WJEC CBAC

GCE A level

1215/04

GEOLOGY – GL5

Thematic Unit 4

Geology of the Lithosphere

P.M. TUESDAY, 10 June 2014

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.

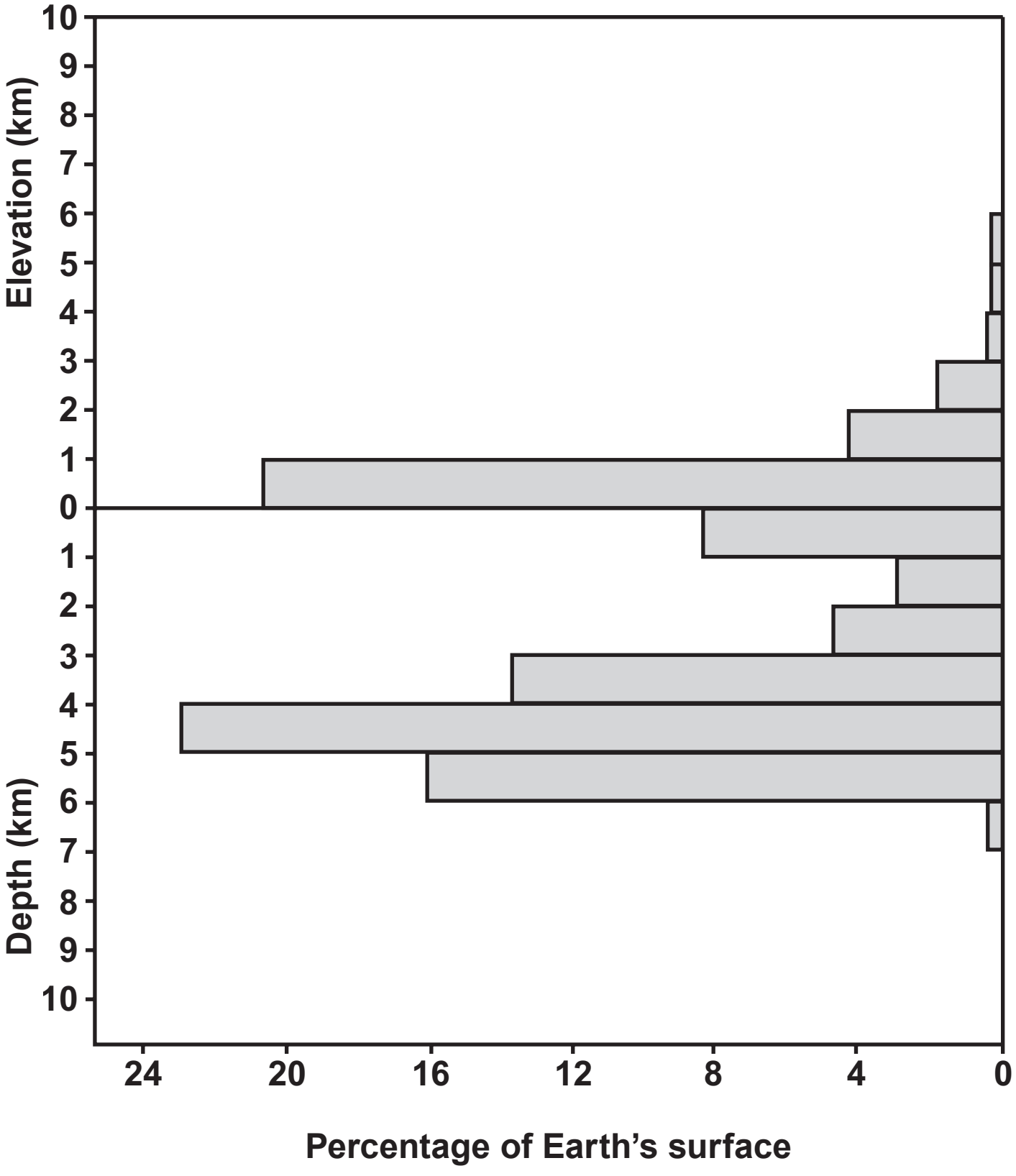
Answer QUESTION 1 in Section A (15 marks) and ONE question from Section B (25 marks).

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.

