Cambridge Assessment International Education

# Cambridge International AS & A Level

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

Paper 1 Core Physical Geography **October/November 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 is a photograph which shows a river flooding.**<br><br>**Name the feature: labelled X**<br><br>Levée/slip-off slope/point bar/embank/edge of floodplain | **1** |
| 1(a)(ii) | **Name the feature: between Y and Z.**<br><br>(River) bluff/embankment/river cliff | **1** |
| 1(b) | **Describe the features of the flooding shown in Fig. 1.1.**<br><br>Points which could be raised:<br>• Extensive flooding/much land covered with water<br>• Intermittent flooding in the right foreground up to the bluff/settlement not flooded<br>• More extensive flooding to the left of the river<br>• Floodplain completely covered in the background<br>• Levées did not stop the flooding/exceeding bankfull stage<br>• There seems to be more overbank flooding at inner bends<br>• Poses a risk to settlement<br><br>Three points for 3 marks. | **3** |
| 1(c) | **Suggest the factors that led to the flooding shown in Fig. 1.1.**<br><br>This is a purely generic question, so any relevant factors can be credited.<br><br>Some possibilities are:<br>• High rainfall amounts/high intensity rainfall/high river discharge<br>• High antecedent moisture in the drainage basin<br>• High runoff from impermeable surfaces<br>• Changes to catchment characteristics<br>• Low lying land<br>• Levée insufficiently high<br>• Lack of specific flood prevention work<br><br>1 mark for a simple explanation, 2 marks for a developed explanation and 3 marks for a well developed explanation up to the maximum. | **5** |

**Atmosphere and weather**

| Question | Answer | Marks |
|---|---|---|
| 2(a) | **Fig. 2.1 shows predicted increased impacts of hazards as a result of global warming, in the USA, 2050.**<br><br>**Which part of the USA is predicted to be most affected by an increase in precipitation?**<br><br>East/eastern area/north-east | **1** |
| 2(b) | **Describe the pattern of predicted increased impacts of hazards shown in Fig. 2.1.**<br><br>Pattern could include groups of specific hazards that occur in one geographical area.<br><br>• Hazards occur generally across the USA/more concentrated in eastern half<br>• Precipitation increase is mostly in the east and south-east<br>• Increased warming is mostly in the north around the Great Lakes and west coast<br>• Increased storms are mostly in the far south-east<br>• Increased water deficit is mainly in the central/mid-west<br>• Increased drought is mostly in the south-west but widely scattered<br><br>Any three accurate points for 3 marks. | **3** |
| 2(c) | **Examine how global warming might explain <u>two</u> of the predicted increased impacts of hazards shown in Fig. 2.1.**<br><br>The detail will depend on which impacts are discussed, but there needs to be a link between the increased hazards and global warming. Response can explain the link between the enhanced greenhouse effect and global warming.<br><br>Two marks for explanation of enhanced greenhouse effect.<br><br>Mark 3/3 or 2/4 for the explanation of two of the impacts of hazards. | **6** |

**Rocks and weathering**

| Question | Answer | Marks |
|---|---|---|
| 3(a) | **Fig. 3.1 shows three types of mass movement.**<br><br>**Name the type of mass movement labelled A.**<br><br>Rotation landslip/landslide/slump/slide (rock/mud) | **1** |
| 3(b) | **Compare the features of the mass movements labelled B and C in Fig. 3.1.**<br><br>B is a mudflow/debris flow and C is a slump.<br><br>The main points on which to base the comparison are:<br>• B is longer and narrower<br>• B exits from a gully/channel in the hills<br>• C possess a back wall/scar, whereas B does not<br>• C appears to be more consolidated and travels less far<br>• Both types extend onto the lowland at the base of the slopes<br>• Both have flowing components<br>• B is gentler overall/C is steeper<br>• B appears to be more fluid/wetter<br><br>Any four valid points for 4 marks. | **4** |
| 3(c) | **Suggest how mass movement B shown in Fig. 3.1 formed.**<br><br>B is a mudflow/debris flow, thus:<br>• (Heavy) precipitation will be the main cause as water will form the basis of the explanation<br>• Water increases weight, increases stress<br>• Gravity effect on steep slopes<br>• Water increases pore water pressure, reducing cohesion in the fine-grained material, thus reducing shear strength<br>• Water might act as a lubricant/less friction<br>• Slope vibrations such as earthquakes<br><br>1 mark for a simple explanation, 2 marks for a developed explanation and 3 marks for a well developed explanation up to the maximum. | **5** |

## Section B

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

### Hydrology and fluvial geomorphology

| Question | Answer | Marks |
|---|---|---|
| 4(a)(i) | **Define the fluvial terms *laminar flow* and *evapotranspiration*.**<br><br>Laminar flow: smooth flow/no eddies (1) in the form of sheets (1)<br><br>Evapotranspiration: the combined process of evaporation (1) and transpiration from the stomata/leaves of vegetation (1) | **4** |
| 4(a)(ii) | **Briefly explain why abrasion/corrasion varies along a river channel.**<br><br>The answers are predicated on an understanding of abrasion/corrasion.<br><br>Abrasion/corrasion will vary because of variations along a channel of the following which need to be explained:<br>• Velocity<br>• Amount of sediment load<br>• Size of sediment load<br>• Discharge<br>• Erodibility of river bed<br><br>1 mark for a simple explanation, 2 marks for a developed explanation and 3 marks for a well developed explanation. | **3** |

