Cambridge International AS & A Level

Cambridge International Examinations
Cambridge International Advanced Subsidiary and Advanced Level

GEOGRAPHY **9696/01**

Paper 1 Core Physical Geography **For Examination from 2018**

SPECIMEN MARK SCHEME

1 hour 30 minutes

MAXIMUM MARK: 60

This document consists of **15** printed pages and **1** blank page.

CAMBRIDGE International Examinations

Section A

Hydrology and fluvial geomorphology

Question	Answer	Marks
1(a)	**Draw a sketch map of the meander in Zone X in Photograph A. Label the main features.** The sketch map doesn't have to perfectly match the photograph. The following features are expected: • three point bars/areas of deposition/slip-off slopes • at least one river cliff • a surrounding floodplain. The sketch map should **not** be an idealised/theoretical meander. **2 marks** for the diagram including these features. Features which might be labelled include: • meander • river cliffs • point bars/slip-off slopes (area of deposition) • floodplain. **2 marks** can be given for two or more accurate labels. No credit can be given for features not seen in Zone X e.g. riffles and pools, thalwegs and a multiplicity of oxbow lakes on an idealised meander diagram.	**4**
1(b)	**Explain the formation of <u>one</u> feature you identified in (a).** Candidates may choose any valid feature including: • meander • river cliff • point bar/slip-off slope (area of deposition) • floodplain. Answers should include a description of the sequence of events leading to the development of the feature and an explanation of the processes involved in its formation. Explanation of the chosen feature should include the role of any three of the following processes: • velocity/energy of water flow variations spatially • location and mechanism of specific processes • erosional or depositional outcomes of water flow variations • role of flooding • effects of the above process over time on the landform.	**3**

Question	Answer	Marks
1(c)	**Using Photograph A, suggest how the river might change course.** Candidates may suggest: • further exaggeration of the meanders leading to • cut offs • oxbow lake formation. Reference to flooding should be credited. Description of how this takes place should include the role of erosion and deposition in the exaggeration of a meander, including the sequence of events, process detail and location of each process. All the above could be achieved with well labelled diagrams. **1 mark** for identification of possible changes to the course including location. **2 marks** for explanation of the process leading to this change.	**3**

Atmosphere and weather

Question	Answer	Marks
2(a)(i)	**Using Fig. 1, identify:** **the location of the maximum temperature;** CBD	**1**
2(a)(ii)	**the value of the minimum temperature.** 24 [°C]	**1**
2(b)	**With reference to evidence from Fig. 1, describe the relationship between land-use and temperature shown.** 1 mark for each correct relationship between temperature and land use. Candidates may identify the following relationships: • highest in CBD [27.5°–28.4°] but candidates must relate this to land use for any credit (1) • lower in industry [27.5°–27.2°] (1) but decline slower/plateaus/does not continue to decline at same rate (1) • lowest in outer residential areas [24°] (1) declining from inner to outer residential areas [but not same rate east and west] (1) • anomaly of residential areas and industry to the west of CBD, temperature in inner residential areas is higher [27.6°] than industry [27.4°] (1) Expect data from Fig. 1 to support the description e.g. stated temperatures at different points. **1 mark** can be awarded for stating the general trend of urban temperature, i.e. decrease in temperature from the centre of the city (CBD) towards the fringe (outer residential areas), with no attempt to link temperature to the land use.	**3**

Question	Answer	Marks
2(c)	**Explain why night time temperatures vary across an urban area such as the one shown in Fig. 1.** Candidates must show awareness of spatial differences, which may be related to Fig. 1 or an urban area in general. They may choose to explain one or more factors in detail, or discuss several factors in a more general way. Explanations may include the following factors: • release of heat absorbed during the day • variations in amount of heat absorbed due to surface characteristics such as albedo and density • heat released from anthropogenic sources – heating and lighting of buildings, power stations, industry, vehicles, etc. • pollution blanket • protection against wind • variations in density of buildings/open space • other relevant factors. **1 mark** for each simple explanation, **2 marks** for each developed explanation, or **3 marks** for each well-developed explanation. Development might come as depth of explanation, the linking of factors together, or the relationship to a specific aspect of the pattern of temperature.	**5**

