Surname	Centre Number	Candidate Number
Other Names		2

GCE A level

1215/04

GEOLOGY – GL5

Thematic Unit 4
Geology of the Lithosphere

P.M. TUESDAY, 11 June 2013

ONE of TWO units to be completed in 2 hours

Suitable for Modified Language Candidates

			Examiner only
Section A	**1.**	**15**	
Section B	**2.**	**25**	
	3.		
	4.		
Total		**40**	

1215
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ADDITIONAL MATERIALS

In addition to this and one other examination paper, you may require 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 time-distance graph showing data collected from a seismic survey designed to calculate the local thickness of the continental crust. **Figure 1b** illustrates a two layer ray path model to explain the results of this seismic survey.

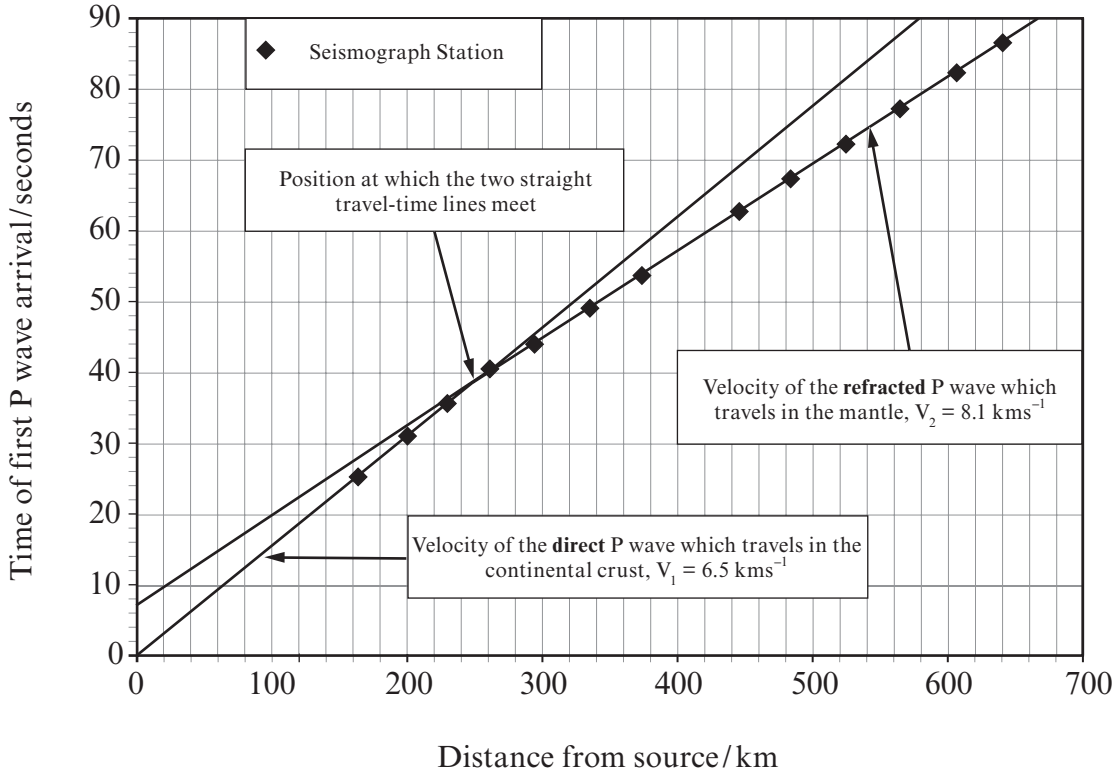
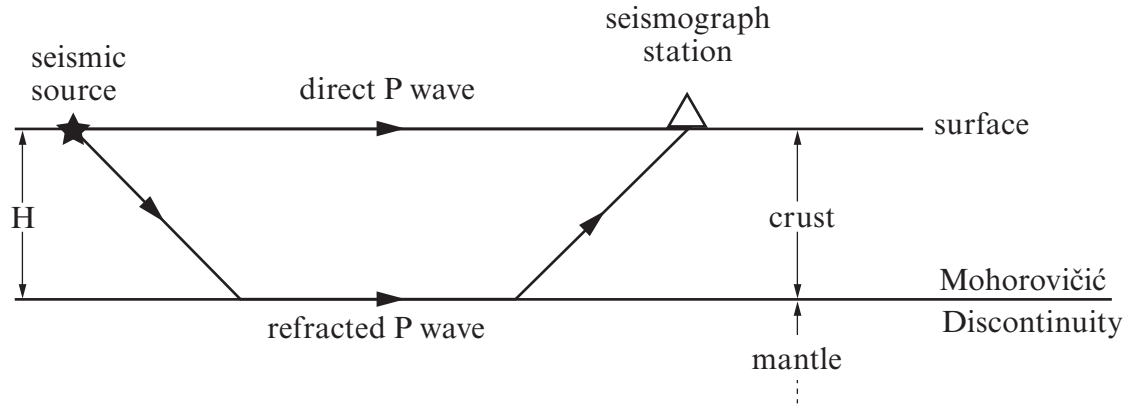


