

91243



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SUPERVISOR'S USE ONLY

Level 2 Geography, 2018

91243 Apply geography concepts and skills to demonstrate understanding of a given environment

2.00 p.m. Thursday 15 November 2018
Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Apply geography concepts and skills to demonstrate understanding of a given environment.	Apply geography concepts and skills with precision to demonstrate in-depth understanding of a given environment.	Apply geography concepts and skills with precision to demonstrate comprehensive understanding of a given environment.

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should attempt ALL parts of the question in this booklet.

Pull out Resource Booklet 91243R from the centre of this booklet.

If you need more room for any answer, use the extra space provided at the back of this booklet.

Check that this booklet has pages 2–12 in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

Excellence

TOTAL

8

ASSESSOR'S USE ONLY

INSTRUCTIONS

In this paper, you are to explain how interaction between the characteristics or features of Bhutan's natural and cultural environments contributes to the country's sustainability.

Refer to the resource booklet before beginning your answer to the question in this booklet.

Parts (a), (b), (c) and their related resources should enable you to gain an understanding of Bhutan, so that in part (d) you can explain how interaction between the characteristics or features of Bhutan's natural and cultural environments contributes to the country's sustainability.

Space is provided on page 8 to help you plan your answer to (d).

QUESTION

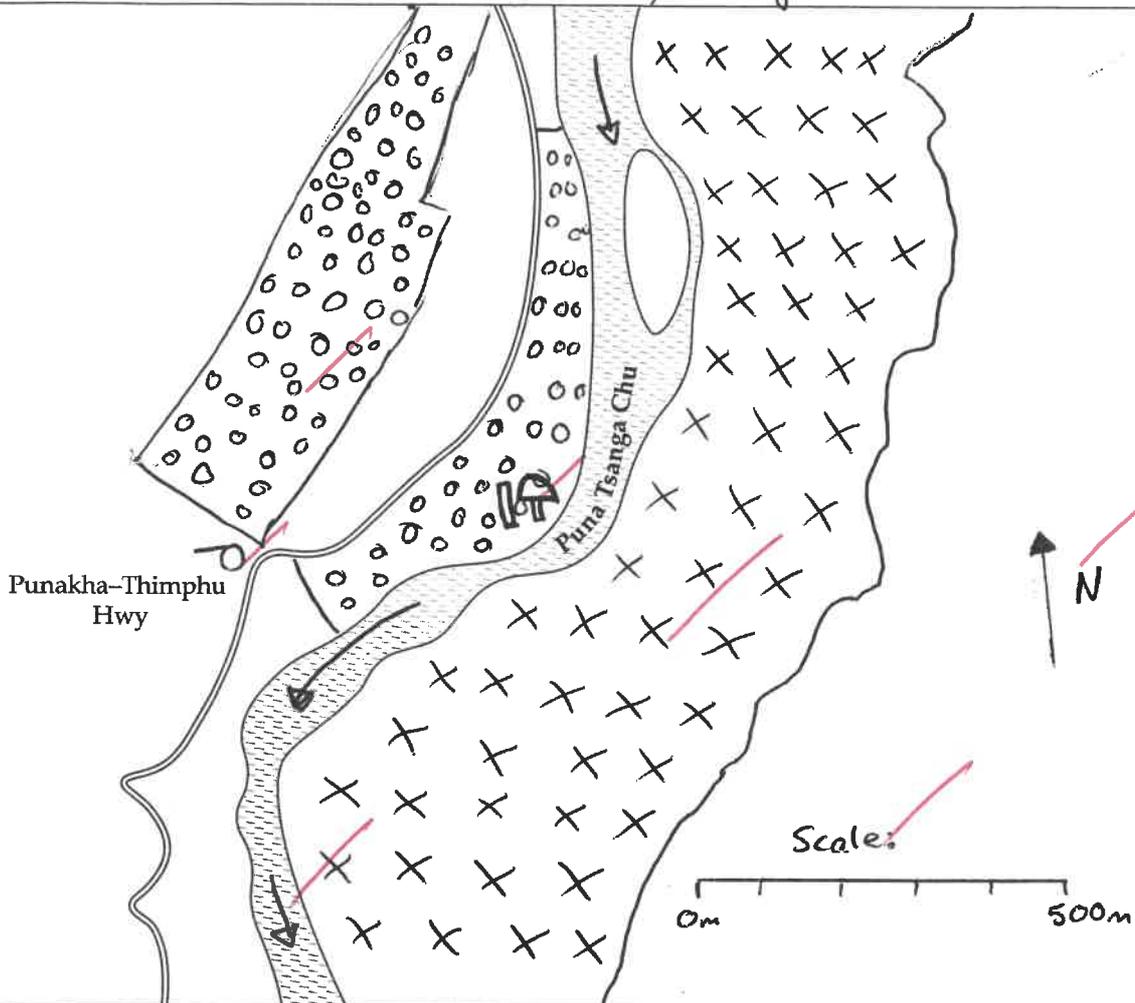
(a) Photograph interpretation and précis map drawing

