Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

A-level
GEOGRAPHY

Paper 1 Physical Geography

Wednesday 22 May 2019 Afternoon Time allowed: 2 hours 30 minutes

Materials
For this paper you must have:
- the colour insert (enclosed)
- a pencil
- a rubber
- a ruler.

You may use a calculator.

For Examiner's Use	
Section	Mark
A	
B	
C	
TOTAL	

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in Section A.
- Answer **either** Question 2 **or** Question 3 **or** Question 4 in Section B.
- Answer **either** Question 5 **or** Question 6 in Section C.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The total number of marks available for this paper is 120.

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Section A

Water and carbon cycles

Answer **all** questions in this section.

0 1 . 1 Outline flows within the water cycle operating on a hill slope.

[4 marks]

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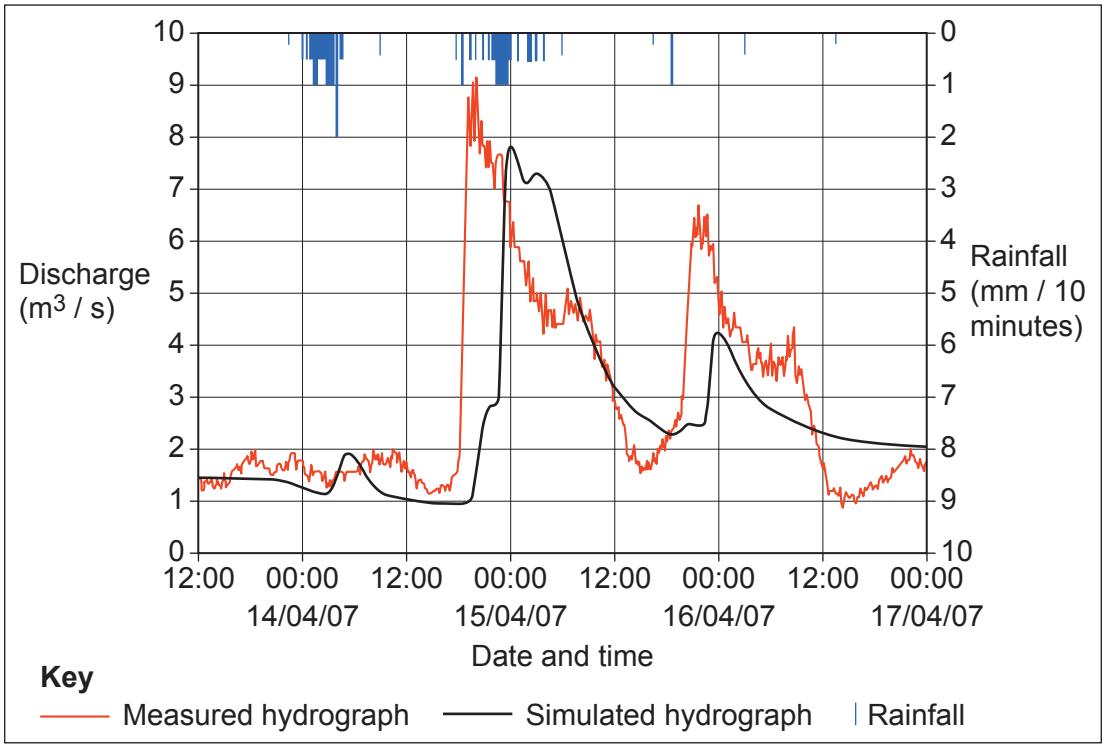
Figure 1 shows rainfall data, a measured hydrograph and a simulated hydrograph for Taguibo Watershed in Mindanao Island, southern Philippines. The data were collected from 13 to 17 April 2007. The simulated hydrograph is a computer-generated prediction of discharge.

Figure 1



0 1 . 2 Analyse the data shown in **Figure 1**.

[6 marks]

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Figures 2a and **2b** are in the insert.

Figure 2a shows two maps indicating the changing vegetation cover in the Taguibo Watershed in Agusan del Norte province, north-eastern Mindanao Island, Philippines, from 1976 and 2001. The third map shows how the area could be rehabilitated with natural vegetation.

