Cambridge Assessment International Education

Cambridge Pre-U

GEOGRAPHY **9768/01**

Paper 1 Global Environments **May/June 2023**

MARK SCHEME

Maximum Mark: 50

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

This syllabus is regulated for use in England, Wales and Northern Ireland as a Cambridge International Level 3 Pre-U Certificate.

[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.

Guidance notes for marking 9768/01

Levels of response marking is used for the 6 mark and the 15 mark questions.

This Mark Scheme contains, on the following page, the **Generic Mark Scheme** (GMS) used for assessing all pieces of extended writing bearing 15 marks in the Cambridge Pre-U Geography, followed by **Indicative Content** for each question.

Whilst the GMS captures the essential generic qualities of responses in 5 mark bands (Levels), the Indicative Content is what it says: some indication of the probable content or possible approaches to the questions and titles set. Candidates may develop their own approaches to questions. Examiners should not expect to find all the Indicative Content in any one response. Responses may be placed in any GMS Level without fulfilling all the descriptors for that mark band. Responses may exhibit characteristics of more than one Level and so examiners use the principle of best fit in determining response quality.

Cambridge International expects Examiners to use their geographical judgement and professional experience, combined with guidance given by Senior Examiners at the Standardisation Meeting and during the standardisation process, in assessing responses appropriately.

Generic Mark Scheme (GMS)

Level	Marks	Assessment criteria
5	**13–15**	• Detailed and accurate knowledge and clear, high order understanding of the subject content • Relevant and accurate exemplification used effectively • Clear organisation; good English expression; accurate use of geographical terminology • Fully focused on the specific demands of the question • Thorough analysis and a critical approach to evaluation; appropriate application of concepts and theories • Conclusion is logical and well founded on evidence and argument
4	**10–12**	• Good knowledge and depth of understanding of the subject content • Appropriate and effective exemplification • Logical organisation; sound English expression; appropriate use of geographical terminology • Well focused on the demands of the question • Good analysis and evaluation; generally appropriate application of concepts and theories • Conclusion is sound and based on evidence and argument
3	**7–9**	• Sound knowledge and understanding of the subject content lacking depth in some areas • Appropriate but partial exemplification, may not be integrated with the argument • Generally clear communication but lacking some organisation; English expression and use of geographical terminology are mostly accurate • Specific demands of the question mostly met • Some ability to analyse and evaluate; limited application of concepts and theories • Conclusion is limited and has some links to the rest of the response
2	**4–6**	• Some knowledge and understanding of the subject content lacking depth and detail • Exemplification used may be limited • Limited organisation; English expression is basic with some accurate use of geographical terminology • Question is addressed broadly or partially • Analysis, evaluation and application of concepts and theories are limited and may be superficial • Conclusion is basic and may not be linked to the rest of the response
1	**1–3**	• Little knowledge and understanding of the subject content • Exemplification, if used, is simple or may not be relevant • Lack of clarity and organisation; English expression is simple with inaccuracies; geographical terminology is basic or not understood • Question is understood weakly and may be addressed slightly • Superficial statements replace analysis and evaluation; application of concepts and theories may be minimal or absent • Conclusion may be absent or simply asserted
0	**0**	• No creditable response.

Section A

Answer **one** question from this section.

Hot arid and semi-arid environments

Question	Answer	Marks
1(a)(i)	**Fig. 1.1 shows Lake Chad, Africa, in 1973, 1987 and 2007.** **Describe the changes to Lake Chad shown in Fig. 1.1.** • Reduction in size overall • There is more than one separate water body; in 1987 there are three and in 2007 there are two water bodies/lakes • In 1973 coverage was across four countries; sq.km. might be roughly calculated • Reduction from NE and SE westwards • Two tiny areas by 2007 in Chad and Cameroon • Increase in vegetation cover • Scale and map evidence may be used for which credit should be awarded There should be mention of locations and direct reference to the maps and dates for 4 marks. Any four points that are applicable to the map and question will be credited.	**4**
1(a)(ii)	**Suggest how physical and human factors may help to explain the changes you have described in (a)(i).** Physical: climate change, drought, i.e. lack of rainfall feeding the lake itself, the ground water supplies and the rivers feeding the lake. It is a basin of inland drainage and the drought and climate change effects are widespread in this part of Africa. Vegetation coverage may be mentioned which is creditable. Human: abstraction of water for human consumption, irrigation, crop production, drinking water for animals (and perhaps humans), population growth (natural increase is high), migration.	**6**

