

Candidate Name	Centre Number	Candidate Number

WELSH JOINT EDUCATION COMMITTEE
General Certificate of Education
Advanced



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455/04

GEOLOGY GL5

THEMATIC UNIT 4

GEOLOGY OF THE LITHOSPHERE

P.M. TUESDAY, 19 June 2007

For Examiner's Use only.

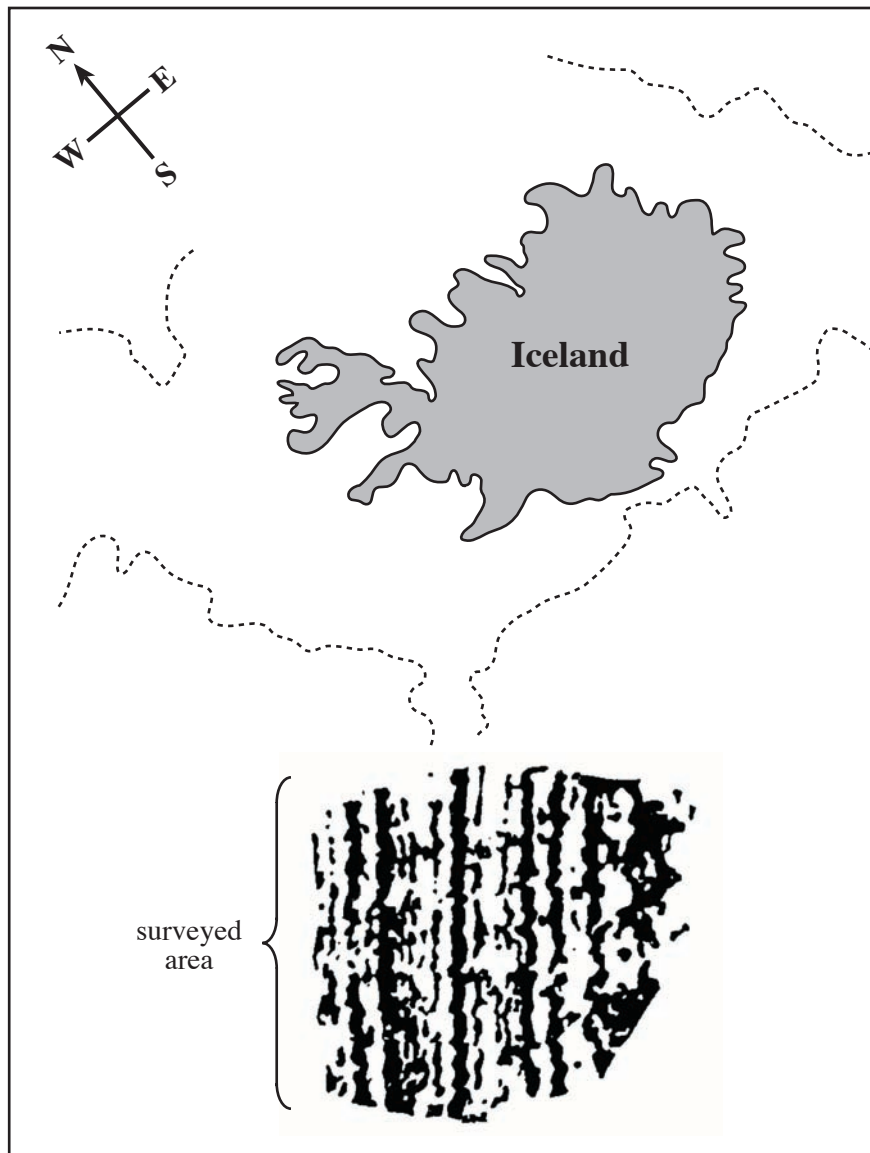
Section A	1	
	2	
Section B	3	
	4	
	5	
Total	50	

*Answer **both** questions in Section A (25 marks) and **one** question in Section B (25 marks).*

SECTION A

*Answer both questions in the spaces provided.
This section should take approximately half an hour to complete.*

1. **Figure 1a** shows the magnetic anomalies within a surveyed area of the oceanic lithosphere to the southwest of Iceland.



Key to surveyed area

Magnetic polarity	
Normal	
Reverse	

----- 200m depth contour

Figure 1a

- (a) (i) Describe the pattern of the magnetic anomalies. [2]

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- (ii) Draw within the surveyed area on **Figure 1a** a line to show the axis of the Mid Atlantic Ridge. [2]

- (iii) Give **two** reasons for your choice of position of the axis. [2]

Reason 1

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Reason 2

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Figure 1b shows polarity changes for the past 5 Ma. Major periods of magnetisation are called **chrons**. Four chrons have been recognized, two normal and two reversed, and these are named.

