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**GEOGRAPHY****9696/12**

Paper 1 Core Physical Geography

**October/November 2018**

MARK SCHEME

Maximum Mark: 60

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**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.

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This document consists of **16** 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 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.

**Section A**

Answer **all** questions in this section.

**Hydrology and fluvial geomorphology**

Question	Answer	Marks
1(a)(i)	<p><b>Figs. 1.1 and 1.2 show storm hydrographs for drainage basins with different characteristics.</b></p> <p><b>In Fig. 1.1 which line, <u>W</u> or <u>X</u>, is for a large drainage basin?</b></p> <p>Hydrograph X</p>	<b>1</b>
1(a)(ii)	<p><b>In Fig. 1.2 which line, <u>Y</u> or <u>Z</u>, is for a forested drainage basin?</b></p> <p>Hydrograph Z</p>	<b>1</b>
1(b)	<p><b>With reference to Fig. 1.1, compare the shape of the two lines, <u>W</u> and <u>X</u>.</b></p> <p>The main differences are:</p> <ul style="list-style-type: none"> <li>• Smaller peak for W</li> <li>• Steeper rise for W</li> <li>• More sudden initial drop in discharge for W</li> <li>• Apparently shorter lag time for W, assuming that the rainfall event started at time zero.</li> <li>• Broader top for X</li> <li>• Less total discharge for W</li> </ul> <p>It is a comparison so any relevant similarities should be credited. Maximum 1 mark if no direct comparison.</p> <p>Any three points for the 3 marks.</p>	<b>3</b>

Question	Answer	Marks
1(c)	<p><b>Explain how soils and rock type influence the amount and rate of infiltration in a drainage basin.</b></p> <p>Some of the factors affecting both amount and rate are for both soils and rock type:</p> <ul style="list-style-type: none"> <li>• porosity</li> <li>• permeability</li> <li>• infiltration capacity influenced by different soil characteristics</li> <li>• antecedent moisture in the soil might also be considered, as some types of soil will retain water from previous rainfall more than others</li> </ul> <p>Discussion of amount and rate will probably be integrated so it is not feasible to allocate marks to each. But there needs to be some mention of rate for full marks. Both soils and rock type need to be discussed but there need not necessarily be an equal weight. The better candidates might argue that rock type is more important in percolation and only affects infiltration if the land surface is bare of soils. Credit suggestions that rock type influences the type of soils and that impermeable rock will mean that soils will become saturated quicker, thus reducing infiltration.</p> <p>Maximum 4 if nothing relevant on rock type. If a very general account without mentioning soil characteristics maximum marks cannot be achieved.</p> <p>1 mark for each simple explanation, 2 marks for each developed explanation and 3 marks for each well-developed explanation.</p>	<b>5</b>

## Atmosphere and weather

Question	Answer	Marks
2(a)	<p><b>Fig. 2.1 shows global surface pressure systems and surface winds for July.</b></p> <p><b>Name the line labelled <u>A</u> shown in Fig. 2.1.</b></p> <p>The position of the Inter Tropical Convergence zone. Accept thermal equator.</p>	1
2(b)	<p><b>Describe the pattern of surface winds south of the Equator shown in Fig. 2.1.</b></p> <p>There are several components to this that can be described:</p> <ul style="list-style-type: none"> <li>• the pattern of west to east winds in high southern latitudes</li> <li>• winds radiating out of high pressure zones</li> <li>• winds blowing towards the Equator (south-east trade winds) might be described</li> </ul> <p>Any other points that seem relevant from the figure.</p> <p>Any three relevant points for the 3 marks.</p>	3
2(c)	<p><b>Explain the distribution of global surface pressure systems shown in Fig. 2.1.</b></p> <p>One of the important features of the northern hemisphere is the location of low pressure systems in the landmass and the general high pressure systems in the oceans. As it is July, the land pressures can be related to the passage of the overhead sun and the differential heating of land and sea. The southern hemisphere distribution is somewhat different because of the relative lack of land masses.</p> <p>Allow credit for discussion of tri-cellular model if clearly related to low pressure at the July position of the ITCZ.</p> <p>There needs to be reference to both low/high pressures and land/sea.</p> <p>1 mark for each simple explanation, 2 marks for each developed explanation and 3 marks for each well-developed explanation.</p>	6