Refer to **Resource A** on pages 6 and 7 of the resource booklet.

In the space on the opposite page, complete a précis map of the satellite photograph shown in Figure 1, by:

- (i) Locating and labelling the following features:
 - The area of agriculture (terraced rice fields) on the eastern side of the Puna Tsanga Chu river
 - The main built-up area of buildings in Khuruthang village.
- (ii) Showing the location of the following features:
 - The fuel station in Khuruthang village
 - The Damchen Resort.
- (iii) Showing the direction of the flow of the Puna Tsanga Chu river, using an arrow.
- (iv) Providing the map with an appropriate scale, using the distance from the Damchen Resort to the fuel station in Khuruthang (400 metres).
- (v) Giving the map a title and appropriate key, and indicating the compass direction north.

Title: Précis Map of Khuruthang Village and Surrounds.



Key:

X	X	X
X	X	X

 - Agricultural area on eastern bank.

o	o	o	o
o	o	o	

 - Built-up area of Khuruthang village.

- Fuel Station

- Damchen Resort

- Direction of flow on Puna Tsanga Chu river

(b) Diagram construction

ASSESSOR'S
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Refer to **Resource B** on page 8 of the resource booklet.

- (i) Using information from Figure 7, complete the diagram below to explain the **dry winter monsoon winds** in the same way that the wet summer monsoon winds are explained in Figure 6.

The position of the sun in winter has been shown.

You need to show the location and direction of the winds, other features, and complete a key, including annotation notes.

Dry winter winds – October to April

Key:

-  Sun, and Sun's radiation
-  Warm air risin.
-  Wind
-  Cooler air
-  Rainclouds
-  Dry air.

- ① During the winter, the sun heats the air over the Bay of Bengal of India, which then rises.
- ② This causes low pressure over India
- ③ Cold air from the Tibet Desert is drawn in.
- ④ This means the air is dry and cold as it reaches Bhutan, with a Northerly wind.
- ⑤ This results in dryer rivers in Bhutan, so less water on India's lowland plains.

- (ii) Explain why there is temporal (seasonal) variation in the monsoon winds, and how this affects rainfall in Bhutan.

In your answer, refer to specific information provided about the summer and winter monsoons, as well as the geographic concept of **Processes** on page 2 of the resource booklet.