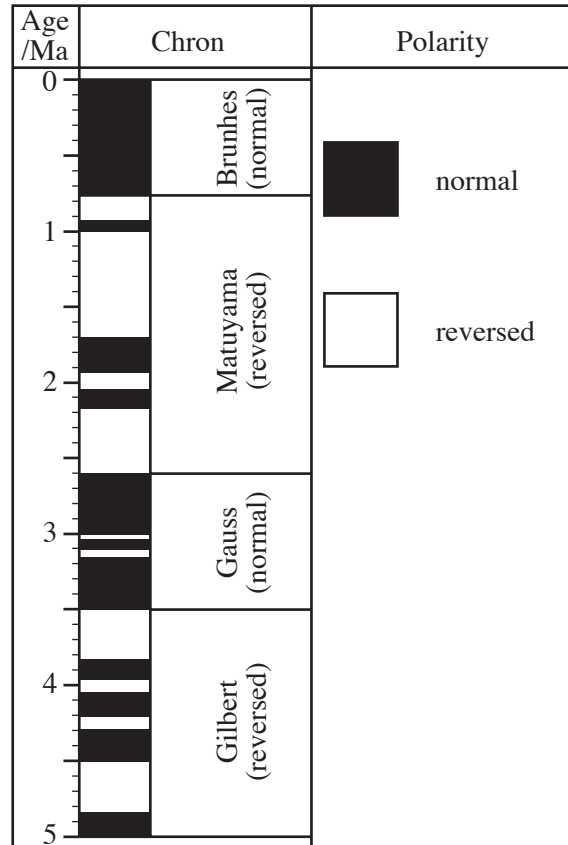


Figure 1b

- (b) (i) State the name of the shortest chron shown on **Figure 1b**. [1]
-
- (ii) The Gilbert chron contains an equal number of normal and reversed episodes of magnetisation. State the **total** number of episodes in the Gilbert chron. [1]
-
- (iii) Suggest why the Gilbert chron is described as a period of reversed magnetisation when it contains equal numbers of normal and reversed magnetisations. [1]
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-

Figure 1c shows how the magnetic striping varies with distance from the axis of the ridge in part of the North Atlantic. The boundaries between the Gauss chron and the Matuyama chron to the east and west of the Mid-Atlantic ridge have been marked with arrows labelled G_1 and G_2 .

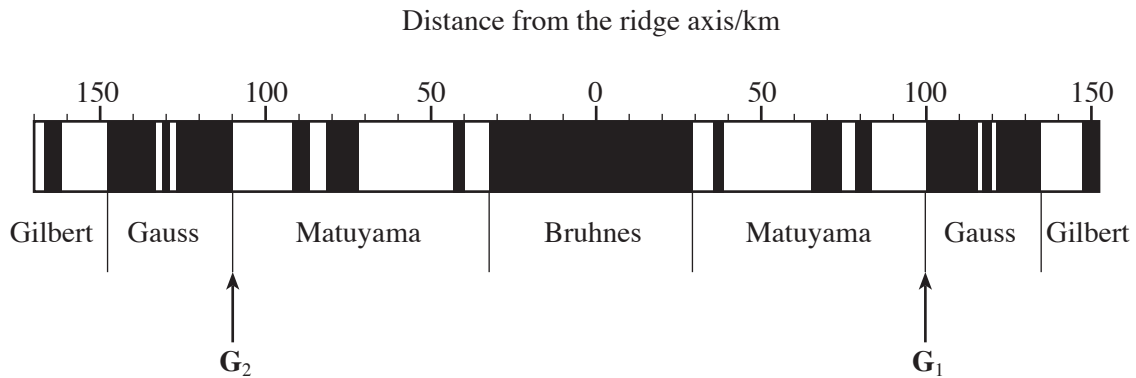


Figure 1c

(c) Refer to **Figures 1b** and **1c**.

- (i) Calculate the rate between G_1 and G_2 at which the Atlantic Ocean is widening. Show your working and give your answer in centimetres per year (cm y^{-1}). [2]

Ocean widening at cm y^{-1}

- (ii) The plates are moving at different velocities to the east and west of the ridge axis. Suggest reason(s) to explain this. [2]

Reason(s)

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Total 13 marks

Turn over.

2. **Figure 2a** is a photograph of a faulted pebble found within a conglomerate. **Figure 2b** is a drawing of the pebble together with the directions of two of the principal stresses which caused the faulting.



