CAMBRIDGE
International Education

Cambridge International AS & A Level

GEOGRAPHY **9696/11**

Paper 1 Core Physical Geography **May/June 2024**

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 2024 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 descriptions 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)
	Level 4	Levels-marked questions only: Section B part (c)
	Level 3	Levels-marked questions only: Section B parts (b) and (c)
	Level 2	Levels-marked questions only: Section B parts (b) and (c)
	Level 1	Levels-marked questions only: Section B parts (b) and (c)
	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)
	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
	Developed point	All questions
	Appropriate example or case study given	All questions
	Irrelevant	All questions
	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.  or 	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 shows the annual peak discharge recurrence interval for the Dwarkeswar River in India.** **Using Fig. 1.1, state the annual peak discharge with a recurrence interval of 10 years.** 1230–1250 cumecs (must have the units)	**1**
1(b)	**Describe the relationship between annual peak discharge and recurrence interval shown in Fig. 1.1.** The main points are: • Annual peak discharge increases as return period increases/positive relationship • There are weaker/exceptions to a simple positive relationship, for example, recurrence intervals of between 2 and 4 years • Rate of change of peak discharge is greater between lower recurrence intervals than between larger ones • More frequent episodes of annual peak discharge less than 800 cumecs/fewer observations of greater than 800 cumecs (allow other comparisons) **Reserve 1 mark** for data showing any relationship of the data e.g. peak discharges of less than 400 cumecs is likely to recur every 1 to 2 years, whereas a discharge of 1400 cumecs is likely to recur every 30 years. **1 mark** for each description.	**3**

Question	Answer	Marks
1(c)	**Use Fig. 1.1 to suggest how recurrence intervals can be used in flood prediction and prevention.** Uses could include: • Helps to calculate probability of flood events based on observed/ past events/recognises that 100-year flood has a probability of 1% etc. • Used to help predict how often an event may happen • Recognition that it is a probability, often based on little data, and not a certainty • Used to help predict the size of the event as well as frequency • Predicts the likelihood of the volume of flood (by amount of discharge) over time • Consideration can then be given to where prevention takes place and the extent of the prevention/land use zoning predictions, how economically viable it is (cost-benefit analysis) • Suitable prevention can be planned based on predicted recurrence levels (e.g. height of flood barriers/artificial levees to counter a specific discharge) • Need to know bankfull discharge figure **1 mark** for each simple suggestion with an additional **1 mark** for each development, up to the maximum. **Reserve 1 mark** for use of Fig. 1.1.	**6**

Atmosphere and weather

Question	Answer	Marks
2(a)(i)	**Fig. 2.1 shows afternoon temperatures across an urban area.** **Name the effect shown in Fig. 2.1.** Urban heat island	**1**
2(a)(ii)	**Calculate the range in temperature shown in Fig. 2.1.** 4 °C (needs the units)	**1**
2(b)	**Describe the pattern of temperature shown in Fig. 2.1.** The main descriptive points are: • Increasing temperatures towards centre of urban area/lower temperatures in rural/agricultural area • Not a uniform increase – there are fluctuations/rises in temperature recorded over suburban residential area to the top right of the figure • Pattern is different either side of the central urban area • 33 °C is the maximum temperature recorded/29 °C is the lowest temperature recorded **1 mark** for each description. **Reserve 1 mark** for correct use of data.	**4**
2(c)	**Give reasons for the pattern of temperature shown in Fig. 2.1.** Reasons for increased temperatures towards the centre of the urban area could include: • Darker surfaces with lower albedo rates; (dev) absorb/retain and release heat • Heat generated from buildings, industry etc. • Heat from increased traffic • Less vegetation meaning no heat is lost by evapotranspiration • Lack of surface water, lakes etc. meaning no heat is lost by evaporation • Height and density of buildings, block wind/trapping air; (dev) thus heat is not dispersed • More smog and pollution/particulate matter in urban area; (dev) increases cloud cover/traps and absorbs radiation (no credit for greenhouse gases as they are not a local influence) The reverse is true for more suburban/rural areas but no double credit for the reverse. **1 mark** for each reason with an additional **1 mark** for each development, up to the maximum. **Max. 2 marks** if only one reason given.	**4**