Figure 2b shows the possible impact of a storm in 2007 upon the runoff volume in the Taguibo Watershed for each of the situations shown in **Figure 2a**.

0 1 . 3 Using **Figure 2a**, **Figure 2b** and your own knowledge, assess the potential impact of changing vegetation cover upon the runoff in this area.

[6 marks]

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0 1 . 4 To what extent does an understanding of feedback systems in the carbon cycle help with attempts to mitigate the impacts of climate change?

[20 marks]

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Section B

Answer **either** Question 2 **or** Question 3 **or** Question 4.

Question 2 **Hot desert systems and landscapes**

0 2 . 1 Outline sources of energy in hot desert environments.

[4 marks]

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Question 2 continues on the next page

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Figures 3a and **3b** are in the insert.

Figure 3a shows the primary productivity in five study areas of northern China which are at different stages of aeolian desertification.

Figure 3b shows the percentages of soil particle size in the same five study areas.

0 2 . 2 Analyse the data shown in **Figure 3a** and **Figure 3b**.

[6 marks]

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Figure 4 shows the landscape around and including Uluru in the Uluru-Kata Tjuta National Park, Northern Territory, Australia.

Figure 4

Note: Uluru is one of Australia's most recognisable natural landmarks. The sandstone formation stands 348 m high, rising 863 m above sea level, with most of its bulk lying underground. It has a total circumference of 9.4 km. Uluru is dominantly composed of coarse-grained sandstone and other rock fragments including basalt and granite.

0 2 . 3 Using **Figure 4** and your own knowledge, assess the role of weathering in the development of this landscape.

[6 marks]

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0 2 . 4 'The fragile inter-relationship between climate, soils and vegetation in arid regions is becoming increasingly affected by human activity.'

How far do you agree with this view?

[20 marks]

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End of Question 2

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Question 3 Coastal systems and landscapes

0 3 . 1 Explain the development of saltmarsh environments.

[4 marks]

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Question 3 continues on the next page

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Figure 5 is in the insert.

Figure 5 shows data related to the distribution of beach erosion and accretion measured from 1984 to 2016. Accretion occurs when more sand is accumulated on beaches than is lost to erosion.

0 3 . 2 Analyse the data shown in **Figure 5**.

[6 marks]

Extra space

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Figure 6 is a photograph of a stretch of coastline in the Mahia Peninsula, North Island, New Zealand.

Figure 6

Note: In New Zealand, there is a variety of coastal dune landforms. The dunes in **Figure 6** are relatively small shore-parallel foredunes located immediately behind the beach. Dunes can be made up of a variety of surface dune types. They can form hills and ridges which can rise to a hundred metres or more above the shoreline and represent long-term accumulations of large volumes of sand.

0 3 . 3 Using **Figure 6** and your own knowledge, assess the role of vegetation in the development of this landscape.

[6 marks]

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0 3 . 4 'Shoreline management/integrated coastal zone management can effectively tackle the expected eustatic sea level change and associated threat to coastal landscapes over the coming decades.'

To what extent do you agree with this view?

[20 marks]

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Extra space

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End of Question 3

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Question 4 Glacial systems and landscapes

0 4 . 1 Explain the formation of rôches moutonnées.

[4 marks]

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Question 4 continues on the next page

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Figures 7a, **7b** and **7c** are in the insert.

Figure 7a shows the number of days where ablation exceeds accumulation across the Greenland ice sheet between 1 January and 31 December 2017.

Figure 7b shows the number of melting days difference from the 1981–2010 average across the Greenland ice sheet between 1 January and 31 December 2017.

Figure 7c shows the percentage of the Greenland ice sheet experiencing melting in 2017. This is compared to the 1981–2010 median.

0 4 . 2 Analyse the data shown in **Figure 7a**, **Figure 7b** and **Figure 7c**.

[6 marks]

Extra space

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Figure 8 shows a periglacial landscape near Tuktoyaktuk, Northwest Territories, Canada.