**Rocks and weathering**

Question	Answer	Marks
3(a)(i)	<p><b>Fig. 3.1 shows a cross-section of part of the Earth's crust.</b></p> <p><b>Name the landform labelled <u>P</u>.</b></p> <p>Mid-ocean ridge. Just ocean ridge is acceptable. Ocean is necessary.</p>	<b>1</b>
3(a)(ii)	<p><b>Name the landform labelled <u>Q</u>.</b></p> <p>Ocean trench. Ocean is necessary.</p>	<b>1</b>
3(b)	<p><b>With reference to Fig. 3.1, describe the process labelled <u>R</u>.</b></p> <p>The process in operation is subduction. The following points should be described:</p> <ul style="list-style-type: none"> <li>• the movement of oceanic plate towards the continental plate</li> <li>• subduction, below the continental plate</li> <li>• along the Benioff zone</li> <li>• resulting in melting of the crust</li> </ul> <p>Three points for the 3 marks.</p>	<b>3</b>
3(c)	<p><b>Explain the formation of volcanic island arcs.</b></p> <p>The following are the main points that could be considered in an explanation of volcanic island arcs:</p> <ul style="list-style-type: none"> <li>• the convergence of two oceanic plates</li> <li>• the subduction of the denser plate</li> <li>• melting in the Benioff zone</li> <li>• to form volcanic island arcs</li> </ul> <p>These are the main points that could be credited. A well-annotated diagram can get full marks.</p> <p>1 mark for each simple explanation, 2 marks for each developed explanation and 3 marks for each well-developed explanation.</p>	<b>5</b>

**Section B**

Answer **one** question from this section.

**Hydrology and fluvial geomorphology**

Question	Answer	Marks
4(a)(i)	<p><b>Briefly describe how abrasion occurs in a river channel.</b></p> <p>The main points that could be made are:</p> <ul style="list-style-type: none"> <li>• the scraping of particles</li> <li>• along the bed and against the sides of river channels</li> <li>• by high river flows (high turbulence)</li> <li>• leading to erosion of the river bed and banks</li> </ul> <p>Not to be confused with attrition.</p> <p>Three relevant points for 3 marks.</p>	<b>3</b>
4(a)(ii)	<p><b>Describe the conditions under which deposition occurs in river channels.</b></p> <p>Deposition occurs when the velocity or discharge of a river drops below the critical amount needed to keep sediments of a specific size in motion. The Hjulstrom curve might be used as part of the description, indicating that deposition will depend on the balance between river velocity and size of particles being transported. Answers might also suggest locations in a river channel where deposition might occur such as the inner bends of a meandering river or as eyots in a braided channel. However, the description needs to be in relation to the low river velocity or decreasing discharge.</p> <p>The main points are as follows but there may be other relevant points:</p> <ul style="list-style-type: none"> <li>• drop in velocity or discharge</li> <li>• depends on particle size with reference to velocity</li> <li>• coarser particles are deposited first</li> <li>• shape of particles might influence deposition</li> </ul> <p>Four relevant points for 4 marks.</p>	<b>4</b>

Question	Answer	Marks
4(b)	<p><b>Explain the formation of <u>two</u> fluvial depositional landforms.</b></p> <p>Candidates are expected to know the depositional landforms noted in the syllabus. The depositional landforms noted are point bars (slip-off slopes), riffles, levees, deltas and floodplains. Levees are formed mostly by overtopping. Most of the landforms are specifically related to meandering channels. However, sand bars (eyots) are relevant if discussing braided channels. For deltas there needs to be reference to flocculation for high marks. There should be a description of the chosen landforms and sediment size as well as an explanation.</p> <p>There does not need to be an equal balance, but two landforms are required for Level 3. Thus only one landform restricts it to top of Level 2, depending on quality of explanation.</p> <p>Award marks based on the quality of explanation and breadth of the response using the marking levels below.</p> <p><b>Level 3</b> <span style="float: right;"><b>6–8</b></span> Response considers two relevant landforms and makes clear links to the processes operating in rivers. 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.</p> <p><b>Level 2</b> <span style="float: right;"><b>3–5</b></span> Response covers two relevant landforms in outline or may focus on one landform at the expense of the other. Only one relevant landform restricts it to top of Level 2 depending on quality of explanation. Some links are made to processes but these links will be deficient in some respects. Response develops on a largely secure base of knowledge and understanding.</p> <p><b>Level 1</b> <span style="float: right;"><b>1–2</b></span> Response covers the landforms in a basic way. Links to the processes operating will be limited. Knowledge is basic and understanding may be inaccurate.</p> <p><b>Level 0</b> <span style="float: right;"><b>0</b></span> No creditable response.</p>	<b>8</b>



