OCR
RECOGNISING ACHIEVEMENT

ADVANCED SUBSIDIARY GCE   **2831**

GEOLOGY

Global Tectonics and Geological Structures

THURSDAY 11 JANUARY 2007   Afternoon

Time: 1 hour

Additional materials: Electronic calculator
                      Ruler (cm/mm)

Candidate Name	

Centre Number					

Candidate Number				

INSTRUCTIONS TO CANDIDATES

- Write your name, Centre Number and Candidate Number in the boxes above.
- Answer **all** the questions.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Do **not** write in the bar code.
- Do **not** write outside the box bordering each page.
- WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED. ANSWERS WRITTEN ELSEWHERE WILL NOT BE MARKED.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- You will be awarded marks for the quality of written communication where this is indicated in the question.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.

FOR EXAMINER'S USE

Qu.	Max	Mark
1	18	
2	16	
3	16	
4	10	
TOTAL	60	

This document consists of **11** printed pages and **1** blank page.

Answer **all** the questions

1 The simplified diagram below shows a cross section through the Earth.

(a) Complete the table below using the appropriate letter **A** – **H**.

not to scale
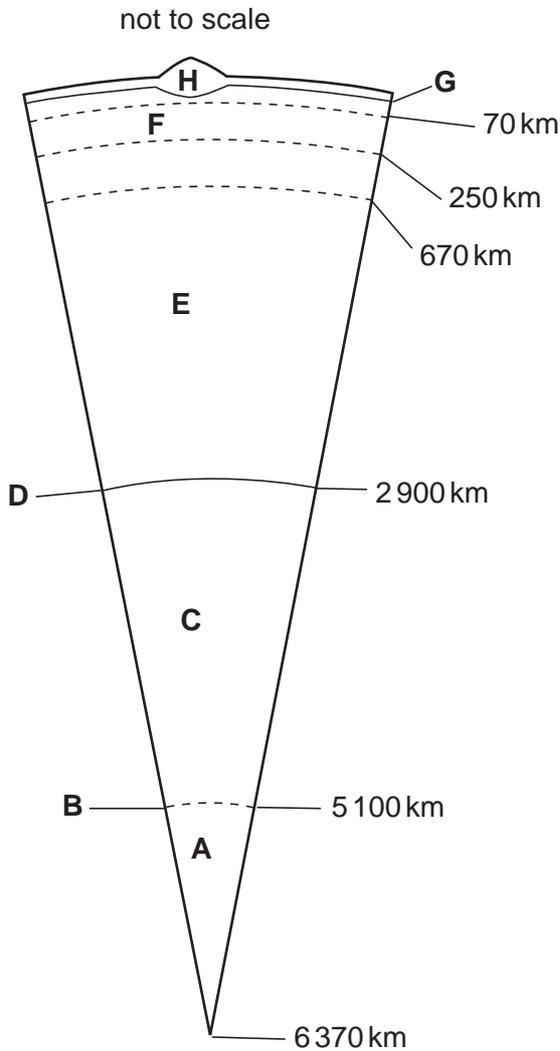
feature	appropriate letter **A** – **H**
Gutenberg discontinuity	
inner core	
lower mantle	
asthenosphere	
Mohorovicic discontinuity	
the crust	

H
G
70 km
F
250 km
670 km
E
D — 2 900 km
C
B — 5 100 km
A
6 370 km

[6]

(b) Describe how geologists locate the discontinuities.

....

....

....

.... [2]

(c) Complete the table below showing the properties of the lower mantle, inner core and asthenosphere. Part of the table has been completed for you.

	physical state	**composition (rock type or chemical composition)**
lower mantle	solid	
inner core		
asthenosphere		peridotite/ultrabasic

[4]

(d) Explain how geologists estimate the average density of the Earth's core.

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.... [2]

(e) Within the crust there are layers of sedimentary rocks.

   (i) Draw labelled arrows on the diagram to show the dip and strike directions.

bedding surface
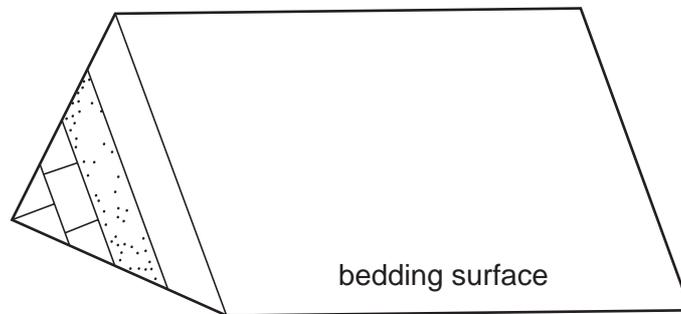
[2]

   (ii) Define the term *strike*.