There is temporal/seasonal variation in monsoon winds in India, Tibet, and Bhutan, resulting in changes to rainfall seasonally in Bhutan. Between April and September, Bhutan's summer months, the sun is over the Tibetan desert. Climate processes due to this cause seasonal variation in monsoon winds. Hotter air over the deserted area result in lifting air and a low pressure system. This causes cold^{wet} air from the Bay of Bengal to travel north to Tibet, releasing rain over the Bhutanese Himalaya due to a change in topography. This causes increased rainfall in Bhutan in the summer months, which can also be seen in the first graph of Resource C. So although the summer months are warmer, they are wetter due to the cold monsoon winds from the south. However, the winter months mean the sun is over the Bay of Bengal, so cold air travels from Tibet to India (southbound), and due to the relative elevations (Tibet is at a similar altitude to Bhutan), rain does not fall so much in Bhutan due to the topography. Hence, the main cause of seasonal variation in the monsoon winds and Bhutanese rainfall (climate processes) is due to seasonal variations in sunlight (global processes) and the topography of the region due to tectonic processes (plate movement). The ^{1st} graph of Resource C also displays this seasonal variation, and that although it is cooler in the Bhutanese winter, it is drier due to the seasonal variation in the directions of the monsoon winds.

(c) Graph interpretation

Refer to Resource C on page 9 of the resource booklet.

- (i) Using specific information from Figure 8 and Figure 9, explain how Bhutan's climate affects monthly hydroelectricity production.

Figure 8 shows the seasonal variation in rainfall, with increased rainfall in summer months of ~~July~~ June, July, and August, with a maximum average ^{monthly} rainfall of 375mm in July. The graph in Figure 9 follows a similar trend - higher hydroelectricity production in summer months. However, the trend shows higher electricity production slightly after the highest rainfall, in July, August, and September with percentages around 18% of the annual product. This delay is likely due to the time it takes for water to flow down the mountains and into the reservoirs as well as due to snowmelt producing greater production in spring.

- (ii) Using specific information from Figure 8 and Figure 10, explain how Bhutan's climate affects the monthly number of tourist arrivals.

