Cambridge Assessment International Education

Cambridge International AS & A Level

GEOGRAPHY **9696/11**

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.

Cambridge International is publishing the mark schemes for the October/November 2021 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

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)	**Fig. 1.1 is a photograph which shows the High Country Rivers, New Zealand.** **Name the type of river channel shown in Fig. 1.1.** Braided	**1**
1(b)	**Draw a cross-section of the river channel from X to Y shown in Fig. 1.1. Label the main features.** The main river features which could be shown are: • Multiple channels and islands/sand bars • The flat nature of the channel floor • Low vertical banks 2 marks for the cross-section, and 2 marks for the labelling.	**4**
1(c)	**Suggest reasons for the formation of the channel type shown in Fig. 1.1.** Explanation will be in terms of the factors causing braiding. The main ones are: high fluctuating discharges with a large, coarse sediment load, erodible banks, sudden change in gradient. 1 mark for each simple explanation, 2 marks for a developed explanation up to a maximum of 5 marks.	**5**

Atmosphere and weather

Question	Answer	Marks
2(a)	**Fig. 2.1 shows average solar radiation and average global surface temperature change, 1910–2010.** **State the year when average solar radiation is the highest as shown in Fig. 2.1.** 1954 or 1955	**1**
2(b)	**Compare the trends in average solar radiation and average global surface temperature change shown in Fig. 2.1.** • Both average solar radiation change and average global surface temperature change have similar rising trends initially after 1910 with solar radiation reaching a minor peak ten years later than temperature change (1940 v 1950) • Solar radiation then declines rapidly and then a constant fluctuation whereas temperature change embarks on a continuous rising trend Four points of comparison using the above points. One mark may be credited for valid data. If two separate accounts with no comparison, maximum 2 marks.	**4**
2(c)	**Suggest reasons for the trend in average global surface temperature change shown in Fig. 2.1.** The explanation will be in terms of the enhanced greenhouse effect. The processes behind the increasing greenhouse gas concentration in the atmosphere, the trapping of outgoing radiation and the nature of the relevant gases should be discussed (carbon dioxide, methane, aerosols, etc.). An interesting point is that the trends are similar up to 1940. It is after that date that temperature change diverts. This suggests that the enhanced greenhouse effect begins to assert an influence at this point. Note expansion of industry, deforestation, fossil fuels, etc. Accept the general spread of urbanisation, population, transport, etc., as an additional point. 1 mark for each simple explanation, 2 marks for a developed explanation up to a maximum of 5 marks.	**5**

Rocks and weathering

Question	Answer	Marks
3(a)	**Fig. 3.1 and Fig. 3.2 show tectonic landforms and processes at two types of convergent plate boundaries.** **Name the process at Z shown in Fig. 3.1.** Subduction	**1**
3(b)	**Compare the tectonic landforms and processes between Fig. 3.1 and Fig. 3.2.** • The main differences in the processes are that oceanic-continental convergence is characterised by subduction, whereas continental-continental collision is not • Oceanic-continental convergence is characterised by oceanic trenches, fold mountains and continental volcanoes • Continent-continent collision only has fold mountains • The main similarity is that in both cases the plates are converging, and fold mountains are created in both cases 1 mark for each simple difference, 2 marks for a developed point up to a maximum of 5 marks.	**5**
3(c)	**Explain the formation of tectonic landforms at divergent (constructive) plate boundaries.** The main explanation will be in terms of: • Convection currents moving the plates apart, mostly oceanic • Creation of a mid-ocean trench or rift valley • Upwelling of magma (volcanoes) • Formation of a mid-ocean ridge • Transform faults 1 mark for each simple explanation, 2 marks for a developed explanation up to a maximum of 4 marks. Credit explanatory diagram.	**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)	**Define the fluvial terms *solution* and *throughflow*.** Solution: a transport process (1) where dissolved minerals are carried downstream (1). Throughflow: the downslope movement of water (1) within the soil towards the river channel (1) parallel to the surface (1).	**4**
4(a)(ii)	**Briefly explain how turbulent flow causes erosion in river channels**. The main characteristic of turbulent flow are eddies (1), and it is this turbulent movement in different directions (1) with entrained particles that initiates and leads to erosion, especially potholes (1).	**3**
4(b)	**Explain how water stores in a drainage basin system are affected by changes in land use.** The water in the stores will be affected by changes in flows. These could include groundwater, lakes, reservoirs, etc. These will need to be discussed and how these are affected by land use change. The argument will depend on the land use changes discussed. The most frequent change discussed will probably be from forest cover to urban land use. But changes from one rural land use to another will also be relevant. Award marks based on the quality of explanation and breadth of the response using the marking levels below. **Level 3 (6–8)** Response clearly explains how stores in a drainage basin system are affected by changes in land use. 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. **Level 2 (3–5)** Response explains how stores in a drainage basin system are affected by changes in land use. Response develops on a largely secure base of knowledge and understanding. Examples may lack detail or development. **Level 1 (1–2)** Response describes how stores in a drainage basin system are affected by changes in land use. Knowledge is basic and understanding may be inaccurate. Examples are in name only or lacking entirely. **Level 0 (0)** No creditable response.	**8**

