

**ADVANCED SUBSIDIARY GCE****GEOLOGY**

Global Tectonics and Geological Structures

**2831**

Candidates answer on the question paper

**OCR Supplied Materials:**

None

**Other Materials Required:**

- Electronic calculator
- Ruler (cm/mm)

**Thursday 8 January 2009****Afternoon****Duration: 1 hour**

|                       |  |                      |  |
|-----------------------|--|----------------------|--|
| Candidate<br>Forename |  | Candidate<br>Surname |  |
|-----------------------|--|----------------------|--|

|               |  |  |  |  |  |                  |  |  |  |  |
|---------------|--|--|--|--|--|------------------|--|--|--|--|
| Centre Number |  |  |  |  |  | Candidate Number |  |  |  |  |
|---------------|--|--|--|--|--|------------------|--|--|--|--|

**INSTRUCTIONS TO CANDIDATES**

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

**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**.
- 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.
- This document consists of **12** pages. Any blank pages are indicated.

**FOR EXAMINER'S USE**

| Qu.          | Max       | Mark |
|--------------|-----------|------|
| 1            | 17        |      |
| 2            | 17        |      |
| 3            | 16        |      |
| 4            | 10        |      |
| <b>TOTAL</b> | <b>60</b> |      |

Answer **all** the questions.

- 1 (a) There are a number of discontinuities that have been identified within the Earth.

- (i) Name each discontinuity in the table below.

| name of discontinuity | boundary          |
|-----------------------|-------------------|
|                       | crust/mantle      |
|                       | mantle/outer core |

[2]

- (ii) Describe the outer core/inner core discontinuity.

.....

..... [1]

- (iii) Explain how discontinuities can be detected.

.....

.....

.....

..... [2]

- (b) (i) Describe **two** characteristics of the lithosphere.

.....

.....

.....

..... [2]

- (ii) Describe **two** characteristics of the asthenosphere.

.....

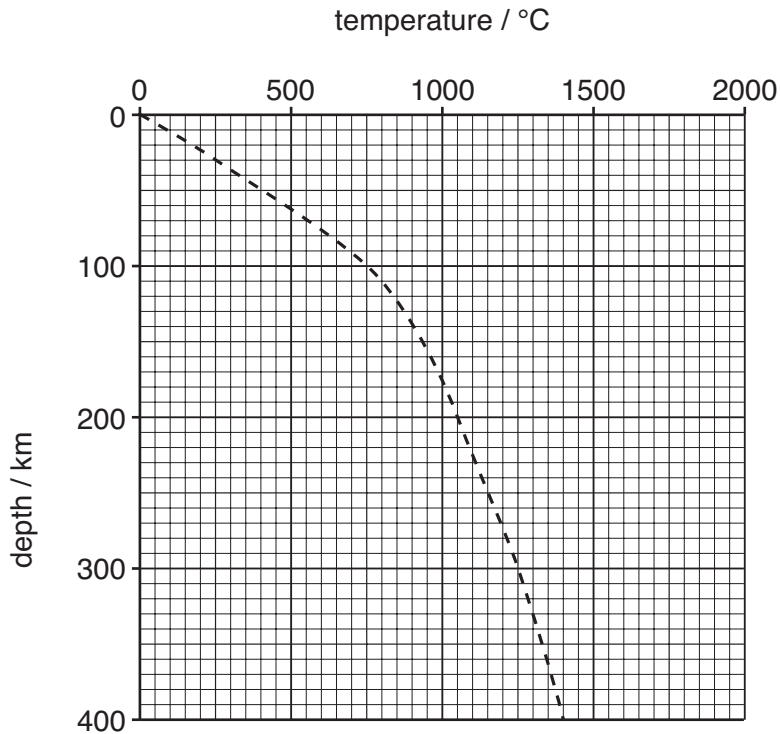
.....

.....

..... [2]

(c) This question is about how temperature changes with depth (geothermal gradient) for two regions, **A** and **B** in the Earth.

- (i) The geothermal gradient has been plotted for region **A** (dashed line). Use the data in the table to construct the geothermal gradient for region **B**. [2]



| region <b>B</b> |                  |
|-----------------|------------------|
| depth / km      | temperature / °C |
| 0               | 0                |
| 100             | 900              |
| 200             | 1200             |
| 300             | 1450             |
| 400             | 1700             |

- (ii) Calculate the geothermal gradient between 0 and 100 km for region **A**.

..... °C/km [1]

- (iii) Calculate the geothermal gradient between 100 and 400 km for region **A**.  
Give your answer to one decimal place.

..... °C/km [1]

- (iv) Does the geothermal gradient increase, decrease or stay the same with depth?

..... [1]

- (v) Describe the difference between these two geothermal gradients.

.....