Question	Answer	Marks
1(b)(i)	**EITHER** **Discuss the extent to which weathering processes in hot arid and semi-arid environments are the result of temperature changes.** Indicative content: There are two categories of weathering: physical and chemical. Arguably the former needs temperature change and does not involve chemical changes to the rocks whereas the latter does. The catalyst for chemical weathering is water/H_2O. This produces chemical reactions with the rocks which breakdown, usually into different products. Physical weathering in arid environments is largely responsible for boulders, rocky deserts and screes; all of which form major recognisable landforms. Physical weathering: thermal fracture and exfoliation are quoted in the syllabus. It is argued that exfoliation requires dew to make the rates faster. It is considered that tafoni is the result of dew. Diurnal temp change in arid areas can be as much as 40 °C. It can be 40 °C in the daytime and go down to minus figures at night. This will trigger thermal fracture along joints and faults and exfoliation because of the temperature differential between surface and interior of the rock face. Chemical weathering involves a chemical reaction which may result in decomposition of the rock to form a chemically different weathered product. The conclusion should be clear and based on the argument made by the candidate. It does not matter how they conclude provided it is supported by evidence. The higher-level answers will be conclusive, in most cases.	**15**

Question	Answer	Marks
1(b)(ii)	**OR** **To what extent is desertification changing the traditional lifestyles of societies in hot arid and semi-arid environments?** Indicative content: The focus of this question which considers 'human interaction with hot arid and semi-arid environments' is directed at the ways human activities, societies and lifestyles change in response to changing environmental conditions. The Tuareg, Fulani and Maasai are the people that inhabit the Sahara Desert and the fringes south of the Sahara known as 'The Sahel' which is particularly blighted by the process of desertification, i.e. the degradation of the landscape due to increasing drought and rainfall variability. These societies are subsistence, nomadic and semi-nomadic pastoralists by tradition; herders looking for pasture for their animals. Hence, as this is in short supply, they have to move not only their animals but also their homes etc. and find another suitable spot. There is use of indigenous resources for their homes, firewood etc. These societies have been affected by a range of changes to their environment which has resulted in an increased tendency to migrate to the cities or other places to find a more regular source of food. These changes have been caused by climate change, drought, overgrazing as a result, salinisation of water as it dries up and increasing depths of ground water (causing the wells to dry up). There is a decreasing tendency to be dependent on water as societies settle and build tents rather than brushwood walls etc.; as they become sedentary and commercial it might be argued that the availability of water is less crucial. Clothing and habitations might be discussed depending on the case study material used for the answer. Higher-level answers may be able to consider all aspects of the question to reach a conclusive ending with specific reference to named case studies. Lower-level answers may find a clear focus more difficult to achieve and write descriptively rather than constructing a cogent argument.	**15**

Glacial and periglacial environments

Question	Answer	Marks
2(a)(i)	**Fig. 2.1 shows the number and orientation of corries / cirques in adjacent areas within a formerly glaciated environment in the United Kingdom.** **Using Fig. 2.1, compare the number and orientation of the corries / cirques between the two areas shown.** • In the NE quadrant in both areas • Both have NNE facing corries; two in Area A and one in Area B • Area A has eight in the ENE quadrant whereas Area B has five in the NNE quadrant • NNW orientation; one in Area A and two in Area B • Area B has some orientation in the SE quadrant whereas Area A does not Numbers and **correct** orientation (i.e. E.N.E) should be used for 4 marks.	**4**
2(a)(ii)	**Explain the reasons for the comparisons you have described in (a)(i).** Factors: geology, resistance and structure, altitude, temperature and rainfall, last glaciation. On the whole, north and east facing slopes are colder which results in more snow and ice accumulation and weathering to provide the initial hollows. Altitude affects rainfall. If most recently glaciated then there may have been snow lying until late in the period. e.g. Devensian in the UK; this would be true of both areas A and B, hence both would have snow lying (a similarity in this latter case).	**6**
2(b)(i)	**EITHER** **To what extent do relict upland glacial landscapes reflect past glacial processes?** Indicative content: Examples of relict glaciated landscapes could be identified i.e., areas that have undergone glaciation in the past. For instance, the upland landscape of Snowdonia or the Lake District which have identifiable landforms that constitute the characteristic landscape e.g. glacial troughs, corries and tarns, hanging valleys, truncated spurs, roches moutonnées. Subsequent modifications that have taken place since the ice retreated could also be considered i.e., physical processes in the form of weathering, erosion, fluvial processes and modifications from human activities such as industrial e.g. HEP, mining, tourism etc. It is important that the answers are well structured and thought through with specific examples to gain the higher-level marks. Lower-level marks will be achieved for a more descriptive approach with less evaluation.	**15**

