Cambridge Assessment International Education

Cambridge International AS & A Level

GEOGRAPHY **9696/11**

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.

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

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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 and Fig. 1.2 show catchment flows in a drainage basin system before and after urbanisation.** **Calculate flow X in Fig. 1.1.** 10% Need % for the mark.	**1**
1(a)(ii)	**Name flow Y in Fig. 1.2.** Run off / overland / surface or any variation on this.	**1**
1(b)	**Using Fig. 1.1 and Fig. 1.2, describe the changes to catchment flows after urbanisation.** Evapotranspiration has reduced 10% or from 40% to 30%. (1) Infiltration has reduced 35% or from 50% to 15 %. (1) Runoff / overland flow has increased 45% from 10% to 55%. (1) Max. 2 if no specific reference to data.	**3**
1(c)	**Explain why catchment flows change after urbanisation.** • Decrease in vegetation means less evapotranspiration, thus more water reaches the ground surface. • Less interception leads to more water reaching the surface and possibly more overland flow. • Reduction in roots, as a result of less vegetation, leads to decrease in infiltration as fewer pathways for water to go. • Impermeable surfaces, a result of urbanisation, reduces infiltration, increasing overland flow and directing flows of water through artificial drainage, percolation, throughflow and base flow reduced. • Human impacts on flows – abstraction of groundwater reducing groundwater flow, dam building/drainage systems, associated with urbanisation. **1 mark** for each simple explanation, **2 marks** for each developed explanation, or **3 marks** for each well developed explanation up to the maximum. Development might come as depth of explanation, the linking of factors together, or the relationship to a specific modification caused by urbanisation.	**5**

Atmosphere and weather

Question	Answer	Marks
2(a)	**Fig. 2.1 is two photographs which show a type of precipitation.** **Describe the characteristics of the type of precipitation shown in Fig. 2.1.** Hail/ice (1 mark), pellets/spheres of ice (1 mark), vary in size/small/0.5 cm to 1.0 cm diameter (1 mark), some indication of colour/opaqueness (1 mark), hard/solid state.	**2**
2(b)	**Briefly explain the formation of the type of precipitation shown in Fig. 2.1.** The main points are: • Produced through turbulence and convection in cumulonimbus clouds. • Results in condensation on cooling, which can lead to freezing and the formation of hail. • Repeated strong uplift and downdraughts of moving air allowing growth as they get coated with more ice (sublimation is a relevant process). General point about formation of precipitation is a simple explanation. **1 mark** for a simple explanation, **2 marks** for a developed explanation, or **3 marks** for a well developed explanation.	**3**

Question	Answer	Marks
2(c)	**Explain why the type of precipitation may vary in one location.** Candidates may suggest: • Stability of air means a lack of uplift and adiabatic cooling limits the development of clouds and rainfall. • Discussion about the moisture content of air, or anti cyclonic conditions compared with cyclonic conditions changing over time at any one location. • Diurnal variations of heating and cooling or seasonal variations with reasons given. • Cause of rainfall can give rise to characteristically different types of precipitation – convectional rainfall leading to short heavy outbursts, frontal rainfall leading to continuous rain. • Passage of fronts can cause changes in the type of precipitation in one location. • Cooler conditions / freezing (leads to snow). Syllabus lists clouds, rain, hail, snow, dew, fog. If there is clearly more than one location, then little credit unless there is variation within one of the locations. **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 variation.	**5**

Rocks and weathering

Question	Answer	Marks
3(a)(i)	**Fig. 3.1 shows the global pattern of tectonic plates.** **Name the type of plate shown as X in Fig. 3.1.** Oceanic plate.	**1**
3(a)(ii)	**Name the type of plate boundary shown as Y in Fig. 3.1.** Conservative, transform, transverse.	**1**
3(b)	**Draw a sketch of plate boundary Z in Fig. 3.1. Label the main features.** The following features can be labelled: • Subducting plate • Fold mountains forming on continental crust • Ocean trench • Volcanoes on the continent • Accretionary wedge • Oceanic crust / continental crust, sima/sial, Nazca/South America • Benioff zone • Convection currents • Magma chamber/melting oceanic plate One mark for each accurately located feature whether in a cross-section or plan form.	**4**
3(c)	**Explain the formation of <u>one</u> of the features you identified in <u>(b)</u>.** Candidates may choose any valid feature including: • Fold mountains • Ocean trench • Accretionary wedge • Subduction zone • Volcanoes on continent but not island arcs Accept a feature that is relevant but not identified and a feature which is included in the diagram but not labelled. Credit a feature identified in part (b) even if the diagram is for the wrong boundary. Explanation could include the role of plate movement, convection currents, type of plate, subduction and development of feature. **1 mark** for a simple explanation, **2 marks** for a developed explanation, or **3/4 marks** for each well developed explanation. Development might come as depth of explanation, 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)	**Define the fluvial terms *cavitation* and *suspension*.** Cavitation: explosion of air bubbles (1) trapped in river banks by water action (1). Suspension: the transport of fine particles/sediment (1) within/on the water/not in contact with bed or banks (1).	**4**
4(a)(ii)	**Describe the formation of a point bar within a river.** • Related to deposition in meandering river channels. • Eroded material from the outside bend is carried across the channel and deposited on the inside bend. • Where velocity is slower, thus leading to build up of sediment into a point bar or slip off slope. **1 mark** for a simple description of the formation, **2 marks** for a developed description of the formation, or **3 marks** for a well developed description of the formation.	**3**

