Cambridge International AS & A Level

Cambridge Assessment International Education
Cambridge International Advanced Subsidiary and Advanced Level

GEOGRAPHY **9696/12**

Paper 1 Core Physical Geography **May/June 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.

Cambridge International is publishing the mark schemes for the May/June 2019 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U 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.

Hydrology and fluvial geomorphology

Question	Answer	Marks
1(a)(i)	**Fig. 1.1 shows a storm hydrograph.** **Using Fig. 1.1: state the peak discharge** 50 (accept 48–52) cumecs Units are needed for the mark	**1**
1(a)(ii)	**Using Fig. 1.1: name A and B.** A = recessional limb / falling limb / descending limb / receding limb – limb required B = base flow / groundwater flow	**2**
1(b)	**Calculate the lag time in Fig. 1.1. Show your working.** Working showing calculation of 0200 day 2 – 1600 (1545–1645) day 1 (1) 10 (10.15–9.15) hours (1) Allow variation, as noted above, for reading taken from any point on peak precipitation bar.	**2**
1(c)	**Explain <u>two</u> factors that affect the shape of a storm hydrograph.** The candidate may refer to: • landuse (e.g. urbanisation, nature of agriculture) • nature and intensity of precipitation • shape and size of drainage basin • drainage density • porosity and permeability of soils • rock type • slopes • vegetation type 1 mark for each simple explanation, 2 marks for a developed explanation up to the maximum of 3 marks for any point. Mark 3 + 2 or 2 + 3	**5**

Atmosphere and weather

Question	Answer	Marks
2(a)	**Fig. 2.1 shows the global pattern of ocean currents.** **Using Fig. 2.1, describe the pattern of ocean currents in the Southern Hemisphere.** The emphasis should be on the pattern and not a current by current account. • most are circular / anti-clockwise (1) • all have the warmer current flowing towards the south and the colder current flowing towards the north (1) • S. Equatorial current flowing west near the equator (1) • East Wind Drift current flowing west along 60 °S / west wind drift 40–60 °S (1) Three points for 3 marks.	**3**
2(b)	**Explain <u>two</u> ways in which the ocean currents described in <u>(a)</u> affect the seasonal variation of temperature in the Southern Hemisphere.** The emphasis should be on seasonal variation. Seasonal changes in temperature can be the result of winds, modified by the temperature of ocean currents, meeting continental air (prevailing winds will influence the effectiveness of changing temperatures at the coast). Ocean currents transport heat energy (about 25% of the total energy budget). Thus, ocean currents will tend to decrease seasonal temperature variations in coastal areas (warm ocean currents will tend to increase minimum winter temperatures, cold ocean currents will tend to decrease summer maximum temperatures). 1 mark for a simple explanation. 2 marks for each developed explanation.	**4**
2(c)	**Explain <u>one</u> factor, other than ocean currents, that affects the seasonal variation of temperature in the Southern Hemisphere.** The syllabus suggests that the candidate can offer either latitude or land sea distribution with the emphasis again on seasonal variations. For latitude the apparent movement of the sun, north and south, will affect seasonal variations in temperature. This could be linked to seasonal pressure changes and winds. Land-sea distribution could be part of another explanation with different thermal capacities of the land and sea. The sea heats more slowly in the summer than the land, and retains heat in the winter more than the land. 1 mark for each simple explanation, 2 marks for a developed explanation up to the maximum of 3 marks.	**3**

Rocks and weathering

Question	Answer	Marks
3(a)(i)	**Fig. 3.1 shows types of mass movement.** **Using Fig. 3.1, name the mass movement at: Y** Heave / creep (soil)	**1**
3(a)(ii)	**Using Fig. 3.1, name the mass movement at: Z** Fall (rock)	**1**
3(b)	**Using evidence from Fig. 3.1, compare the effects of mass movements Y and Z on the slopes.** Fig. 3.1 shows that Y has less scarring on the landscape (1), as the vegetation has time to adapt (1) to the changing dynamics of the slope. Z has a very clear bare rock face (1) with a collection of scree at the foot of the slope (1) with a steep gradient (1). The gradient change is not as pronounced in Y compared to Z (1). Dislocation of human factors (road, fence) and trees (1) in Y.	**4**
3(c)	**Explain why mass movement Z may have occurred.** Material has become detached because of: • weathering (freeze-thaw, wetting and drying) • vegetation (growth of roots, etc.) • seismic activity • precipitation • rock structure • human activity 1 mark for each simple explanation, 2 marks for each developed explanation relevant to mass movement Z.	**4**

Section B

Answer **one** question from this section.

