OCR
RECOGNISING ACHIEVEMENT

Thursday 16 May 2013 – Afternoon

AS GCE GEOLOGY

F791/01 Global Tectonics

F7129901613

Candidates answer on the Question Paper.

OCR supplied materials:
None

Other materials required:
- Ruler (cm/mm)
- Protractor
- Electronic calculator

Duration: 1 hour

F 7 9 1 0 1

Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

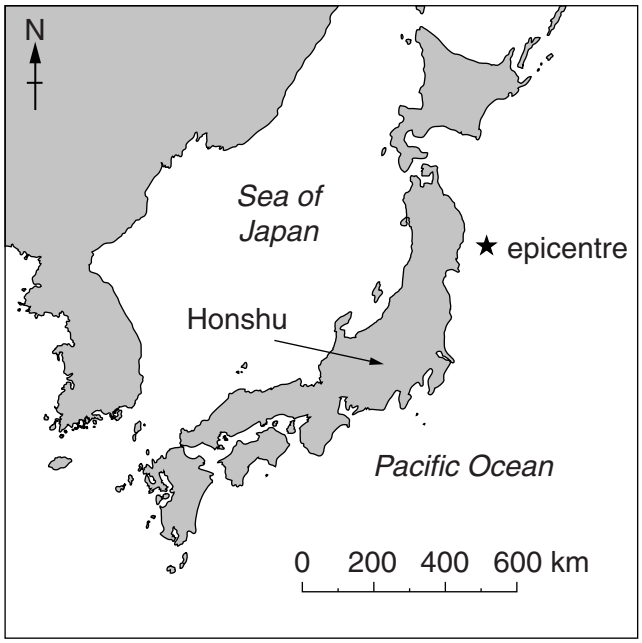
- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. If additional space is required, you should use the lined page at the end of this booklet. The question number(s) must be clearly shown.
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **60**.
- Where you see this icon you will be awarded a mark for the quality of written communication in your answer.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.
- This document consists of **12** pages. Any blank pages are indicated.

Answer **all** the questions.

1 The map below shows the epicentre of the 2011 Honshu earthquake in Japan.



The 2011 Honshu earthquake was the most powerful recorded in Japanese history. It had an epicentre 70 km off the coast of Japan at a focal depth of 32 km. The island of Honshu moved 2.5 m to the east. Over 15 000 people are known to have died.

(a) What type of plate tectonic setting was responsible for the Honshu earthquake?

..... **[1]**

(b) The earthquake measured 9.0 on the Richter scale.

(i) What does the Richter scale measure?

..... **[1]**

(ii) What does the Mercalli scale measure?

..... **[1]**

(iii) Name the lines that join places with the same value on the Mercalli scale.

In your answer, you should use the appropriate terms, spelled correctly.

..... **[1]**

(c) (i) The Honshu earthquake generated a tsunami which caused a huge amount of damage and loss of life. Explain how the earthquake generated the tsunami.

.....

.....

.....

..... **[2]**

(ii) Describe **one** social and **one** economic consequence of this earthquake.

social .....

.....

economic .....

.....

[2]

(d) (i) Explain how earthquakes cause liquefaction.

.....

..... **[1]**

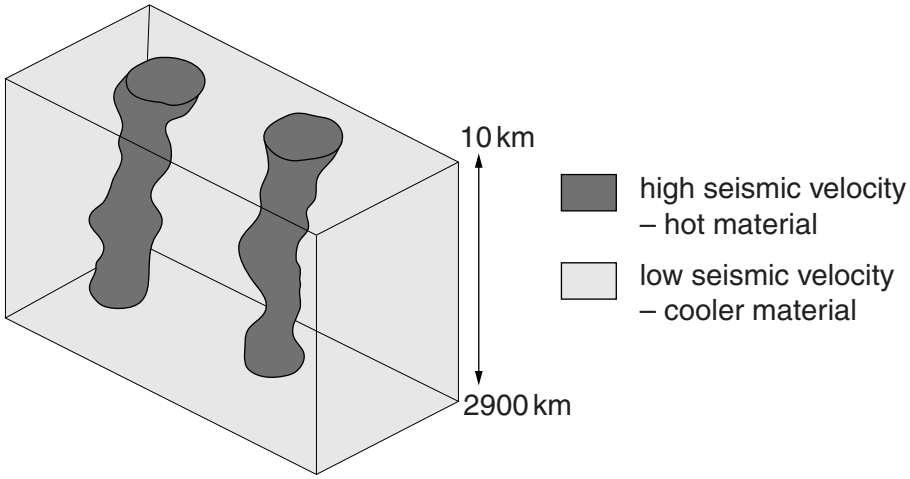
(ii) Describe how liquefaction affects built structures.

.....

..... **[1]**

[Total: 10]

2 **(a)** The diagram below shows a seismic tomography image through the mantle.



