

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS**  
**AS GCE**  
**F791/01**  
**GEOLOGY**  
**Global Tectonics**  
**MONDAY 11 MAY 2015:**  
**Morning**  
**DURATION: 1 hour**  
**plus your additional time allowance**  
**MODIFIED ENLARGED 24pt**

<b>Candidate forename</b>						<b>Candidate surname</b>				
<b>Centre number</b>						<b>Candidate number</b>				

**Candidates answer on the Question Paper.**

**OCR SUPPLIED MATERIALS:**

**None**

**OTHER MATERIALS REQUIRED:**

**Ruler (cm/mm)**

**Protractor**

**READ INSTRUCTIONS OVERLEAF**

## **INSTRUCTIONS TO CANDIDATES**

**Write your name, centre number and candidate number in the boxes on the first page. 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 pages at the end of this booklet. The question number(s) must be clearly shown.**

## **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.**

**Any blank pages are indicated.**

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**Answer ALL the questions.**

- 1 (a) The solar system is believed to have formed from a nebula.**

## Describe how the planets of the solar system formed.

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**[2]**

- (b) The densities of the planets of the solar system are given in the table below.**

PLANET	DENSITY (g/cm <sup>3</sup> )	TERRESTRIAL PLANET
Earth	5.52	
Jupiter	1.33	
Mars	3.93	
Mercury	5.43	
Neptune	1.64	
Saturn	0.70	
Uranus	1.30	
Venus	5.24	

- (i) Place a tick (✓) in the correct boxes to indicate the terrestrial planets.**

- (ii) Use the data in the table to calculate the average density of the terrestrial planets and of the gas giants.

terrestrial planets \_\_\_\_\_ g/cm<sup>3</sup>

gas giants \_\_\_\_\_ g/cm<sup>3</sup> [1]

- (c) Explain how the density of the whole Earth and of the surface rocks can be used to infer the density of the core and mantle rocks.

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[2]

- (d) (i) Describe ONE type of evidence that has been obtained from exploration of the Moon, but NOT from exploration of Mars.

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[1]

- (ii) Describe the scale and type of volcanic activity on Mars.

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[1]

[TOTAL: 8]

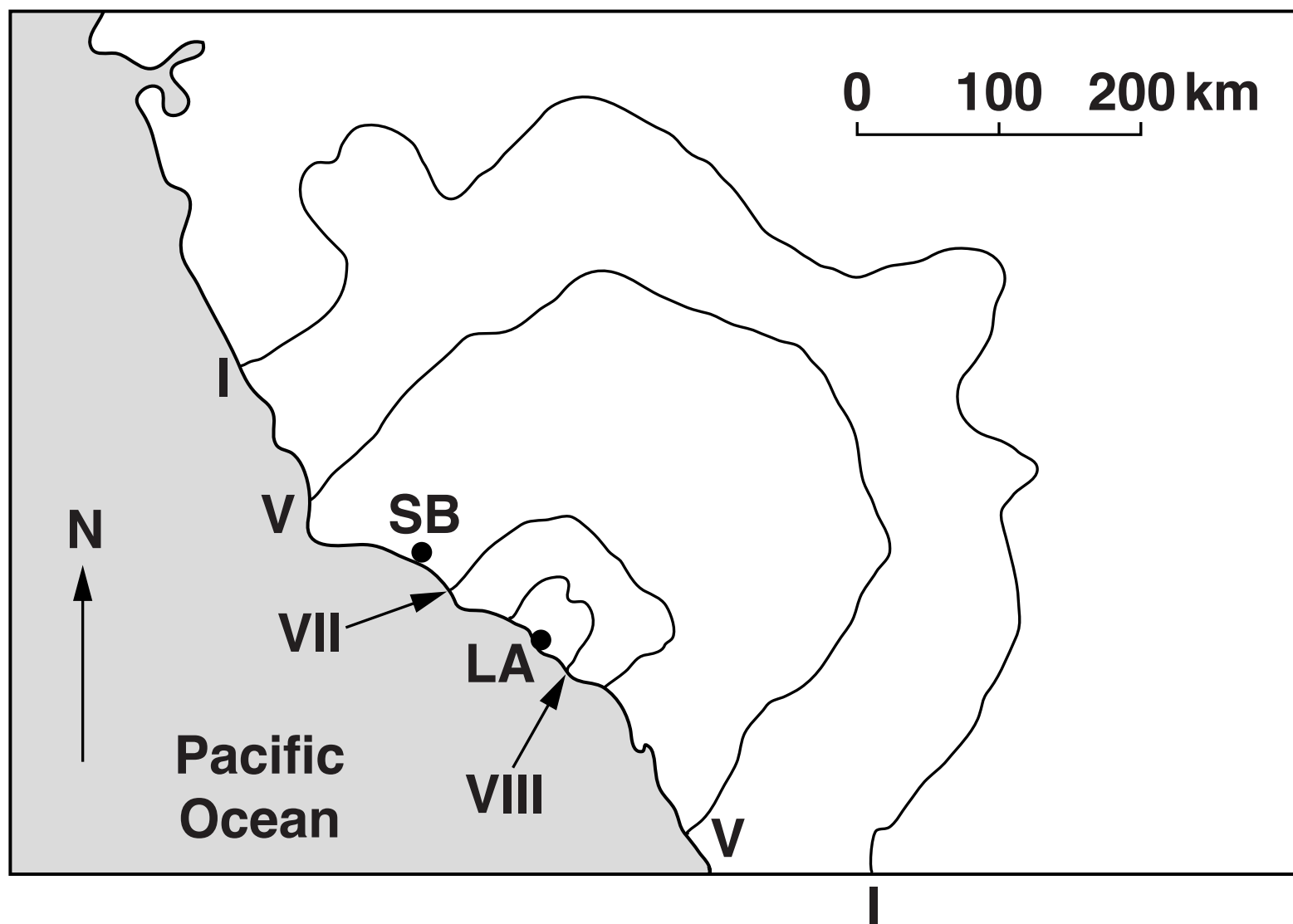
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- 2 The map below shows the intensity of an earthquake that struck California in 1971. The isoseismal lines for I, V, VII and VIII are shown.

