

Cambridge International AS & A Level

GEOGRAPHY**9696/12**

Paper 1 Core Physical Geography

May/June 2025

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 2025 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

This document consists of **17** printed pages.

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.

Annotations guidance for centres

Examiners use a system of annotations as a shorthand for communicating their marking decisions to one another. Examiners are trained during the standardisation process on how and when to use annotations. The purpose of annotations is to inform the standardisation and monitoring processes and guide the supervising examiners when they are checking the work of examiners within their team. The meaning of annotations and how they are used is specific to each component and is understood by all examiners who mark the component.

We publish annotations in our mark schemes to help centres understand the annotations they may see on copies of scripts. Note that there may not be a direct correlation between the number of annotations on a script and the mark awarded. Similarly, the use of an annotation may not be an indication of the quality of the response.

The annotations listed below were available to examiners marking this component in this series.

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)
Highlighter	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

Annotation	Meaning	Use
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)
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 and Fig. 1.2 show the depth of groundwater in southern India, May 2019 and January 2020. State the depth of groundwater at X in Fig. 1.1. Only credit 5.0–9.9 metres (below ground level) – must have units.	1
1(b)	Describe <u>two</u> similarities and <u>two</u> differences between the patterns shown in Fig. 1.1 and Fig. 1.2. Similarities include: • both have ground water closest to surface in the east • both have deepest groundwater to the north-west and pockets in south-east • both have shallower groundwater along the coast • both have deep/low groundwater in central area (10.0–19.9 and 20.0–39.9 metres below ground level) Differences include: • groundwater nearer the surface in Fig. 1.2 (January 2020) – in the east it is <2.0 and 2.0–4.9 metres below ground level • groundwater is deeper/lower in Fig. 1.1 (May 2019) – with the majority of the area having ground water deeper than 5 metres • Fig. 1.1 (May 2019) has groundwater that is greater than 10 metres to the far north-west, whereas most groundwater is less than 10 metres in Fig. 1.2 (January 2020) • there are no areas of ≥ 40.0 metres below ground level in Fig. 1.2 (January 2020), whereas there are in Fig. 1.1 (May 2019) • there are only three small areas where groundwater is <2.0 metres below ground level in Fig. 1.1 (May 2019), whereas in Fig. 1.2 (January 2020) there are larger/more significant areas especially along the coast 1 mark for each similarity and 1 mark for each difference. Reserve 2 marks for each.	4

Question	Answer	Marks
1(c)	Suggest reasons for the differences between groundwater levels in Fig. 1.1 and Fig. 1.2. Reasons could include: • seasonal variations in precipitation – low rainfall in May reduces groundwater recharge, (monsoon) rainfall before January recharges stores • seasonal variations in evaporation (temperature) – higher temperatures in May increase evaporation, lowering water table • seasonal variations in abstraction rates, extraction of groundwater in May e.g. for irrigation of crops during dry season • seasonal variations in agriculture/increasing evapotranspiration by crops 1 mark for each reason, with additional marks for developed reasons to max. 3.	5

Atmosphere and weather

Question	Answer	Marks
2(a)(i)	Fig. 2.1 shows areas of greatest concern from climate-related impacts of global warming. State the least common climate-related impact shown in Fig. 2.1. Drought	1
2(a)(ii)	State the number of climate-related impacts identified in area X on Fig. 2.1. 1	1
2(b)	Describe the pattern shown in Fig. 2.1. Description of the pattern could include: • higher number of climate-related impacts mostly within continental land mass/centre of continents • most of Africa and/or three quarters of South America have the greatest number/range of climate related impacts • northern parts of North America, Europe and Asia have the least climate-related impacts/no climate-related impacts • all areas with 3+ climate-related impacts are around/between the tropics/around the equator • no river flooding impact shown in Oceania/western North America/southern Africa • fewer climate-related impacts associated with islands • the number of impacts decreases as move from equatorial regions to polar regions 1 mark for each descriptive point.	3
2(c)	Suggest reasons for the pattern shown in Fig. 2.1. Reasons could include: • effect of latitude – areas more susceptible to higher temperatures (lower latitudes) are at greater risk from extreme heat stress • equatorial and sub-tropical zones experience most intense heating as sun is overhead, higher latitudes have increased seasonality/less insolation • population location and location of high severity impacts means areas identified are mainly tropical latitudes and of higher population totals • seas moderate temperatures, reducing extremes • continentality – air is drier inland • LICs and MICs have greatest concern in ability to cope with impacts, as have less funds for mitigation • increased evaporation in equatorial regions leads to increased precipitation which leads to increased flooding 1 mark for each reason, with additional marks for developed reasons to max. 3.	5