Question	Answer	Marks
4(c)	**'The characteristics of the soil are the most significant influence on the shape of a storm hydrograph.'** **With the aid of examples, how far do you agree?** 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. Candidates are likely to discuss characteristics such as soil permeability and porosity. They may also discuss characteristics such as antecedent soil moisture. The argument may form around the characteristics of the soil against other factors that influence the shape of a storm hydrograph. Factors such as vegetation cover and parent rock are closely linked to the soil characteristics, as are other factors such as shape of drainage basin and human activity. Nevertheless, the argument will consider the significance of the characteristics of soil. Award marks based on the quality of the response using the marking levels below. **Level 4 (12–15)** Response thoroughly discusses the significance of the influence of the characteristics of soil, and other factors, on the shape of the storm hydrograph. Examples used are appropriate and integrated effectively into the response. Response is well founded in detailed knowledge and strong conceptual understanding of the topic. **Level 3 (8–11)** Response discusses the significance of the influence of the characteristics of soil, and other factors, on the shape of the storm hydrograph but may be unbalanced. Examples may lack detail or development. Response develops on a largely secure base of knowledge and understanding. **Level 2 (4–7)** Response shows general knowledge and understanding of how soil affects the shape of the storm hydrograph. 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). **Level 1 (1–3)** Response may broadly discuss reasons for different shapes of storm hydrographs but does not address the question and does not come to a convincing conclusion. Response is descriptive, knowledge is basic and understanding is poor. **Level 0 (0)** No creditable response.	**15**

Atmosphere and weather

Question	Answer	Marks
5(a)(i)	**Describe the factors involved in the formation of rain**. Rising air (1) cools and condenses (dew point) (1) around condensation nuclei (1).	**3**
5(a)(ii)	**Briefly explain the formation of fog.** The two main mechanisms involve advection or radiation. Advection involves: • The movement of warm air • Over a cold surface • With the cooling of the air • Leading to condensation at low levels Radiation involves: • Radiation cooling of the ground • At night with clear skies and calm conditions • Leading to the cooling of the air near the ground • Leading to condensation Reference to both advection and radiation required for full marks.	**4**

Question	Answer	Marks
5(b)	**Explain the daytime part of the diurnal energy budget.** The daytime energy budget is a six-factor model. All the components need description and explanation. Incoming solar radiation, reflected solar radiation, energy absorbed at the surface, sensible heat transfer, latent heat transfer, long wave radiation. Answer could be approached through a diagram, but both description and explanation are required for high marks. Award marks based on the quality of explanation and breadth of the response using the marking levels below. **Level 3 (6–8)** Response clearly explains the daytime part of the diurnal energy budget. 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. **Level 2 (3–5)** Response explains the daytime part of the diurnal energy budget. Response develops on a largely secure base of knowledge and understanding. Examples may lack detail or development. **Level 1 (1–2)** Response describes the daytime part of the diurnal energy budget. Knowledge is basic and understanding may be inaccurate. Examples are in name only or lacking entirely. **Level 0 (0)** No creditable response.	**8**

