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A-level **GEOGRAPHY**

Paper 1 Physical Geography

Wednesday 17 May 2023 Morning Time allowed: 2 hours 30 minutes

Materials

For this paper you must have:

- the colour insert (enclosed)
- a pencil
- a rubber
- a ruler.

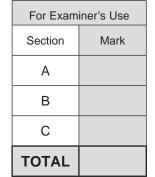
You may use a calculator.

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.
- If you need additional extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- 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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Water and carbon cycles			
	Answer all questions in this section.		
0 1 . 1	Outline the purpose of a flood hydrograph.	[4 marks]	
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	Figure 1 is in the insert.
	Figure 1 shows information about freshwater abstraction in Finland in 2020.
0 1 . 2	Analyse the data shown in Figure 1 . [6 marks]
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	Question 1 continues on the next page



	Figure 2 is in the insert.
	Figure 2 shows global proposed carbon sequestration rates compared to implemented carbon sequestration rates between 2000 and 2020.
0 1 3	Using Figure 2 and your own knowledge, assess the challenges associated with carbon sequestration.
	[6 marks]
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0 1 . 4	Evaluate the potential impact of changes in the carbon budget on a tropical rainforest that you have studied. [20 marks]



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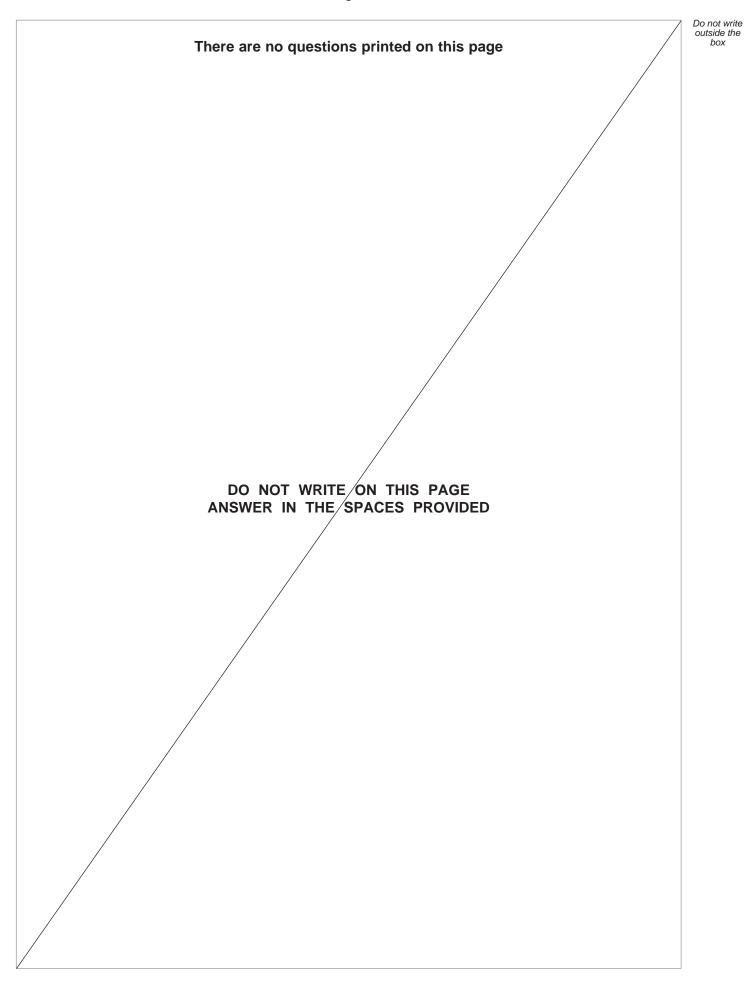
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End of Section A	
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Turn over for Section B	







Section B

	Answer one question in this section.	
	Answer either Question 2 or Question 3 or Question 4.	
Question 2	Hot desert systems and landscapes	
0 2 . 1	Outline weathering processes in hot deserts.	[4 marks]
	Extra space	
	Question 2 continues on the next page	



Figure 3 shows the changing size of the Sahara Desert between 1980 and 1990. A standard deviation calculation has been started.