Rocks and weathering

Question	Answer	Marks
3(a)	**Fig. 3.1 is a photograph which shows a slope in Somerset, UK.** **Name the type of mass movement at A shown in Fig. 3.1.** Heave/(soil) creep	**1**
3(b)	**Draw a labelled diagram of the mass movement shown in Fig. 3.1.** Labelling could include: • Different rates of movement • Terracettes (ridges/raised lines) of soil perpendicular to gradient of hill Accept a cross-sectional diagram. **1 mark** for representation of the mass movement in the diagram. **2 marks** for the labelling of features of the mass movement shown. No credit for features not seen in the photograph.	**3**
3(c)	**Explain <u>two</u> ways a slope may be modified to reduce mass movement.** Allow any modification, with appropriate explanation, which is designed to reduce stress on a slope. Explanation should explain what the strategy is, how it reduces mass movement, with a developed point that could include its efficiency and the type of mass movement that it prevents/reduces. The main strategies are: • Afforestation – planting of trees, with roots stabilising ground/increasing sheer strength. Also extracts moisture from the soil reducing weight, reducing pore water pressure (lubrication) and increasing cohesion. • Netting – covering surface to allow plant colonisation and to help to retain material on slope (prevention of rockfalls) • Pinning – adding anchors or bolting (normally long metal poles) to unstable rock to prevent/reduce movement and to hold the slope together • Grading – large-scale earth movements to reduce the angle/height of the slope to reduce the effect of gravity and sheer stress • Terracing – cutting terraces on the slope to break gradient. Excess water accumulates on each step, reducing runoff • Shotcrete/spraycrete – spraying concrete onto to rock slopes to obliterate joints and other weaknesses, stopping water getting into the rocks; especially effective for rockfalls and rock slides • Slope drainage channels – to remove water efficiently from soils and other material • Gabions at base of slope to stabilises slope base **1 mark** for describing a technique/modification. **1 mark** for a basic explanation and **1 mark** for development. **Max. 3 marks** for any one technique/modification. Credit labelled diagrams where appropriate.	**6**

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 hydrological terms *infiltration* and *interception*.** Infiltration is the process by which water soaks into or is absorbed by the soil (1) in a downward movement/from the surface (1). Interception is the trapping of water during a precipitation/rainfall event on leaves of vegetation, etc. (1) preventing it initially reaching the ground (1).	**4**
4(a)(ii)	**Describe a river levée.** Levées are: • Raised banks along a river • Parallel to river channel • Usually composed of sediment • With coarser grained material nearer the river channel • May be an artificial feature • May be vegetated **1 mark** for each descriptive point. Credit use of diagram.	**3**

Question	Answer	Marks
4(b)	**Explain the formation of meanders and oxbow lakes.** Meander and oxbow lake formation: • Starts from straight channels • Irregularities on the riverbed cause turbulence • Production of alternating riffles and pools • Leading to line of fastest flow (thalweg) to swing back and forth • Leading to helicoidal flow from the outer to inner bank and back again. • Erosion on the outer bank/river cliff (abrasion, hydraulic action, cavitation) and deposition on the inner bank (point bar/slip off slope) • Sinuosity increases until river cuts through at high flows • Deposition at mouth of old channel • To leave an oxbow lake Allow greater depth to meanders, as these are the start of the explanation for oxbow lakes. If only meanders, **max. 4 marks**. Credit accurate labelled diagrams. 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 formation of meanders and oxbow lakes. 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 the formation of meanders and/or oxbow lakes. Response develops on a largely secure base of knowledge and understanding. Examples may lack detail or development. **Max. 4 marks** if only one feature. **Level 1 (1–2)** Response explains the formation of meanders or oxbow lakes or is largely descriptive of both. 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)	**'Climate is the most significant factor which influences discharge within a drainage basin.'** **With the aid of examples, how far do you agree with this statement?** Candidates may discuss climate as being a key factor – features such as precipitation and temperature clearly influence the discharge within a drainage basin. An increase in precipitation can lead to a noticeable increase in discharge. Temperature may also be discussed, such as higher temperatures leading to higher rates of evaporation, or lower temperatures leading to frozen ground, thus reducing transfers below the surface. Candidates may also discuss the increased levels of discharge seen from factors such as melting snow and ice melt leading to higher rates of discharge relating to temperature. Therefore, comments can relate to flows, stores, and transfers within a drainage basin, such as evaporation or infiltration, leading to changes in channel flow. Candidates should also consider other factors which influence the discharge within a drainage basin: • Drainage basin size and shape • Drainage density • Porosity and permeability of soils • Rock type • Slopes and topography • Vegetation • Land use/degree of urbanisation • Human interference e.g. abstraction, dams 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 climate is the most significant factor influencing discharge within a drainage basin. 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 climate is the most significant factor influencing discharge within a drainage basin but may be unbalanced. Examples may lack detail or development. Response develops on a largely secure base of knowledge and understanding.	**15**

Question	Answer	Marks
4(c)	**Level 2 (4–7)** Response shows general knowledge and understanding of the extent to which climate is the most significant factor influencing discharge within a drainage basin. 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 climate as a factor influencing discharge within a drainage basin 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.	