Question	Answer	Marks
4(c)	<p data-bbox="316 248 1302 315"><b>With the aid of examples, examine the extent to which vegetation type and land use in a drainage basin affect the likelihood of river flooding.</b></p> <p data-bbox="316 349 1310 651">Candidates are free to develop their own approach to the question and responses will vary depending on the approach chosen. The discussion should focus on the ways that vegetation type and land use affect the rate and amount of movement of water towards the rivers. However, this is an evaluative question, thus ‘the extent to which’ will need to be discussed to achieve a mark in the higher levels. Discussion of vegetation type could evaluate the differences between grassland and forested land, and land use could include consideration of urban land uses (impermeable surfaces) and rural land uses.</p> <p data-bbox="316 685 1302 752">Award marks based on the quality of the response using the marking levels below.</p> <p data-bbox="316 786 1318 819"><b>Level 4</b> <span style="float: right;"><b>12–15</b></span></p> <p data-bbox="316 819 1302 1055">Response thoroughly discusses the ways that vegetation type and land use affect the likelihood of river flooding. Response has good contextual understanding of these factors with a sound examination of the extent to which either vegetation type or land use affect flooding or the extent to which other factors affect the likelihood of flooding. Response is well-founded in detailed knowledge and strong conceptual understanding of the topic.</p> <p data-bbox="316 1088 1318 1122"><b>Level 3</b> <span style="float: right;"><b>8–11</b></span></p> <p data-bbox="316 1122 1302 1223">Response discusses how vegetation type and land use affect the likelihood of river flooding but discussion may be unbalanced. Response develops on a largely secure base of knowledge and understanding.</p> <p data-bbox="316 1256 1318 1290"><b>Level 2</b> <span style="float: right;"><b>4–7</b></span></p> <p data-bbox="316 1290 1302 1458">Response shows general knowledge and understanding of the factors that might lead to river flooding but will be unbalanced. Understanding of the topic may be partial or inaccurate. There may be concluding remarks but there will be very limited evaluation. General responses without the use of a specific example(s) will not get above the middle of Level 2 (6 marks).</p> <p data-bbox="316 1491 1318 1525"><b>Level 1</b> <span style="float: right;"><b>1–3</b></span></p> <p data-bbox="316 1525 1262 1626">Response may broadly discuss river flooding but does not address the question and so does not provide a convincing evaluation. Knowledge is basic and understanding is poor.</p> <p data-bbox="316 1659 1318 1693"><b>Level 0</b> <span style="float: right;"><b>0</b></span></p> <p data-bbox="316 1693 632 1727">No creditable response.</p>	15

**Atmosphere and weather**

Question	Answer	Marks
5(a)(i)	<p><b>Define the terms <i>latent heat transfer</i> and <i>sublimation</i>.</b></p> <p>Heat energy absorbed or released by a substance (1 mark) during a change in its physical state (e.g. condensation, evaporation) (1 mark) that occurs without changing its temperature (1 mark). These are the essential points to look for, but they might be expressed slightly differently.</p> <p>Sublimation is the process whereby a solid, such as ice, passes into the vapour state (1 mark) without going through the liquid phase (1 mark). It can also act in reverse.</p> <p>Mark as 2 + 2.</p>	<b>4</b>
5(a)(ii)	<p><b>Briefly describe the factors that influence the rate of evaporation.</b></p> <p>The key factors are:</p> <ul style="list-style-type: none"> <li>• temperature</li> <li>• wind speed</li> <li>• relative humidity (moisture content in the air)</li> <li>• source of water</li> </ul> <p>These points need a qualification. 1 mark for a list.</p> <p>Mark as three points.</p>	<b>3</b>