Figure 3

Year	Area (millions of km²)	$x-\overline{x}$	$(x-\overline{x})^2$
1980	8.6	-0.609	0.371
1981	8.9	-0.309	0.095
1982	9.25	0.041	0.002
1983	9.4	0.191	0.036
1984	10.0		
1985	9.25	0.041	0.002
1986	9.1	-0.109	0.012
1987	9.4	0.191	0.036
1988	8.9	-0.309	0.095
1989	9.2	-0.009	0.000
1990	9.3	0.091	0.008
	$\sum x = 101.3$		$\sum (x - \overline{x})^2 = 1.283$
	$\bar{x} = 9.209$		

Key

x =area of Sahara Desert

 \overline{x} = mean

 \sum = sum of

 σ = standard deviation

n = number in sample

Standard deviation formula

$$\sigma = \sqrt{\frac{\sum (x - \overline{x})^2}{n}}$$

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0 2 . 2	Complete the table and standard deviation calculation in Figure 3 and evaluation usefulness of the technique in analysing this data.	aluate the
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	Figures 4a , 4b and 4c are in the insert, and show information about a town in Egypt (El-Sheikh El-Shazli) which is prone to desert flash flooding.
	Figure 4a shows the location of El-Sheikh El-Shazli relative to a number of wadis in the area shown on a satellite image.
	Figure 4b shows sketch maps of the town and area flooded before and after increased urbanisation.
	Figure 4c is a photograph of the town looking towards the hills in Figure 4b.
0 2 3	Using Figures 4a , 4b , 4c and your own knowledge, assess the relative importance of physical and human factors contributing to the flash flooding events in this area. [6 marks]
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0 2 . 4	With reference to a hot desert that you have studied, assess the relative of different sources of energy in landscape development.	importance [20 marks]



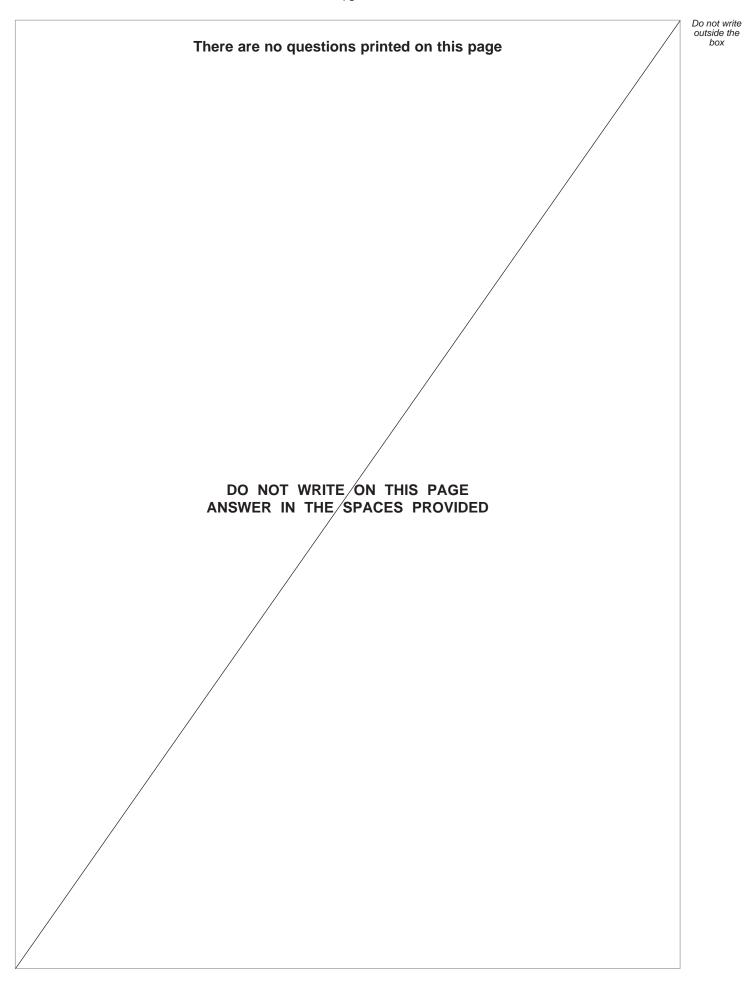
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Question 3	Coastal systems and landscapes	
0 3 . 1	Outline processes of mass movement at the coastline.	[4 marks
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Figure 5 shows the variation in tidal ranges at various locations across the British Isles. A standard deviation calculation has been started.

Figure 5

Location	Difference between high and low tide (m)	$x-\overline{x}$	$(x-\overline{x})^2$
Plymouth	4.7	-0.808	0.653
Southampton	4.0	-1.508	2.274
Dover	5.9	0.392	0.154
Aberdeen	3.7	-1.808	3.269
Liverpool	8.4		
Avonmouth	12.3	6.792	46.131
Belfast	3.1	-2.408	5.798
Derry / Londonderry	2.2	-3.308	10.943
St Helier	9.8	4.292	18.421
Swansea	8.4	2.892	8.364
Lowestoft	1.9	-3.608	13.018
Lerwick	1.7	-3.808	14.501
	$\sum x = 66.1$		$\sum (x - \overline{x})^2 = 131.890$
	$\bar{x} = 5.508$		