Figure 8

Note: The aerial photograph was taken in late summer, near Tuktoyaktuk. It shows a largely flat area, in a coastal region near the Beaufort Sea in the Canadian Arctic. The mound in the image rises up to 36 metres above sea level. Local climate has had a powerful impact on the landscape, which is characterised by a high water table and the presence of numerous lakes.

0 4 . 3 Using **Figure 8** and your own knowledge, assess the role of frost action in the development of this landscape.

[6 marks]

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0 4 . 4 With reference to a glaciated landscape from beyond the UK, assess the impact of human activity upon the natural systems and physical landscape.

[20 marks]

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Do not write outside the box

Extra space

End of Question 4

36

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Section C

Answer **either** Question 5 **or** Question 6.

For the multiple-choice questions, completely fill in the circle alongside the appropriate answer.

CORRECT METHOD ⬬ WRONG METHODS ⊗ ⊙ ⊜ ✓

If you want to change your answer you must cross out your original answer as shown. ⊠

If you wish to return to an answer previously crossed out, ring the answer you now wish to select as shown. ⊠

Question 5 Hazards

0 5 . 1 What is an appropriate measure to tackle the spread of wildfire?

[1 mark]

A In higher income countries, insurance is available. Whilst this can be very costly, it does mean that any damage done during the event can be quickly rectified. ⬭

B Replanting trees in fire-affected areas can quickly return the area to its original condition, thus preventing the spread of fire in any future event. ⬭

C Education and warning systems can provide invaluable information to people in fire prone areas. Lookouts and regular patrols can help with early evacuation. ⬭

D Use of retardants combined with controlled burning can contain a wildfire, provided this is well planned and co-ordinated in advance of the event. ⬭

Question 5 continues on the next page

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0 5 . 2 What is an island arc?

[1 mark]

A Where oceanic plates collide, subduction leads to increased friction and melting. The less dense material begins to rise through the crust, creating a series of volcanic islands.

B Radioactive elements beneath the crust cause intense heating, often away from plate boundaries. As the volcano breaks through the crust and crust moves, an arc is formed.

C As plates diverge, magma is forced to the surface. After subsequent underwater eruptions, eventually island arcs are formed along ridges, such as in the Mid Atlantic.

D As continental plates collide, enormous pressure is exerted and folding occurs. Where folding occurs in coastal locations, some land can be cut off by the sea leading to arc formation.

0 5 . 3 What is the process of slab pull?

[1 mark]

A At constructive plate boundaries, convection currents cause plates to pull apart. This generates both seismic and volcanic activity.

B At conservative plate margins, plates are pulled alongside each other. This generates seismic activity after a period of pressure build-up.

C At destructive margins gravity forces lithosphere to descend into the mantle. The collision with the other plate causes both shallow and deep seismic activity.

D At constructive plate margins, plates are pulled apart leading to the formation of rift valleys. These valleys continue to widen and generate significant seismic activity.

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0 5 . 4 Which is the method for measuring the size of a volcanic eruption?

[1 mark]

A Volcanoes can be monitored by considering the seismic activity and the amount of gases being released. Infrared cameras can also be used to detect magma movement. ⬭

B A logarithmic scale where the energy release is proportional to the scale of the event. Each unit of increase on the scale equates to approximately 30 times the increase in energy, mainly felt through vibration. ⬭

C A qualitative scale which measures the impact of the event. The scale has 12 points. At each point there is a description which increases in severity through to total destruction. ⬭

D A logarithmic scale which offers an indication of the explosiveness of events. It is a way of classifying events by volume of material produced and frequency of events. ⬭

Figures 9a and **9b** are in the insert.

Figure 9a shows data related to the eruption of Kīlauea Volcano, Hawai'i, USA, on 24 May 2018.

Figure 9b shows a satellite image of the same eruption.

0 5 . 5 Using **Figure 9a** and **Figure 9b**, analyse the data shown.

