Cambridge Assessment International Education

Cambridge International AS & A Level

GEOGRAPHY **9696/12**

Paper 1 Core Physical Geography **October/November 2023**

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 2023 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

[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.

AS Level Geography 9696 (Paper 1 and Paper 2) specific marking instructions

Examiners must use the following annotations:

Annotation	Meaning	Use
	Correct point	Point-marked questions only: Section A, Section B part (a)
	Incorrect	Point-marked questions only: Section A, Section B part (a)
L4	Level 4	Levels-marked questions only: Section B part (c)
L3	Level 3	Levels-marked questions only: Section B parts (b) and (c)
L2	Level 2	Levels-marked questions only: Section B parts (b) and (c)
L1	Level 1	Levels-marked questions only: Section B parts (b) and (c)
0	Level 0 – No creditable response	Levels-marked questions only: Section B parts (b) and (c)
Highlight	Creditworthy part of an extended response	Levels-marked questions only: Section B parts (b) and (c)
EVAL	Evaluative point	Levels-marked questions only: Section B part (c)
^	Omission or further development/detail needed to gain credit	All questions
	Unclear or validity is doubted	All questions
DEV	Developed point	All questions
EG	Appropriate example or case study given	All questions
IRRL	Irrelevant	All questions
NAQ	Material that does not answer the question	All questions
	Highlighting a significant part of an extended response – to be used with another annotation e.g. IRRL or EVAL	Levels-marked questions only: Section B parts (b) and (c)

Annotation	Meaning	Use
SEEN	1. Diagram or essay plan has been seen but no specific credit given 2. Additional page has been checked	1. Any diagrams or essay plans 2. All blank pages in the provided generic answer booklet and/or extension answer booklet(s).
R	Rubric error	Optional questions only (place at start of question not being credited): Section B (Candidates answer one question)

Examiners must consider the following guidance when marking the essay questions:

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.

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 a river in Alaska, USA.** **Name the type of river channel labelled A on Fig. 1.1.** Meander/meandering	**1**
1(b)	**Draw a cross-section from B to C shown in Fig. 1.1. Label the main features.** The main features that can be labelled are: • Slip off slope/point bar • Undercut slope/river cliff River channel should be shown as asymmetrical – deeper at undercut bank grading to shallow at the point bar. One mark for a cross-section even if profile is inaccurate/unrealistic. **2 marks** for the labelling and **2 marks** for the profile.	**4**
1(c)	**Explain how the landform labelled D on Fig. 1.1 may have formed.** The landform is an oxbow lake: • Initial development of a meandering channel (helicoidal flow); development – with the thalweg swinging towards the outside bend • Undercutting the outside bends; development – with evidence of processes • Curvature increasing/reduces width of neck • River cuts through; at times of high flow/floods • Deposition occurs in the cut off; over time becomes permanent with vegetation growth Credit clear and correct diagram that adds to the answer. **1 mark** for each simple explanation, **2 marks** for a developed explanation up to the maximum.	**5**

Atmosphere and weather

Question	Answer	Marks
2(a)	**Fig. 2.1 and Fig. 2.2 show two possible causes of precipitation.** **State the cause of precipitation shown in Fig. 2.1.** Frontal/cyclonic	**1**
2(b)	**Compare the causes of precipitation shown in Fig. 2.1 and Fig. 2.2.** The main points are: Differences: • Uplift is caused by the fronts (with air of different densities) in Fig. 2.1 but by convection in Fig. 2.2 • Evaporation/evapotranspiration occurs in Fig. 2.2 but not in Fig. 2.1 Similarities: • Rising of warm, moist air occurs in both causes • Leading to cooling and condensation and formation of clouds **1 mark** for each accurate comparison. It needs some explicit comparison rather than two separate descriptions, maximum **2 marks** if no specific comparison. **3 marks** if only similarities or differences.	**4**
2(c)	**Explain how precipitation is caused by orographic uplift of air.** Orographic uplift: • Presence of a topographic barrier such as a hill or mountain • Moving air/wind forced to rise up this barrier • Air cools as it rises and reaches condensation level; condensation nuclei provide a surface for water vapour to condense on • Precipitation occurs when water droplets increase sufficiently in size (collision idea) and falls • On the windward side, precipitation will occur Credit the use of diagrams. **Maximum 3** if no mention of mountain/barrier. **1 mark** for each simple explanation, **2 marks** for a developed explanation up to the maximum.	**5**