..... [1]

(vi) Suggest an area of the Earth's surface where there is low heat flow.

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

(d) What is the main source of the Earth's heat?

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

**[Total: 17]**

**2 (a)** There are three main types of plate margin: constructive, destructive and conservative.

(i) For each plate margin below give an example.

constructive plate margin .....  
 destructive oceanic-continental .....  
 destructive continental-continental .....  
**[3]**

(ii) Draw a labelled cross section of a constructive plate margin.

**[4]**

- (b) Sea floor spreading is thought to be a mechanism for plate movement.

Using the subheadings below, outline evidence for sea-floor spreading.

- (i) age of ocean crust

.....

.....

.....

..... [2]

- (ii) magnetic reversals

.....

.....

.....

..... [2]

- (c) In 1915, Alfred Wegener published his book *The Origin of Continents and Oceans*. This put forward the first strong case for the movement of continents.

Using the subheadings below, outline evidence for continental drift.

- (i) major geological structures

.....

.....

.....

..... [2]

- (ii) lithology (rock type)

.....

.....

.....

..... [2]

- (iii) fossils

.....

.....

.....

..... [2]

[Total: 17]  
Turn over

- 3 (a) The table below gives data on some of the most destructive historical earthquakes.

| date of earthquake | location                | deaths  | magnitude (Richter Scale) |
|--------------------|-------------------------|---------|---------------------------|
| 1556               | Shenshi, China          | 830 000 | 8 approx                  |
| 2004               | Sumatra                 | 283 106 | 9.1                       |
| 1976               | Tangshan, China         | 255 000 | 7.5                       |
| 2005               | Pakistan                | 86 000  | 7.6                       |
| 1995               | Kobe, Japan             | 5 470   | 6.9                       |
| 1989               | Loma Prieta, California | 63      | 7.1                       |
| 1994               | Northridge, California  | 57      | 6.7                       |

- (i) Why is the magnitude reading for the Shenshi earthquake only an approximation?

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

- (ii) What does magnitude measure?

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

- (iii) Suggest **two** reasons why so many people died in the Shenshi earthquake.

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

- (b) Most of the deaths in the Sumatra earthquake were from the subsequent tsunami.

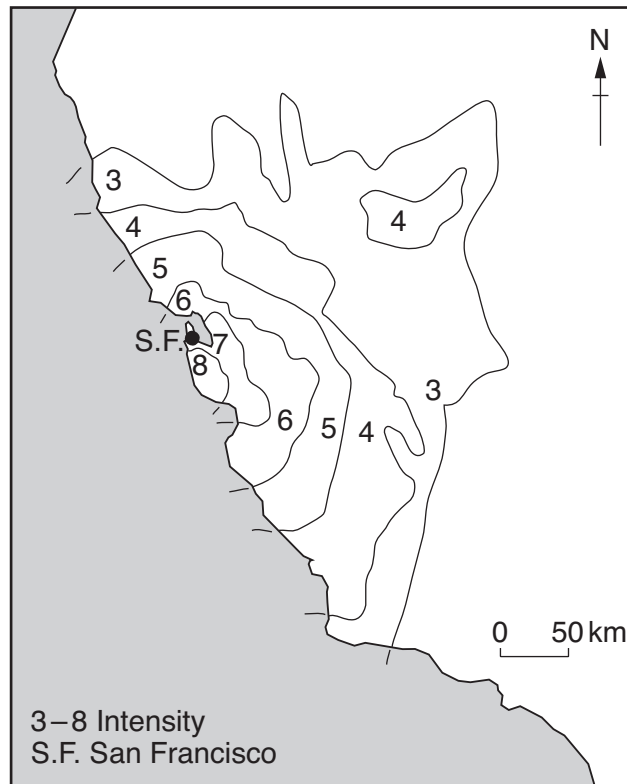
- (i) What is a tsunami?

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

- (ii) How does an earthquake create a tsunami?

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

- (c) The map below shows isoseismal lines constructed using the Mercalli scale for the Loma Prieta earthquake in California.



- (i) What does the Mercalli scale measure?
- .....
- ..... [1]
- (ii) What is the maximum number on the Mercalli scale? ..... [1]
- (iii) Using the map above explain why the pattern of isoseismal lines are not concentric circles.
- .....
- .....
- .....
- ..... [2]
- (iv) Mark and label the epicentre of the Loma Prieta earthquake on the map above. [1]
- (v) Name a major fault associated with Californian earthquakes.
- ..... [1]

(d) Define the following terms:

*focus* .....

.....

*epicentre* .....

.....

[2]

(e) Name and describe **one** method used to predict earthquakes in California.

.....

.....

.....

..... [2]

[Total: 16]



[8]

**[Total: 10]**

[illegible]

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