Question	Answer	Marks
5(b)	<p><b>Explain how convection and frontal uplift of air can lead to precipitation.</b></p> <p>They are both mechanisms whereby air is forced to rise which may enable the rising air to reach dew point from which condensation occurs. If the air keeps on rising, then there may be sufficient condensation for precipitation to occur. Convection requires the heating of the land surface to produce air that is capable of rising. Frontal precipitation requires the warm air to rise above cold air at a front. In both situations, the air needs to keep on rising.</p> <p>In the case of convection, the air needs to be warmer than the general environmental air. In the case of frontal uplift, it will depend on the type of front.</p> <p>There does not need to be an equal balance, but both are required for Level 3. Thus only one restricts it to the top of Level 2, depending on the quality of explanation.</p> <p>Award marks based on the quality of explanation and breadth of the response using the marking levels below.</p> <p><b>Level 3</b> <span style="float: right;"><b>6–8</b></span> Response considers both mechanisms and makes clear links to the processes operating. 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.</p> <p><b>Level 2</b> <span style="float: right;"><b>3–5</b></span> Response covers the two mechanisms in outline or may focus on one mechanism at the expense of the other. Some links are made to processes but these links will be deficient in some respects. Response develops on a largely secure base of knowledge and understanding. Examples may lack detail or development.</p> <p><b>Level 1</b> <span style="float: right;"><b>1–2</b></span> Response covers the mechanisms in a basic way and the mechanisms might not be relevant. Links to the processes operating will be limited. Knowledge is basic and understanding may be inaccurate.</p> <p><b>Level 0</b> <span style="float: right;"><b>0</b></span> No creditable response.</p>	<b>8</b>

Question	Answer	Marks
5(c)	<p><b>With reference to <u>one</u> urban area, assess the extent to which its climate is affected by human activity.</b></p> <p>Candidates are free to develop their own approach to the question and responses will vary depending on the approach chosen.</p> <p>The discussion should focus on the ways that human activity affects the climate of one specific urban area as noted in the syllabus. The question refers to climate, thus answers concentrating on temperature alone will not score many marks. As noted, the syllabus requires candidates to have studied a specific case study.</p> <p>The main effects of human activity are:</p> <ul style="list-style-type: none"> <li>• increased temperatures especially in winter and at night</li> <li>• increased precipitation (rain) but lesser snowfalls</li> <li>• decreased general windiness but with channelling of winds along streets</li> <li>• decreased relative humidity</li> <li>• increased amounts of fog</li> </ul> <p>These effects are the result of the activities and building land use. There needs to be an accurate link to the nature of the chosen urban area.</p> <p>Award marks based on the quality of the response using the marking levels below.</p> <p><b>Level 4</b> <span style="float: right;"><b>12–15</b></span> Response thoroughly discusses how human activity affects the climate of the chosen urban area. The chosen urban area will be described in a knowledgeable and accurate way. Response is well-founded in detailed knowledge and strong conceptual understanding of the topic with a reasoned assessment of the extent to which the climate is affected.</p> <p><b>Level 3</b> <span style="float: right;"><b>8–11</b></span> Response discusses how human activities affect the climate of the chosen urban area but the range of climatic characteristics discussed might be less comprehensive, and an assessment of the extent to which the climate is affected will be less reasoned. Response develops on a largely secure base of knowledge and understanding.</p> <p><b>Level 2</b> <span style="float: right;"><b>4–7</b></span> Response shows general knowledge and understanding of the effect of human activities on the climate of the chosen urban area. However, the range of climatic effects discussed will be limited and knowledge of the urban area will be limited. Understanding of the topic may be partial or inaccurate and there will be very limited assessment. The discussion might be more generic rather than related to a case study. General responses without the use of a specific example of an urban area will not get above the middle of Level 2 (6 marks).</p>	15

Question	Answer	Marks
5(c)	<p><b>Level 1</b> Response may broadly discuss the effect that human activities have on the climate of the chosen urban area but does not address the question and so does not provide a convincing assessment. Knowledge is basic and understanding is poor. The answer may be purely generic.</p> <p><b>Level 0</b> No creditable response.</p>	<p><b>1–3</b></p> <p><b>0</b></p>

