

Candidate forename		Candidate surname	
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Centre number						Candidate number				
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
ADVANCED SUBSIDIARY GCE**

**F791**

**GEOLOGY**

**Global Tectonics**

**THURSDAY 19 MAY 2011: Morning**

**DURATION: 1 hour**

**SUITABLE FOR VISUALLY IMPAIRED CANDIDATES**

**Candidates answer on the question paper.**

**OCR SUPPLIED MATERIALS:**

**None**

**OTHER MATERIALS REQUIRED:**

**Electronic calculator**

**Ruler (cm/mm)**


**Pair of compasses**

**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. Pencil may be used for graphs and diagrams only.
- 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.
- Answer ALL the questions.

## **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 steps in any calculations.

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**Answer ALL the questions.**

**1 The structure and composition of the crust and mantle can be obtained from direct evidence.**

**(a) (i) Name and describe ONE type of direct evidence for the composition of the crust.**

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**[2]**

**(ii) Name and describe ONE type of direct evidence for the composition of the mantle.**

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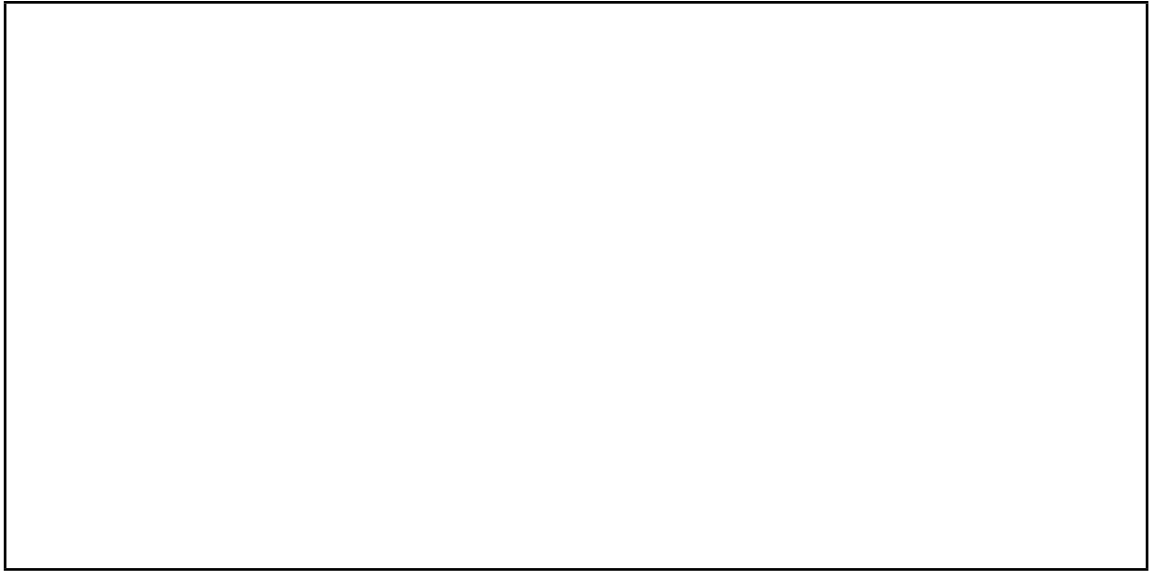
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**[2]**

**(b) (i) Complete the table opposite showing the characteristics of oceanic and continental crust.**

<b>CRUST TYPE</b>	<b>AGE OF THE OLDEST ROCKS (Ma)</b>	<b>AVERAGE COMPOSITION</b>	<b>AVERAGE THICKNESS (km)</b>	<b>DENSITY (g/cm<sup>3</sup>)</b>
<b>OCEANIC</b>	<b>200</b>		<b>7</b>	
<b>CONTINENTAL</b>		<b>silicic / intermediate</b>		<b>2.7</b>

- (ii) Draw a fully labelled cross section through the oceanic crust to show the sequence of rocks or describe the sequence of rocks clearly.**