**KEY:**

**LA = Los Angeles**

**SB = Santa Barbara**



- (a) (i) Describe how isoseismal lines are constructed.

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[1]

- (ii) Explain why the isoseismal lines are not perfectly concentric.

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[1]

(b) The table below shows a summary of the Mercalli intensity scale.

<b>SCALE VALUE</b>	<b>DESCRIPTION OF EFFECTS</b>
<b>I</b>	<b>Not usually felt by people unless in favourable conditions.</b>
<b>II</b>	<b>Felt only by a few people mainly on the upper floors of buildings. Delicately suspended objects may swing slightly.</b>
<b>III</b>	<b>Felt by people indoors, especially on the upper floors of buildings. Cars may rock slightly. Feels similar to the passing of a truck. Indoor objects may shake.</b>
<b>IV</b>	<b>Felt indoors by most people, and outdoors by a few. Walls make cracking sounds. Objects shake noticeably. Feels like a heavy truck hitting the building.</b>
<b>V</b>	<b>Felt by all. Bells will ring. Feels like a large train passing close to a house. Slight damage to buildings. Some may be frightened and run outdoors.</b>
<b>VI</b>	<b>Many frightened and run outdoors; walk unsteadily. Books fall off shelves; some heavy furniture moved. Moderate damage to buildings.</b>
<b>VII</b>	<b>Difficult to stand. Furniture broken. Considerable damage to poorly built structures; some chimneys broken or heavily damaged.</b>
<b>VIII</b>	<b>Considerable damage in normal buildings with a possible partial collapse. Damage great in poorly built structures. Chimneys, monuments, walls fall.</b>
<b>IX</b>	<b>General panic. Damage moderate to great in substantial buildings, with a possible partial collapse. Walls can fall down or collapse.</b>



- (i) One resident affected by the earthquake observed that it was difficult to stand up, her chair collapsed and her chimney was broken but did not fall down.

Using this information and the Mercalli intensity scale write the letter R ON THE MAP on page 7 to show a possible location for this resident. [1]

- (ii) Draw ON THE MAP the isoseismal line for VI. Describe the effect of the earthquake on buildings in Santa Barbara.

