Cambridge International AS & A Level

Cambridge Assessment International Education
Cambridge International Advanced Subsidiary and Advanced Level

GEOGRAPHY **9696/13**

Paper 1 Core Physical Geography **October/November 2019**

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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Cambridge Assessment International Education

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.

Hydrology and fluvial geomorphology

Question	Answer	Marks
1(a)	**Fig. 1.1 shows the development of a river channel.** **Identify feature A shown in Fig. 1.1.** Slip-off slope, point bar. Accept an area of deposition.	**1**
1(b)	**Compare the river channel at Stage 1 with the river channel at Stage 3 as shown in Fig. 1.1.** The main differences between Stages 1 and 3 are: • increase in length as a result of increased sinuosity • development of river cliffs • development of point bars • development of more conspicuous mid-channel zones of deposition (bars) Similarities between the stages: • both have riffles • both have mid-channel areas of deposition (bars) Three relevant points for full marks. Maximum 2 if two separate statements.	**3**
1(c)	**Explain the changes you described in <u>(b)</u>.** The main points that need discussion are: • the development of pools and riffles • leading to helicoidal flow • erosion at the outer bends and deposition at the inner bends (point bars) Marks for development, but all three needed for full marks.	**6**

Atmosphere and weather

Question	Answer	Marks
2(a)	**Fig. 2.1 shows global average temperature, 1900–2010.** **Calculate the difference in global average temperature between 1910 and 1980 shown in Fig. 2.1. Show your working.** 13.82°C and 14.22°C, thus 0.4°C. Degrees Celsius and working need to be mentioned in the answer for 2 marks.	**2**
2(b)	**Describe the trend in global average temperature shown in Fig. 2.1.** The main points that could be noted are: • a general rising trend (1) (required for 3 marks) • fluctuations around the general rising trend (1) • a period of general decline between 1936 and 1964 (1)	**3**
2(c)	**Suggest reasons for the trend in global average temperature after 1960.** The enhanced greenhouse effect should be used as an explanation for the steeply rising trend. There needs to be reference to more than one greenhouse gas (carbon dioxide/methane/CFCs, etc.) and the reasons for the increased amounts of such gases in the atmosphere. Holes in the ozone layer get no credit. Possible discussion points related to the increase in greenhouse gases and thus the enhanced greenhouse effect are: • increased use of fossil fuels/industrialisation • population increase • increased standard of living (cars, travel, etc.) • urbanisation • deforestation/agriculture Two main reasons with development are sufficient for 5 marks.	**5**

Rocks and weathering

Question	Answer	Marks
3(a)	**Fig. 3.1 shows a photograph of a mass movement.** **Name the type of mass movement shown in Fig. 3.1.** Rockfall / fall	**1**
3(b)	**Describe <u>three</u> features of the mass movement shown in Fig. 3.1.** The features which could be noted are: • cone of debris of mixed sizes/scree/talus • very steep rock face/scar • jointed and fractured nature of the rock • bare rock/no vegetation	**3**
3(c)	**Explain how the mass movement shown in Fig. 3.1 may have occurred.** A number of suggestions can be made such as: • the role of specific weathering processes (such as frost shattering, hydration, etc.) in weakening the rock • undercutting by the construction of the road, leading to increased stresses • undercutting by the river • vibrations caused by traffic • the effect of earthquakes Maximum 3 for one developed point.	**6**

Section B

Answer **one** question from this section.

Hydrology and fluvial geomorphology

Question	Answer	Marks
4(a)(i)	**Define the hydrological terms *antecedent moisture* and *stemflow*.** Antecedent moisture is the existing moisture in the soil (1) from a previous rainfall event or before a new rainfall event (1). Stemflow is the movement of precipitation down the stem of the vegetation/trees to the ground (1) after it has been intercepted by vegetation (1).	**4**
4(a)(ii)	**Briefly explain the formation of springs.** Springs are the outflowing of water on a slope/ground surface where throughflow is impeded and has to rise to the surface (1). It can be the result of impermeable zones in rock or soil (1) or simply a rise in the water table (1).	**3**

Question	Answer	Marks
4(b)	**Describe and explain the factors leading to seasonal variations in an annual river hydrograph.** Annual hydrographs show the river flow through a year and thus reflect the changing factors that lead to variations in flow. These could be variations in agricultural land use and leaf cover on trees, seasonal variations in evapotranspiration and in precipitation type and amounts, including factors such as snow and ice melt. Seasonal variations in water abstraction is also relevant. Award marks based on the quality of explanation and breadth of the response using the marking levels below. **Level 3 (6–8)** Response considers a variety of factors that vary throughout the year and that could lead to variations in river flow such as human activity and climatic factors. 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 considers some of the factors leading to seasonal variations in discharge but is limited in the range of factors discussed. Response develops on a largely secure base of knowledge and understanding. Examples may lack detail or development. **Level 1 (1–2)** Response lists one or more descriptive points about factors that affect the annual hydrograph. 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)	**With the aid of examples, assess the extent to which soft engineering is more effective than hard engineering in preventing river floods.** 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. Whichever approach is chosen, knowledge of both soft engineering techniques (land use zoning, washland, afforestation, river bank conservation, river restoration, etc.) and hard engineering techniques (dams, reservoirs, embankments, channel straightening, dredging, channel diversion, relief channels, etc.) needs discussing in a relatively balanced way. The use of examples of located river management and/or engineering techniques is needed to enhance the assessment. Award marks based on the quality of the response using the marking levels below. **Level 4 (12–15)** Response thoroughly discusses the complex nature of floods and prevention techniques, using specific initiatives for flood prevention with a balanced approach between soft and hard engineering. Response is well founded in detailed knowledge and strong conceptual understanding of the topic. **Level 3 (8–11)** Response discusses both soft and hard engineering techniques 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 soft and hard engineering techniques but may be very unbalanced. 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 soft and hard engineering techniques 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)	**Define the terms *incoming solar radiation* and *condensation*.** Incoming solar radiation is shortwave radiation (insolation) (1) from the sun (1). Condensation is formation of water droplets (gas to liquid) (1) as a result of a drop in temperature to the dew point (1).	**4**
5(a)(ii)	**Briefly explain how radiation cooling occurs.** Points that need discussing in the explanation are: • radiation cooling is when the ground cools as a result of outgoing terrestrial (longwave) radiation • radiation cooling takes place mostly at night • under calm conditions • with clear skies Three points for 3 marks.	**3**