**[2]**

**[Total: 10]**

**2 (a) (i) Describe how volcanic activity has been identified on Mars, Venus and the moons of Jupiter.**

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

**(ii) One of the moons of Jupiter shows a lot of volcanic activity. Name this moon.**

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

**(b) State the region of the Solar System where most meteorites are thought to originate.**



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

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

**[Total: 4]**

**3 (a) There are thought to be a number of processes that drive plate movement, including mantle convection.**

**(i) Describe the process that may “push” plates apart at ocean ridges.**

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[1]

**(ii) Describe the process that may “pull” plates apart.**

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[1]

**(iii) Describe ONE piece of evidence for rising convection currents.**

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[1]

**(iv) Explain why no oceanic crust is older than 200 Ma (Jurassic).**

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[1]



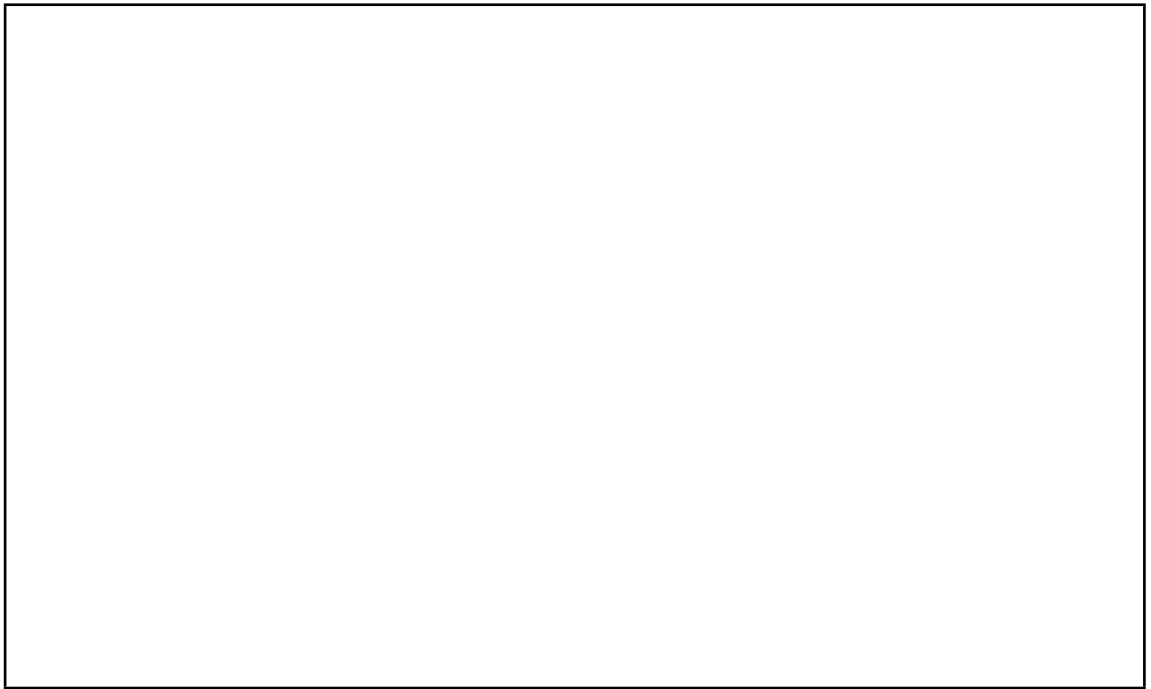
**(b) Describe TWO pieces of evidence from the oceanic crust for sea floor spreading.**

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

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

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

- (c) (i) Describe clearly a convergent plate margin involving continental plates only. You should include fold mountains, batholiths, rocks being metamorphosed, an area of partial melting and the directions of the plate movement. You may use diagrams to help you make your description.**



**[4]**

- (ii) What is the name of the fold mountain range formed by the convergence of the Indian and Eurasian plates?**