Question	Answer	Marks
2(b)(ii)	**OR** **Discuss the extent to which nature reserves and parks play an important role in the sustainable management of either glacial or periglacial environments.** Indicative content: Answers will likely include definition and identification of nature reserves and parks and explanation of the environmental fragility of many of these areas, including flora and fauna. The question is related to the management of glacial and periglacial environments listed on the syllabus. The syllabus includes a list of issues which could usefully be employed to highlight the case studies used and the discussion, for example economic development and resource use e.g. oil drilling in the Arctic Wildlife Nature Reserve. Management strategies may involve limitation of numbers, research studies into fragile environments and the designation of vulnerable areas. There are numerous globally distributed reserves and parks that might be used to illustrate the points e.g. Glen Roy and Lochaber Geopark and the Cairngorms National Park in Scotland, Apuseni Reserve in Romania, Rocky Mountains in Montana, Norway etc. This answer needs reference to specific examples of both the issues and threats to these environments and the strategies for the higher-level marks.	**15**

Coastal environments

Question	Answer	Marks
3(a)(i)	**Fig. 3.1 shows a stretch of coastline at Del Mar 'beach city', California, USA, which is susceptible to rising sea levels. Fig. 3.2 is adapted from a recent podcast by the mayor of Del Mar.** **Using Fig.3.1, describe the ways in which the threat of rising sea levels is being managed.** • Rock armour composed of large angular boulders piled up arguably in a fairly random manner • Sea wall – a concrete sill underlain by what appears to be a vertical construction of copper coloured metal • Wide sandy beach may represent beach replacement additions of sand to maintain width of beach	**4**
3(a)(ii)	**Using Figs. 3.1 and 3.2, explain why managed retreat is not a suitable strategy to combat the threat of rising sea levels at Del Mar.** Two main reasons: (i) The cost of seaboard properties, compensation rates very high if compulsory purchased. (ii) Land and properties behind are lower so even more susceptible to higher sea levels and flooding. These reasons will need some development to gain 6 marks. Ideally some specific reference to the figures is required.	**6**
3(b)(i)	**EITHER:** **Examine the extent to which sub-aerial processes determine the formation and characteristics of cliffs and shore platforms.** Indicative content: Cliff and shore platform form is the result of external factors like sub-aerial processes; weathering may initiate fractures and openings in the cliff face enabling the action of waves to continue the process. All forms of wave erosion could be discussed provided the subject of the question is kept in focus i.e., the characteristics and form of the cliffs (stratification, rock resistance, composition of the rock which will determine the height and angle of the cliff face). The inherent factors such as the structure and lithology of the cliffs should be discussed. Both these aspects need to be considered with examples and or case studies to illustrate the argument. Knowledge and understanding of all the processes and appreciation of structure and lithology is essential for higher-level answers. Lower-level answers may focus on examples and take a descriptive approach to the characteristics and form of cliffs whereas higher-level answers will be explanatory throughout to support the descriptions.	**15**

Question	Answer	Marks
3(b)(ii)	**OR** **Assess the extent to which coral reefs are fragile coastal ecosystems.** Indicative content: Answers will define coral reefs and describe and explain their generation/formation: coral larvae attach to submerged rocks and develop into polyps which secrete $CaCO_3$, therefore adding to the surface. To function they develop a symbiotic relationship with zooxanthellae through photosynthesis. Waste products of the polyps are circulated back to the zooxanthellae. Polyps also have tentacles to catch food. The structure of reefs consists of seaweed, sponges, clams, oysters. Some notion of this may precede the idea that they are biodiverse/the most biodiverse of the marine ecosystems. Coral reef ecosystems are threatened by a wide variety of both physical and human factors. Physical: climate change; storms/waves/floods create stronger forces on the reefs themselves, warming and acidification of the oceans. The latter causes bleaching and the former breaks the reef structures. In fact, whenever corals are under stress from whatever source they are subject to bleaching. Note that, although temperature increase of the ocean is most commonly quoted, this reason is not the principal cause of bleaching. Although a change of pH has occurred, it is slight. i.e. pH from 7.6 to 7.2 –this slight increase in acidity is sufficient to cause the building of $CaCO_3$ in the corals. Human: coastal development, boat anchors, destructive fishing practices, coral harvesting, land pollution, sedimentation, nutrient pesticides etc. The reason coral reefs are fragile is because they are not resilient, i.e. when threatened they do not regenerate easily or speedily, so become irreparably damaged.	**15**

Section B

Answer **one** question from this section.