   .... [1]

   (iii) Define the term *true dip*.

   .... [1]

[Total: 18]

[Turn over

2 **(a)** **(i)** Use the diagram below to help explain why earthquakes occur. Use technical terms where necessary.

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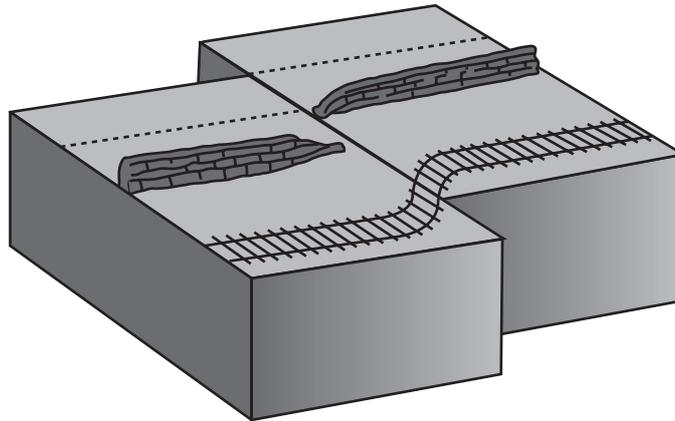
.... [3]

(ii) Name the instrument that detects seismic waves.

.... [1]

(iii) Name the record/trace of the seismic wave.

.... [1]

(b) **(i)** What two measurements are required to work out the **magnitude** of an earthquake?

measurement 1 ....

measurement 2 .... [2]

(ii) Name the scale used to indicate magnitude.

.... [1]

(iii) How do seismologists work out the intensity of an earthquake?

....

.... [1]

   (iv) Name two non-seismic factors that can affect the intensity of an earthquake

   factor 1 ....

   factor 2 .... [2]

(c) (i) Define the term earthquake *focus*.

   ....

   .... [1]

   (ii) Put a tick (✓) in the correct column to indicate the typical seismic activity at each of the features shown in the table.

feature	shallow foci only	shallow to deep foci	aseismic
continental shields			
subduction zones			
mid ocean ridges			
ocean basins			

[4]

[Total: 16]

[Turn over

3 The diagram shows a cross-section through the Hawaiian island chain, which was produced by a hot spot currently located under Hawaii.
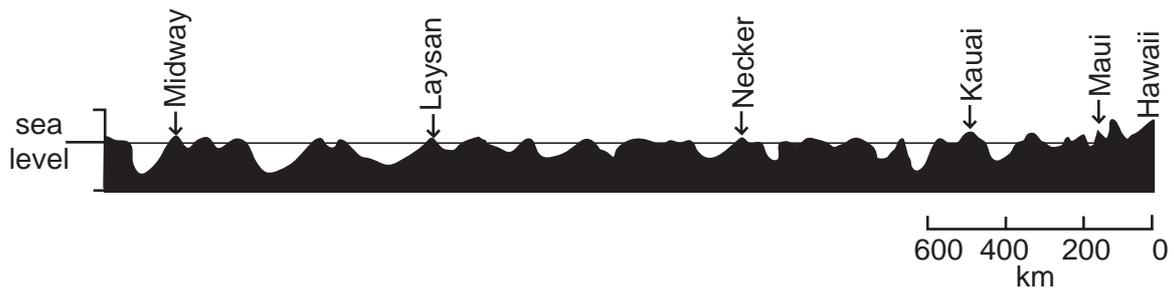
© Ken Rubin, University of Hawaii, modified after: Stearns (1946) Geology of the Hawaiian Islands, Hawaii Division of Hydrography Bulletin 8

(a) **(i)** Use the scale to calculate the distance of each island from Hawaii. Put your answers in the table below. Maui has been done for you.

island	average age of the rocks (Ma)	Distance from Hawaii (km)
Hawaii	0	0
Maui	1	140
Kauai	5	
Necker	10	
Laysan	20	
Midway	28	

[2]

(ii) Use the information in the table above to plot a graph of age of rocks against distance from Hawaii. Draw a line of best fit.

