AQA

Please write clearly in block capitals.

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

Surname _____

Forename(s) _____

Candidate signature _____

I declare this is my own work.

# 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.

| 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.
- 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.

*Do not write outside the box*

## Section A

## Water and carbon cycles

Answer **all** questions in this section.

**0 1 . 1** Outline the purpose of a flood hydrograph.

**[4 marks]**

Extra space

Do not write outside the box

**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]**

Extra space

**Question 1 continues on the next page**

*Do not write outside the box*

**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]**

Extra space

Do not write outside the box

**0 1 . 4** Evaluate the potential impact of changes in the carbon budget on a tropical rainforest that you have studied.

**[20 marks]**

*Do not write outside the box*

Extra space

*Do not write outside the box*

**End of Section A**

**Turn over for Section B**

36

Do not write outside the box

**There are no questions printed on this page**

**DO NOT WRITE ON THIS PAGE**
**ANSWER IN THE SPACES PROVIDED**

Do not write outside the box

## 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 km$^2$) $x$ | $x - \bar{x}$ | $(x - \bar{x})^2$ |
|---|---|---|---|
| 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 | | $\sum (x - \bar{x})^2$ = 1.283 |
| | $\bar{x}$ = 9.209 | | |

**Key**

$x$ = area of Sahara Desert
$\bar{x}$ = mean
$\sum$ = sum of
$\sigma$ = standard deviation
$n$ = number in sample

Standard deviation formula

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

Space for working

$\sigma$ =

Do not write outside the box

**0 2 . 2** Complete the table and standard deviation calculation in **Figure 3** and evaluate the usefulness of the technique in analysing this data.

**[6 marks]**

Extra space

**Question 2 continues on the next page**

Do not write outside the box

**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]**

Extra space

Do not write outside the box

**0 2 . 4** With reference to a hot desert that you have studied, assess the relative importance of different sources of energy in landscape development.

**[20 marks]**

*Do not write outside the box*

Extra space

*Do not write outside the box*

**End of Question 2**

**36**

Do not write outside the box

**There are no questions printed on this page**

**DO NOT WRITE ON THIS PAGE**
**ANSWER IN THE SPACES PROVIDED**

Do not write outside the box

**Question 3 Coastal systems and landscapes**

**0 3 . 1** Outline processes of mass movement at the coastline.

**[4 marks]**

Extra space

**Question 3 continues on the next page**

**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) $x$ | $x - \bar{x}$ | $(x - \bar{x})^2$ |
|---|---|---|---|
| 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 | | $\sum(x - \bar{x})^2$ = 131.890 |
| | $\bar{x}$ = 5.508 | | |

**Key**

$x$ = tidal range
$\bar{x}$ = mean
$\sum$ = sum of
$\sigma$ = standard deviation
$n$ = number in sample

Standard deviation formula

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

Space for working

$\sigma$ =

Do not write outside the box

**0 3 . 2** Complete the table and standard deviation calculation in **Figure 5** and evaluate the usefulness of the technique in analysing this data.

**[6 marks]**

Extra space

**Question 3 continues on the next page**

**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]**

Extra space

Do not write outside the box

**0 3 . 4** To what extent do natural processes account for the changes in a local scale coastal landscape that you have studied?

**[20 marks]**

*Do not write outside the box*

Extra space

*Do not write outside the box*

**End of Question 3**

**36**

Do not write outside the box

**There are no questions printed on this page**

**DO NOT WRITE ON THIS PAGE**
**ANSWER IN THE SPACES PROVIDED**

Do not write outside the box

**Question 4 Glacial systems and landscapes**

**0 4 . 1** Outline the processes by which ice moves within a glacier.

**[4 marks]**

Extra space

**Question 4 continues on the next page**

**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 km$^2$) $x$ | $x - \bar{x}$ | $(x - \bar{x})^2$ |
|---|---|---|---|
| 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 | | $\sum (x - \bar{x})^2$ = 7.123 |
| | $\bar{x}$ = 5.171 | | |

**Key**
$x$ = minimum extent
$\bar{x}$ = mean
$\sum$ = sum of
$\sigma$ = standard deviation
$n$ = number in sample

Standard deviation formula

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

Space for working

$\sigma$ =

Do not write outside the box

**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 marks]**

Extra space

**Question 4 continues on the next page**

Do not write outside the box

**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]**

Extra space

Do not write outside the box

**0 4 . 4** Analyse the relative importance of erosion and deposition in the development of fluvioglacial landscapes.

**[20 marks]**

*Do not write outside the box*

Extra space

*Do not write outside the box*

**End of Question 4**

**End of Section B**

36

Do not write outside the box

## 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]**

Extra space

*Do not write outside the box*

**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]**

Extra space

**Question 5 continues on the next page**

*Do not write outside the box*

**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]**

Extra space

*Do not write outside the box*

**0 5 . 4** How far do you agree that mudflows are more hazardous than nuées ardentes?

**[9 marks]**

Do not write outside the box

Extra space

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]**

*Do not write outside the box*

**Turn over ▶**

*Do not write outside the box*

Extra space

**End of Question 5**

48

Do not write outside the box

**Question 6 Ecosystems under stress**

**0 6 . 1** Outline the concept of net primary production.

**[4 marks]**

Extra space

**Question 6 continues on the next page**

*Do not write outside the box*

**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

Do not write outside the box

**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]**

Extra space

*Do not write outside the box*

**0 6 . 4** Assess the relative importance of different physical factors in a region experiencing ecological change.

**[9 marks]**

*Do not write outside the box*

Extra space

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

**[20 marks]**

*Do not write outside the box*

*Do not write outside the box*

Extra space

**END OF QUESTIONS**

48

Do not write outside the box

**There are no questions printed on this page**

**DO NOT WRITE ON THIS PAGE**
**ANSWER IN THE SPACES PROVIDED**

*Do not write outside the box*

| Question number | **Additional page, if required.**<br>**Write the question numbers in the left-hand margin.** |
|---|---|

*Do not write outside the box*

| Question number | **Additional page, if required.**<br>**Write the question numbers in the left-hand margin.** |
|---|---|
| | |