FIGURE 1a


Elevation (km)
10
9
8
7
6
5
4
3
2
1
0
1
2
3
4
5
6
7
8
9
10
Depth (km)
24
20
16
12
8
4
0
Percentage of Earth's surface

SECTION A

1 FIGURE 1a opposite shows the elevation above and the depth below sea level of the Earth's surface.

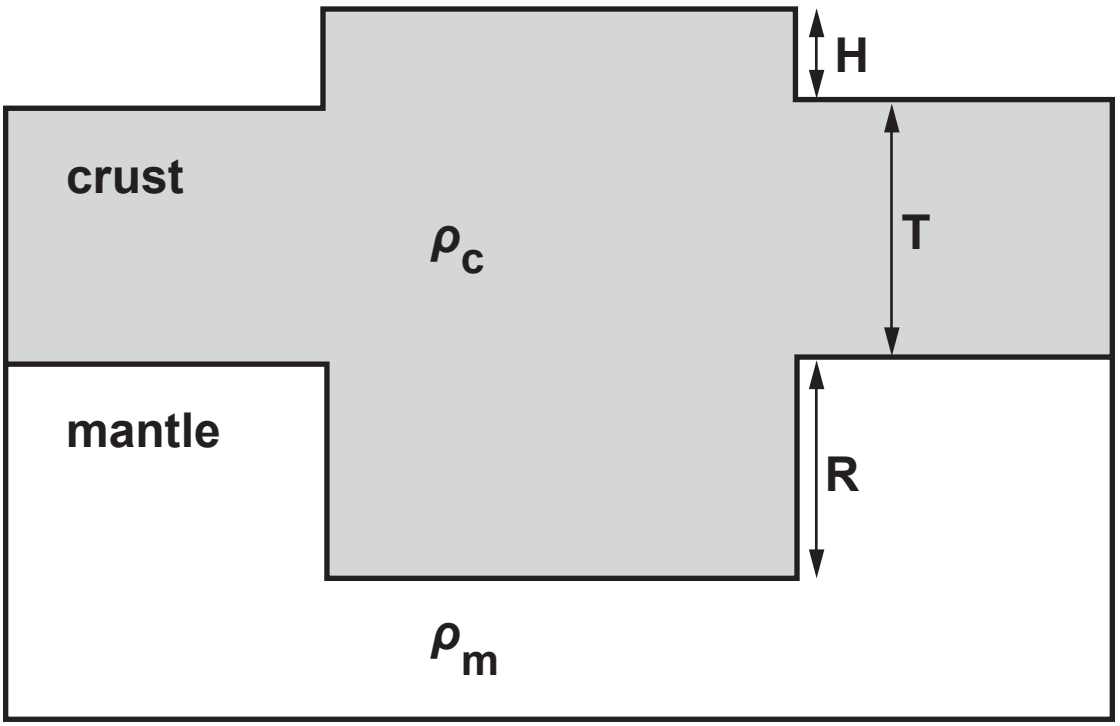
(a) (i) Use FIGURE 1a to complete TABLE 1. [2]

Percentage of the Earth's surface with an elevation between 0 and 1 km	%
Percentage of the Earth's surface with an elevation above 3 km	%

TABLE 1

(ii) Explain why the percentage of the Earth's surface with an elevation above 3 km is so small. [3]

FIGURE 1b



H = height of a mountain above sea level (the height of Mount Everest is 8850 m)

T = normal thickness of the crust (the normal thickness of the crust in the Himalayan region is 40 km)

R = thickness of the root of a mountain

ρ_c = density of the crust, approximately 2700 kg m^{-3}

ρ_m = density of the mantle, approximately 3300 kg m^{-3}

FIGURE 1b opposite shows the relationship between the elevation of the Earth's surface and the depth to the base of the crust.

(b) Use the data from FIGURE 1b.

(i) Calculate the thickness R of the root of Mount Everest in km. Show your working.

[3]

R may be calculated using the formula:

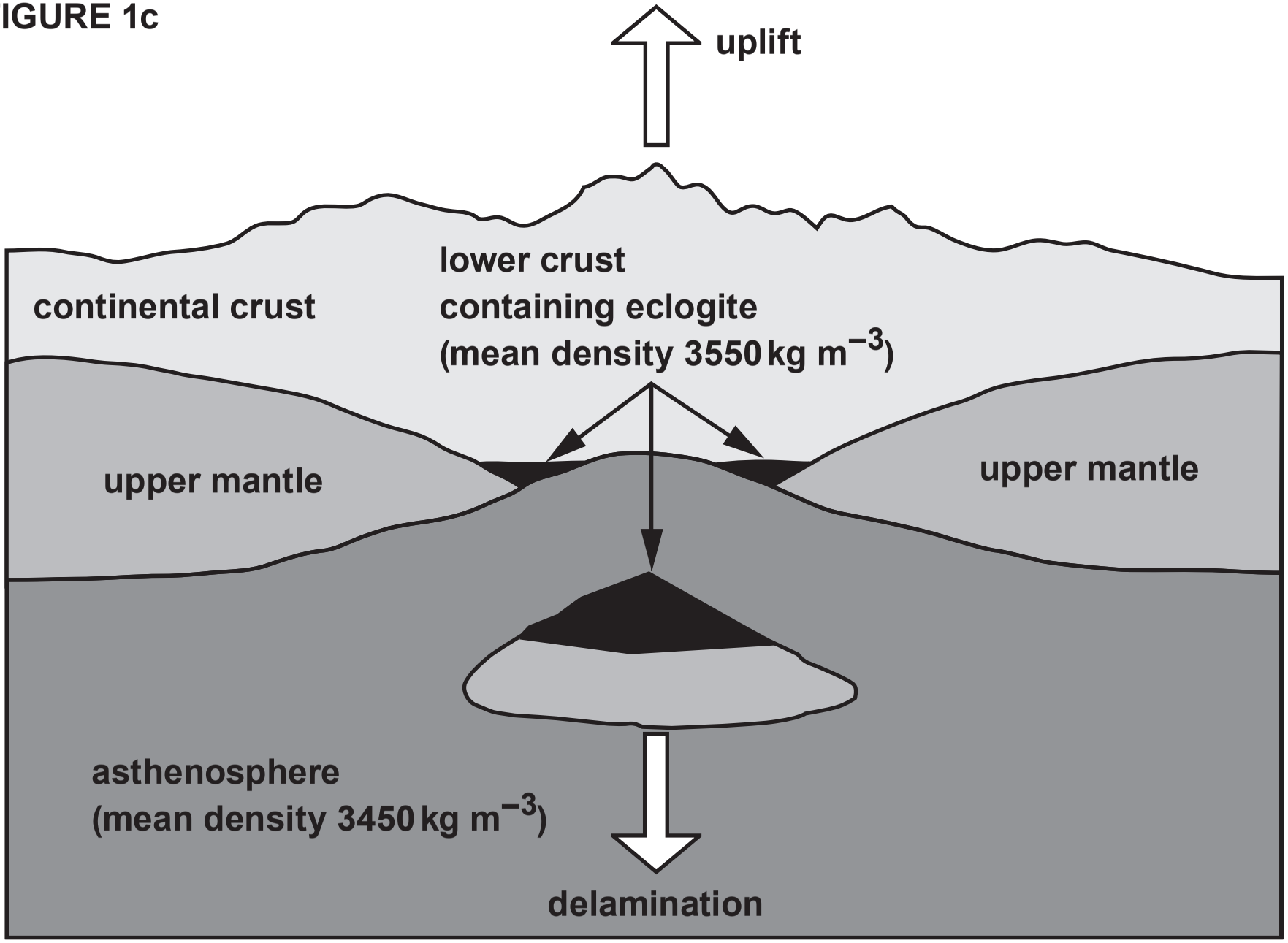
$$R = \frac{H \times \rho_c}{\rho_m - \rho_c}$$

_____ **km**

1(b) (ii) **Calculate the thickness of the continental crust beneath the summit of Mount Everest in km. Show your working. [2]**

_____ **km**

FIGURE 1c


uplift
continental crust
lower crust
containing eclogite
(mean density 3550 kg m^{-3})
upper mantle
upper mantle
asthenosphere
(mean density 3450 kg m^{-3})
delamination

1(c) **In mountain belts with very thick continental crust, the high pressures and temperatures can result in the base of the crust recrystallising to form the rock eclogite. A possible consequence of this recrystallisation is a process called delamination, as shown in FIGURE 1c opposite.**

(i) **Using FIGURE 1c explain how delamination can take place. [3]**

(ii) **Use the information given in FIGURES 1b and 1c to explain why mountains experience uplift when delamination occurs. [2]**

15

SECTION B

Answer ONE question only.

Write your answer in the remaining pages of this booklet.

2 Describe and evaluate the factors that influence the composition of the magma formed at

- **constructive plate boundaries and**
- **destructive (island arc and cordilleran) plate boundaries. [25]**

3 Describe and evaluate the role that seismology has played in determining the

- **structure and**
- **composition of the lithosphere. [25]**

4(a) Describe and explain the pattern of surface heat flow across

- **an active spreading centre and**
- **an active ocean-continent subduction zone.**

(b) Evaluate the role that temperature has on the type of deformation a rock experiences. [25]

END OF PAPER