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[1]

**(c) Complete the following sentences by using the correct terms from the list below:**

**amplitude  
epicentre  
focus  
frequency  
surface  
0 km  
70 km  
700 km**

**The point within the Earth where an earthquake originates is the \_\_\_\_\_ and the point on the surface directly above it is the \_\_\_\_\_ .**

**The California earthquake in 1971 was ‘shallow’, which means its depth is between \_\_\_\_\_ km and \_\_\_\_\_ km. Body waves travel through the interior of the Earth but most of the damage was caused by L waves which are \_\_\_\_\_ waves that have high \_\_\_\_\_ .**

**[5]**

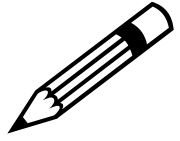
**(d) Seismometers are used to detect earthquakes.**

**Outline how seismometers work.**

\_\_\_\_\_

\_\_\_\_\_ **[1]**

**(e) (i) Name and describe the type of plate margin found in California.**



**In your answer, you should use the appropriate technical term, spelled correctly.**

**type of plate margin** \_\_\_\_\_

**description** \_\_\_\_\_

\_\_\_\_\_ **[2]**

**(ii) Why are only shallow earthquakes found at this type of plate margin?**

\_\_\_\_\_

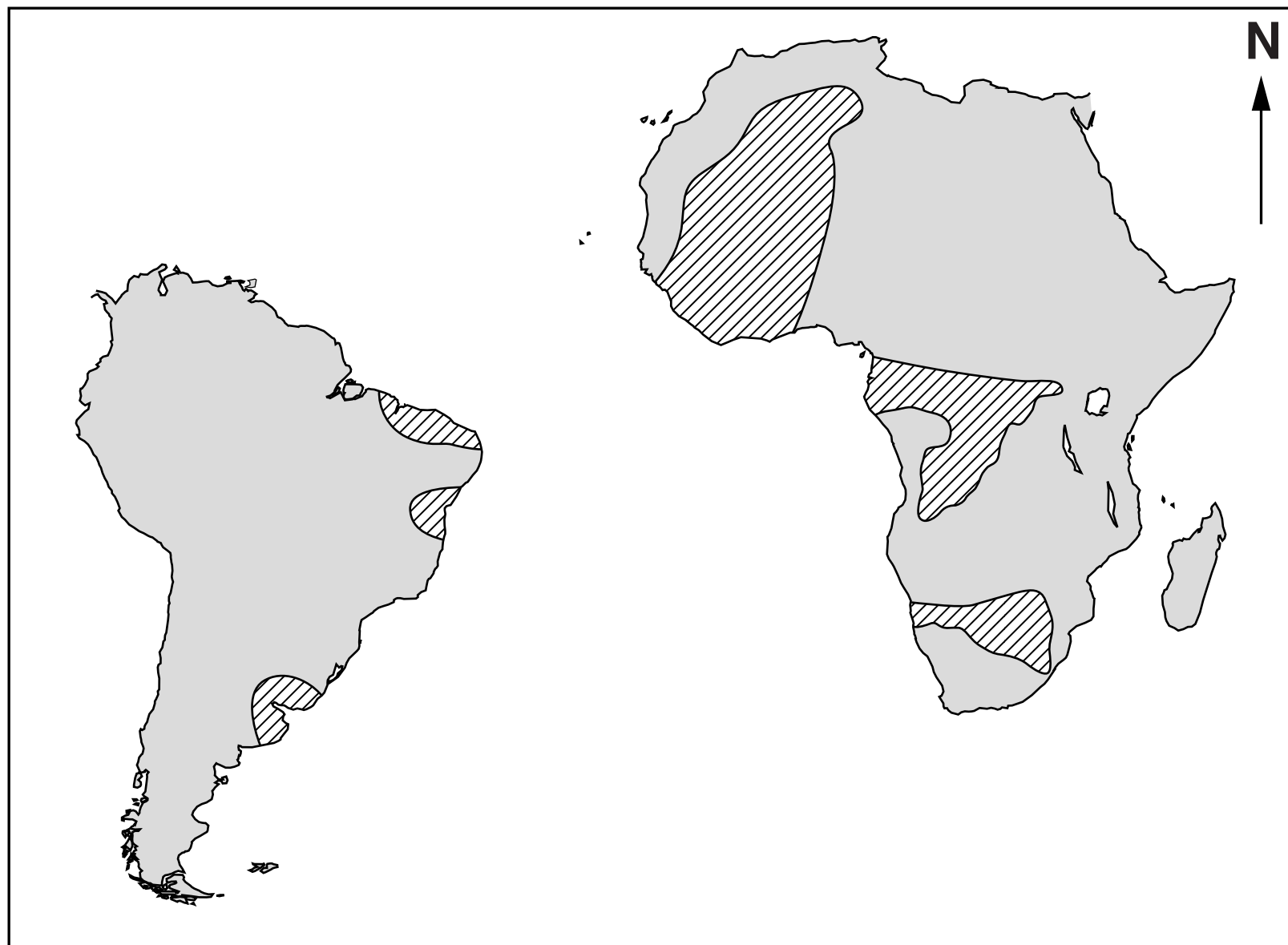
\_\_\_\_\_ **[1]**