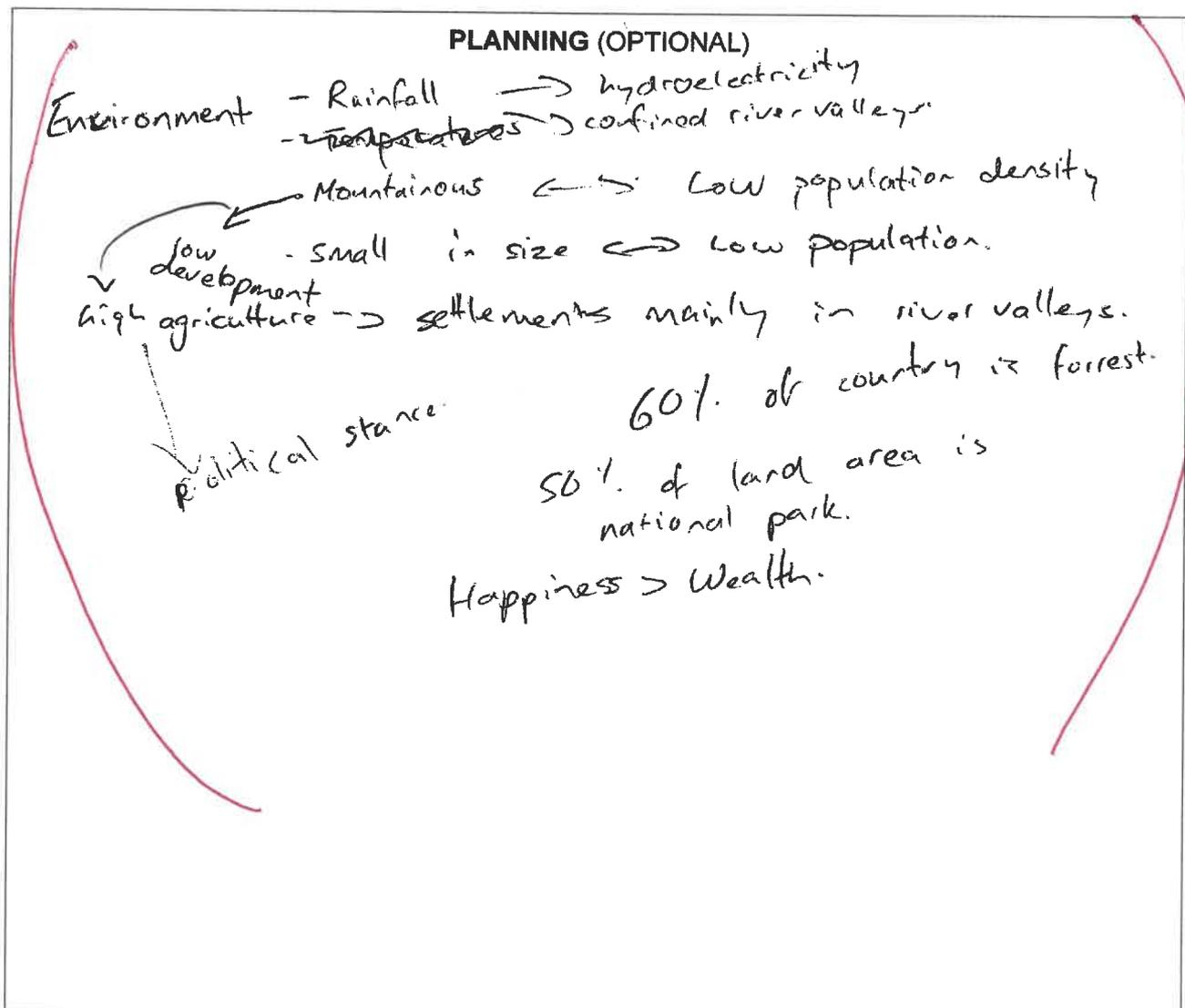
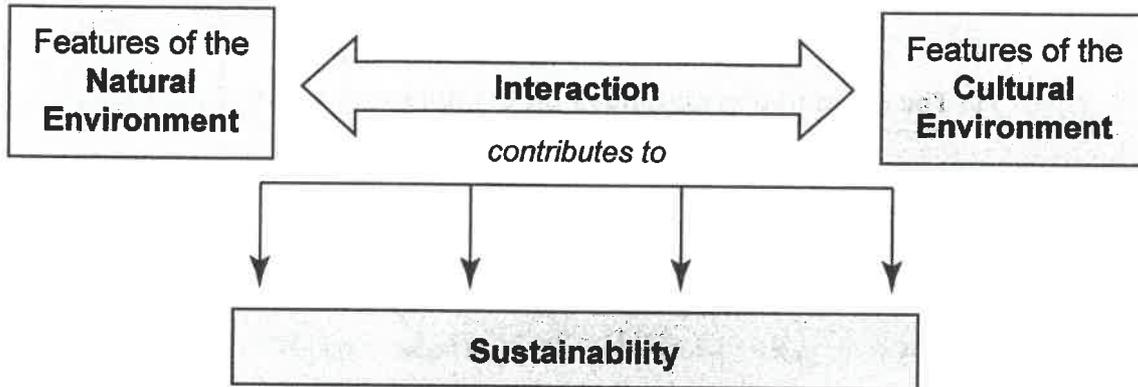
Figure 10 shows that average tourist numbers follow an inverse relationship to rainfall shown in Figure 8. Figure 10 shows two peaks to tourist numbers, in March and April (^{autumn} ~~spring~~) at 7500 monthly tourists and October (spring) at 12000 monthly tourists. It is least ~~at~~ during summer, when rainfall is highest in Figure 8, especially during July with ~2100 tourists, and in mid winter (January) where temperatures are lowest (-3°C) with ~1800 tourists. This shows that high rainfall causes fewer tourist numbers, and low temperatures do the same. Hence, the patterns of Bhutan's climate affect its tourist arrivals.

(d) **Bhutan and sustainability**

Explain how interaction between the characteristics or features of Bhutan's natural and cultural environments contributes to the country's sustainability.