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

- (iii) Name a type of fault that is responsible for thickening of the crust.**

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

**(iv) Slabs of oceanic crust may be broken off and included in fold mountains. What is the name for these slabs of oceanic crust?**



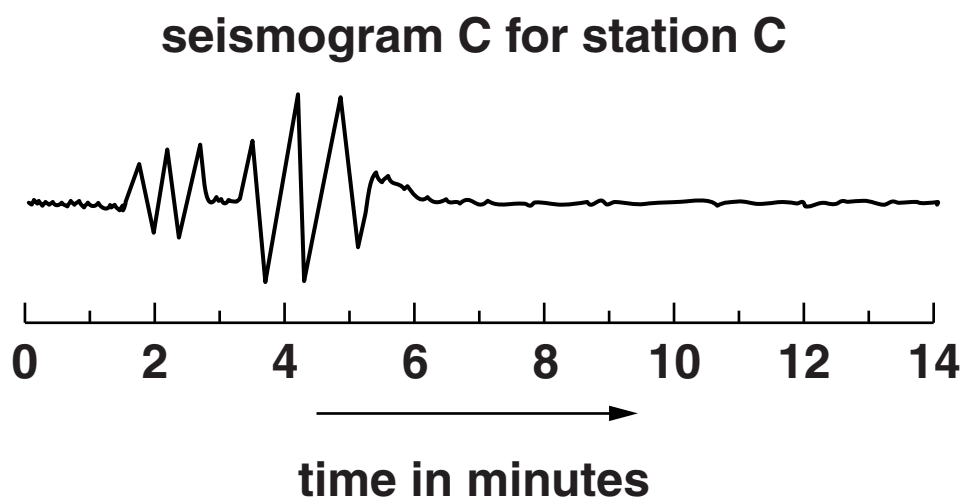
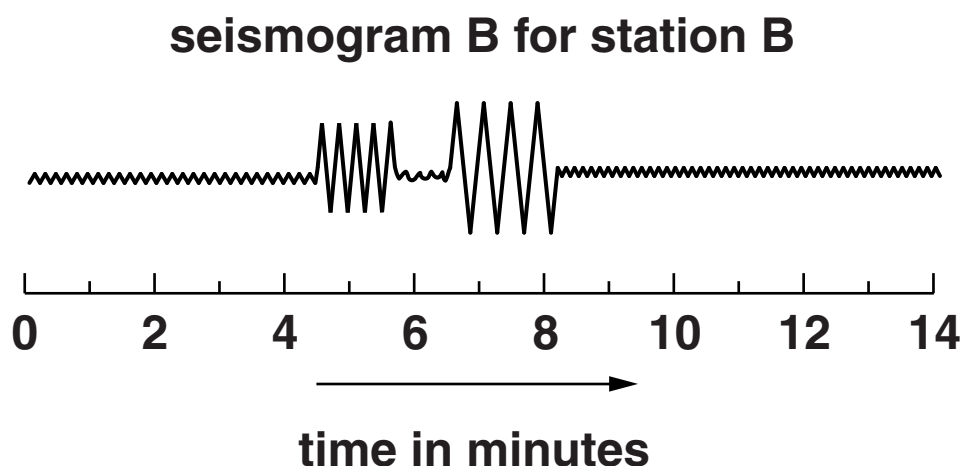
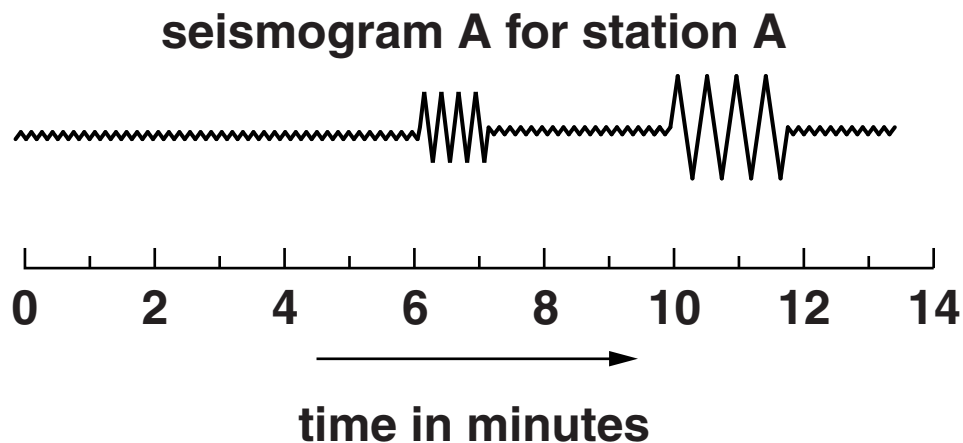
**In your answer, you should use an appropriate technical term, spelled correctly.**