(i) Mark and label a hotspot on the diagram. **[1]**

(ii) Explain how seismic tomography has been used to provide evidence for hot spots and mantle plumes.

.....

..... **[1]**

(iii) With the aid of a labelled cross section diagram, explain how a chain of islands and seamounts develops over a hotspot.

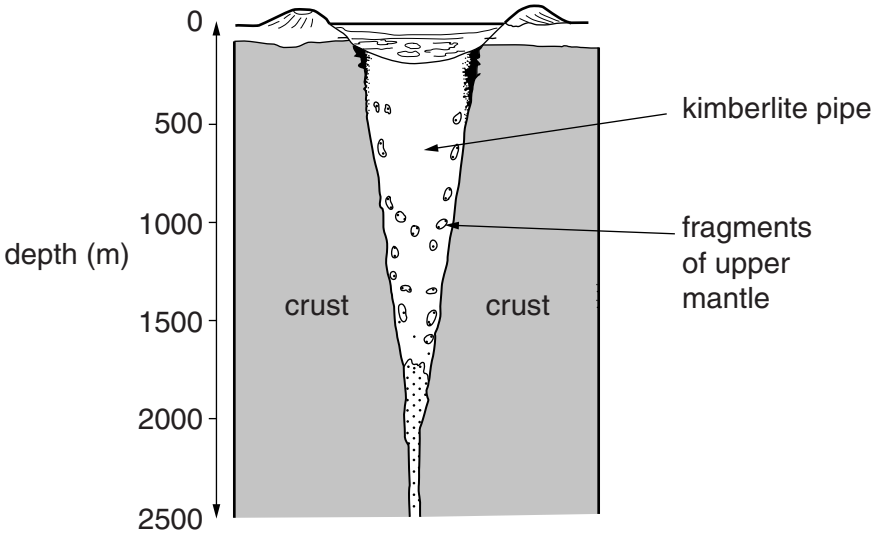
On your diagram add the following labels:
- the oldest seamount
- a mantle plume
- the youngest island
- direction of plate movement

.....

.....

..... **[3]**

(b) The diagram below is of a kimberlite pipe in South Africa.



(i) Explain how kimberlite pipes have provided evidence for the composition of the mantle.

.....

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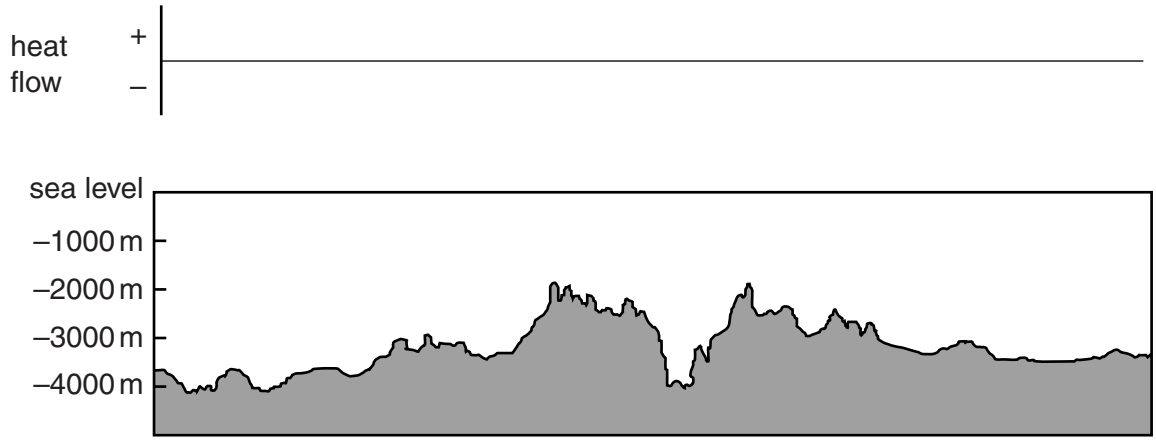
..... **[2]**

(ii) Give the technical term for the fragments labelled in the diagram.

..... **[1]**

[Total: 8]

3 The diagram below is a simplified cross section through the Mid-Atlantic Ridge.



(a) (i) Label the axial rift on the cross section diagram above. **[1]**

(ii) Draw the heat flow anomaly on the axes above. **[1]**

(iii) Explain the pattern shown by the heat flow.

.....

..... **[1]**

(iv) Transform faults occur at mid-ocean ridges. In the space below draw a fully labelled plan view diagram of a transform fault displacing a mid-ocean ridge.

plan view

[2]

(v) Explain how the use of satellites has provided evidence for sea floor spreading.

.....

..... **[1]**

(b) The Atlantic Ocean has spread by 4500 km over the last 150 Ma. Calculate the average rate of spreading in cm/year over the last 150 Ma. Show your working.

..... cm/year **[2]**

(c) Why are earthquakes rare in the ocean basins away from the mid-ocean ridges?

.....