Question	Answer	Marks
4(b)	**Explain how a river flood can impact people.** The impact of a river flood will be dependent on the size and location as well as the management of the flood event. There are a variety of impacts, and the answers may discuss economic and social impacts as well as refer to case study examples. Short term and long term impacts may be contrasted. Emphasis is on people rather than the environment in general. Impacts can also be beneficial, e.g. cultivation on flood plains. 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 a flood can impact people. Specific examples and impacts are discussed. 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 some ways a flood may impact people. Response develops on a largely secure base of knowledge and understanding. Examples may lack detail or development. **Level 1 (1–2)** Response suggests the impact a flood can have on people. 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 intensity of precipitation is 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 can consider a range of factors which influence a storm hydrograph, including drainage basin characteristics, type of precipitation, soil type, and land use. Candidates should evaluate the significance of the intensity of precipitation against other factors. Emphasis should be on intensity but amount will be a valid discussion point. Characteristics of the storm hydrograph (lag, peak discharge, rising and falling limbs) need description and explanation. 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 intensity of precipitation on the shape of the storm hydrograph. Response has good contextual understanding of factors affecting storm hydrographs. 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 intensity of precipitation 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 the significance of the intensity of precipitation on 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 the significance of the intensity of precipitation on the shape of the storm hydrograph 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 <u>two</u> ways incoming (shortwave) solar radiation can be reflected.** The main ways are: • Clouds with reference to type of clouds, colour, etc. • Surfaces (e.g. snow, ice, water, various vegetation and crop types, building, road surfaces) with different albedos. • Scattering by particulate matter. Mark as 2/2, 1/3, 3/1 depending on level of detail.	**4**
5(a)(ii)	**Briefly explain the latitudinal radiation deficit in the global energy budget.** The greatest radiation deficit is in the higher latitudes where there is more outgoing radiation than incoming radiation as a result of: • The high albedo in this area. • Lack of insolation for several months results in a radiation deficit in the area. • The low angle of the sun's rays means that insolation has to pass through more atmosphere and is spread over a greater area, contributing to the radiation deficit. **1 mark** for a simple explanation, **2 marks** for a developed explanation, or **3 marks** for a well developed explanation. Development might come as depth of explanation, the linking of factors together.	**3**

Question	Answer	Marks
5(b)	**Explain how ocean currents influence surface temperatures on land.** Ocean currents (including the great global ocean conveyor belts) transfer heat from warmer equatorial areas north and south. Other currents bring cooler water back in a continuous cycle. This is a horizontal transfer of energy, ensuring a more even distribution of temperature. The sea temperatures and ocean currents influence the development of winds which transfer heat to land, with areas nearest to the coast being most affected. 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 ocean currents influence surface temperatures. 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 ocean currents influence surface temperatures. 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 ocean currents influence surface temperatures. 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)	**'The most significant effect of human activity on urban climates is on humidity.'** **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 should discuss the effect that human activity has on urban climates and consider the most significant effect. Humidity, which is lower in urban areas, needs to be discussed and explained. Candidates will need to discuss temperature, winds and precipitation in order to evaluate the significance of humidity. Award marks based on the quality of the response using the marking levels below. **Level 4 (12–15)** Response thoroughly discusses that humidity is the most significant effect of human activity on urban climates. 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. **Level 3 (8–11)** Response discusses that humidity is the most significant effect of human activity on urban climates 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 significant effect of human activity on the humidity of urban climates. 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 whether the most significant effect of human activity on climate in urban areas is on humidity 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 *pressure release (dilatation)* and *hydrolysis*.** Pressure release (dilatation): the reduction of pressure on rock by surface unloading (1) leads to the fracturing of the rock (creation of joints) (1). Hydrolysis is a chemical process involving water (1) reacting with certain rock minerals leading to the decomposition of the rock/producing soluble by-products/hydroxides (1). The best example is the weathering of feldspar to clay (1).	**4**
6(a)(ii)	**Briefly explain the role of water in mass movement.** • Water increases lubrication which reduces the friction between the sliding surfaces. • It may also increase the weight of the soil. • Pressure from pore water is increased which reduces strength allowing movement to take place, e.g. mudflows. • Wetting and drying of soils may lead to soil heave and creep. • Freeze-thaw in joints on rock cliffs (free faces) may lead to rockfall. **1 mark** for a simple explanation, **2 marks** for a developed explanation, or **3 marks** for a well developed explanation. Development might come as depth of explanation, the linking of factors together.	**3**

Question	Answer	Marks
6(b)	**Explain how temperature affects physical weathering processes.** Candidates may discuss the way fluctuating temperatures around 0 degrees Celsius enable physical weathering processes like freeze thaw to take place. Heating / cooling is relevant (exfoliation, granular disintegration) with the focus on the temperature regime which leads to the resulting weathering activity. Salt crystallisation is also relevant (evaporation produces salt crystals which increase in size; certain salts also expand on heating). Temperature helps to increase root action. Reference to the Peltier diagram should be credited where this helps to explain the answer. Diagrams should be credited where they help to explain an answer. 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 role of temperature in physical 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 role of temperature in physical weathering processes. 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 the role of temperature in physical weathering processes. 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)	**'Attempts to reduce mass movement are not always successful.'** **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. Content may include a discussion of the success or otherwise of specific attempts to control mass movement (stabilisation of slopes by a variety of means, afforestation, drainage, slope regrading, netting, pinning, concreting, etc.) with an assessment as to why some schemes fail. Accept avalanches as mass movements. Award marks based on the quality of the response using the marking levels below. **Level 4 (12–15)** Response thoroughly discusses whether attempts to reduce mass movement have been successful. Response has good contextual understanding of the effects of managing 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. **Level 3 (8–11)** Response discusses whether attempts to reduce mass movement have been successful 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 whether attempts to reduce mass movement have been successful. 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 whether attempts to reduce mass movement have been successful 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**