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

**[Total: 15]**

- 4 Information from seismograms can be used by seismologists to locate the epicentre of an earthquake.

Simplified seismograms from three seismometers are shown below:



- (a) Calculate the arrival times to the nearest half minute for the P and S waves for seismograms B and C. Seismogram A has been completed for you.

	P WAVE ARRIVAL TIME (min)	S WAVE ARRIVAL TIME (min)
seismogram A	6	10
seismogram B		
seismogram C		

[2]

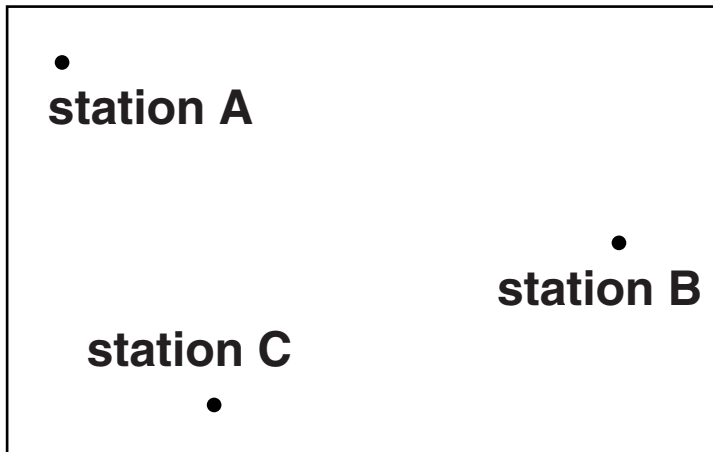
- (b) Using the P wave arrival time data from the seismograms and assuming that P waves travel at 500 km/min, calculate the distance from the epicentre for stations B and C. Station A has been calculated for you.

station A distance 3000 km

station B distance \_\_\_\_\_ km

station C distance \_\_\_\_\_ km [2]

**(c) Using the distance from epicentre data for all 3 stations, locate the epicentre of the earthquake.**



**[3]**

**[Total: 7]**

**5 (a) There are a number of structures formed by compressive and tensional stresses. Below is a list of geological structures:**

- **dome**
- **horst**
- **overfold**
- **recumbent fold**
- **tear fault.**

**Definitions are given in the table below. Complete the table by matching each definition with the correct structure from the list above.**

<b>DEFINITION</b>	<b>STRUCTURE</b>
<b>a fold with both limbs dipping in the same direction but by different amounts, with the axial plane inclined</b>	
<b>an upthrown block of crust with normal faults on either side</b>	
<b>an area of crust that has been upfolded forming a circular outcrop with rocks dipping away from the core of the fold in all directions</b>	
<b>a fold with a near horizontal axial plane</b>	

**[4]**

**(b) Explain how an angular unconformity is formed. You may use a sequence of diagrams to help you make your explanation.**