Key

x = tidal range

 \overline{x} = mean

 \sum = sum of

 σ = standard deviation

n = number in sample

Standard deviation formula

$$\sigma = \sqrt{\frac{\sum (x - \overline{x})^2}{n}}$$

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0 3 . 2	Complete the table and standard deviation calculation in Figure 5 and evalusefulness of the technique in analysing this data.	uate the
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	Figures 6a, 6b and 6c are in the insert.
	Figure 6a shows a photograph of mangrove taken above and below the water line.
	Figure 6b shows the major benefits of mangrove for people.
	Figure 6c shows the proportion of protected and unprotected mangrove in the ten largest nations with mangrove forests.
0 3 . 3	Using Figures 6a , 6b , 6c and your own knowledge, assess the sustainability of mangrove forests in coastal management.
	[6 marks]
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0 3 . 4	To what extent do natural processes account for the changes in a local selandscape that you have studied?	cale coastal
		[20 marks]



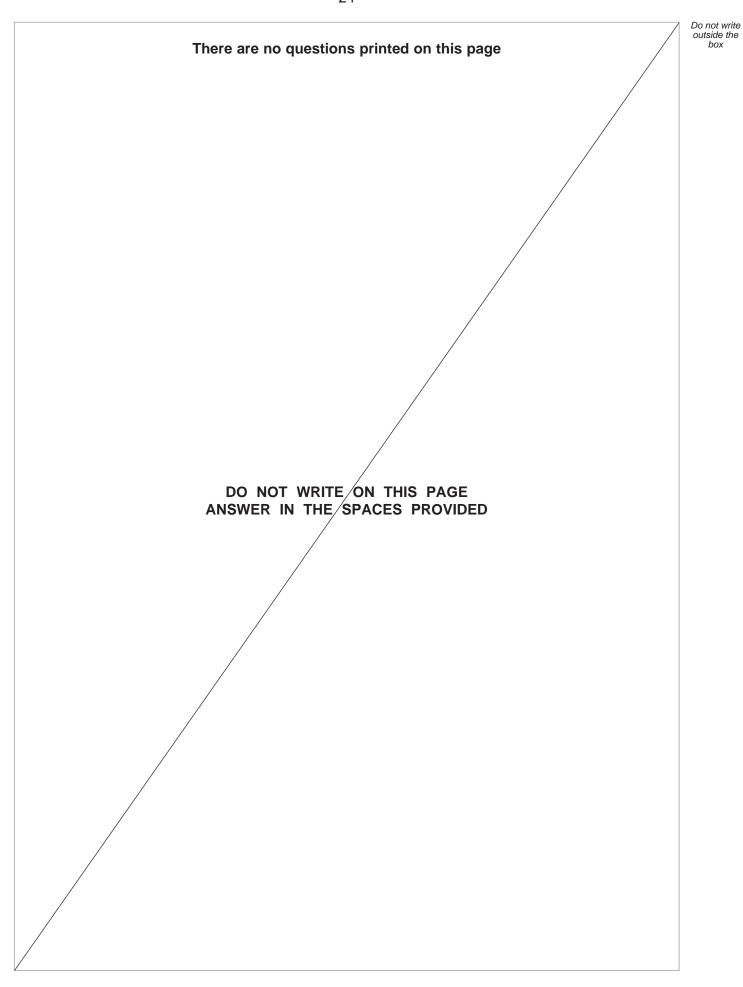
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Question 4	Glacial systems and landscapes	
0 4 . 1	Outline the processes by which ice moves within a glacier.	[4 marks
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Figure 7 shows the minimum extent of Arctic ice between 2002 and 2015. A standard deviation calculation has been started.

Figure 7

Year	Minimum extent (millions of km²)	$x-\overline{x}$	$(x-\overline{x})^2$
2002	5.95	0.779	0.607
2003	6.13	0.959	0.920
2004	6.04	0.869	0.755
2005	5.56	0.389	0.151
2006	5.91	0.739	0.546
2007	4.29		
2008	4.72	-0.451	0.203
2009	5.38	0.209	0.044
2010	4.92	-0.251	0.063
2011	4.61	-0.561	0.315
2012	3.62	-1.551	2.406
2013	5.35	0.179	0.032
2014	5.28	0.109	0.012
2015	4.63	-0.541	0.293
	$\sum x = 72.39$		$\sum (x - \overline{x})^2 = 7.123$
	$\bar{x} = 5.171$		

Key

x = minimum extent

 \overline{x} = mean

 \sum = sum of

 σ = standard deviation

n = number in sample

Standard deviation formula

$$\sigma = \sqrt{\frac{\sum (x - \overline{x})^2}{n}}$$

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0 4 2	Complete the table and standard deviation calculation in Figure 7 and evaluate the usefulness of the technique in analysing this data. [6 mark	
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	Figures 8a and 8b are in the insert.
	Figure 8a shows trends in the onset of winter freeze-up in the Arctic Ocean and surrounding areas, 1979–2019.
	Figure 8b shows the change in the age of ice in the Arctic Ocean, 1985–2019.
0 4 . 3	Using Figure 8a , Figure 8b and your own knowledge, assess the potential future for Arctic sea ice.
	[6 marks]
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0 4.4	Analyse the relative importance of erosion and deposition in the develop fluvioglacial landscapes.	ment of
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Section C