Rocks and weathering

Question	Answer	Marks
3(a)	**Fig. 3.1 shows the global distribution of young fold mountains and active volcanoes.** **Name <u>one</u> young fold mountain range shown in Fig. 3.1 that has no active volcanoes.** There are several possibilities: • Himalaya • Alps • Pyrenees	**1**
3(b)	**Compare the distribution of young fold mountains with the distribution of active volcanoes shown in Fig. 3.1.** The main points of comparison could be: • Volcanoes and fold mountains along the west coast of North and South America • Inland fold mountains with few volcanoes, Himalaya, Alps • Volcanoes off the east coast of Asia but no fold mountains • Volcanoes in the centre of oceans, e.g. Atlantic There could be an alternative comparison: • Mountain ranges with major volcanoes – Andes, Rockies, perhaps the Caucasus • Mountain ranges without volcanoes – the Himalaya, Alps, Pyrenees • Volcanoes not associated with young fold mountain ranges – Southeast Asia, East Africa, Iceland and mid-Atlantic ridge, Hawaii One mark available for mention of areas where neither occur.	**4**
3(c)	**Explain the distribution of young fold mountains shown in Fig. 3.1.** The main points for consideration are: • Fold mountains are formed by the convergence of tectonic plates, development – driven by convection currents/drag • Convergence of oceanic/continental or continental/continental plates development – name of appropriate plates • Where an oceanic plate is forced below a continental plate, subduction forces the continental plate upwards • Where two continental plates collide, there is no subduction but one plate is forced underneath the other; this occurs along major thrust planes, leading to uplift • In either case, marine sediments (accretionary wedges) get crushed between the plates causing uplift of the sediments and the formation of fold mountains **1 mark** for each simple explanation, **2 marks** for a 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)	**Describe the conditions which lead to overland flow on slopes.** The main points to be considered are: • High input of rainfall on slopes or sudden melting of snow • Impermeability of the ground surface • Antecedent moisture/saturated ground • Steep slopes • Low level of interception by vegetation Low infiltration without qualification is not creditable. **1 mark** for each point.	**3**
4(a)(ii)	**Explain how the shape of a drainage basin affects the shape of a storm hydrograph.** The main points are: • The shape of the storm hydrograph is governed by the amount and speed of water reaching the river channel • A circular drainage basin generally possesses tributaries that converge on the main channel quickly; development – producing a rapid rise in discharge in the main channel which is reflected on the hydrograph (steep rising limb, high peak discharge) • An elongated drainage basin possesses tributaries that join at separate points along the main channel; development – producing a more measured hydrograph response (less steep rising limb lower peak discharge) • There may be reference to other more complicated drainage basin shapes Diagram could be used and should be credited if relevant, clear and correct. **1 mark** for each simple explanation, **2 marks** for a developed explanation up to the maximum.	**4**

Question	Answer	Marks
4(b)	**Explain how the Hjulström curve is used to explain erosion and deposition in a river channel.** The Hjulström curve shows the relationship between water velocity and sediment size and erosion (entrainment), transport and deposition. It therefore shows the critical velocities at which erosion and deposition may occur in river channels. The shape of the curve also shows that the finer particles need higher velocities for entrainment because clay particles resist entrainment due to their cohesion. Candidates need to refer to relevant characteristics of the particles, such as weight and shape for a Level 3 mark. 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 the Hjulström curve is used to explain erosion and deposition in a river channel. Response is well founded in detailed knowledge and strong conceptual understanding of the topic. Examples used are appropriate and integrated effectively into the response. **Level 2 (3–5)** Response explains how the Hjulström curve is used to explain erosion and deposition in a river channel. Response develops on a largely secure base of knowledge and understanding. Examples may lack detail or development. **Level 1 (1–2)** Response describes how the Hjulström curve is used to explain erosion and deposition in a river channel. 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 view that the amount of rainfall is the most important factor in causing a river to flood.** This is an evaluation question so the various factors that may cause a river to flood need to be examined. Water is needed in sufficient quantities for the river to flood, thus rainfall amount may be critical, but rainfall intensity may also be important depending on other factors such as drainage basin characteristics (drainage density, soils, land use, topography). These will need assessing. Snow/glacial melt can also be significant. The role of human activity will probably be stressed such as urbanisation, deforestation and land use changes. Management changes to reduce flooding are not relevant, but lack of management, such as dredging, might be relevant. Award marks based on the quality of the response using the marking levels below. **Level 4 (12–15)** Response thoroughly assesses the view that the amount of rainfall is the most important factor in causing a river to flood. 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 assesses the view that the amount of rainfall is the most important factor in causing a river to flood 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 view that the amount of rainfall is the most important factor in causing a river to flood. 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 view that the amount of rainfall is the most important factor in causing a river to flood, 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 in which incoming (shortwave) solar radiation is prevented from reaching the Earth's surface.** Possible ways are: • Absorption (1) by clouds or atmospheric gases or dust particles (1) • Reflection (1) by clouds or atmospheric gases or dust particles (1) • Scattering (1) by dust particles (1) Two ways described for **2 marks** each.	**4**
5(a)(ii)	**Briefly explain how dew is formed.** The main points that need consideration are: • Radiation at night with clear skies and little wind • Leading to cooling of the land surface • Condensation level reached leading to the formation of dew on the surfaces **1 mark** for each point.	**3**

