Cambridge Assessment International Education

# Cambridge International AS & A Level

**GEOGRAPHY** **9696/12**

Paper 1 Core Physical Geography **May/June 2021**

MARK SCHEME

Maximum Mark: 60

**Published**

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

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**[Turn over**

## Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

## Section A

Answer **all** questions in this section. All questions are worth 10 marks.

**Hydrology and fluvial geomorphology**

| Question | Answer | Marks |
|---|---|---|
| 1(a)(i) | **Fig. 1.1 shows a storm hydrograph.**<br><br>**State when maximum precipitation occurred in Fig. 1.1.**<br><br>18/24 hrs (or any number between the two). Requires indication of units. | **1** |
| 1(a)(ii) | **Identify feature A of the storm hydrograph shown in Fig. 1.1.**<br><br>Rising limb / Ascending limb | **1** |
| 1(b) | **Describe how the storm hydrograph in Fig. 1.1 might change following deforestation in the area.**<br><br>• Shorter lag time<br>• Steeper rising limb<br>• Steeper falling limb<br>• More flashy response<br>• Discharge of shorter duration<br>• Higher peak discharge<br>• Credit to be given for an annotated diagram describing the changes.<br><br>**1 mark** for each correctly stated point up to **max. 4 marks**. | **4** |
| 1(c) | **Explain reasons for the changes you described in (b).**<br><br>• Reduction in vegetation interception<br>• Greater overland flow / surface run off<br>• Less uptake of water by plants<br>• Reduction in infiltration<br><br>Credit valid reasons not described in **1(b)**.<br>Credit application of reasons to the shape of the hydrograph.<br><br>**1 mark** for each simple explanation, **2 marks** for each developed explanation, or **3 marks** for each well developed explanation. Development might come as depth of explanation, the linking of factors together or the relationship to a specific aspect of the changes following deforestation. | **4** |

**Atmosphere and weather**

| Question | Answer | Marks |
|---|---|---|
| 2(a) | **Fig. 2.1 is a photograph which shows a type of precipitation.**<br><br>**Describe the characteristics of the type of precipitation shown in Fig. 2.1.**<br><br>• Fog / cloud / mist<br>• Low lying / close to ground<br>• White in colour<br>• Suspended water droplets (condensation) / very small droplets<br>• Reduces visibility / opaque<br>• Discontinuous / occurs in threads<br><br>**1 mark** for each correctly stated point up to **max. 2 marks**. | **2** |
| 2(b) | **Briefly explain the formation of the type of precipitation shown in Fig. 2.1.**<br><br>• Air cooled close to Earth's surface.<br>• Saturated air leads to condensation and water droplets.<br>• Tiny droplets remain suspended in the air.<br>• Condensation nuclei present allow water droplets to coalesce and grow.<br><br>Allow formation of Advection fog (warm moist air going over colder surface such as body of water).<br><br>Allow formation of Radiation fog (forming at night – cold calm conditions with radiation away from Earth's surface).<br><br>**1 mark** for each correctly stated point up to **max. 3 marks**. | **3** |
| 2(c) | **Explain how orographic uplift of air can lead to precipitation.**<br><br>• Barrier forces air to rise (mountains).<br>• Air expands and cools.<br>• Dew point is reached leading to condensation around hygroscopic nuclei.<br>• Once saturated, air cools at a lower rate causing instability.<br>• Collision or Bergeron processes create larger raindrops.<br><br>Credit use of diagram.<br><br>**1 mark** for each simple explanation, **2 marks** for each developed explanation, or **3 marks** for each well developed explanation. Development might come as depth of explanation, the linking of factors together or the relationship to a specific aspect of linking orographic uplift to the formation of precipitation. | **5** |

**Rocks and weathering**

| Question | Answer | Marks |
|---|---|---|
| 3(a)(i) | **Fig. 3.1 shows tectonic plate boundaries in East Asia.**<br><br>**Identify the plate boundary at X in Fig. 3.1.**<br><br>Destructive / Convergent | **1** |
| 3(a)(ii) | **Name the process at Y in Fig. 3.1.**<br><br>Subduction / convection currents | **1** |
| 3(b) | **Draw a cross section of the plate boundary at line Z. Label the main features.**<br><br>The diagram does not need to perfectly match the figure.<br><br>The following features are expected:<br><br>• Continental plate, crust, Eurasian / Oceanic plate, crust, Philippine<br>• Direction of movement / convection currents<br>• Subduction<br>• Ocean trench / trough<br>• Fold mountains<br>• Volcanoes<br>• Accretionary wedge<br>• Benioff zone<br><br>**1 mark** each for four accurately located features. | **4** |
| 3(c) | **Explain the formation of <u>one</u> landform associated with the type of plate boundary shown at X in Fig. 3.1.**<br><br>Candidates may choose any appropriate feature, such as fold mountains, ocean trenches, volcanoes, etc.<br><br>Allow volcanic (island) arc because of the association with this region.<br><br>Answer should include a description of the sequence of events which leads to the formation of the feature and an explanation of the processes which are involved.<br><br>**1 mark** for each simple explanation, **2 marks** for each developed explanation, or **3 marks** for each well developed explanation. Development might come as depth of explanation or the linking of factors together. | **4** |