Tropical environments

Question	Answer	Marks
4(a)(i)	**Fig. 4.1 shows the annual rate of deforestation in the Brazilian Amazon, 2000–20.** **Describe the trends in the annual rate of deforestation between 2000 and 2020 shown in Fig. 4.1** • Starts at 17 700 sq. km per annum rising to 27 500 sq. km in 2004 • From 2000 to 2004, roughly a rate of 2500 sq. km per annum. That is an average rate of 2500 sq. km/yr. • From 2004 to 2012 there is a steep decline to below 5000 sq. km/yr • From 2012 until 2020 there are small fluctuations but there is a general increase in the trend to about 11 000 sq. km. Time scale and figures should be included for 4 marks.	**4**
4(a)(ii)	**Suggest two possible reasons for deforestation in tropical rainforest environments such as the Brazilian Amazon.** • Increasing demand for trees and forest resources e.g. timber • Increasing demand for farming land, e.g. cattle ranching for beef production, soy crops • Government policy e.g. subsidised agriculture, taxation policies • Subsistence farmers squeezed out of traditional farmlands, migrating to unoccupied lands available • Growth of intensive, mechanised agriculture • Construction of roads/highways (e.g. between Peru and Brazil) • Illegal mining activities e.g. for gold There are a range of possible reasons for each selected there should be some development of the reason.	**6**

Question	Answer	Marks
4(b)(i)	**EITHER** **With reference to two tropical environments, examine the extent to which their differences and location depend on climatic patterns.** Indicative content: This question gives plenty of choice as there are five tropical environments listed in the syllabus. However, it is likely that the two major ones, tropical rainforest and tropical savanna, will be chosen. Both differences and location need to be addressed. Differences will focus on the nature and characteristics of the vegetation, its structure and biodiversity. Their locations in terms of latitude and continental locations should also be considered. Latitude produces characteristic climatic patterns in terms of rainfall and temperature; in the case of the examples mentioned above both environments are tropical but the tropical savannas at lower latitudes have a much greater seasonality, for instance. Candidates may observe that as latitude changes the vegetation shows a gradation of change rather than abrupt changes i.e. close to the equator there is dense evergreen tropical rainforest as a response to high rainfall, temperatures and humidity all year round whereas, with increasing distance, the forests gradually thin out to lower growing, more sparsely distributed deciduous trees and shrubs and grasses i.e. savanna. However, the clearly delineated latitudinal pattern is modified by local factors such as altitude and aspect, soil type, drainage and geology. These can be related closely to the tropical vegetation itemised in the syllabus. Tropical lowland evergreen forest correlates with flat land/lowland close to the equator, montane forest is found at higher altitudes within the area, freshwater swamp forest may be correlated with soil type and drainage within these major latitudinal zones. The conclusion will be clear if most of the above points are made, achieving higher-level marks. Lower-level answers may include plenty of factual material but with a weaker argument and pattern clearly identified.	**15**

Question	Answer	Marks
4(b)(ii)	**OR** **To what extent is the biological diversity of the tropical rainforest ecosystem a consequence of the interconnections between plants and animals?** Indicative content: The question targets 'the biotic environment' and the functioning of the tropical rainforest. Knowledge of the fauna (and their habitats) within the forest is needed, to include below-ground level fauna e.g. insects, decomposers etc. Candidates will consider the interconnections between plants and animals for instance, those mentioned in the syllabus: pollination, dispersal and food webs, linked to biological diversity. The role of decomposers is crucial for the functioning of the nutrient cycle and therefore the continuation of biological diversity. This is a technical question demanding appreciation and exemplification of the role of flora and fauna in the functioning of the ecosystem. Approaches will vary according to the teaching the candidate has received; responses might therefore be different but of equal value. If the answer involves an evaluation of the interconnections and what might break the connections down, for instance, human activities e.g. deforestation it is likely to gain higher-level marks. Candidates may also offer abiotic reasons for biological diversity, such as year-round sunlight, high annual rainfall and warm temperatures, and assess the extent to which these are responsible for biological diversity. Lower-level answers will be largely descriptive and less well constructed with an uncertain conclusion.	**15**