..... **[1]**

(d) Describe **one** piece of direct evidence for the structure and composition of oceanic crust.

.....

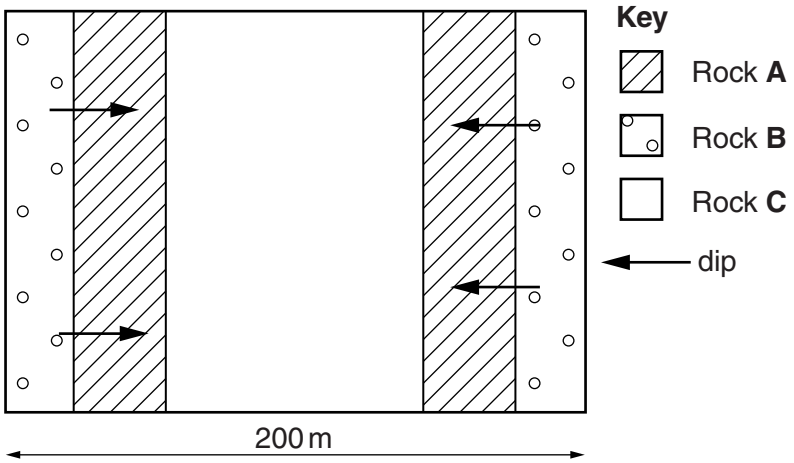
.....

.....

..... **[2]**

[Total: 11]

4 The geological map below shows a sequence of rocks that are the right way up.



(a) (i) Using the correct technical terms, fully name the structure shown above.

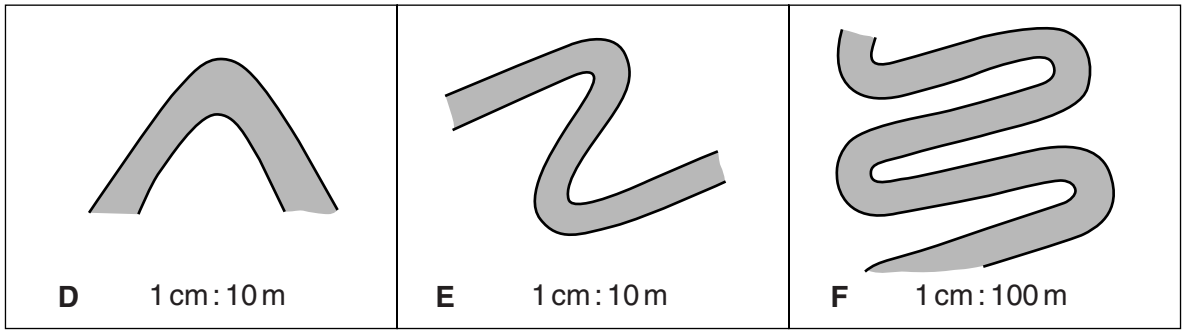
In your answer, you should use the appropriate terms, spelled correctly.

..... **[1]**

(ii) Using only the letters **A**, **B** or **C**, complete the following sentence.

The youngest rock is ..... and the oldest rock is ..... . **[1]**

(b) The diagrams below show cross-sections of three different fold structures in the same rock.



(i) Identify the fold structures **D** .....

E .....

F ..... **[3]**

(ii) Which fold structure formed under the highest compressive stress?

..... **[1]**

(iii) On fold structure **E** above:

- draw the axial planes
- label an inverted limb. **[2]**

(c) Draw a normal fault in the space below. Clearly label the:

- downthrown side
- angle of dip of the fault.

[2]

(d) Slickensides are often found along a fault.

(i) Describe the characteristics of slickensides.

.....

..... **[1]**

(ii) Explain how slickensides form.

.....

..... **[1]**

(e) **(i)** Draw a labelled diagram of a fault breccia.

[1]

(ii) Explain how fault breccia forms.

.....

..... **[1]**

[Total: 14]

5 **(a)** Meteorites have been used as indirect evidence for the composition of different layers of the Earth.

(i) Define the term *meteorite*.

.....

..... **[1]**

(ii) State **three** pieces of evidence for the impact of meteorites on Earth.

Evidence 1 .....

Evidence 2 .....

Evidence 3 .....

[3]

(b) The upper part of the Earth consists of the lithosphere and the asthenosphere.

(i) Describe **two** properties of the lithosphere.

.....

.....

.....

..... **[2]**

(ii) Describe **two** properties of the asthenosphere.

.....

.....

.....

..... **[2]**

(iii) Describe the key role that the asthenosphere plays in plate tectonics.

.....

..... **[1]**

[Total: 9]

6 Describe the processes and features that occur at an oceanic–continental convergent plate margin.

You should use a labelled diagram to illustrate your answer.

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.... [8]

[Total: 8]

END OF QUESTION PAPER

ADDITIONAL ANSWER SPACE

If additional answer space is required, you should use this lined page. The question number(s) must be clearly shown in the margin.