Atmosphere and weather

Question	Answer	Marks
5(a)(i)	**Describe the albedo effect.** The albedo affects the amount of incoming solar/shortwave radiation (1) which is absorbed or reflected (1) determined by surface characteristics (1), such as snow has a high albedo or oceans have a low albedo (1).	**3**
5(a)(ii)	**Explain why not all incoming (shortwave) solar radiation reaches the surface of the Earth.** The main points of explanation are in terms of both absorption and reflection of the radiation such as: • Reflected by clouds • Absorbed by clouds • Scattering by dust, aerosols, and air molecules • Absorbed by ozone **1 mark** for each point.	**4**

Question	Answer	Marks
5(b)	**Explain the causes of precipitation.** The syllabus lists clouds, rain, hail, snow, dew and fog as the types of precipitation. The syllabus lists convection, frontal and orographic uplift of air, and radiation cooling as causes. Evaporation is a requirement of most processes to produce moist air that can then undergo uplift, cooling, reaching dewpoint and condensation. Cooling by conduction (contact with cold surface) can lead to the formation of dew. Candidates may discuss processes of growth of water droplets, collision theory and/or different types of precipitation e.g. processes leading to hail or snow as well as the role of condensation nuclei. Credit cloud seeding if present. Credit the use of diagrams where they help explain the cause. 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 causes of precipitation. 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 the causes of precipitation. Response develops on a largely secure base of knowledge and understanding. Examples may lack detail or development. **Level 1 (1–2)** Response describes the causes of 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 examples, evaluate whether the atmospheric impact of global warming might vary with location.** There is an issue here concerning the interpretation of the question. The syllabus interprets atmospheric impacts as the impact of global warming on atmospheric processes such as frequency and intensity of storms and tropical cyclones, droughts and perhaps wildfires. There is another interpretation and that refers to the impact on people and the environment and how this may vary from location to location. Candidates could discuss difference between location being on an ocean or on a continental interior. Increased extreme weather would have a difference in impact – only certain locations can host the origin for a tropical storm, and as a result also limits the latitudes within which it travels. Differences can also be discussed between latitude and also altitude, where small increase in temperature could lead to very significant changes e.g. melting of glaciers. Candidates might suggest changes of temperature would result in the loss/gain of snow cover, which in turn leads to a change in albedo. If snow cover was to decrease, albedo rate would decrease, so less solar radiation would be reflected – which leads to a potential acceleration of global warming. Increased temperatures can also lead to some areas receiving increased amounts of rainfall – this is due to the increased rates of evaporation and moisture. Increased cloud cover, from the increased levels of evaporation over large areas of water may result in decreased temperatures. Changes in pressure systems, weakening of the Jetstream causing ‘blocking’. Impact on ocean currents and their role in moderating climate e.g. Gulf stream. Award marks based on the quality of the response using the marking levels below. **Level 4 (12–15)** Response thoroughly assesses whether the atmospheric impact of global warming might vary with location. Examples used are appropriate and integrated effectively into the response. Response is well founded in detailed knowledge and strong conceptual understanding of the topic.	**15**

Question	Answer	Marks
5(c)	**Level 3 (8–11)** Response assesses whether the atmospheric impact of global warming might vary with location 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 the atmospheric impact of global warming might vary with location. 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 atmospheric impact of global warming 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 weathering terms *freeze-thaw* and *pressure release (dilatation)*.** Water enters joint in rock (1) expands on freezing exerting pressure (1) repeated cycles weaken the rock (1). Pressure release (dilatation) is the erosion of overlying rock (1) which reduces pressure on the underlying rock (1) creating joints and sheeting (pseudo-bedding planes) in the rocks (1). **2 marks** for each definition.	**4**
6(a)(ii)	**Describe the weathering process of vegetation root action.** The process of the growth of roots from plants (1) into joints or crevices in the rock (1) forcing the rock apart as the root grows (1).	**3**
6(b)	**Explain how rock type and rock structure affect the rate of weathering.** Discussion of rock type and structure can also include the texture and composition. A clear discussion to examples of actual rock type and structure is needed e.g. composition and structure. This means that limestone is weathered by carbonation and might be weathered at a faster rate. Granite would be prone to hydrolysis with the feldspars being especially vulnerable. Rock structure will include jointing and bedding planes. 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 and rock structure affect the rate of weathering. 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 rock type and rock structure affect the rate of 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 or rock structure affect the rate of 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)	**'The movement of tectonic plates is determined by the process of subduction.'** **With the aid of examples, how far do you agree with this statement?** Candidates may discuss the more traditional view of subduction from convection currents causing the movement of plates. However, some candidates would consider other aspects, such as the evidence for slab pull and ridge push causing the movement of plates. Here the subducting slab gives rise to the slab pull. Consideration could be given to the type of plate, the density of plates, and location. Candidates may also refer to the conservative and constructive plate boundaries where movement is not related to subduction. 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 the movement of tectonic plates is determined by the process of subduction. 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 the movement of tectonic plates is determined by the process of subduction 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 the movement of tectonic plates is determined by the process of subduction. 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 movement of tectonic plates and the process of subduction 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**