Hydrology and fluvial geomorphology

Question	Answer	Marks
4(a)(i)	**Describe how underground water recharge occurs.** Water movement from the surface (infiltration) (1), deep percolation of water (1) into saturated / groundwater zone (1).	**3**
4(a)(ii)	**Explain how channel straightening may help prevent river flooding.** Increases the velocity (1) steepens the gradient (1) as meanders are removed (1), increased scouring increases river capacity (1), floodwater is taken downstream more quickly from the area that has been straightened (1).	**4**

Question	Answer	Marks
4(b)	**Describe and explain different patterns of flow within a river channel.** The three key flows are laminar, turbulent and helicoidal. The candidate may show awareness that most flows are not laminar: • laminar flow results from a smooth bed and flows in a simple sheet • turbulent flow occurs at higher rates of velocity, or with a rough stream bed, causing eddies. • helicoidal flow is where the core of maximum velocity follows a corkscrew or spiralling path as it flows downstream, often producing an asymmetrical cross section. Secondary flows may be mentioned. The cross-section profile of a river flow may be drawn, and credit can be given for this. 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 three key different patterns of flow within a river and the circumstances under which they form. 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 describes some different patterns of flow within a river and the circumstances under which they form. Response develops on a largely secure base of knowledge and understanding. Examples may lack detail or development. **Level 1 (1–2)** Response describes some of the different patterns of flow within a river and the circumstances under which they form. The precise terms are lacking. 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)	**'River flooding impacts the environment more than it impacts people.'** **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 route is chosen, essays which discuss the key aspects of environmental impact verses people and support their argument with relevant examples will be credited. There may be detailed consideration of one or more examples, or a broadly conceived response, drawing on several examples to illustrate the factors involved. The approach could be comparing one detailed case study looking at the impact on the environment (natural and / or manmade) versus the people. Or another approach could be to go through the different impacts (economic / social / environmental) and attempt to quantify them in order for a comparison to be made to then answer the main point of the essay. Although the emphasis will be on negative impacts, the recognition that some environmental impacts could be positive (addition of nutrients, alluvium, creation of diverse habitats such as wetland, marshes) might indicate a higher level response. Award marks based on the quality of the response using the marking levels below. **Level 4 (12–15)** Response thoroughly discusses the extent that flooding impacts the environment more than people or vice versa, with clear assessment of contrasts. Response has good contextual understanding of the concepts such as different costs and measures of impacts. Response is well founded in detailed knowledge and strong conceptual understanding of the topic. **Level 3 (8–11)** Response discusses the extent that flooding impacts the environment more than people or vice versa, with assessment of contrasts 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 impacts of floods, but may not consider the balance fully between the environment and people. 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 impacts of floods 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 *orographic uplift* and *condensation*.** When air is forced upwards (1) because of the terrain / relief / topography (1). When gas turns into a liquid (1) through cooling (1).	**4**
5(a)(ii)	**Describe how fog forms.** Air is cooled (1), with water vapour condensing (1), under calm conditions (near the ground) (1). Cooling can be the result of radiation loss or advection.	**3**

Question	Answer	Marks
5(b)	**With reference to <u>one</u> urban area, describe and explain the effects of human activity on precipitation and winds.** A purely generic answer will not get above the middle of Level 2. Simply stating an urban area with little specific detail will get limited credit. Generally with respect to precipitation, urban areas have greater cloud cover, partly because of the increase in condensation nuclei compared to surrounding areas and partly an orographic effect. The heating within urban areas also encourages uplift which helps to form precipitation. The uplift of air also encourages the air from surrounding areas to be drawn in due to the pressure difference. Winds tend to be lower, as the buildings provide greater friction. There are also wind tunnel effects, as building spacing and shape results in the wind being more variable. There is turbulence and frictional drag. The localised higher velocities can also be due to the Venturi effect. Award marks based on the quality of explanation and breadth of the response using the marking levels below. **Level 3 (6–8)** Response clearly links how human activity affects both precipitation and wind. 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 links how either precipitation or wind are affected by human activity. The response may be unbalanced or the link is not detailed. Response develops on a largely secure base of knowledge and understanding. Examples may lack detail or development. **Level 1 (1–2)** Response contains some understanding of how human activity may affect temperature or humidity, though the terms are lacking and the link is vague. 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 reflected solar radiation is the most important factor in determining the diurnal energy budget.** Candidates are free to develop their own approach to the question and responses will vary depending on the approach chosen. Whichever route is chosen, essays which discuss the extent to which reflected solar radiation is the most important factor and support their argument with relevant examples will be credited. There may be detailed consideration of one or more examples, or a broadly conceived response, drawing on several examples to illustrate the factors involved. Reflected solar radiation clearly has a significant effect on the diurnal energy budget, with a clear difference between night time and day time energy budgets. This clearly is an important factor when considering the overall temperature and diurnal energy budget. Albedo rates might be discussed. However, it is not just the reflected solar radiation which has a significant influence on the diurnal energy budget. A variety of other factors in the diurnal energy budget (incoming solar radiation, outgoing radiation, absorption, sensible heat transfer, latent heat, cloud cover, seasonality, human activity etc.) could be discussed. Diagrams of the energy budget (daytime and night time) could be credited. Award marks based on the quality of the response using the marking levels below. **Level 4 (12–15)** Response thoroughly discusses the extent that reflected solar radiation is the most important factor in determining the diurnal energy budget, with clear assessment of other factors. Response has good contextual understanding of the concepts and the energy budget. Candidates consider the significance of solar radiation in determining the diurnal energy budget, and are able to draw examples from different surface materials. Response is well founded in detailed knowledge and strong conceptual understanding of the topic. **Level 3 (8–11)** Response discusses the extent that reflected solar radiation is the most important factor in determining the diurnal energy budget, with some assessment of other factors 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 reflected solar radiation has on the diurnal energy budget. 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).	**15**

