Surname	Centre Number	Candidate Number
Other Names		2

GCE A Level – LEGACY

1215/04

S18-1215-04

GEOLOGY – GL5

Thematic Unit 4
Geology of the Lithosphere

THURSDAY, 7 JUNE 2018 – MORNING

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.		
	Total	**40**	

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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.

Examiner only

SECTION A

1. **Figure 1a** shows the results of laboratory experiments to determine how the strength of quartz may vary with depth in the crust when deformed by a compressive stress at a constant rate.

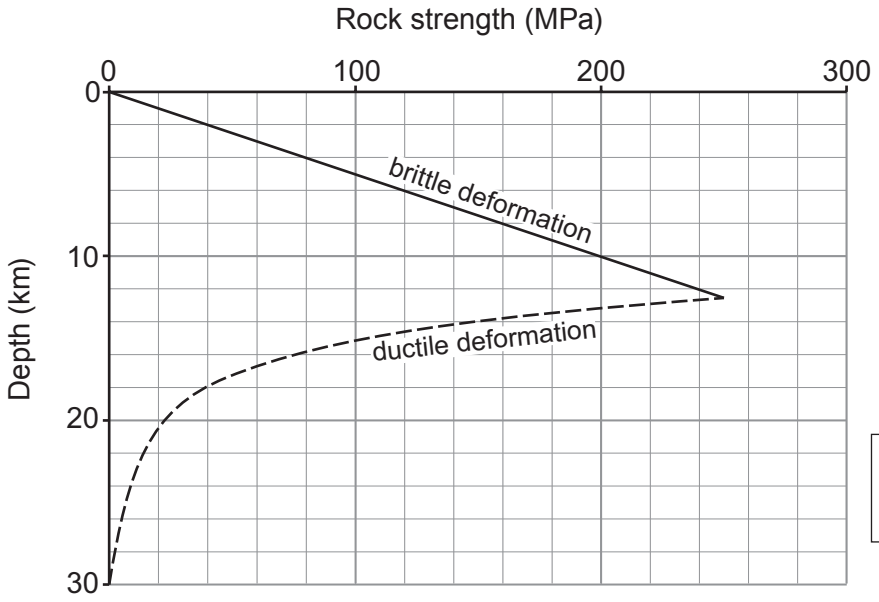

Figure 1a

(a) Use **Figure 1a** to complete **Table 1a**. [3]

maximum strength (MPa)	•
depth to brittle-ductile transition boundary (km)	•
mean increase in rock strength per km in the brittle zone ($MPakm^{-1}$)	•

Table 1a

(b) When compressed at a strain rate **one hundred times** slower than shown in the box in **Figure 1a**, quartz is found to have a reduced maximum strength and to become ductile at shallower depths.

(i) Sketch a strength profile on **Figure 1a** to demonstrate this behaviour. [2]

(ii) Calculate the strain rate at which the quartz is now deformed. [1]

..... s^{-1}

Examiner only

(c) **Figure 1b** is a cross-section to show the distribution of earthquake foci in part of the Himalaya. **Figure 1c** is one model used to show how rock strength may change through the continental crust and upper mantle in this area.

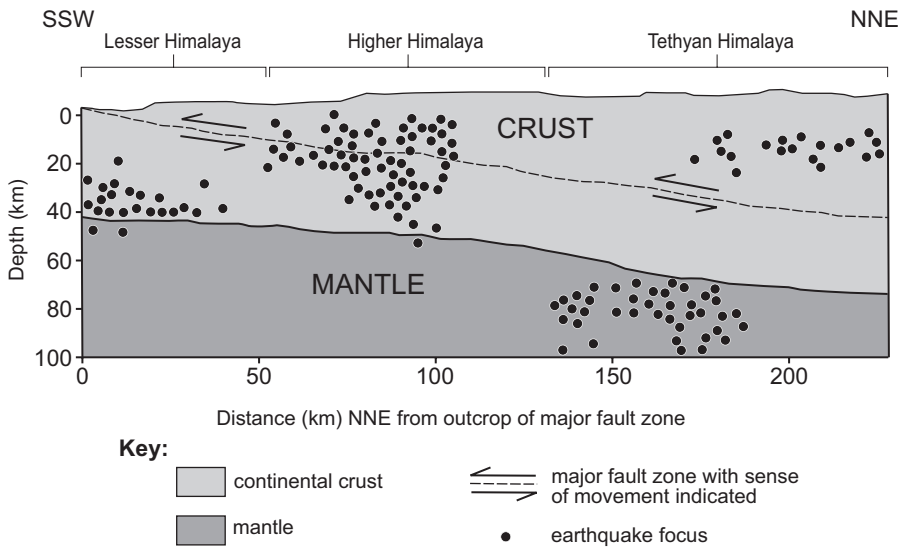

Figure 1b

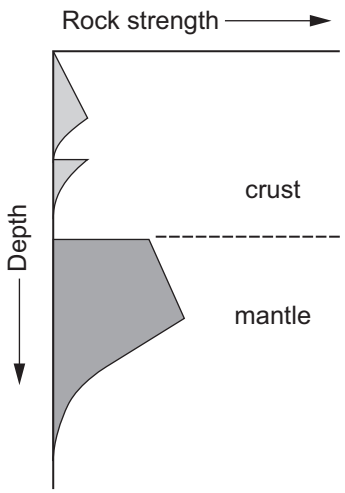

Figure 1c

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(i) Refer to **Figure 1b**. Complete **Table 1b** to describe the distribution of earthquakes beneath the Lesser, Higher and Tethyan Himalaya. [3]

Lesser Himalaya	•
Higher Himalaya	•
Tethyan Himalaya	•

Table 1b

(ii) Use **Figure 1b** and your knowledge. Explain why earthquakes occur in the Himalaya. [3]

.....

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Turn over.

Examiner only

(iii) Use **Figures 1a and 1b** to select the most likely area where the distribution of earthquake foci best match the model shown in **Figure 1c**. Explain your answer. [3]

Lesser Himalaya ☐ Higher Himalaya ☐ Tethyan Himalaya ☐ Tick **one** box only

Explanation .....

.....

.....

.....

15

SECTION B

Answer **one** *question only.*

Write your answer in the remaining pages of this booklet.

2. *(a)* Describe and explain the layered seismic structure of the oceanic crust.

(b) Evaluate the significance of ocean drilling in providing evidence for the composition of the oceanic crust and upper mantle. [25]

3. *(a)* Describe and explain the variations in surface heat flow measurements across the Earth's surface.

(b) Evaluate the importance of surface heat flow measurements to support the theory of plate tectonics. [25]

4. *'The distribution of ages of rocks in oceanic and continental lithosphere is predictable'.* Evaluate this statement with respect to the way in which oceanic and continental lithosphere is created. [25]

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Examiner only

Examiner only

Examiner only

Turn over.

Examiner only

END OF PAPER

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Acknowledgements

Figure 1a *and* **1c** *adapted from Fossen, H., 2010. Structural Geology, Cambridge University Press.*

Figure 1b *from Schulte-Pelkum et al. 2005. Imaging the Indian subcontinent beneath the Himalaya. Nature, v.435, 1222-1225.*