## Section B

Answer **one** question from this section. All questions are worth 30 marks.

### Hydrology and fluvial geomorphology

| Question | Answer | Marks |
|---|---|---|
| 4(a)(i) | **Describe <u>two</u> ways that sediment is transported in rivers.**<br><br>The way sediment is transported in rivers is by:<br><br>• Traction<br>• Saltation<br>• Suspension<br>• Solution<br><br>No marks for identification. Description required of each selected transportation process.<br><br>Up to a **maximum of 2 marks** for each description. | **4** |
| 4(a)(ii) | **Describe a riffle and pool sequence in a river channel.**<br><br>Pool is a deeper area of the channel (1) / less turbulent (1) / fine sediment (1).<br><br>Riffle is a shallow area of the channel (1) / turbulent (1) / coarse sediment (1).<br><br>Need both pool and riffle for **3 marks**.<br><br>Give credit for the identification of a pool and riffle sequence within a meandering channel. Discussion of (mean) velocity is also relevant. Credit an annotated diagram. | **3** |

| Question | Answer | Marks |
|---|---|---|
| 4(b) | **Explain how a river flood can impact the natural (physical) environment.**<br><br>The impact a flood will depend on the size and location as well as the management of the flood event. There are a variety of impacts which may be discussed as short term and long term, positive and negative or through a different structure in the answer. Do not credit reference to impact on people.<br><br>Negative impacts can include: loss of vegetation and destruction of habitat, mass movement, pollution of aquatic environments.<br><br>Positive impacts can include: enrichment of floodplain from nutrients and sediments.<br><br>Creation of landforms, e.g. natural levees, braiding, etc., are also relevant.<br><br>Award marks based on the quality of explanation and breadth of the response using the marking levels below.<br><br>A case study approach would be valid.<br><br>**Level 3 (6–8)**<br>Response clearly identifies the impact a flood can have on the environment. Response is well founded in detailed knowledge and strong conceptual understanding of the topic. Any examples used are appropriate and integrated effectively into the response.<br><br>**Level 2 (3–5)**<br>Response identifies some ways a flood can have an impact on the environment. Response develops on a largely secure base of knowledge and understanding. Examples may lack detail or development.<br><br>**Level 1 (1–2)**<br>Response suggests the impact a flood can have on the environment. Knowledge is basic and understanding may be inaccurate. Examples are in name only or lacking entirely.<br><br>**Level 0 (0)**<br>No creditable response. | **8** |

| Question | Answer | Marks |
|---|---|---|
| 4(c) | **'Water abstraction by human activities is the main influence on the groundwater store.'**<br><br>**With the aid of examples, how far do you agree?**<br><br>Candidates are free to develop their own approach to the question and responses will vary depending on the approach chosen. Whichever approach is chosen, essays which address the question and support their argument with relevant examples will be credited. There may be detailed consideration of a case study/one or more examples or a broadly conceived response, drawing on several examples to illustrate the factors involved.<br><br>Abstraction can be for agriculture, industry or domestic use. Groundwater is just one component of the drainage basin hydrological system and is related to the other components in the system. Discussion may include climate and climatic change, seasonality, vegetation, geology (to facilitate/hinder infiltration and percolation), urbanisation.<br><br>Award marks based on the quality of the response using the marking levels below.<br><br>**Level 4 (12–15)**<br>Response thoroughly discusses the factors that influence the groundwater store. Response has good contextual understanding of the groundwater store. Examples used are appropriate and integrated effectively into the response. Response is well founded in detailed knowledge and strong conceptual understanding of the topic.<br><br>**Level 3 (8–11)**<br>Response discusses factors that influence the groundwater store but may be unbalanced. Examples may lack detail or development. Response develops on a largely secure base of knowledge and understanding.<br><br>**Level 2 (4–7)**<br>Response shows general knowledge and understanding of the factors that influence the groundwater store. Response is mainly descriptive or explanatory with limited use of examples and understanding of the topic may be partial or inaccurate. Some concluding remarks. General responses without the use of example(s) will not get above the middle of Level 2 (6 marks).<br><br>**Level 1 (1–3)**<br>Response may broadly discuss influences on the groundwater store but does not address the question and does not come to a convincing conclusion. Response is descriptive, knowledge is basic and understanding is poor.<br><br>**Level 0 (0)**<br>No creditable response. | **15** |