Question	Answer	Marks
5(c)	**Level 1 (1–3)** Response may broadly discuss reflected solar radiation and diurnal energy budget 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.	

Rocks and weathering

Question	Answer	Marks
6(a)(i)	**Define the terms *sheetwash* and *rainsplash*.** Sheetwash is the movement of water on a sloping surface (1) as a uniform layer (1). Rainsplash is where soil is detached by raindrops (1) hitting the surface (1).	**4**
6(a)(ii)	**Briefly describe how netting can reduce mass movements on slopes.** Netting: • helps to contain loose material (1) • can be contoured to slopes to prevent larger movements (1) • can catch debris (1) • can stabilise slopes by allowing other management techniques to operate (1) Any 3 marks up to maximum 3.	**3**

Question	Answer	Marks
6(b)	**Describe and explain the formation of volcanic island arcs.** Island arcs are formed along a convergent plate boundary, where there is a subduction zone between two oceanic plates. Movement is generated by convection currents. The denser oceanic plate is subducted below the other oceanic plate. They occur as curved linear chains, and may form two lines (extinct and active island arc systems). The descending plate, through the process of subduction, is melted along the Benioff zone. The molten magma then moves through the crust to produce the volcanoes, the basis for the arcs. Credit any diagrams where they serve to help describe or explain the formation. Award marks based on the quality of explanation and breadth of the response using the marking levels below. **Level 3 (6–8)** Response clearly describes and explains the way volcanic island arcs are formed, including the role of the processes present. 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 describes and/or explains the way volcanic island arcs are formed with clear reference to the processes present. The response may be unbalanced or where both description and explanation is mentioned, the link with the resulting features of volcanic island arcs is weaker. Response develops on a largely secure base of knowledge and understanding. Examples may lack detail or development. **Level 1 (1–2)** Response contains some description or explanation of volcanic island arcs. There is little or no reference to the processes present. The terms are lacking and the link is vague. 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)	**'Convection currents are the most significant factor in the formation of landforms at divergent plate boundaries.'** **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 route is chosen, essays which discuss the key focus of the extent that convection currents are the most significant factor and support their argument with relevant examples will be credited. There may be detailed consideration of one or more examples, or a broadly conceived response, drawing on several examples to illustrate the factors involved. Landforms that could be included are oceanic ridges, rift valleys, transform faults, volcanic islands, pillow lavas, The approach could be comparing how convection currents are the most significant and then to compare this with other factors which help the formation of landforms. Other factors which could be discussed are the extensional forces which actually weaken the crust and cause fissures for the mid oceanic trench to form. In addition, the type of magma could be commented on, as this results in the different characteristics to the landforms. Furthermore the actual location of the landform can be considered – those under the water would have fissures and then smaller landforms such as beds of pillow lava – this wouldn't be the case for above water. Award marks based on the quality of the response using the marking levels below. **Level 4 (12–15)** Response thoroughly discusses the extent that convection currents are the most important factor in the formation of the landforms at divergent plate boundaries, with clear assessment of contrasts. Response has good contextual understanding of the other factors which could be considered. Response is well founded in detailed knowledge and strong conceptual understanding of the topic. **Level 3 (8–11)** Response discusses the extent that convection currents are the most important factor in the formation of the landforms at divergent plate boundaries, with some assessment of the other factors 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 landforms at divergent plate margins and factors which form them, but may not consider a range of factors or the possible alternatives. 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).	**15**

Question	Answer	Marks
6(c)	**Level 1 (1–3)** Response may broadly discuss divergent plate margin landforms 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.	