Temperate environments

Question	Answer	Marks
5(a)(i)	**Fig. 5.1 shows the plant succession in a temperate deciduous woodland.** **Using Fig. 5.1, describe the plant succession shown.** • There is an increasing variety of species in each sere • The total number of species stayed the same during the first two stages at 5, but then multiplied by a factor of over 2.5 in stage 3 • The number of species continued to grow by stage 4, but at slower rate. Between stage 4 and stage 5, the growth rate picked up again to reach a total of 27 species present. • In stage 1 and 2, there were only pioneer and early coloniser species. The pioneer species dominates in stage 1 with 80% whereas by stage 2 the early coloniser made up 60% and the absolute number of pioneer species had decreased. • The absolute number of pioneer species stayed consistent though all stages from stage 2 onwards. In stage 3, one late coloniser species appeared and the growth was in early coloniser species. In stage 4, the number of late colonisers multiplied by eight, whereas the number of early colonisers fell to 7 and continued to fall to five in stage 5. • Very rapid growth of the late colonisers continued in stage 5, where they made up 20 of the 27 total species There may be less detail than is indicated here. Any four valid points supported by data from the figure will be credited.	**4**
5(a)(ii)	**Suggest why the changes you have described in (a)(i) occur.** Increasing variety and height of species. Initial pioneers which do not require soil for growth and development e.g. lichens are joined by early colonisers e.g. mosses because there is incipient soil formation, nutrient availability and a place to root. This process continues along the stages through grasses in stage 3, to shrubs like hawthorn in stage 4, until it reaches stage 5 which is dominated by late coloniser species e.g. deciduous trees, oak and birch which are the tallest. Shade, soil formation and nutrient availability account for the stages. As the taller plants colonise, they shade out the lower growing plants. However, each stage accounts for increasing breakdown of the rock to provide nutrients, a source of water and rooting for the bigger plants.	**6**

Question	Answer	Marks
5(b)(i)	**EITHER** **Assess the extent to which the structure and functioning of the northern coniferous forest are dependent upon its nutrient cycling.** Indicative content: The structure and functioning of the ecosystem depends on the closed environment of the nutrient cycling around the system which consists of biomass, soil and litter (inclusion of a diagram would be helpful). There are inputs and outputs which enable the cycling to operate, these are: inputs: rainfall, sunlight, weathering outputs: weathering, run-off and leaching These dynamic inputs and outputs are the result of geology, climate, time and human activities. This material should form the basis of the argument around which the candidate will discuss changes and their effects and relate them carefully back to structure and the functioning. Candidates may be tempted to relate changes to human activity. This approach is perfectly acceptable as long as it links back to the subject of the question which is the structure and functioning of the chosen ecosystem. Case studies or specific examples will enhance answers. The latter two points will characterise the higher-level answers.	**15**

Question	Answer	Marks
5(b)(ii)	**OR** **'The development of the "bread baskets" of the world, such as the American Mid-West, have had a detrimental effect on the environment.'** **To what extent do you agree with this statement?** Indicative content: Answers should define and exemplify some of the 'bread baskets' and highlight and describe their original natural ecosystems e.g. grasslands of North America (i.e. the Prairies) and Asia (i.e. the Steppes). Their utilisation, for instance, extensive large-scale monocultural crop production (namely wheat) feeds a large proportion of the world population. Other smaller subsistence types of farming, e.g. herding of animals on the Asian steppes. In the Prairies during the 1930s, the time of the Dust Bowl, initially the farms were small holdings of 160 acres which were not then growing wheat. After Roosevelt's spell in power the farms were increased to 640 acres but even then, extensive wheat growing had not taken over. It was the Russian revolution that sparked the amalgamation to huge farms to fulfil the global demand for wheat that had dried up in areas like Ukraine because of conflict. Climate change has also played a role. The way these farming methods may impact detrimentally on the natural environment: soil management, toxicity, erosion, pesticides insecticides. Rachel Carson's iconic book, 'Silent Spring' might be referenced. Discussion might consider landscape management of the environment generally. The historical perspective is of importance in North America i.e., the Dust bowl of the 1930s, it's consequences and the subsequent use of the land. The human environment is also encapsulated in the question. There could be a balanced answer between poverty and wealth, subsistence and capitalism, arguing in opposition to the statement that the large-scale production is of staple crops (such as bread flour) providing high energy foods for survival compared with environmental issues.	**15**