Question	Answer	Marks
5(b)	**Explain how convectional uplift of air can lead to precipitation.** Convection causes uplift of air as the ground is heated and the heat is transferred to the adjacent air. Precipitation occurs when the heated air rises, is cooled to dew point and water droplets grow (coalesce) and fall as precipitation. 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 convection causes the uplift of air, followed by condensation and the formation of clouds and precipitation. 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 provides an explanation of how convection causes the uplift of air, followed by condensation and the formation of clouds and precipitation. Response develops on a largely secure base of knowledge and understanding. Examples may lack detail or development. **Level 1 (1–2)** Response describes how convectional uplift occurs and leads to precipitation. 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 a case study, assess the extent to which human activity affects the climate of an urban area.** 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 should be detailed consideration of a case study, but a broadly conceived response, drawing on several examples to illustrate the factors involved, can gain credit. This question reflects the need to examine a specific urban area and the factors that affect its climate. This question asks for a consideration of a range of climatic factors such as temperature, humidity, precipitation and winds. These need discussing but not necessarily to the same extent. Human activities could be land use in the urban area, structure of buildings, industry, transport, etc. Award marks based on the quality of the response using the marking levels below. **Level 4 (12–15)** Response thoroughly discusses the effect of human activity on a range of climatic characteristics in the chosen urban area in a balanced way. Response is well founded in detailed knowledge and strong conceptual understanding of the topic. **Level 3 (8–11)** Response discusses the effect of human activity on the climate of a specific urban area 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 effect of human activity on the climate of a specific urban area. 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 effect of human activity on the climate of urban areas but there may be no or little reference to a specific urban area. 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)	**Describe the nature of conservative plate boundaries.** Conservative plate boundaries are: • boundaries where two plates are moving side by side • either in the same direction but at different speeds • or in opposite directions • no landforms are created or destroyed • frictional activity/earthquakes Three separate points for 3 marks.	**3**
6(a)(ii)	**Explain how ocean ridges are formed.** The key elements are: • the moving apart of oceanic plates • as a result of convection currents in the mantle • rising of magma • which cools and accumulates to form the ridges	**4**

Question	Answer	Marks
6(b)	**Describe and explain how vegetation affects the weathering of rocks.** Vegetation can affect weathering in several ways such as by direct action of roots or humic acids or indirectly by protecting the surface from physical weathering. There needs to be a balanced assessment of different types of weathering and how these are affected by vegetation. Vegetation leads to: • increased chemical weathering through the release of organic acids • increased carbonation by release of carbon dioxide from roots and decaying vegetation • increased chelation by growth of lichens on rock surfaces • increased biological weathering by pressure caused by root growth in cracks and crevices in the rock • reduced physical weathering by protection of the surface reducing thermal insulation Award marks based on the quality of explanation and breadth of the response using the marking levels below. **Level 3 (6–8)** Response describes and thoroughly explains the effects of vegetation on the type and rate of a range of weathering processes. 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 effects of vegetation on the type and rate of a range of weathering processes. Response develops on a largely secure base of knowledge and understanding. Examples may lack detail or development. **Level 1 (1–2)** Response describes the effect of vegetation on 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)	**With the aid of examples, discuss the view that the type of tectonic plate boundary determines the tectonic landforms produced.** 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, or a broadly conceived response, drawing on several examples to illustrate the factors involved. There are four main plate boundary types: destructive convergent, collision convergent, divergent and conservative. The greatest variety of landforms is produced at destructive plate boundaries: where subduction produces trenches, volcanoes and island arcs when two oceanic plates converge, and trenches, volcanoes and fold mountains when oceanic plates and continental plates converge. Divergent plate boundaries produce ocean ridges, volcanoes and rift valleys. Collision, non-subductive, plate boundaries only produce fold mountains and there is no volcanic action. No distinctive landforms are produced at conservative boundaries, although small fault scarps might be created. Award marks based on the quality of the response using the marking levels below. **Level 4 (12–15)** Response thoroughly discusses the landforms associated with plate boundaries in a balanced way. Response is well founded in detailed knowledge and strong conceptual understanding of the topic. **Level 3 (8–11)** Response discusses the landforms associated with plate boundaries 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 landforms at plate boundaries. 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 landforms at plate boundaries 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**