

Surname	Centre Number	Candidate Number
Other Names		2



**GCE A level**

1215/04



S16-1215-04

**GEOLOGY – GL5**  
**Thematic Unit 4**  
**Geology of the Lithosphere**

P.M. FRIDAY, 10 June 2016

ONE of TWO units to be completed in 2 hours

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
Section A 1.	15	
Section B 2.	25	
3.		
4.		
<b>Total</b>	<b>40</b>	

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**ADDITIONAL MATERIALS**

In addition to this and one other examination paper, you will need a calculator.

**INSTRUCTIONS TO CANDIDATES**

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **question 1** in Section A (15 marks) and **one** question from Section B (25 marks).

**INFORMATION FOR CANDIDATES**

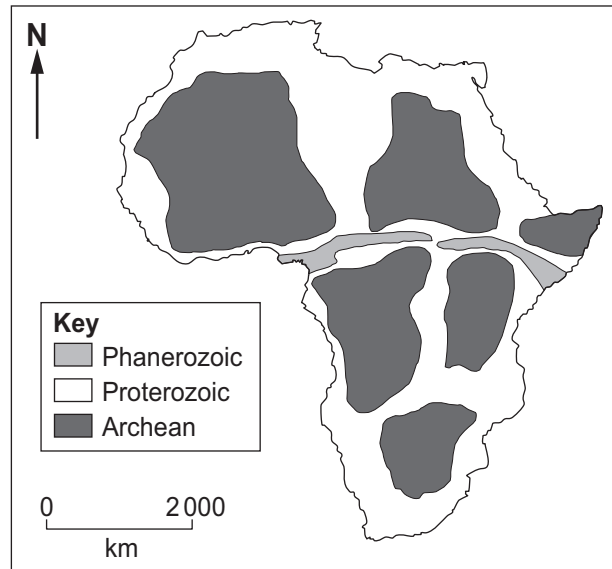
The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

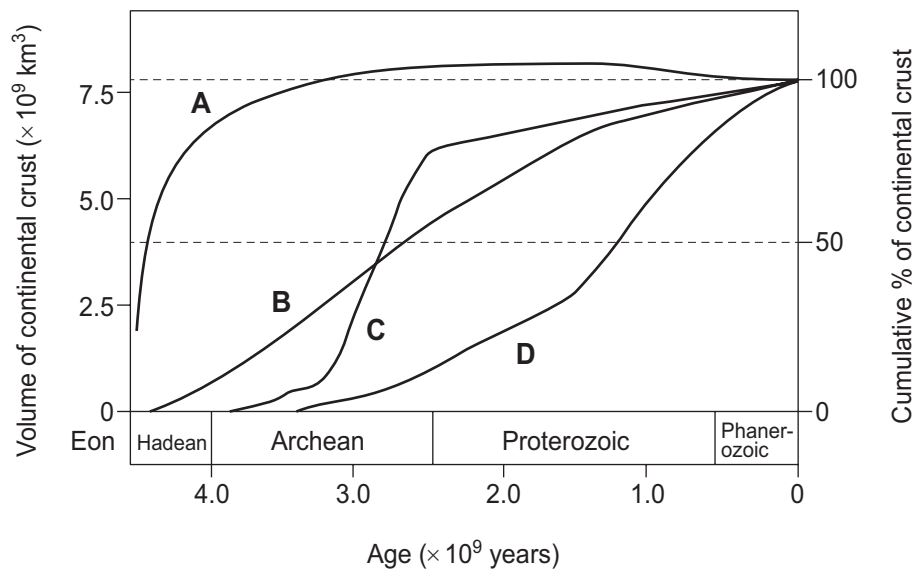
## SECTION A

1. **Figure 1a** is a simplified map of the geology of Africa showing the distribution of Archean, Proterozoic and Phanerozoic rocks.

**Figure 1b** shows four models (A, B, C and D) that have been proposed to show how the volume of continental crust on Earth has changed through geological time.



**Figure 1a**



**Figure 1b**

- (a) Use **Figure 1a** to describe the distribution of Archean, Proterozoic and Phanerozoic rocks in Africa. [3]

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- (b) (i) Use **Figure 1b** to complete **Table 1** below. [3]

The present day volume of the continental crust	•	$\times 10^9 \text{ km}^3$
The age of the oldest continental crust according to model <b>B</b>	•	$\times 10^9 \text{ years}$
The eon where the maximum rate of continental growth took place according to model <b>C</b>	•	

**Table 1**

- (ii) Use your values in **Table 1** to calculate the mean rate of growth of continental crust for model **B**. Show your working. [2]

*Mean rate of growth* = .....  $\text{km}^3\text{year}^{-1}$

- (iii) Describe the differences between models **A** and **D** in illustrating the changes in the volume of continental crust during the last 4.5 billion years. [3]

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(c) A student states that the age distribution data for Africa shown on **Figure 1a** best supports model **C** on **Figure 1b**. Critically evaluate the student's conclusion. [4]

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**SECTION B**

Answer **one** question only.

Write your answer in the remaining pages of this booklet.

2. (a) Describe the layered structure and composition of an ophiolite sequence.
- (b) Evaluate the use of ophiolites in understanding the layered structure and composition of oceanic lithosphere. [25]
3. (a) Describe the main processes responsible for lithospheric thickening in orogenic belts.
- (b) *'Erosion is the main factor influencing the height of mountain ranges in orogenic belts.'*  
Evaluate this statement. [25]
4. Evaluate the use of seismic techniques in investigating the structure of the lithosphere. [25]

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**Acknowledgement**

**Figure 1a** – adapted from G.C. Begg et al. 2009. *The lithospheric architecture of Africa: Seismic tomography, mantle petrology and tectonic evolution. Geosphere, v5, 23-50.*

**Figure 1b** – adapted from C.J. Hawkesworth et al. 2010. *The generation and evolution of the continental crust. Journal of the Geological Society, v167, 229-248.*