GCE A level

1215/04

GEOLOGY – GL5

Thematic Unit 4

Geology of the Lithosphere

A.M. TUESDAY, 16 June 2015

ONE of TWO units to be completed in 2 hours plus your additional time allowance

Surname _____

Other Names _____

Centre Number _____

Candidate Number 2 _____

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

ADDITIONAL MATERIALS

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

INSTRUCTIONS TO CANDIDATES

Use black ink, black ball-point pen or your usual method.

Write your name, centre number and candidate number in the spaces on the front cover.

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 opposite is a simplified geological map of the island of Sumatra in the east Indian Ocean. FIGURE 1b opposite is a cross section (X–Y) showing the distribution of earthquake foci across the Sumatran subduction zone.**

(a) **Describe the distribution of earthquake foci in FIGURE 1b. [3]**

1(b) (i) Draw and label on FIGURE 1b a line to show the probable position of the top of the subducted Indian Oceanic Plate. [2]

(ii) The Indian Oceanic Plate bends before it subducts. This may result in tensional forces at shallow depths in the plate. Label ONE earthquake focus (T →) on FIGURE 1b which may result from such a process. [1]

(iii) Earthquakes at shallow depths can also be generated as rising magma intrudes into brittle rocks. Label ONE earthquake focus (M →) on FIGURE 1b which may result from such a process. [1]

1(c) **The chain of islands stretching from Simeulue to Enggano on FIGURE 1a forms part of a modern day accretionary prism. Explain the evidence on FIGURE 1a to support this idea. [2]**

1(d) **The PRE-TERTIARY ROCKS of Sumatra can be divided into three main rock units (TABLE 1 opposite). These three units indicate that accretion has been occurring in the Sumatra region for more than 100 Ma. Explain the evidence in TABLE 1 which supports this idea. [6]**

15

TABLE 1

Pre-Tertiary Rock Unit	Explanation of evidence
1. Altered peridotites, gabbros, dolerites and basalts (often pillowed)	
2. Greywackes (turbidites) and fine-grained marine sediments	
3. Andesite and basalt volcanics closely associated with reef limestones	

SECTION B

Answer ONE question only.

Write your answer in the remaining pages of this booklet.

2(a) **Describe how the rate AND direction of seafloor spreading might be calculated from**

- **patterns of ocean magnetic anomalies**
- **mantle plume (hotspot) data.**

(b) **Evaluate the effectiveness of these two methods in determining the rate AND direction of seafloor spreading. [25]**

3(a) **Describe the differences between oceanic and continental lithosphere in terms of**

- **composition**
- **thickness**
- **age.**

(b) **"Our knowledge of the composition of the continental lithosphere is limited."**
Evaluate this statement. [25]

4. **“The strength of rocks and how they deform in the lithosphere is controlled solely by temperature.”**
Evaluate the validity of this statement. [25]

END OF PAPER

FIGURE 1a

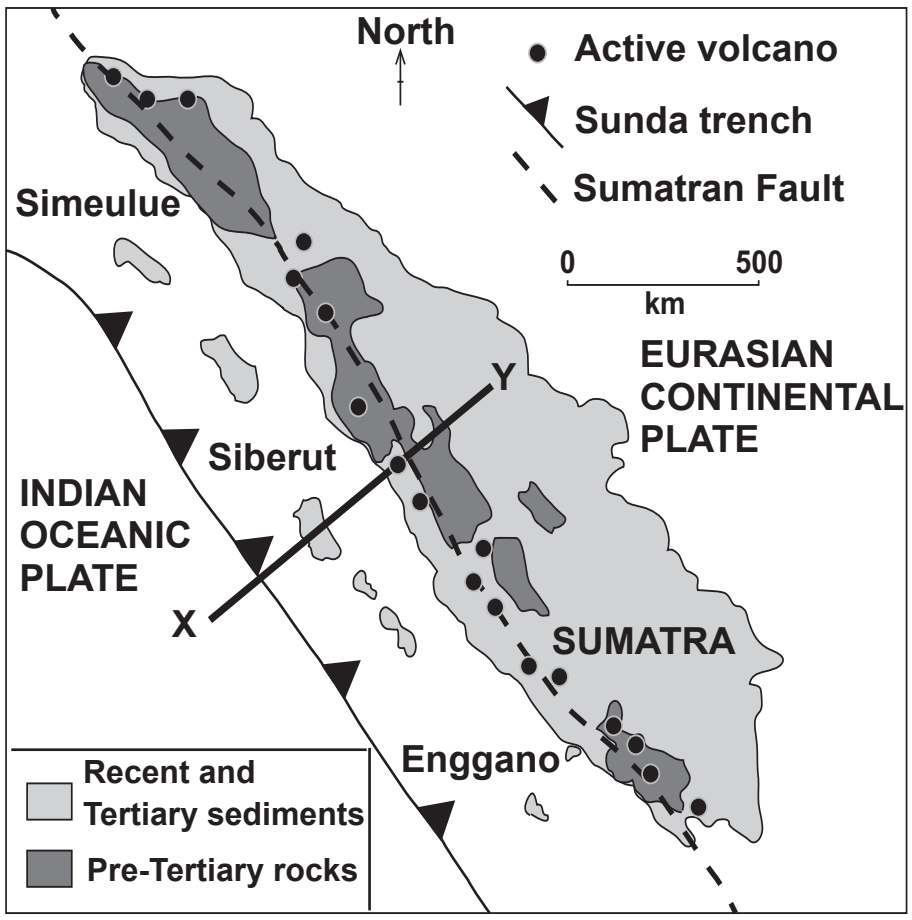

FIGURE 1b