In your answer, refer to:

- the geographic concepts of **Environments**, **Interaction**, and **Sustainability** on page 2 of the resource booklet
- **Resource D** on pages 10 and 11 of the resource booklet, and any other resources
- specific information from your answers in parts (a), (b) and (c).



Interaction between factors of Bhutan's natural environment such as climate and terrain and factors of Bhutan's cultural environment such as low population density and political stance results in its 'model' environmental sustainability, as well as cultural sustainability - maintaining cultural practices. The terrain of Bhutan contributes in many ways to its sustainability. This is due to its highly hilly and mountainous terrain, it has been, and still is, quite inaccessible, impossible for wide development, and makes it a picturesque location. This inaccessibility makes it means it has not developed as rapidly, partly due to cultural interaction caused by political stance towards sustainability, as other Asian countries nearby such as Bangladesh, and has therefore been able to develop more sustainably, with more planning to keep its natural resources intact. Due to towns and cities being largely confined to river valleys, as is seen in the Précis Map in question a), development as well as population growth is limited, meaning there is less overall pollution, and less population density requiring less sustainable solutions. Its picturesque location, as well as interaction with political stance towards maintaining cultural values, makes Bhutan a prime tourism destination, causing large tourism revenue to be re-invested into sustainability. The political stance also interacts with this, with the nation making tourism have a low environmental impact, making it a sustainable industry. Its climate also interacts with the nation's political sustainability stance, as well as its terrain, to make large sources of energy from hydroelectric dams possible. This means it is able to not only produce all of its energy from

a sustainable supply, it is also able to export energy to India, bringing in more revenue. This is largely due to the terrain, of large confined river valleys ideal for dams, and a relatively wet climate, as seen in question c) i). The terrain also means that the rivers drop a long way, from elevations of around 7500m to 200m, releasing energy all the way. The environmental factor of large forested areas also interact with the political stance to maintain these areas means that Bhutan is able to ~~be~~ be carbon-negative, as the trees can bring in carbon dioxide from the atmosphere. This also interacts with tourism, as large numbers of tourists can sustainably visit these forests and national park.

In conclusion, multiple natural environmental factors interact with multiple cultural environmental factors to cause Bhutan to become one of the most sustainable countries in the world. New Zealand could learn from Bhutan, as we have many similar ~~environ~~ natural environmental factors, but with a different political stance we could definitely improve our sustainability.

Excellence Exemplar 2018

Subject	Geography		Standard	91243	Total score	8
Q	Grade score	Annotation				
	E8	<p>This paper demonstrates the use of skills with a high level of accuracy in presentation and interpretation and shows a thorough understanding of geography concepts, using geographic terminology and showing insight.</p> <p>The features shown on the map in part (a) use appropriate symbols and key, and accuracy is shown in their location (e.g. the fuel station and the resort) and in the north direction and scale. Likewise, the diagram in part (b) shows use of appropriate conventions in showing the key features and has a high level of accuracy in both their positioning and explanation. In interpretation of the graphs in part (d), conventions have been used to interpret the graphs and there is a high level of accuracy through use of specific information in supporting that interpretation and recognition that the highest numbers of tourists are in the autumn and spring.</p> <p>The explanation of the temporal variation in the monsoon winds in part (b) shows a detailed understanding of the geographic concept of process being a sequence of actions and that a process can have temporal variation. This is supported by thorough explanation and supporting information. The response also uses geographic terminology and shows insight by recognising both that the temporal variation in the monsoon winds is due to the position of the sun, and that the consequence is a difference in winter and summer seasonal rainfalls as a result.</p> <p>In explaining the sustainability of Bhutan in part (c), the response demonstrates a thorough and comprehensive understanding of the concepts of environment, interaction and sustainability (e.g. both environmental and cultural sustainability). This is supported by thorough explanation and use of supporting specific information throughout. Insight is shown by incorporating information from previous parts of the question.</p>				