Rocks and weathering

Question	Answer	Marks
3(a)(i)	**Identify the main type of weathering occurring at <u>A</u>.** (strong) chemical	**1**
3(a)(ii)	**Identify the main type of weathering occurring at <u>B</u>.** (strong) physical	**1**
3(b)	**With reference to evidence from Fig. 2, describe the relationship between temperature and type of weathering.** Candidates must link the type of weathering to the pattern of temperature. Expect accurate readings of temperature from Fig. 2 to support the description. **1 mark** for each relationship between temperature and type of weathering. Type of weathering changes from physical to chemical as temperature rises or the reverse (1). Chemical weathering stops/starts at –1 °C to 2 °C (1) Physical weathering in general 6 °C and below (1) Comment about the strength of either chemical or physical weathering and temperatures from Fig. 2 (1) Comment on frost action varying from –2 °C /1 °C to +11 °C/+13 °C (1) **Max. 2 marks** can be awarded for general trend of the temperature and weathering type with no reference to Fig. 2.	**4**

Question	Answer	Marks
3(c)	**Explain the role of water in <u>one</u> weathering process.** For physical processes such as freeze-thaw and salt crystal growth the role of water is clearer than for heating/cooling, pressure release or vegetation roots. Expect and credit ideas such as changes in the state or role of water and its influence on rocks and minerals: solid to liquid, liquid to solid, insoluble to soluble, removal by solution, break up into ions and cations etc. Expect a clear explanation of the role of water in the process. The following marking approach could be used: **Freeze-thaw**: water as a liquid in cracks (1), freezes (solid) (1), expands and exerts pressure, the crack widens (1), more water can enter, when melting takes place and the process continues over a period of time/cycles (1); **Salt crystal growth**: water containing salts seep into cracks and joints (1), evaporates, leaving crystals behind (1), which expand when heated and exert pressure on the (confining) rock (1). Accept for a fourth mark an idea of where the water/salt comes from: such as from the sea, from (acids) decomposing rock etc. **Carbonation**: rain water combines with carbon dioxide or an organic acid (1) to form an acidic solution (1), which reacts with limestone (calcium carbonate) (1) changing it from an insoluble to a soluble form (calcium bicarbonate), which is removed in solution (1). **Hydration**: rock mineral takes up water (1), increases volume (1), creating physical stresses within the rock/mineral (1) leading to break up over time (1). **Hydrolysis**: rain water (with the aid of carbon dioxide) (1) breaks up into positive and negative (H+ and OH-) ions (1), chemically combines with minerals within rocks (silicate and carbonates) (1) and breaks it up forming both soluble and insoluble parts (1). The soluble parts are removed in solution (by water) (1). **Max. 2 marks** can be awarded for explanation of role of water in a broad group i.e. either physical or chemical weathering. Some use of Fig. 2 is possible – but is not needed – such as evidence that increased mean annual rainfall is associated with stronger weathering. Equally a broad general statement that water is essential in any/most processes would be valid. For either accept this as basic credit (1).	**4**

Section B

Hydrology and fluvial geomorphology

Question	Answer	Marks
4(a)(i)	**Define the hydrological terms *overland flow* and *infiltration*.** Overland flow is when water moves across the surface of the land (1) as it is unable to be absorbed into the ground (1)/is greater than infiltration rate (1). Infiltration is when water on the ground moves downwards (1) and enters the soil (1). **Max. 2 marks** for each definition.	**4**
4(a)(ii)	**Briefly describe the process of transpiration.** Transpiration is the movement of water within plants (1) and its loss as vapour (1) through the (stomata of the) leaves (1). Answers may be via a well annotated diagram.	**3**