Rocks and weathering

Question	Answer	Marks
3(a)	Fig. 3.1 is a photograph which shows a type of weathering on a brick pavement. Name the type of weathering shown in Fig. 3.1. Freeze–thaw/frost shattering.	1
3(b)	With the aid of a diagram, describe the weathering process you named in (a). Description could include: • frequent fluctuating temperatures around 0°C • water enters crack/pores in brick and then freezes • freeze and melting causes stress and volume of water when frozen increases by around 9%, pressure exerted on brick • leads to disintegration (cracking/flaking) of material as shown • process repeats 1 mark for each descriptive point. Max. 3 marks if no diagram.	4
3(c)	Explain how the amount of rainfall can affect the type <u>and</u> rate of weathering. Explanation could include: • rainfall is needed to supply moisture to aid chemical reactions (1) – allows hydration/hydrolysis etc. to occur (DEV) • rainfall also affects physical weathering as for certain types of physical weathering (e.g. salt crystallisation/freezing–thaw) water needs to be present • plants require water to grow, increasing formation of organic acids • plant/tree roots can aid mechanical weathering • rainfall that is slightly acidic will increase the rate of chemical weathering such as carbonation • low rainfall results in low rates of/slight weathering • reduction of rainfall/lack of rainfall means less weathering e.g. reference to the Peltier diagram • as annual rainfall increases the rate of weathering increases, especially for chemical weathering • rainfall may also cause exposure of the rock e.g. by washing away weathered debris, which then exposes surfaces to be weathered 1 mark for each simple explanation, with additional marks for development. For full marks, reference to type <u>and</u> rate of weathering must be discussed.	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)	Define the fluvial terms ‘saltation’ and ‘hydraulic action’. Saltation is the transport of sediment (1) by a hopping / skipping / bouncing / jumping motion (1). Hydraulic action is the erosion of the riverbed/bank (1) by sheer force of water / compression of air in crevices (pores) by water (1). 2 marks for each term.	4
4(a)(ii)	Explain how drainage density is calculated. Total length of all streams/rivers in the drainage basin (1) Area of drainage basin (1) Total length <u>divided by</u> area (1) 1 mark for each explanatory point.	3

Question	Answer	Marks
4(b)	Describe the formation of waterfalls <u>and</u> oxbow lakes. The description of the formation of a waterfall should ideally start before it is formed or indicating rocks of different resistance. Changes in base level or knickpoints could also be cited. Sudden change in gradient or rock type, water velocity increases, hydraulic action and abrasion increase. The relatively weaker rock is less resilient to erosion and thus creates an area of differential erosion with undercutting occurring. Diagrams can be used to help exemplify the point. Development of plunge pools may be given. Reference to retreat and gorges are relevant. Oxbow lakes would be described from the meander development and erosion. The basic process could be described using diagrams. The narrowing neck of the meander and cut off due to lateral erosion is key. Meanders increase in sinuosity due to erosion on the outside bend. Deposition takes place at the neck of the meander, narrowing the neck of the meander. Floodwater/high discharge cuts through the neck of the meander and deposition isolates the meander bend, resulting in the oxbow lake. Award marks based on the quality of description and breadth of the response using the marking levels below. Level 3 (6–8) Response clearly describes the formation of waterfalls <u>and</u> 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 describes the formation of waterfalls <u>and/or</u> oxbow lakes. Response develops on a largely secure base of knowledge and understanding. Examples may lack detail or development. Level 1 (1–2) Response simply describes the formation of waterfalls <u>and/or</u> oxbow lakes. Knowledge is basic and understanding may be inaccurate. Examples are in name only or lacking entirely. Level 0 (0) No creditable response. If only discuss one feature, Max. Level 2.	8

Question	Answer	Marks
4(c)	‘Hard engineering is more effective than soft engineering in preventing river flooding.’ With the aid of one or more examples, how far do you agree with this statement? Candidates may suggest that hard engineering can be designed to protect areas (up to a certain flood risk). Hard engineering methods are artificial structures which attempt to alter the flow of water and prevent inundation e.g. embankments/levées, dams, diversion channels, flood walls, etc. The argument could be posed that while they may be effective in preventing some floods, they may have unintended consequences and also may not be as visually appealing. Effectiveness may be considered in terms of a reduction in casualties, damage to infrastructure and financial costs. Thus, effective in prevention, but not effective financially (economical) or environmentally. Soft engineering approaches are more in keeping with the natural characteristics of the river and the natural environment as they work with natural processes e.g. afforestation, wetland regeneration, catchment ponds, land-use zoning. They reduce the impact, though flooding may still occur. 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 hard engineering is more effective than soft engineering in preventing river flooding. 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 hard engineering is more effective than soft engineering in preventing river flooding 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 hard engineering is more effective than soft engineering in preventing river flooding. 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 how hard engineering and soft engineering can prevent river flooding 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 how the type of surface affects the albedo rate. The following factors could be considered: • lighter coloured surfaces have higher albedo rates (1) such as ice and snow/accurate percentages (DEV) • more solar radiation is reflected off lighter surfaces (1) • darker coloured surfaces have lower albedo rates (1) such as tarmac, ploughed fields and coniferous forests/accurate percentages (DEV) • more solar radiation is absorbed by darker surfaces (1) 1 mark for each simple description, 2 marks for a developed description, up to max. 2.	4
5(a)(ii)	Explain <u>one</u> way the incoming (shortwave) radiation is reflected back into the atmosphere before it reaches the Earth's surface. Ways could include: • clouds/water droplets/ice crystals • clouds normally have a higher albedo than the surrounding atmosphere • scattered/bounced back into the atmosphere 1 mark for a simple explanatory point, 2 marks for a developed explanation and 3 marks for a well-developed explanation.	3