[6 marks]

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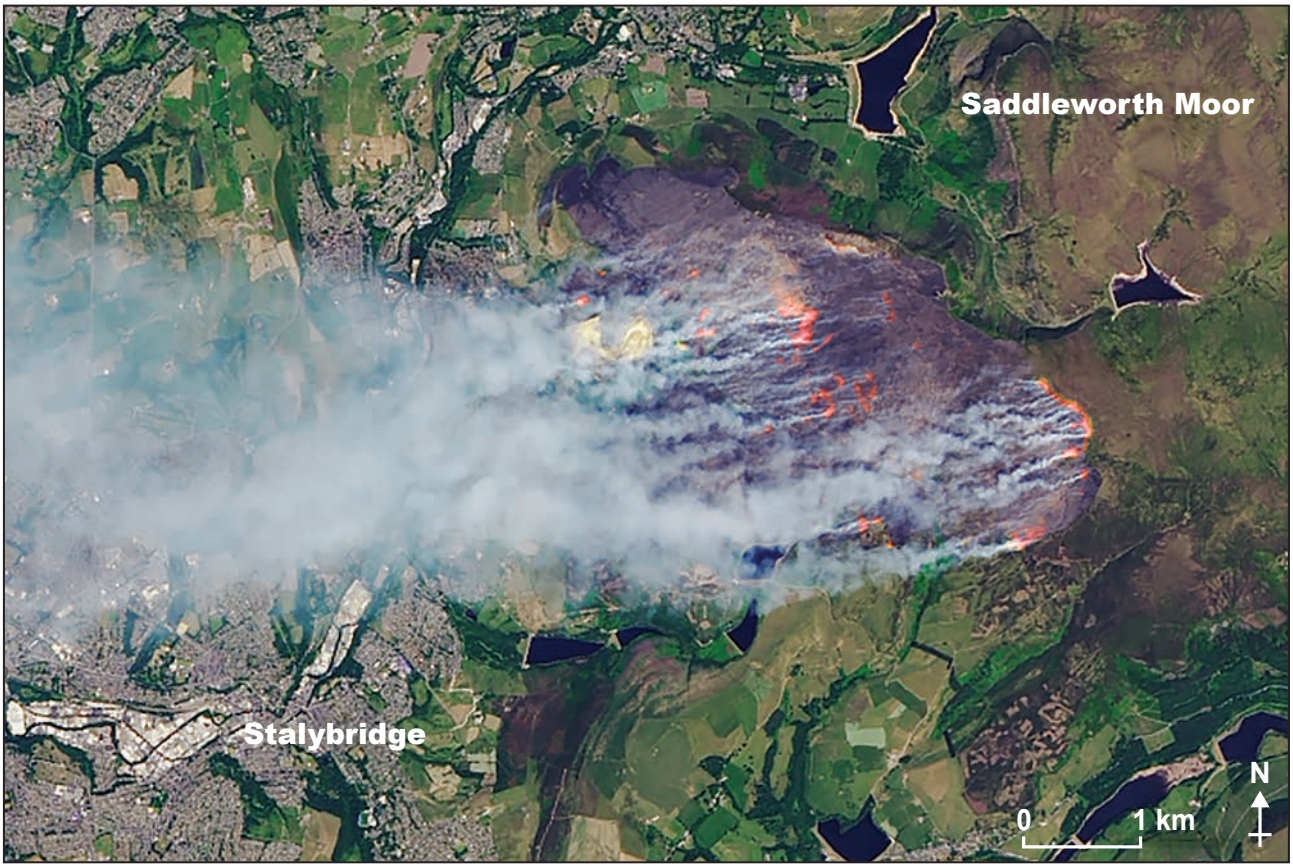
Figure 10 shows a wildfire on Saddleworth Moor, Greater Manchester, UK on 27 June 2018.

Figure 10



Note: Saddleworth Moor is an upland area north east of Manchester. The soils are composed of peat. In June 2018, there was a heatwave which was accompanied by virtually no rain and a dry wind for several weeks. Around 150 soldiers and firefighters were called in to tackle the blaze. The blaze lasted for weeks and may have been started deliberately.

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0 5 . 6 Using **Figure 10** and your own knowledge, assess the potential issues associated with managing an event such as this.

[9 marks]

Extra space

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0 5 . 7 To what extent do you agree that the impact of volcanic activity can be mitigated against more effectively than tropical storms?

[9 marks]

Extra space

Do not write outside the box

0 5 . 8 Assess the relative usefulness of the Park Model and the Hazard Management Cycle in understanding the impact of seismic events.