**Atmosphere and weather**

| Question | Answer | Marks |
|---|---|---|
| 5(a)(i) | **Define the atmospheric terms *evaporation* and *convection*.**<br><br>Evaporation is the process of a change of state from a liquid to a gas (1) by heat (1).<br><br>Convection is when air is warmed (1) and rises (1). | **4** |
| 5(a)(ii) | **Briefly explain the latitudinal radiation surplus in the global energy budget.**<br><br>• Located approximately between 40 degrees N and 40 degrees S where incoming solar radiation exceeds outgoing radiation.<br>• The angle of the sun's rays below 40 degrees N and S means heat is spread over a smaller land surface.<br>• Less heat is also lost when rays pass at a low angle through the atmosphere.<br><br>**1 mark** for a simple explanation.<br>**2 marks** for a developed explanation.<br>**3 marks** for a well developed explanation. | **3** |

| Question | Answer | Marks |
|---|---|---|
| 5(b) | **Explain the seasonal variation in global pressure belts.**<br><br>Candidates may discuss the seasonal shift and migration of the ITCZ and low pressure zones due to the passage and position of overhead sun. They may relate their answer to the tricellular model and the movement of the thermal equator. May note the importance of continentality in accentuating the pressure belts.<br><br>Award marks based on the quality of explanation and breadth of the response using the marking levels below.<br><br>**Level 3 (6–8)**<br>Response clearly explains how the global pressure belts vary on a seasonal basis with a detailed explanation of why this is the case. Response is well founded in detailed knowledge and strong conceptual understanding of the topic. Any examples used are appropriate and integrated effectively into the response.<br><br>**Level 2 (3–5)**<br>Response explains how the global pressure belts vary on a seasonal basis with an explanation of why this is the case. Response develops on a largely secure base of knowledge and understanding. Examples may lack detail or development.<br><br>**Level 1 (1–2)**<br>Response contains some understanding of how the global pressure belts vary on a seasonal basis with why this is the case. Knowledge is basic and understanding may be inaccurate. Examples are in name only or lacking entirely.<br><br>**Level 0 (0)**<br>No creditable response. | **8** |

| Question | Answer | Marks |
|---|---|---|
| 5(c) | **'The most significant effect of human activity on urban climates is on wind.'**<br><br>**With the aid of examples, how far do you agree?**<br><br>Candidates are free to develop their own approach to the question and responses will vary depending on the approach chosen. Whichever approach is chosen, essays which address the question and support their argument with relevant examples will be credited. There may be detailed consideration of a case study/one or more examples or a broadly conceived response, drawing on several examples to illustrate the factors involved.<br><br>Candidates should discuss the effect that human activity has on climate and consider the most significant effect being wind. Wind is to be discussed, and candidates may also consider temperature, humidity and precipitation.<br><br>Award marks based on the quality of the response using the marking levels below.<br><br>**Level 4 (12–15)**<br>Response thoroughly discusses the most significant effect of human activity on climate in urban areas. Response has good contextual understanding of the effect human activity has on urban climates and the significance of the effects. Examples used are appropriate and integrated effectively into the response. Response is well founded in detailed knowledge and strong conceptual understanding of the topic.<br><br>**Level 3 (8–11)**<br>Response discusses the most significant effect of human activity on climate in urban areas but may be unbalanced. Examples may lack detail or development. Response develops on a largely secure base of knowledge and understanding.<br><br>**Level 2 (4–7)**<br>Response shows general knowledge and understanding of the most significant effect of human activity on climate in urban areas. Response is mainly descriptive or explanatory with limited use of examples and understanding of the topic may be partial or inaccurate. Some concluding remarks. General responses without the use of example(s) will not get above the middle of Level 2 (6 marks).<br><br>**Level 1 (1–3)**<br>Response may broadly discuss the most significant effect of human activity on climate in urban areas but does not address the question and does not come to a convincing conclusion. Response is descriptive, knowledge is basic and understanding is poor.<br><br>**Level 0 (0)**<br>No creditable response. | **15** |