Question	Answer	Marks
5(b)	Explain the different causes of precipitation. The four main causes are: • convectional • orographic • frontal • radiation cooling The candidate should describe the process of the air being forced to rise due to convection / relief / front and then the processes by which precipitation is formed (cooling, condensing, forming of water vapour and droplets). For the first three causes, the following factors are relevant: • the mechanism that forces air to rise • the air on rising then cools • and if it cools (to below dew point), condensation occurs • water droplets may coalesce to produce rain 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 different 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 different 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 different 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)	‘Incoming solar radiation is the most important factor in determining the global energy budget.’ With the aid of examples, how far do you agree with this statement? Global energy budget is the balance between incoming radiation (shortwave) and outgoing radiation (longwave). It can be argued that incoming solar radiation is the most important factor, as without this, the budget would not exist. Incoming solar radiation is affected by absorption, re-radiation, reflection, scattering, etc. Credit can also be given to discussion on: • latitudinal pattern of radiation (excesses and deficits) • atmospheric transfers – wind belts and ocean currents • seasonal variation in temperature, pressure and wind belts – influence of latitude, land/sea distribution and ocean currents 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 incoming solar radiation is the most important factor in determining the global energy budget. 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 incoming solar radiation is the most important factor in determining the global energy budget 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 incoming solar radiation is the most important factor in determining the global 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). Level 1 (1–3) Response may broadly discuss incoming solar radiation and the global 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.	15

Rocks and weathering

Question	Answer	Marks
6(a)(i)	Briefly describe <u>two</u> types of plate boundaries. The candidate can select two from divergent (constructive), conservative and convergent (destructive and collision). Credit can be given to the use of a diagram(s). Divergent (constructive) – Two plates move apart. New crust material is produced in the gap between them, creating mid-ocean ridges and rift valleys. Transform/conservative fault – Where two plates move past one another, either at different speeds in the same direction or in different directions. Convergent (destructive) – Two plates move towards each other; the denser oceanic plate is subducted. Convergent (collision) – Two continental plates move towards each other, the lithosphere is deformed, and mountain building occurs. There is no subduction. 1 mark for a simple description, 2 marks for a developed description. Reserve 2 marks for each plate boundary. Credit the use of accurate diagrams.	4
6(a)(ii)	Briefly explain the location of ocean trenches. Ocean trenches can be formed at oceanic–oceanic boundaries or oceanic–continental convergent boundaries. Heavier oceanic plate slides under the lighter continental plate (subduction) with the formation of the ocean trench. Melting takes place in the Benioff zone. The subducting plate sinks at an angle, forming the trench. The lithosphere is bent as it is pushed down and forms a steep v-shaped depression. As the subducting plate is forced down, the downwards pressure on the non-subducting plate means it is also pulled down and it buckles. Diagrams can be given marks where they serve to explain the location. Credit the use of named examples as a way of developing the answer e.g. Peru trench, Mariana trench. 1 mark for a simple explanation, 2 marks for a developed explanation and 3 marks for a well-developed explanation.	3

Question	Answer	Marks
6(b)	Explain the movement of water and sediment on the surface of slopes. The syllabus details rainsplash and surface runoff (sheetwash and rills) as key movements to be discussed by the candidate. But soil creep and mudflows may be credited. The question asks for surface movement. Rainsplash includes the movement of sediment as a result of each raindrop dislodging the sediment and moving soil particles downslope. Sheetwash (or sheet erosion) is the erosion of material/sediment, over the surface of the land, being carried by an unconcentrated water flow. When rainfall exceeds the infiltration capacity of the soil, water will flow on the surface. It may develop into small rivulets and then shallow channels may develop as rills, then are enlarged forming gullies, and sediment moved downslope through these channels. 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 movement of water and sediment on the surface of slopes. 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 movement of water and sediment on the surface of slopes. Response develops on a largely secure base of knowledge and understanding. Examples may lack detail or development. Level 1 (1–2) Response describes the movement of water and sediment on the surface of slopes. 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, evaluate attempts to reduce mass movement. Candidates may refer to different attempts to reduce mass movement. These include those stated in the syllabus: pinning, netting, grading and afforestation. Accept other valid methods: terracing, grouting, shotcrete, slope drainage, retaining walls, vegetation planting. Candidates may refer to examples on different scales or different locations to exemplify their points. Award marks based on the quality of the response using the marking levels below. Level 4 (12–15) Response thoroughly assesses attempts to reduce 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 assesses attempts to reduce mass movement 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 attempts to reduce mass movement. 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 attempts to reduce mass movement 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