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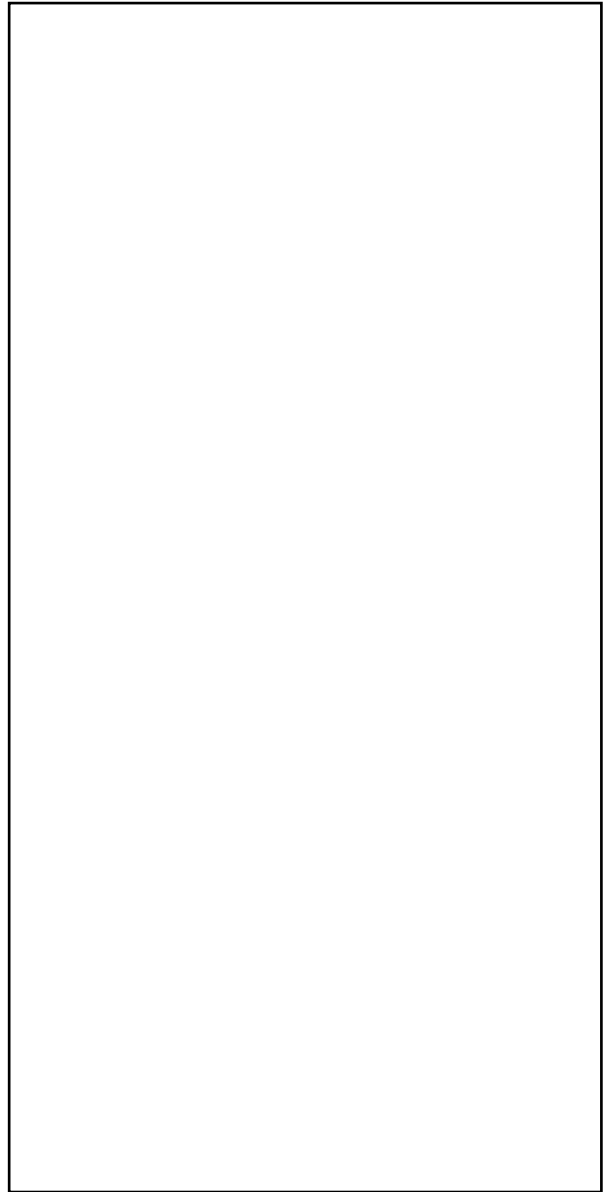
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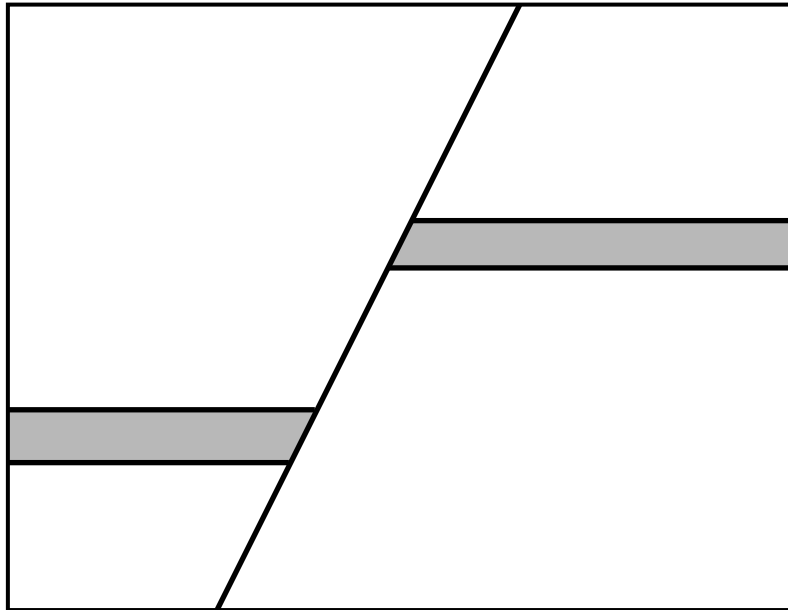
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**[3]**