Question	Answer	Marks
4(b)	**Explain how rock type and soils can affect stores of water in a drainage basin.** Candidates are expected to know about the influence of drainage basin characteristics on hydrographs, such as porosity and permeability of rock type and soils on stores such as: soil water, surface water, ground water and channel storage. There may also be reference to aspects of underground water such as water tables, ground water, recharge and springs. The main effect will be on surface and subsurface stores. Expect a contrast between soils which are porous or non-porous, such as sandy and clay rich, along with rock types which are permeable or impermeable, porous or non-porous. There does not need to be an equal balance, but both rock type and soils are needed for Level 3. Examples could come from rock types or soil and not necessarily be located. Award marks based on the quality of explanation and breadth of the response using the marking levels below. **Level 3** **6–8** Response considers both rock type and soil porosity and makes clear links to contrasts in stores of water. Response is well-founded in detailed knowledge and strong conceptual understanding of the topic. Any examples used are appropriate and integrated effectively into the response. **Level 2** **3–5** Response covers both rock type and soil porosity in outline or may focus on one at the expense of the other. Some links are made to stores of water. Response develops on a largely secure base of knowledge and understanding. Examples may lack detail or development. **Level 1** **1–2** Response lists one or more features of rock types or soils. No links to stores of water. 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, discuss the view that river floods cannot be prevented but their effects can be reduced.** Candidates are free to develop their own approach to the question and responses will vary depending on the approach chosen. Whichever route is chosen, essays which discuss prevention and amelioration and support their argument with relevant examples will be credited. There may be detailed consideration of a case study, or a broadly conceived response, drawing on several examples to illustrate the factors involved. There should be some balance between prevention and reducing the effects. Aspects might include: • forecasts and warnings: issues to consider might be accuracy and ability to respond in different circumstances • drainage basin management: aspects such as modifications to flows and stores related to deforestation and urbanisation • hard engineering and soft engineering: pros and cons of measures such as dams, river straightening, levee construction, diversion spillways, flood plain management, wetland and river bank conservation and restoration. Award marks based on the quality of the response using the marking levels below. **Level 4** **12–15** Response thoroughly discusses the complex nature of floods, prevention and amelioration of effects. Response has good contextual understanding of specific initiatives for flood prevention and reducing effects. Response is well-founded in detailed knowledge and strong conceptual understanding of the topic. **Level 3** **8–11** Response discusses both prevention and reduction of effects but discussion may be unbalanced in favour of one or the other. 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 floods, but may not consider both prevention and reduction of effects. 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 floods 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)	**Briefly describe how some incoming solar radiation is prevented from reaching the earth's surface.** absorption by the atmosphere (1) reflection by clouds (1) scattering by dust etc. (1)	**3**
5(a)(ii)	**Briefly explain why some surfaces absorb more solar energy than others.** Candidates might consider both reflection and absorption. Relative absorption/reflection can be considered in terms of: • Colour: low absorption by light surfaces (snow) and high absorption by dark surfaces (tarmac) • Shininess/dullness: low absorption by shiny surfaces (snow) and high absorption by dull surfaces • Thermal conductivity: density of surface such as soil/rock in comparison to water. **1 mark** for each point, **2 marks** for a developed point to the maximum. A developed point could consider both aspects of colour (light/dark) or shininess (shiny/dull) or explain with more detail or examples.	**4**

Question	Answer	Marks
5(b)	**Describe and explain how temperatures are influenced by distance from the sea.** Candidates are expected to consider only the pattern of temperature by distance from the sea: a coastal and interior difference which reverses seasonally – expect maritime/continental pattern and explanation. Answers may be via a well annotated diagram. Explanation should consider the reasons why the sea heats up more slowly than the land in summer but retains heat in winter, and the land heats up more quickly in the summer but cannot retain its heat in winter. Variations in factors such as: specific heat, heat capacity, albedo, density and mixing could be developed. Award marks based on the quality of explanation and breadth of the response using the marking levels below. **Level 3** **6–8** Response describes the effect of distance from the sea on temperature and provides a balanced explanation of how the varying qualities of land and sea influence temperature. Response is well-founded in detailed knowledge and strong conceptual understanding of the topic. Any examples used are appropriate and integrated effectively into the response. **Level 2** **3–5** Response describes the pattern of temperature well but the explanation is unbalanced. Response develops on a largely secure base of knowledge and understanding. Examples may lack detail or development. **Level 1** **1–2** Response lists one or more descriptive points about temperature for either coastal or inland areas. 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)	**'Global warming is caused as much by individual people as by large organisations.' With the aid of examples, how far do you agree?** Candidates are free to develop their own approach to the question and responses will vary depending on the approach chosen. Whichever route is chosen, essays which discuss the contributions of individuals as well as large organisations, with support from relevant examples will be credited. There may be detailed consideration of one or more examples, or a broadly conceived response, drawing on several examples to illustrate the factors involved. A clear explanation of the possible causes of global warming could focus on the enhanced greenhouse effect, sources of greenhouse gases and more human factors such as the pattern of production of gases – identifying large and small contributors, as well as reference to economic expansion and development. Comment on energy reduction, recycling or conservation is valid but should not dominate over the 'cause' aspect. Credit industry/business, TNCs and countries as large organisations. Award marks based on the quality of the response using the marking levels below. **Level 4** **12–15** Response thoroughly discusses the link between and relative power of the two scales of activity. Response has good contextual understanding of specific causes of global warming. Response is well-founded in detailed knowledge and strong conceptual understanding of the topic. **Level 3** **8–11** Response discusses both large organisations and individuals but discussion may be unbalanced in favour of one or the other. 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 global warming, but may not consider both large organisations and individuals or may cover both in outline only. 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 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.	**15**