age
(Ma)

distance (km)
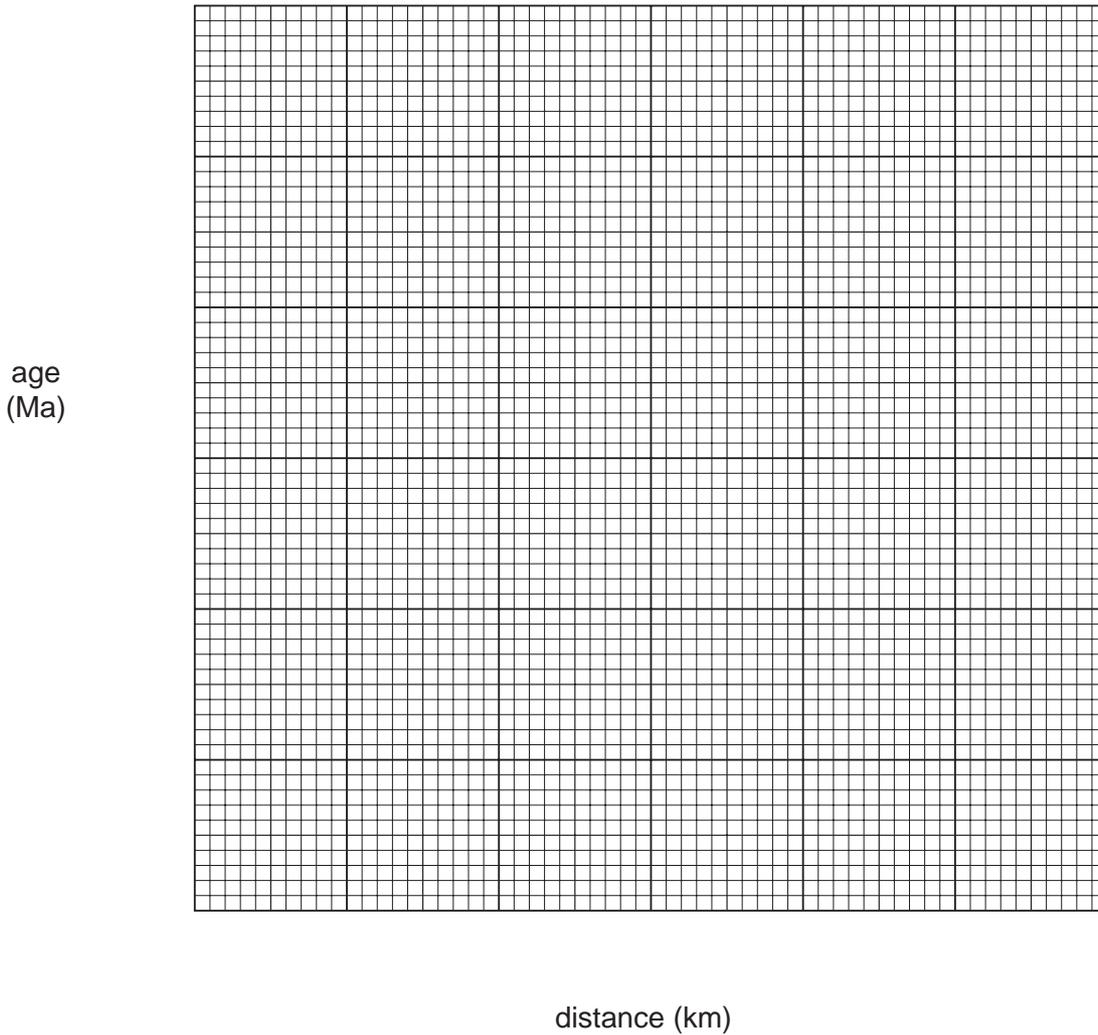
[3]

(iii) Use the data for Midway Island to determine the average rate of sea floor movement over the hot spot in cm / year during the last 28 million years.

Average rate of movement = ... cm / year [2]

[Turn over

(b) (i) Hawaii is an example of a hot spot. Define the term *hot spot.*

....

....

....

.... [2]

(ii) Explain how the pattern of islands was produced.

....

....

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.... [2]

(c) (i) In the space below draw a detailed labelled cross-section showing the layers of the oceanic crust.

[3]

(ii) Describe how magnetic stripes are formed in the oceanic crust.

....

....

....

.... [2]

[Total: 16]

4 In this question, two marks are available for the quality of written communication.

With the aid of diagrams describe the nature and formation of:

- tectonic joints

- cooling joints

- unloading/pressure release joints

- angular unconformities

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.... [8]

Quality of Written Communication [2]

[Total: 10]

[Turn over for optional extension sheet

Optional extension sheet. If you use this lined page to complete an answer to any question, the question number **must** be clearly shown.

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END OF QUESTION PAPER

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