**[TOTAL: 13]**

- 3 Geologists have looked at Africa and South America for evidence of continental drift. The map shows the present positions of Africa and South America.**

**KEY:**

 **continental shield**



- (a) (i) Explain how the continental shield areas have been used as evidence for continental drift. Give TWO reasons for your answers.**

**1** \_\_\_\_\_

\_\_\_\_\_

**2** \_\_\_\_\_

\_\_\_\_\_

**[2]**

**(ii) Draw and label ancient fold mountain chains ON THE MAP. Explain how the shape of these fold mountain chains has been used as evidence for continental drift.**

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**[2]**

**(b) The jigsaw fit of the two continents has been used as evidence for continental drift.**

**Give TWO reasons why using the modern coastlines does NOT give a perfect fit.**

**1** 

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**2** 

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**[2]**

**(c) Using a named example, explain how fossil evidence shows that Africa and South America were once joined.**

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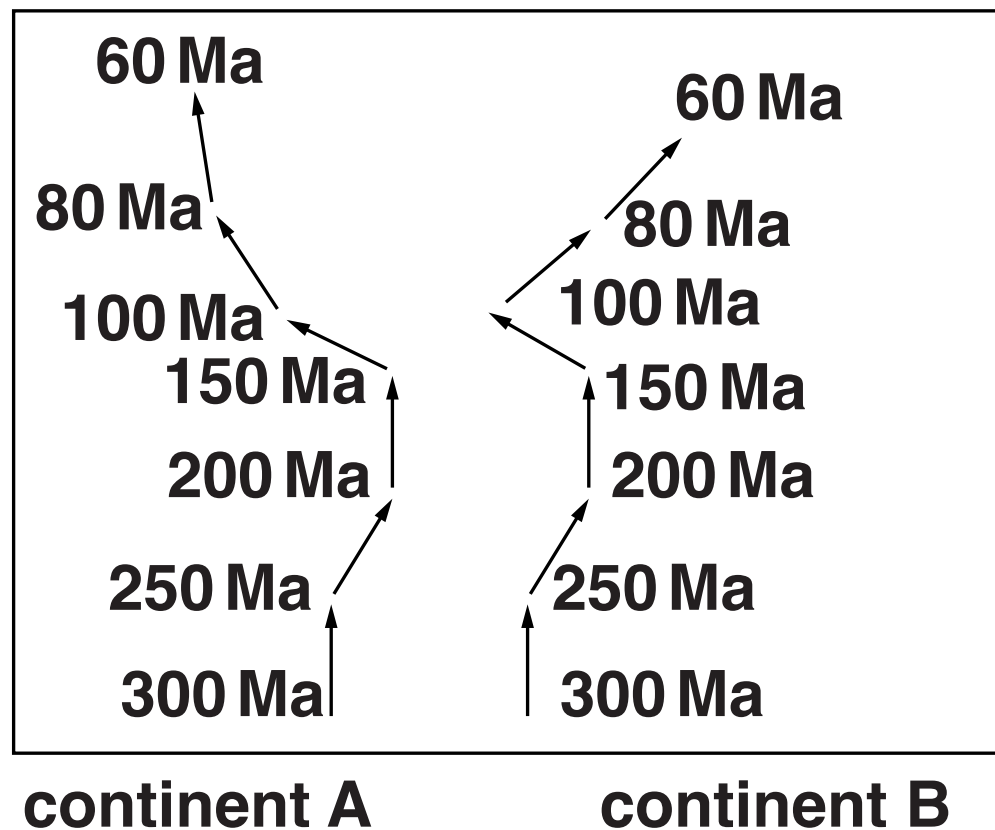
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**[2]**