| Question | Answer | Marks |
|---|---|---|
| 4(b) | **Explain the relationship between riffle and pool sequences in meandering river channels.**<br><br>Riffles are small ridges of material usually found in straight sections of channels between the bends in meandering channels. Pools occur on the outside bends of meandering channels. Riffles occur at about six times the channel width. Both pools and riffles are caused by eddying. Coarse material is deposited at riffles and fine particles in pools.<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 the relationship between riffle and pool sequences in meandering river channels. Response is well founded in detailed knowledge and strong conceptual understanding of the topic. Examples used are appropriate and integrated effectively into the response.<br><br>**Level 2 (3–5)**<br>Response explains the relationship between riffle and pool sequences in meandering river channels but may be unbalanced. 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 describes some aspects of riffle and pool sequences in meandering river channels. 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) | **'Climate is the most important factor influencing flows and stores in a drainage basin system.'**<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>Climate will influence the flows and stores mostly through precipitation type and intensity. But temperature has an effect on evapotranspiration. There are other factors that need to be evaluated, such as land use, soils and rock type, human activity (e.g. water abstraction, dam building).<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 how climate influences the flows and stores in a drainage basin system. 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 how climate influences the flows and stores in a drainage basin system 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 how climate influences flows and stores in a drainage basin system. 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 how climate influences flows and stores in a drainage basin system 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 *deposition* and *sensible heat transfer*.**<br><br>Atmospheric deposition is where material from the atmosphere (1) is deposited directly onto solid surfaces (1).<br><br>Sensible heat transfer is caused by the movement of parcels of air (1) into and out of an area usually by convection taking its heat with it (1). | **4** |
| 5(a)(ii) | **Briefly explain radiation cooling.**<br><br>The heat released from a warm surface (1) by outgoing radiation (1) usually in clear nights (1).<br><br>Three points for 3 marks. | **3** |
| 5(b) | **Explain how human activity affects precipitation and winds in urban areas.**<br><br>Precipitation is mainly affected by increased convection as a result of higher temperatures. Increased pollution will also increase condensation nuclei. There may also be reference to a minor orographic effect of high buildings. Winds are affected by buildings, resulting in reduced overall velocity, but a canyon effect by buildings will increase gustiness.<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 human activity affects precipitation and winds in urban areas. Response is well founded in detailed knowledge and strong conceptual understanding of the topic. Examples used are appropriate and integrated effectively into the response.<br><br>**Level 2 (3–5)**<br>Response explains how human activity affects precipitation and/or winds in urban areas but may be unbalanced. 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 describes how human activity affects precipitation and/or winds in urban areas. 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) | **With the aid of examples, assess the view that latitude is the most important factor in seasonal variations in pressure and wind belts.**<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>The role of latitude is related to the apparent movement of the overhead sun which affects land and sea temperatures. These affect air pressure which in turn affects the strength and direction of winds. The movement of the ITCZ is also relevant. This needs to be evaluated with respect to other factors that affect seasonal variations in pressure and wind belts. The main ones are land/sea distribution and ocean currents.<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 view that latitude is the most important factor influencing seasonal variations in pressure and wind belts. 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 view that latitude is the most important factor influencing seasonal variations in pressure and wind belts 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 seasonal variations in pressure and wind belts and the influence of latitude. 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 view that latitude is the most important factor in influencing seasonal variations in pressure and wind belts 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) | **Contrast continental and oceanic tectonic plates.**<br><br>The main points are:<br>• The material of oceanic plates is silica and magnesium (sima) whereas continental plates are silica and aluminium (sial)<br>• Oceanic plates have a greater density<br>• Oceanic plates are younger<br>• Oceanic plates are thinner<br>• Oceanic plates can be destroyed (subducted) or renewed, whereas continental plates are largely stable<br>• More variety of rocks on continental plates<br><br>Four points for 4 marks. | **4** |
| 6(a)(ii) | **Briefly explain the distribution of volcanic island arcs.**<br><br>As volcanic island arcs are formed by the subduction of an oceanic plate below another oceanic plate, the distribution of island arcs is governed by the location of such destructive plate boundaries.<br><br>1 mark for a simple explanation, 2 marks for a developed explanation and 3 marks for a well developed explanation. | **3** |

| Question | Answer | Marks |
|---|---|---|
| 6(b) | **Explain how afforestation and slope grading can reduce mass movements on slopes.**<br><br>Afforestation will remove water from the slope and may also provide a root binding effect. However, this effect will only have an influence with respect to the depth and density of the root network. Thus, trees might reduce shallow mass movements but not more deep-seated ones. Large trees may also have a destabilising effect because of their weight and when strong winds lead to swaying of trees. Slope grading effectively reduces the downslope influence of gravity, although the act of grading reduces the overall angle of the slope by redistributing material from the top to the bottom of the slope. Terracing is not a form of slope grading as it does not change the overall angle of the slope.<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 afforestation and slope grading can reduce mass movements on slopes. Response is well founded in detailed knowledge and strong conceptual understanding of the topic. Examples used are appropriate and integrated effectively into the response.<br><br>**Level 2 (3–5)**<br>Response explains how afforestation and/or slope grading can reduce mass movements on slopes. 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 describes how afforestation and/or slope grading can reduce mass movements on slopes. 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) | **'Temperature is the most important factor affecting the type and rate of weathering.'**<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>Many factors, other than temperature, also affect the type and rate of weathering (precipitation, rock type and structure, relief, vegetation) but temperature is involved in most weathering processes, both physical and chemical. Unloading (dilatation) is the exception where temperature is not involved.<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 whether temperature is the most important factor affecting the type and rate of weathering. 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 how temperature affects the type and rate of weathering and whether it is the most important factor 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 how temperature affects the type and rate of weathering. 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 how temperature affects the type and rate of weathering 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** |