Rocks and weathering

Question	Answer	Marks
6(a)(i)	**Define the tectonic terms *volcanic island arc* and *ocean trench*.** Volcanic island arcs are: a chain/type of archipelago (1) of volcanic islands parallel or close to a boundary between two converging tectonic plates (1). Ocean trenches are large scale features that are long and relatively narrow depressions in the ocean floor (1) and mark the point where one lithospheric slab subducts beneath another (1). **2 marks** for each definition. **Max. 3 marks** for not making reference to the converging action for each or subduction of one plate under another for ocean trench.	**4**
6(a)(ii)	**Briefly describe the process of sea floor spreading.** Sea floor spreading is a process which occurs at mid ocean ridges (1) where new ocean floor (basaltic magma) is formed through volcanic activity (1), then gradually moves away from the ridge (1). Answers may be via a well annotated diagram.	**3**
6(b)	**Describe and explain the formation of fold mountains.** Description might include: characteristics of fold mountains, height, location, folded/crumpled layers of rock, and could be aided by use of a diagram. The descriptive element is not expected to be a major part of a response. Explanation may include ideas related to: the convergent movement of plates, the characteristics of oceanic and continental plates, the role of sedimentation along continental margins and folding or buckling of sedimentary rocks. There may be some reference to the addition of igneous or volcanic material to the continental crust. Candidates might consider collision and destructive boundaries. 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 fold mountains including the role of plate tectonics, sedimentation and folding. Response is well-founded in detailed knowledge and strong conceptual understanding of the topic. Any examples used are appropriate and integrated effectively into the response. **Level 2** **3–5** Response explains the process in outline but focuses on plate tectonics at the expense of sedimentation and folding. Response develops on a largely secure base of knowledge and understanding. Examples may lack detail or development. **Level 1** **1–2** Response describes fold mountains with little explanation of formation. 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 human activities can affect the stability of slopes.** Candidates are free to develop their own approach to the question and responses will vary depending on the approach chosen. Whichever route is chosen, essays which discuss the effect of human activities on the stability of slopes and support their argument with relevant examples will be credited. There may be detailed consideration of a case study, or a broadly conceived response, drawing on several examples to illustrate the factors involved. Management activities for increasing slope stability might include: pinning, netting, grading, afforestation and other relevant ideas. For decreasing slope stability candidates might consider changes to land use such as: deforestation, extension of cultivated area, transport construction, urbanisation and other relevant activities. There might be a consideration of broader factors such as population growth and increased precipitation and occurrence of storms in some areas as a consequence of global warming. Discussion of the extent should consider the role of human activities as causes of change in slope stability as opposed to other factors. Candidates may also consider the scale of stability/instability and/or specific impacts taken from a case study. Credit use of coastal slopes if linked to stability and human activity. Award marks based on the quality of the response using the marking levels below. **Level 4** **12–15** Response thoroughly discusses the role of human activity and natural factors in relation to slope stability. Response has good contextual understanding of specific initiatives for slope management. Response is well-founded in detailed knowledge and strong conceptual understanding of the topic. **Level 3** **8–11** Response discusses the link between human activities and changes in slope stability but discussion may not consider other factors. 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 slope stability and human activity. 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 slope stability 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**

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