**Rocks and weathering**

| Question | Answer | Marks |
|---|---|---|
| 6(a)(i) | **Describe the characteristics of a mass movement flow.**<br><br>• Structureless / no shearing<br>• Material can be debris, mud or earth<br>• Can vary in speed depending on type of material<br>• Debris Flow track / elongated / lobe<br>• Scar at top of Flow / Source area<br>• Debris fan or delta. Toe marking extent of flow<br>• Lubrication from water thus saturation of soil<br><br>**1 mark** for each correctly stated point up to **max. 4 marks**.<br>Credit can be given for the use of a correct diagram. | **4** |
| 6(a)(ii) | **Describe the process of a mass movement heave.**<br><br>• Lifting of material out of a slope<br>• Wetting/drying and/or freeze/thaw<br>• Upward movement of fine material right angles / perpendicular to the slope<br>• Material falls back vertically when thawed/dried<br>• Slow movement of material down the slope<br>• No obvious failure surface<br><br>Credit use of annotated diagram. | **3** |

| Question | Answer | Marks |
|---|---|---|
| 6(b) | **Explain how rainfall influences the type and rate of weathering.**<br><br>Reference to the Peltier diagram creditworthy.<br>Reference to the type of weathering. Water is key to physical weathering such as salt crystallisation and freeze thaw, but not exfoliation.<br>Water is very important in chemical weathering processes such as hydrolysis, hydration and carbonation, etc.<br>Rainfall can also influence biological weathering through the development of root structures.<br>Note **type** and **rate** of weathering.<br><br>Areas receiving less than 500mm annual rainfall tend to have very slight weathering of any kind. Higher rates of rainfall lead to stronger chemical weathering. Note that temperature, whilst not asked for, is also a factor but is not needed as part of the answer.<br><br>Award marks based on the quality of explanation and breadth of the response using the marking levels below.<br><br>**Level 3 (6–8)**<br>Response clearly explains how rainfall influences the type and rate of weathering. Response is well founded in detailed knowledge and strong conceptual understanding of the topic. Any examples used are appropriate and integrated effectively into the response.<br><br>**Level 2 (3–5)**<br>Response explains how rainfall influences the type and/or rate of weathering. Response develops on a largely secure base of knowledge and understanding. Examples may lack detail or development.<br><br>**Level 1 (1–2)**<br>Response contains some understanding of how rainfall influences the type and/or rate of weathering but lacks detail. Knowledge is basic and understanding may be inaccurate. Examples are in name only or lacking entirely.<br><br>**Level 0 (0)**<br>No creditable response. | **8** |

| Question | Answer | Marks |
|---|---|---|
| 6(c) | **With the aid of examples, assess the extent to which mass movement can be reduced.**<br><br>Candidates are free to develop their own approach to the question and responses will vary depending on the approach chosen. Whichever approach is chosen, essays which address the question and support their argument with relevant examples will be credited. There may be detailed consideration of a case study/one or more examples or a broadly conceived response, drawing on several examples to illustrate the factors involved.<br><br>General strategies could include pinning, netting, gabions, drainage, afforestation, grouting, etc.<br><br>Candidates are expected to have studied a case study which covers the evaluation of attempts to reduce mass movement. Credit should be given to the details from the case study that help support the answer.<br><br>Award marks based on the quality of the response using the marking levels below.<br><br>**Level 4 (12–15)**<br>Response thoroughly discusses the extent to which mass movement can be reduced. Response has good contextual understanding of reducing mass movement. Examples used are appropriate and integrated effectively into the response. Response is well founded in detailed knowledge and strong conceptual understanding of the topic.<br><br>**Level 3 (8–11)**<br>Response discusses the extent to which mass movement can be reduced but may be unbalanced. Examples may lack detail or development. Response develops on a largely secure base of knowledge and understanding.<br><br>**Level 2 (4–7)**<br>Response shows general knowledge and understanding of the extent to which mass movement can be reduced. Response is mainly descriptive or explanatory with limited use of examples and understanding of the topic may be partial or inaccurate. Some concluding remarks. General responses without the use of example(s) will not get above the middle of Level 2 (6 marks).<br><br>**Level 1 (1–3)**<br>Response may broadly discuss reducing mass movement but does not address the question and does not come to a convincing conclusion. Response is descriptive, knowledge is basic and understanding is poor.<br><br>**Level 0 (0)**<br>No creditable response. | **15** |