Figure 1a



H = thickness of crust

Figure 1b

(a) Use **Figure 1a** to complete **Table 1** to find out the time of the first P wave arrivals at seismograph stations positioned 200 km and 565 km from the seismic source. [2]

Distance from seismic source/km	Time of the first P wave arrivals
200	•
565	•

Table 1

(b) The seismographs also detect P waves that reflect off the Mohorovičić Discontinuity. On **Figure 1b** draw the path of a reflected P wave that is detected at the seismograph station. [2]

(c) Using **Figures 1a** and **1b** explain the path of the **refracted P wave** as it travels from the seismic source to and along the Mohorovičić Discontinuity and to the seismograph station. [3]

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(d) It is possible to calculate the thickness of the crust by using data from **Figure 1a** and the formula below.

$$H = \frac{D}{2}\sqrt{\frac{(V_2 - V_1)}{(V_2 + V_1)}}$$

H is the thickness of the crust in km
D is the distance in km at which the two straight travel-time lines meet
V_1 is the velocity in kms^{-1} of the P waves in the crust
V_2 is the velocity in kms^{-1} of the P waves in the mantle

(i) Measure on **Figure 1a** the distance D where the two straight travel-time lines meet.

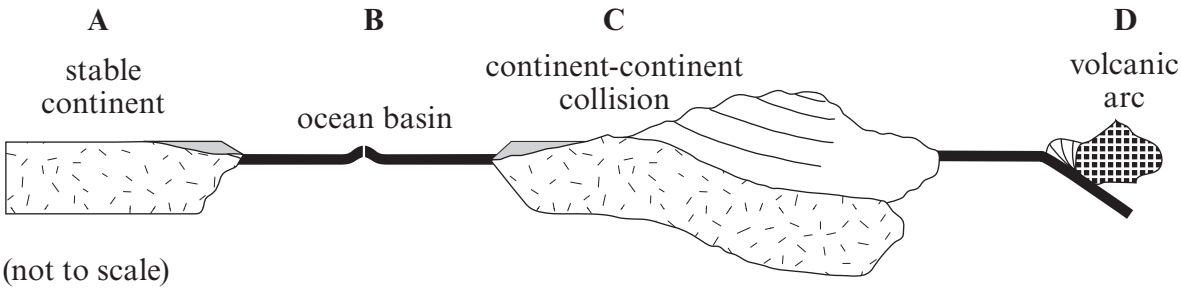
D = ... km [1]

(ii) Show that the thickness of the crust in this area is approximately 40 km by substituting all relevant values from **Figure 1a** into the formula.
Show your working. [3]

Examiner only

(e) Use **all** the data available (given and calculated) and your own knowledge. Which one of the locations (**A-D**) in **Figure 1c**, would most likely be underlain by the crust identified in **Figures 1a** and **1b**.

Give a reasoned explanation for your choice of location. [4]



(not to scale)

Figure 1c

Location .....

Explanation .....

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.....

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15

SECTION B

Answer **one** *question only.*

Write your answer in the remaining pages of this booklet.

2. *(a)* Describe the range of tectonic structures caused by brittle deformation.

(b) Evaluate the role of tensional stresses in the formation of tectonic structures in orogenic belts. [25]

3. *(a)* Describe the nature and origin of the layered structure of the oceanic lithosphere.

(b) Evaluate the contribution that ocean drilling has made to our understanding of the layered structure and composition of the oceanic lithosphere. [25]

4. *(a)* Describe the distribution of ages of rocks in continental areas.

(b) Evaluate the link between this age distribution and the J. Tuzo Wilson cycle. [25]

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