[20 marks]

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48

End of Question 5

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For the multiple-choice questions, completely fill in the circle alongside the appropriate answer.

CORRECT METHOD ● WRONG METHODS ⊗ ⦿ ≋ ✓

If you want to change your answer you must cross out your original answer as shown. ⊠

If you wish to return to an answer previously crossed out, ring the answer you now wish to select as shown. ⊗

Question 6 Ecosystems under stress

0 6 . 1 What is a seral stage?

[1 mark]

A This is a stage where human activity has led to the creation of a sub-climax within the ecosystem. Until the human activity ceases the seral stage will remain. ○

B This is a stage whereby no further changes will occur in the succession. The only change that will occur is due to human activity or as a response to environmental change. ○

C This is a stage in the development of the ecosystem as it progresses towards climax. New species which are better adapted to the conditions outcompete a declining species. ○

D This is a stage in the food web. For example, primary consumers feed off the producers. This would be the second seral stage in the development of the food web. ○

0 6 . 2 What is the distinction between the biotic and abiotic components of an ecosystem?

[1 mark]

A Biotic elements are the weathered rock and leaf litter. These elements interact with the organisms, heat and light (abiotic) to help produce a soil structure. ○

B Biotic elements are part of the structure of a food chain. The biotic elements provide the building blocks of life. The abiotic elements feed off the biotic elements in the food chain. ○

C Biotic elements are responsible for processes such as leaching and decomposition. Abiotic elements provide the raw materials (such as water) which allow life to flourish. ○

D Biotic elements are the living part of an ecosystem such as micro-organisms, plants and animals. Life is supported by the abiotic elements such as weathered rock, climate and various gases. ○

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0 6 . 3 What are trophic levels?

[1 mark]

A These are stages of a food chain or food web. At each new stage there are species which take energy from those in the previous stage. This process supports life. ⬭

B This is a stage in succession of plants in an ecosystem. At each new stage a better adapted species will dominate the local environment as it claims a niche in the local conditions. ⬭

C Trophic levels are a type of species which is responsible for the decay process in the ecosystem. These detritivores consume the dead matter and create conditions for regrowth. ⬭

D Trophic levels are a measure of the biodiversity within an ecosystem. An ecosystem with high trophic levels is considered to be healthy and free from human interference. ⬭

0 6 . 4 Why is weathering important in nutrient cycling?

[1 mark]

A Weathering allows for eroded material to be carried away by aeolian processes. As the eroded material settles in new locations, plant colonisation begins, eg sand dunes. ⬭

B Weathering releases important minerals which decomposers further break down. Bacteria and fungi break down rock particles for future uptake by plants in the cycle. ⬭

C The weathered material is a key part of decomposition. Climate directly impacts upon leaf litter to aid the decomposition process. From this nutrients are released. ⬭

D Weathering processes are essential in the development of healthy soils. Weathered materials are mixed with biotic matter and become available for uptake by plants. ⬭

Question 6 continues on the next page

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Figures 11a and **11b** are in the insert.

Figure 11a shows rainfall totals and cumulative rainfall in a woodland savanna (cerrado) in south-east Brazil between 2009 and 2012.

Figure 11b shows the relationship between albedo and soil water content over the same time period for the same area.

0 6 . 5 Analyse the data shown in **Figure 11a** and **Figure 11b**.

[6 marks]

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Figures 12a and **12b** are in the insert.

Figure 12a shows a simplified diagram of vegetation succession in moorland environments in the UK.

Figure 12b shows a moorland landscape in the UK.

0 6 . 6 Using **Figure 12a**, **Figure 12b** and your own knowledge, assess the potential role of human activity as an arresting factor shaping this landscape.

[9 marks]

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0 6 . 7 Evaluate the impact of human activity upon the future prospects for coral reefs.

[9 marks]

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0 6 . 8 'Changing attitudes towards sustainable tourism, recreation and conservation have meant that local scale ecosystems are no longer under threat.'

To what extent do you agree with this view?

[20 marks]

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END OF QUESTIONS

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ANSWER IN THE SPACES PROVIDED

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