The atmospheric environment

Question	Answer	Marks
6(a)(i)	**Fig. 6.1 shows the atmospheric conditions of the January and July monsoon, South Asia.** **Compare the atmospheric conditions in January with the atmospheric conditions in July as shown in Fig. 6.1.** • Wind direction – south west in July to north east in January • The winds are moving from sea to land in July and therefore are moisture bearing whereas in January they are dry because they are moving across the land towards the sea • Movement of the ITCZ from the southern margins of the Himalayas in July to south of the equator in January • The sub-tropical jet lies over the Himalayas in January but is not present in July	**4**
6(a)(ii)	**Explain how the atmospheric conditions you have compared in (a)(i) influence the monsoon weather in January and July.** The movement of the ITCZ and the sub-tropical jet stream north in the summer with the sun means that the jet stream lies over the northern edge of the Tibetan plateau and so winds are dragged into the area of low pressure from the south-west (SW trade winds). They travel across the Indian Ocean picking up moisture by evaporation. On reaching and moving across the land they drop their moisture as the land rises over the Western Ghats and cooling occurs resulting in the wet monsoon of July. In January the ITCZ moves southwards, the subtropical jet stream moves south too to lie along the southern edge of the Tibetan Plateau so the wind direction changes to north-east blowing from what is now an area of high pressure, i.e. from the hot land surface picking up little moisture on route therefore January is the dry monsoon season. (The Tibetan plateau causes the sub-tropical jet to bifurcate, partly governing the changing seasons and surface weather patterns.)	**6**

Question	Answer	Marks
6(b)(i)	**EITHER** **Assess the extent to which the global redistribution of energy can be explained by the tri-cellular model.** Indicative content: As always, on a global scale this is true. Candidates may draw a diagram to illustrate the tri-cellular model. This will be the foundation of a good answer using latitude names and accurate description of the circulation of air. However, this model is a simplification of the atmosphere which responds to altitude, land and sea surfaces differentially. Cold and warm water ocean currents carry heat and cold both north and south. Examples could include the Labrador current and the Gulf stream/ North Atlantic drift; these exert an influence, modifying temperatures and rainfall amounts. Higher altitudes can produce rainfall and rain shadow areas and large continental land masses have lower specific heat capacities producing hot spots in the summer seasons and lower temperatures in the winter seasons. There are anomalies which don't fit with the model and demonstrate how the tri-cellular model is a simplification; it is not always able to account for energy exchange but it does provide a useful explanation for the re-distribution of global energy. Good, higher-level answers will be able to explain some of the above anomalies clearly in order to demonstrate awareness of the simplification of models and show they appreciate the usefulness and accuracy of the model in this case. Application to a specific area e.g. the mid-latitudes would be a useful example; 'very spatially confined responses' are perfectly acceptable.	**15**

Question	Answer	Marks
6(b)(ii)	**OR** **'Short-term changes in the atmospheric environment of the cool temperate western maritime climate impact heavily on spending patterns and transport'.** **To what extent do you agree with this statement?** Indicative content: The short-term changes may be daily, weekly and/or monthly; the weather of this climate is notoriously changeable/variable and therefore potentially unseasonal. It is possible to agree when considering how retail has to respond to spending changes e.g. supermarkets have direct links with the Met Office and the forecasts enable them to control their supply chains. Weather is monitored on a daily and weekly basis so responses can be put into place. Anticyclonic weather is also a feature of this climate in both summer and winter, which also creates reliance on forecasting e.g. in summer a heatwave means that BBQ food, ice cream and salad stocks are increased whereas in very cold weather in winter, pies and casserole ingredients are increased. These are simple examples of a huge range that might be chosen. Transport may change in response to changing weather conditions: • Extreme weather events: flooding, snow falls, blizzards, fog. Flooding and snow falls etc. may lead to impassable roads, landslides etc. which make lines of communication impossible. • Fog grounds aircraft, heatwaves may melt tarmac and buckle railway tracks e.g. summer 2023. However, there are many other factors which affect these human activities, for example pandemics. Online shopping had increased exponentially during 2020–21. There are many factors which come into play of which the weather is merely one. The conclusion needs to be unequivocal and strong supported by a range of carefully thought-out reasons. This approach will characterise the higher-level answers whereas the lower-level answers may be supported by a less cohesive range of examples which do not attract a clear conclusion.	**15**