-bacterial activity associated with soil development facilitates the decomposition processes and the development of this deeper humus/ organic horizon.
Soil Moisture Soil moisture dramatically increases with successional change, from 75 mg/g after 10 years to 640 mg/g after 225 years.	The increased development of soil organic matter/humus (explained above) provides a higher potential for soil moisture retention. Furthermore, the development of increased vegetation cover can result in reduced evaporation from the soil, thus aiding the conservation of soil moisture. A denser root mat can also retain moisture.
Nitrogen The accumulation of nitrogen is fairly significant over time. It increased from 0.1 mg/g after 10 years to 1.6 mg/g after 225 years.	Over time the development of plant species and their bulk density increased litter input and humus formation as a result of decomposition. Humus increases the cation exchange capacity of the soil and releases nutrients such as nitrogen into the top soil. Thus soil fertility is largely controlled by the humus/organic matter concentration in the soil.

Description	Explanation
A and B Horizons These increased in depth from 6 cm after 10 years to 8 cm after 70 years to approximately 15 cm after 225 years.	These horizons (topsoil (A) and subsoil (B)) have developed over time due to progressive soil forming processes. The accumulation of humified organic matter (from tissue fallout from developing vegetation communities) resulted in a deeper A horizon. The B horizon develops over time with progressive weathering of the bedrock (C horizon). The development of deep penetrating plant roots contributes to the biological disintegration of the bedrock.

AVAILABLE MARKS

Award [3] for a clear description of a selected soil change (with the quotation of relevant values) and a logical, accurate explanation in relation to successional processes. Key geographical terminology should be employed.

Award [2] or [1] for a less thorough description which may omit the quotation of values. There may be a more generalised, or simplistic, explanation presented with more limited specialist terms.
(2 × [3]) [6]

(b) The climatic climax vegetation is comprised of grassland, which is largely controlled by the prevailing climatic regime. The grassland exhibits many distinctive characteristics. Some of the following points may be included:

- a lack of trees except in areas with higher than average moisture availability, e.g. margins of rivers or streams;
- most grasses are drought resistant (xerophytic);
- most are resistant to fire or burning (pyrophytic);
- low biomass;
- high levels of biodiversity under natural conditions with species rich assemblages, e.g. bluestem, dropseed, broome etc.;
- comprised of perennial, annual and bulb plants; and
- dense roots and rhizomes.

Climate – climatic influence can vary dependent on geographical location and latitude.

- The low annual **rainfall** (between 300–1000 mm annually) in many locations is insufficient to support trees.
- Winter temperatures can drop as low as –10 °C and grasses have the ability to die back and regenerate in Spring.
- As hot Summer temperatures can exceed 30 °C, many grassland species have narrow leaves to reduce transpiration moisture loss. Long roots can penetrate up to 2 m deep to maximise soil moisture uptake.
- Grasses have a rapid life cycle to cope with the short 5 month growing season.
- The soft, flexible stems can tolerate the harsh Winter winds.

Award up to **[3]** for an answer which describes the **characteristics of the grasses** which comprise the climatic climax community.

Award up to **[3]** for an explanation of the **importance of climate** in the development of this biotic component of the ecosystem.

Award [1] if climate is accurately described but not linked to vegetation. [6] 12

AVAILABLE MARKS

4 (a) **Geographical Location**

Resource 4A illustrates that hurricane/tropical cyclones are confined to tropical oceanic areas between approximately 5° and 20° North and South of the Equator. Their frequency is highest in the Western Pacific with approximately 30 per year and the Eastern Pacific Basin with approximately 11 per year.

Seasonality

Resource 4B illustrates that they have a distinct seasonal pattern with a more common occurrence between July and October. They reach a maximum in September when 37% of hurricanes develop.