**(d) Simplified polar wandering curves for two continents, A and B, are shown below.**

**The ages of the rocks on each continent are given in millions of years (Ma).**



**(i) Describe how polar wandering curves are constructed.**

\_\_\_\_\_

\_\_\_\_\_ [1]

**(ii) How do the two polar wandering curves provide evidence for the movement of continent A and continent B?**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [2]

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- (e) There are three types of convergent plate margin depending on whether continental or oceanic plates are involved. These plate margins have some features in common and others that are different.**

**The table opposite shows various features that may occur at a convergent plate margin.**

**Complete the table by adding a tick (✓) if the feature is present at the particular plate margin.**

**[4]**

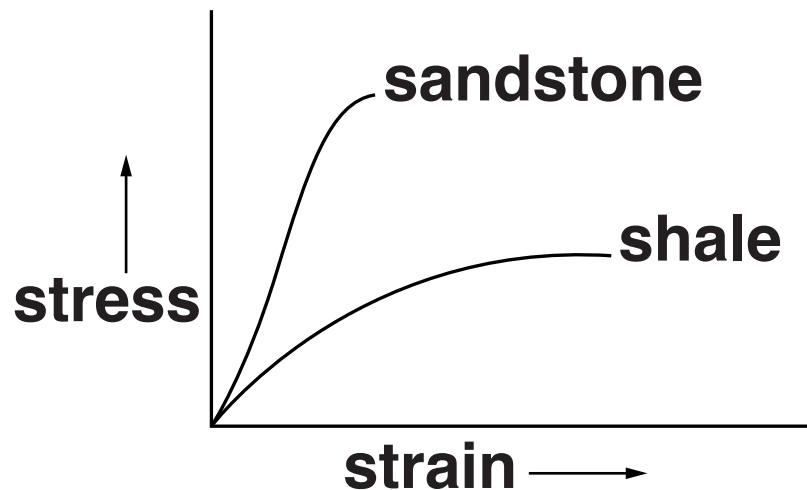
**[TOTAL: 15]**



CONVERGENT PLATE MARGINS			
Feature	Oceanic– oceanic	Oceanic– continental	Continental– continental
Benioff zone			
island arc			
granite batholiths			
fold mountain chains			
ocean trench			
reverse faults			

**4 When rocks experience stress there is often a resulting deformation (strain).**

**(a) The graph below shows the effects of stress and strain on sandstone and on shale at the same depth and temperature.**



**(i) Using the graph, describe and explain how an increase in stress affects sandstone.**

**description** \_\_\_\_\_

\_\_\_\_\_

**explanation** \_\_\_\_\_

\_\_\_\_\_ **[2]**

**(ii) Describe how beds of shale react to increased stress.**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ **[2]**

**(b) When folded, both sandstone and shale can form small-scale structures such as joints or cleavage.**

**(i) Explain how joints form when sandstones are folded.**

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[1]

**(ii) Explain clearly how cleavage can form when shales are folded. You may draw a labelled diagram to help explain how cleavage forms.**

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[2]

(c) (i) State the type of force responsible for folding rocks.



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

\_\_\_\_\_ [1]

(ii) Describe clearly a symmetrical anticline and an asymmetrical syncline. You may draw labelled diagrams to help you make your descriptions.

Symmetrical anticline	Asymmetrical syncline
cross-section	cross-section

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]



**(e) Name and describe TWO geological features that form along fault planes as a result of the rocks moving against each other.**

**feature** \_\_\_\_\_

**description** \_\_\_\_\_

\_\_\_\_\_

**feature** \_\_\_\_\_

**description** \_\_\_\_\_

\_\_\_\_\_ **[4]**

**[TOTAL: 16]**

**5 Describe how geologists have inferred the composition of the Earth's crust and mantle by using:**

**deep mines and boreholes  
volcanic activity  
ophiolites.**

**In your answer you should refer to how the material is brought to the surface and examples of rocks formed.**

**[TOTAL: 8]**

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**END OF QUESTION PAPER**



### ADDITIONAL ANSWER SPACE

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

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