Question	Answer	Marks
5(c)	**With the aid of examples, assess the extent to which the urban heat island influences other characteristics of urban climate.** 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. The heat island refers to the increased temperatures found in urban areas compared to the temperatures of the immediate surroundings. The urban heat island influences other characteristics such as humidity, precipitation and wind. The answer should consider these elements and come to a conclusion. Some limited credit can be awarded for understanding the higher temperatures associated with urban heat islands. Award marks based on the quality of the response using the marking levels below. **Level 4 (12–15)** Response thoroughly discusses how the urban heat island influences other characteristics of urban climate. Examples used are appropriate and integrated effectively into the response. Response is well founded in detailed knowledge and strong conceptual understanding of the topic. **Level 3 (8–11)** Response discusses how the urban heat island influences other characteristics of urban climate but may be unbalanced. Examples may lack detail or development. Response develops on a largely secure base of knowledge and understanding. **Level 2 (4–7)** Response shows general knowledge and understanding as to how the urban heat island influences other characteristics of urban climate. 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). **Level 1 (1–3)** Response may broadly discuss how the urban heat island influences other characteristics of urban climate but does not address the question and does not come to a convincing conclusion. Response is descriptive, knowledge is basic and understanding is poor. **Level 0 (0)** No creditable response.	**15**

Rocks and weathering

Question	Answer	Marks
6(a)(i)	**Define the weathering terms *salt crystal growth* and *hydration*.** Salt crystal growth: water entering cracks and pores in rock (1) evaporates, leaving salts which expand, putting pressure on the rock (1). Hydration: water entering minerals in rock (1) which causes expansion and leads to rock disintegration (1). Credit the idea that joints and crevices can lead to other types of weathering such as carbonation, freeze-thaw, etc.	**4**
6(a)(ii)	**Briefly explain how vegetation root action can lead to the weathering of rocks.** The growth of roots in rock joints and crevices (1), leading to pressure on the rock (1) which can cause rock break up (1).	**3**
6(b)	**Explain how rock type affects the type and rate of chemical weathering.** Rock type is one of the main determinants of the type and rate of chemical weathering. Some rock types are susceptible to specific weathering processes. Thus, granite is vulnerable to hydrolysis and calcareous rocks to carbonation. Rock with joints and bedding planes tends to be more vulnerable because of the ease with which water can penetrate the rock. Award marks based on the quality of explanation and breadth of the response using the marking levels below. **Level 3 (6–8)** Response clearly explains how rock type affects the type and rate of chemical 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. **Level 2 (3–5)** Response explains how rock type affects the type and rate of chemical weathering. Response develops on a largely secure base of knowledge and understanding. Examples may lack detail or development. **Level 1 (1–2)** Response describes how rock type affects the type and rate of chemical weathering. Knowledge is basic and understanding may be inaccurate. Examples are in name only or lacking entirely. **Level 0 (0)** No creditable response.	**8**

Question	Answer	Marks
6(c)	**'Water is the most important factor influencing mass movement on slopes.'** **With the aid of examples, how far do you agree?** 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. Water is a major factor in causing most mass movement types. It can lubricate shear planes for landslides and increase pore water pressure for mudflows. Water also increases the weight of material on slopes. Water is involved in freeze-thaw weathering which might instigate rockfalls. A range of mass movement types should be examined. As the question is evaluative, other factors influencing mass movement should be discussed, such as jointing, gradient, human activity, vegetation, earthquakes, etc. Award marks based on the quality of the response using the marking levels below. **Level 4 (12–15)** Response thoroughly discusses the role of water, and other factors, in influencing mass movement on slopes. Examples used are appropriate and integrated effectively into the response. Response is well founded in detailed knowledge and strong conceptual understanding of the topic. **Level 3 (8–11)** Response discusses the role of water, and other factors, in influencing mass movement on slopes but may be unbalanced. Examples may lack detail or development. Response develops on a largely secure base of knowledge and understanding. **Level 2 (4–7)** Response shows general knowledge and understanding of the role of water in influencing mass movement on slopes. 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). **Level 1 (1–3)** Response may broadly discuss the role of water in influencing mass movement on slopes but does not address the question and does not come to a convincing conclusion. Response is descriptive, knowledge is basic and understanding is poor. **Level 0 (0)** No creditable response.	**15**