As hurricanes require warm ocean temperatures in excess of 26 °C for a depth of 60 m, sea surface temperatures are at a maximum between July and October, having built up heat over the Summer. Water at this temperature causes the overlying atmosphere to become unstable, which is required to sustain convection. The continuous upward draught of moisture-laden air and the release of vast quantities of latent heat by condensation are required to produce bands of cloud as a result of condensation, allowing the hurricane to gain energy as it is fuelled with water vapour. A circulatory motion is encouraged by the Coriolis force at this latitude to produce the spiralling motion which is anticlockwise in the Northern hemisphere.

Description [3]

Award up to [3] for a **description** of the geographical and seasonal pattern of hurricane/tropical cyclone development.
For [3] marks there must be specific map/graph evidence quoted from both of the resources.

Explanation [5]

Award [5] for an **explanation** of both the geographical location and the seasonal occurrence of hurricanes/tropical cyclones. The answer should display sound and detailed knowledge as well as a range of specialist terms.

Award [3]–[4] for a more generalised explanation of the tropical storms with a less confident and impressive range of specialist terms. Alternatively, the answer may lack balance and fail to address both the geographical location and seasonal occurrence. Maximum [3] if only one resource is explained.

Award [1]–[2] for a more simplistic explanation which may lack total accuracy, detail and a range of specialist terms. [8]

			AVAILABLE MARKS
(b)	**(i)**	**Point B** is most likely to represent dew point temperature. [1]	
	(ii)	**Resource 4C** clearly illustrates the formation of orographic (relief) rainfall. As moist air moves inland and meets a relief barrier it is forced to rise. When air rises it subsequently expands and cools which causes the RH to increase. When the RH reaches 100% (Point B) it reaches saturation level (dew point) and condensation will occur and latent heat will be released. Cloud formation occurs and latent heat will result in further thermal uplift, cooling and cloud formation. Therefore rainfall will be experienced in the mountainous areas. As the descending air on the leeward side contracts and warms the RH will decrease, resulting in dry conditions with lower rainfall totals – the rain shadow effect. **Award [3]** for a precise, accurate and well sequenced account of air flow, RH and rainfall patterns. The answer should display a sound understanding of relevant meteorological processes and terminology. **Award ([1]–[2])** for a more generalised or simplistic explanation of air flow, RH and rainfall patterns. There may be less evidence of sequence, completion or inclusion of specialist terminology. **Award [1]** if both RH patterns are correctly identified with no explanation. [3]	12
		Section B	**36**

Section C

AVAILABLE MARKS

5

- Fluvial erosion, transportation and deposition are all processes which create the characteristic features of a river meander. Meanders are perpetuated and develop their sinuosity through helicoidal flow as the thalweg shifts to the outside of the river bend. Meanders develop when alternating pools and riffles form along the river channel. Their formation is intrinsically related to the energy or discharge of the river in the middle and lower course.
- The **outside** of the river bend is characterised by increased river energy and velocity due to the position of the thalweg, resulting in pronounced river erosion. Processes such as abrasion, solution and hydraulic action result in the undercutting of the river banks and the formation of a steep river cliff and a deep river pool. These deep pools are areas of scour, deeper water and fine river sediment, submerged even in conditions of low river flow.
- The **inside** of the meander is characterised by low energy conditions, reduced river velocity, high levels of friction and deposition. Repetitive aggradation results in the development of a point bar or slip-off slope.
- Riffles develop between river meander loops. These are shallow lobes of gravel characterised by the deposition of bedload, scoured and redistributed from the river cliff. The pattern of riffle and pool distribution corresponds directly to the meander length.
- Meanders are not static. These continuous processes cause meanders to continuously migrate downstream, eroding the adjacent land, causing the formation of bluffs and a wider floodplain.
- If pools and riffles are neglected, maximum Level 2.

Level 3 ([9]–[12])
The candidate clearly and comprehensively explains the fluvial processes involved in the formation of the features associated with the river meander. The answer demonstrates a detailed understanding of both fluvial processes and landforms. There is a confident use of specialist terminology.