Figure 2a

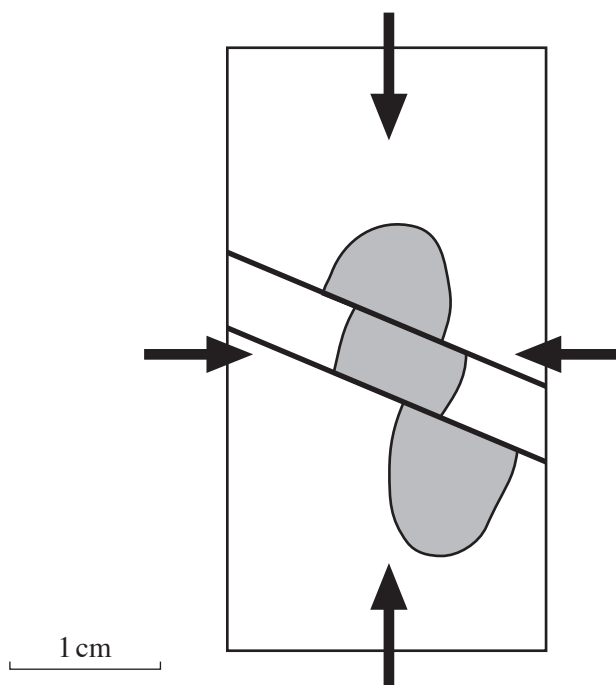


Figure 2b

- (a) (i) Label the two principal stress directions ($\sigma_{\min}$, σ_{int} , or $\sigma_{\max}$) in **Figure 2b**. [2]
- (ii) State the direction of the third principal stress which is **not** shown on **Figure 2b**. [1]
-
- (iii) Name the type of faulting that has affected the pebble. [2]
Give a reason for your answer.
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Figure 2c is a cross-section showing the conglomerate between two sandstones, together with sketches of two sedimentary structures **X** and **Y** found within the sandstones.

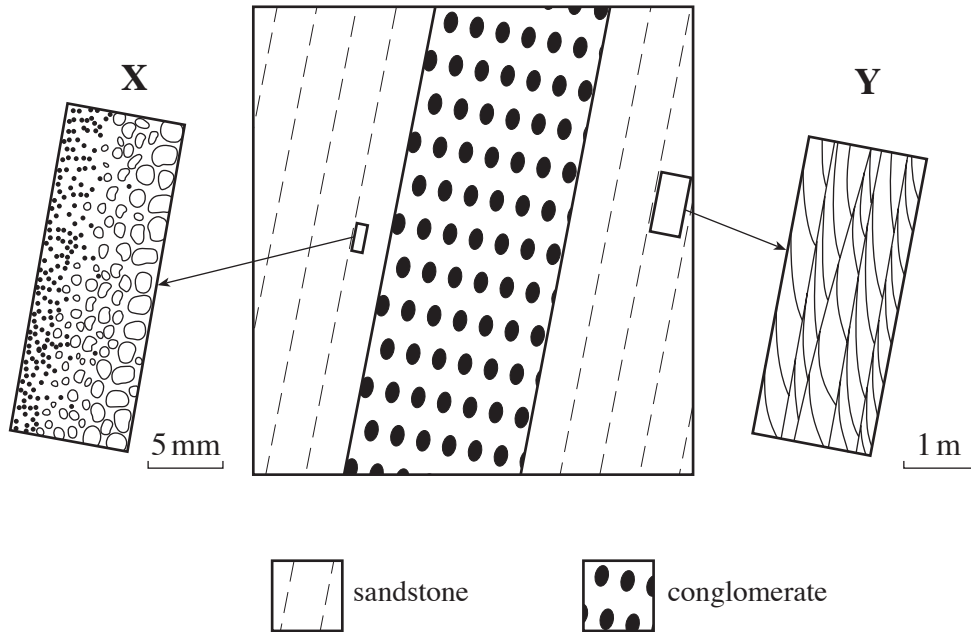


Figure 2c

- (b) It has been suggested that the rocks may be upside down.
Use **Figure 2c** to evaluate this claim.

[5]

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- (c) It has also been suggested that the cross-section might be part of a fold as shown in **Figure 2d**.

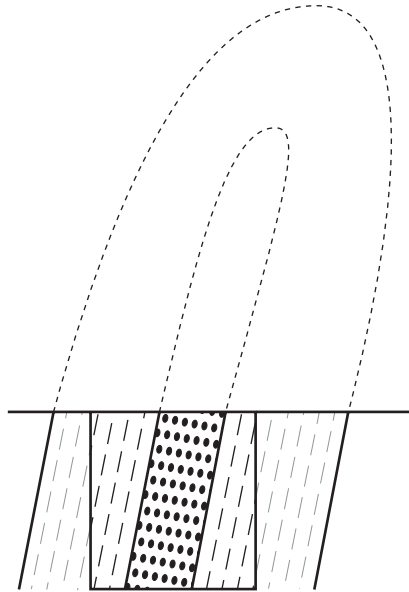


Figure 2d

Discuss whether the fold in **Figure 2d** and the faulting of the pebble in **Figure 2b** may both have been formed at the same time by the same stresses. [2]

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Total 12 marks

SECTION B

*Answer **one** question from this section.*

Write your answer in the remaining pages of this booklet.

- 3.** Describe how the use of seismic studies may contribute to an understanding of the theory of plate tectonics.
Discuss the importance of the different depths of earthquake foci to the theory. [25]
- 4.** (a) Describe the J. Tuzo Wilson Cycle.
(b) Discuss how the present-day distribution of rift valleys might support the J. Tuzo Wilson theory. [25]
- 5.** Describe how sedimentary basins may be formed.
Evaluate the importance of isostasy in the formation of sedimentary basins. [25]

(455-04)

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