	Answer one question in this section.
	Answer either Question 5 or Question 6.
Question 5	Hazards
0 5 . 1	Outline the concept of mitigation in relation to the management of hazards. [4 marks]
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	Figure 9 is in the insert.
	Figure 9 shows information about wildfires in Australia.
0 5 - 2	To what extent does Figure 9 show that wildfires are increasing in intensity and severity?
	[6 marks]
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	Question 5 continues on the next page



	Figure 10 is in the insert.
	Figure 10 shows information about areas at risk following a seismic event based upon underlying geology in Waikato District and the surrounding area, New Zealand.
0 5 - 3	Using Figure 10 and your own knowledge, discuss likely approaches to seismic hazard management in this area.
	[9 marks]
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5 . 4	How far do you agree that mudflows are more hazardous than nuées ardentes?	
	[9 marks]	



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0 5 - 5	With reference to a hazardous location at a local scale, assess the importance of the
	physical processes and factors which have contributed to the scale and nature of the hazard.
	[20 marks]



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End of Question 5



Question 6	Ecosystems under stress	Do not outside bo.
0 6 . 1	Outline the concept of net primary production. [4 marks]	
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	Question 6 continues on the next page	

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	Figure 11 is in the insert.
	Figure 11 shows data related to the number of endangered species across the Mediterranean Basin in 2017.
0 6 - 2	Analyse the data shown in Figure 11.
	[6 marks]
	Extra space



	Figure 12 is in the insert.
	Figure 12 shows information about the Ainsdale Sand Dunes National Nature Reserve (NNR) in north-west England.
0 6 3	Using Figure 12 and your own knowledge, assess the challenges in managing this local scale ecosystem.
	[9 marks]
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0 6 - 4	Assess the relative importance of different physical factors in a region experiencing
	ecological change. [9 marks]
	[o marko]



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0 6 . 5	How far do you agree that the development pressures facing savanna grassland are
0 0 . 5	more extreme than those facing tropical rainforest?
	[20 marks]

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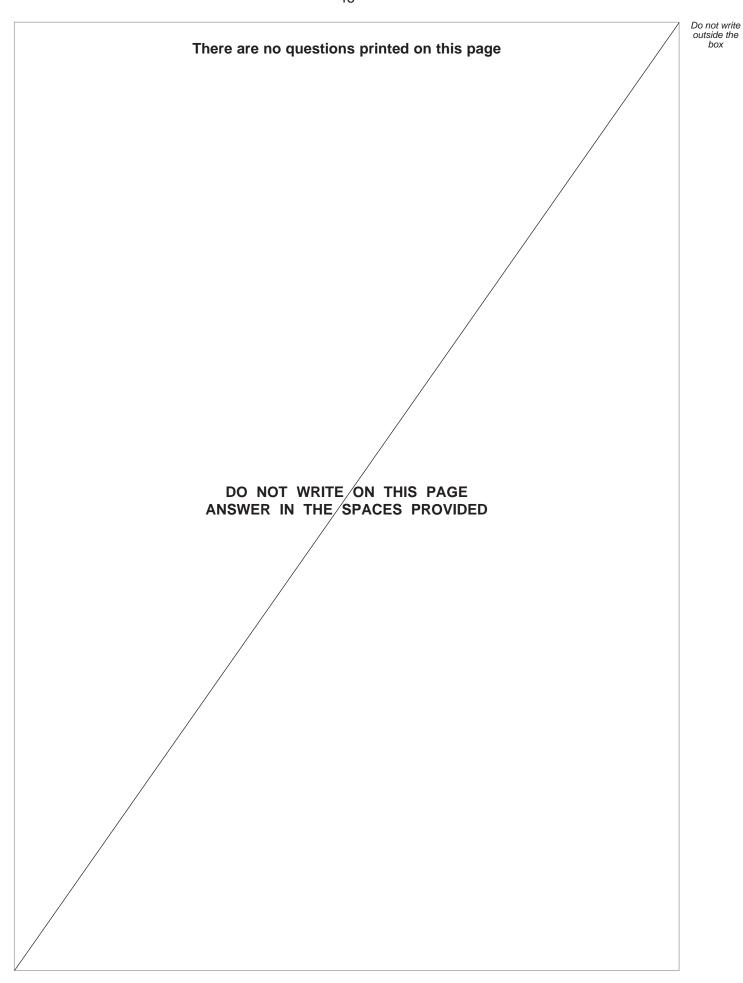
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