**Rocks and weathering**

Question	Answer	Marks
6(a)(i)	<p><b>Define the terms <i>flow</i> and <i>fall</i> as they apply to mass movement.</b></p> <p>Flow is the movement of often wet material (1 mark) on a slope with internal deformation (structureless) (1 mark) and no noticeable failure surface (1 mark).</p> <p>Fall is the free movement of material (1 mark), often very fast (1 mark) from a very steep slope or cliff (1 mark) directly to the ground (1 mark).</p> <p>Mark as 2 + 2 with two points mentioned for each type of movement.</p>	<b>4</b>
6(a)(ii)	<p><b>Briefly describe how rainsplash can lead to sediment movement on hillslopes.</b></p> <p>The three main elements needed are:</p> <ul style="list-style-type: none"> <li>• rainsplash occurs when raindrops hit a bare soil surface</li> <li>• sufficient kinetic energy is involved to dislodge soil particles</li> <li>• this can lead to downslope movement of particles if the rainsplash occurs on a slope</li> </ul> <p>An alternative approach:</p> <ul style="list-style-type: none"> <li>• rainsplash can compact soil</li> <li>• reducing the infiltration rate</li> <li>• initiating overland flow and the movement of sediment</li> </ul> <p>Either of these approaches or a combination of the two with three relevant points for the 3 marks.</p>	<b>3</b>

Question	Answer	Marks
6(b)	<p><b>Explain how weathering is affected by rock type and rock structure.</b></p> <p>There should be a discussion of both physical and chemical weathering and both rock type and rock structure.</p> <p>Candidates might contrast granite with limestone, relating the type of weathering to the rock characteristics such as mineralogy and jointing. Hydrolysis might be related to granite with its mineral feldspar, and carbonation with respect to limestone.</p> <p>There does not need to be an equal balance between rock type and structure but both are needed for a mark in Level 3.</p> <p>Award marks based on the quality of explanation and breadth of the response using the marking levels below.</p> <p><b>Level 3</b> <span style="float: right;"><b>6–8</b></span> Response considers both rock type and rock structure and a variety of weathering processes, both chemical and physical. 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.</p> <p><b>Level 2</b> <span style="float: right;"><b>3–5</b></span> Response covers both rock type and rock structure but may focus on one at the expense of the other. The range of weathering types discussed may be partial. Response develops on a largely secure base of knowledge and understanding. Examples may lack detail or development.</p> <p><b>Level 1</b> <span style="float: right;"><b>1–2</b></span> Response covers the question in a basic way. Links between weathering processes and rock type and rock structure will be limited. Knowledge is basic and understanding may be inaccurate.</p> <p><b>Level 0</b> <span style="float: right;"><b>0</b></span> No creditable response.</p>	<b>8</b>

Question	Answer	Marks
6(c)	<p><b>With reference to <u>one</u> example, evaluate attempts to reduce mass movement.</b></p> <p>Candidates are free to develop their own approach to the question and responses will vary depending on the approach chosen.</p> <p>The discussion should focus on one example, with a description of the nature and effects of that mass movement. This should be followed by an evaluation of attempts to reduce the mass movement. These could be by draining the slope, stabilising the slope, revegetation and many others, depending on the nature of the chosen mass movement.</p> <p>Award marks based on the quality of the response using the marking levels below.</p> <p><b>Level 4</b> <span style="float: right;"><b>12–15</b></span> Response thoroughly discusses the chosen example. The chosen example will be described in a knowledgeable and accurate way. Response is well-founded in detailed knowledge and strong conceptual understanding of the topic with a realistic evaluation of attempts to reduce the mass movement.</p> <p><b>Level 3</b> <span style="float: right;"><b>8–11</b></span> Response discusses the chosen example but the discussion might be less comprehensive. Response develops on a largely secure base of knowledge and understanding with some realistic evaluation of the attempts to reduce the mass movement.</p> <p><b>Level 2</b> <span style="float: right;"><b>4–7</b></span> Response shows only a general knowledge and understanding of the example chosen. Description might be more generic than specific. Understanding of the topic may be partial or inaccurate and there will be very limited evaluation. General responses without the use of a specific example will not get above the middle of Level 2 (6 marks).</p> <p><b>Level 1</b> <span style="float: right;"><b>1–3</b></span> Response may broadly discuss mass movement but does not address the question and so does not provide a convincing evaluation. Knowledge is basic and understanding is poor. The answer may be purely generic.</p> <p><b>Level 0</b> <span style="float: right;"><b>0</b></span> No creditable response.</p>	<b>15</b>