Question	Answer	Marks
5(b)	**Explain how energy is transferred in the atmosphere within the global energy budget.** The two main mechanisms for the horizontal transfer of energy are by wind belts and ocean currents. Wind belts are related to pressure differences, mostly the result of different temperatures related to the latitudinal movement of the overhead sun and the development of the three atmospheric cells. Ocean currents (cold/warm) affect the transfer of energy by affecting the temperature of the air which flows over them. There may also be a discussion of vertical transfer of energy. This is not a comparison of wind and ocean currents; it is a straightforward explanation. 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 energy is transferred in the atmosphere within the global energy budget. Response is well founded in detailed knowledge and strong conceptual understanding of the topic. Examples used are appropriate and integrated effectively into the response. **Level 2 (3–5)** Response explains how energy is transferred in the atmosphere within the global 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 how energy is transferred in the atmosphere within the global 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 land-sea distribution affects the seasonal variation in global pressure.** Pressure is related to rising and falling air, thus the factors that affect this will affect variations in pressure. One of the main influences on pressure is temperature. This is related to the position of the overhead sun which varies throughout the year with latitude. Thus, the tropics have low pressure because of rising air but this zone moves north and south with the overhead sun. Temperatures are affected by land-sea distribution because of the differing thermal conductivities of land and sea. Thus land-sea distribution will distort the latitudinal effect of the passage of the overhead sun and thus pressure. There are major contrasts between the northern and southern hemispheres. The main factor will be the apparent movement of the overhead sun, but land-sea distribution will distort this and cause regional variations. Award marks based on the quality of the response using the marking levels below. **Level 4 (12–15)** Response thoroughly assesses the extent to which land-sea distribution affects the seasonal variation in global pressure. 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 assesses the extent to which land-sea distribution affects the seasonal variation in global pressure 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 extent to which land-sea distribution affects the seasonal variation in global pressure. 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 extent to which land-sea distribution affects the seasonal variation in global pressure 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)	**Describe the main differences between mass movement processes of flows and slides.** The main differences are: • Flows tend to be more fluid with a higher water content • Flows possess internal deformation whereas slides tend to move *en masse* • Flows tend to move faster • This means that flows move faster in their middle portions and at the surface as in a typical flow. Slides move at the same rate throughout their mass • Flows do not possess a sliding or shearing surface where movement occurs, whereas slides do • Flows tend to move in channels, whereas slides do not • Flows tend to move further • Flows can be more continuous; slides tend to move over shorter time periods **1 mark** for each difference.	**4**
6(a)(ii)	**Briefly explain how rills occur on slopes.** Rills are concentrated thin streams of water on the slope. Thus: • They need rainfall amounts that exceed the infiltration capacity of the soil/saturated soil/ground • They need bare surfaces • They need to have soil characteristics that affect infiltration capacity • They need to be on relatively steep slopes • They become concentrated in thin rivulets by surface irregularities/ roughness This is an explanation and not a description. **1 mark** for each point.	**3**

Question	Answer	Marks
6(b)	**Examine the factors that influence physical weathering in different climates.** The focus of the question is clearly the relationship between physical weathering processes and climatic characteristics (mostly temperature and precipitation). However, other factors, such as rock type and structure unrelated to climate, will also influence physical weathering and need to be examined along with climatic influence. Award marks based on the quality of explanation and breadth of the response using the marking levels below. **Level 3 (6–8)** Response clearly examines the factors that influence physical weathering in different climates. Response is well founded in detailed knowledge and strong conceptual understanding of the topic. Examples used are appropriate and integrated effectively into the response. **Level 2 (3–5)** Response examines the factors that influence physical weathering in different climates. Response develops on a largely secure base of knowledge and understanding. Examples may lack detail or development. **Level 1 (1–2)** Response describes the factors that influence physical weathering in different climates. 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, assess the extent to which precipitation is the main factor in causing mass movements.** This requires a thorough understanding of the factors that lead to mass movement with the significance of precipitation as one of those factors. Water is a key factor in most types of mass movement, but may vary in significance depending on the type of movement, reducing shear strength and increasing shear stress (weight, pore water pressure). However, there are other significant factors such as human activity (overloading and undercutting of slopes, traffic vibrations), vibration from earthquakes, and some types of weathering such as freeze-thaw for rock falls. Descriptions of slope wash effects (soil erosion) are not relevant. Award marks based on the quality of the response using the marking levels below. **Level 4 (12–15)** Response thoroughly assesses the role of precipitation in causing mass movements. 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 assesses the role of precipitation in causing mass movements 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 precipitation in causing mass movements. 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 precipitation in causing mass movements 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**