Level 2 ([5]–[8])
The answer may have good qualities but may be less informative, lacking the depth of knowledge required on all aspects of the question. Although general understanding of the meander may be evident, fewer geographical terms may be employed.

Level 1 ([1]–[4])
A more simplistic answer may be presented with a less well developed explanation of fluvial processes and meander features. Alternatively, only a partial answer may be evident with few, if any, specialist terms employed. [12]

12

		AVAILABLE MARKS
6	The details of the answer will depend on the chosen case study. A small scale study is required. Candidates may select a woodland, lake, peatland area etc. The physical or abiotic components may include characteristics such as soils, geology, altitude, aspect, temperature, rainfall, growing season etc. The trophic structure in an ecosystem illustrates the feeding relationship between the organisms (producers and consumers). It is determined by competition within the ecosystem and predator–prey interactions that determine the paths of energy flow and chemical cycling. The trophic structure of an ecosystem is generally visualised in food chains, food webs or biomass pyramids. The biotic organisms are classified at distinct trophic levels depending on their main source of nutrition. The primary consumers or autotrophs essentially support all trophic levels, directly or indirectly, by producing carbohydrates through the process of photosynthesis. The primary, secondary and tertiary consumers, or heterotrophs, use these assimilated organic molecules in the process of consumption. This energy transfer between these biotic organisms is not 100% efficient as energy is lost through heat, respiration, metabolic cell processes etc. The detrivores, or decomposers, derive their energy from detritus (organic waste) and dead organisms from other trophic levels. There should be good reference to case study specifics for both the physical abiotic and biotic components of the selected study. The interaction of the biotic components in the trophic structure can be fully illustrated using a well labelled biomass pyramid. **Level 3 ([9]–[12])** The candidate produces a balanced, well structured response which includes appropriate case study specifics and specialist terminology. A wide range of physical characteristics are accurately described and a good understanding of the trophic structure is displayed. **Level 2 ([5]–[8])** The answer may have good qualities but may lack balance and fail to address both elements of the question. Alternatively the answer may lack depth and the inclusion of fewer case study specifics. **Level 1 ([1]–[4])** The answer displays a more limited appreciation of the physical characteristics and/or trophic structure of the ecosystem. Furthermore, there may be evidence of more superficial knowledge and few, if any, case study specifics and specialist terms. Maximum Level 1 if an inappropriate case study is selected. [12]	12

		AVAILABLE MARKS
7	• Air masses are large bodies of air with relatively uniform temperature, moisture and humidity characteristics. All air masses derive their thermal and moisture characteristics from their source region. Mid-latitude depressions generally occur as a result of the interaction of warm tropical and cold polar air masses at the polar front. • The cold sector of a depression is generally associated with a Polar maritime air mass which is typically characterised by cold/cool temperatures as well as high levels of humidity from the evaporation of moisture on its passage across the Atlantic Ocean. • The warm sector of a depression is generally associated with a Tropical maritime air mass. This air mass is associated with warm/mild thermal properties as it usually approaches Britain from the south-west, coming from the Azores or the Caribbean. It is characteristically humid, which can ultimately produce rainfall upon uplift at the frontal zones. • Case study material is required to exemplify the human effects associated with the weather event. Candidates may use an extreme storm event and positive as well as negative effects are acceptable. **Level 3 ([9]–[12])** The candidate presents an answer which displays a sound and conceptually detailed understanding of the relevant air masses as well as the human effects of a mid-latitude depression. Case study specifics and specialist terminology are a requirement at this level. **Level 2 ([5]–[8])** The answer may have good qualities but may fail to address both elements of the question in depth. Alternatively answers may be less well developed, displaying a more limited insight and understanding. Case study specifics and geographical terminology may be less impressive. **Level 1 ([1]–[4])** A more simplistic answer is presented with limited depth and relevant detail. The answer may lack completion and specialist terminology. There may be some inaccuracy and misunderstanding evident. [12]	12
	Section C	**24**
	Total	**90**