**(c) The cross section below shows faulted strata.**



**(i) On the cross section, clearly label the following features:**

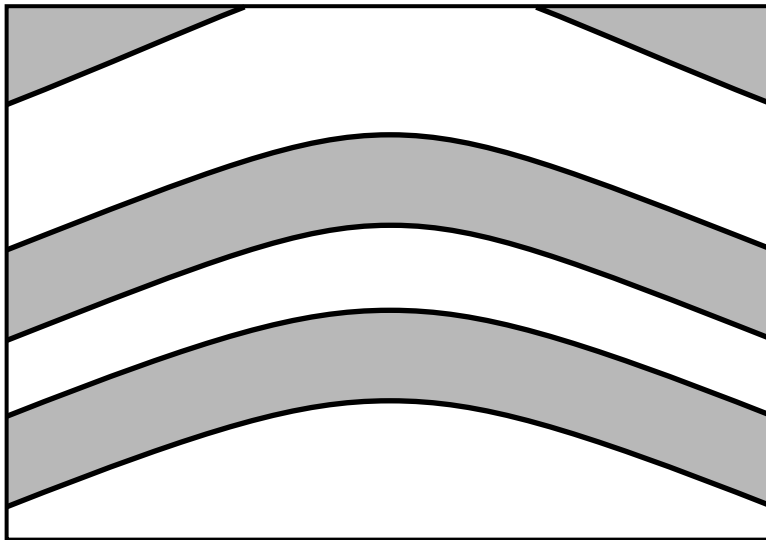
- **fault plane**
- **fault dip**
- **hanging wall**
- **downtthrow side.**

**[4]**

**(ii) Identify the type of fault.**

**[1]**

**(d) (i) On the diagram below, draw joints where they are most likely to form.**



**Key:**

 **shale**

 **sandstone**

**[1]**

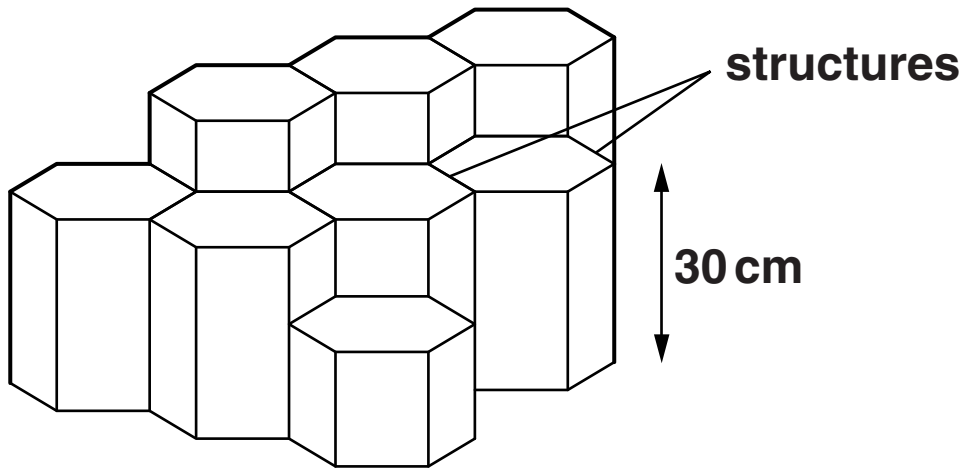
**(ii) Explain your choice of location for the joints.**

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**[1]**

(iii) The diagram below shows a structure found in igneous rocks. Identify the structure and explain how it forms.



name of structure \_\_\_\_\_

how it forms \_\_\_\_\_

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

[Total: 16]

**6 Describe THREE pieces of evidence that can be used to prove that continents have drifted through geological time.**

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[8]

[Total: 8]

**END OF QUESTION PAPER**

## ADDITIONAL PAGE

**IF ADDITIONAL SPACE IS REQUIRED, YOU SHOULD USE THE LINED PAGE BELOW. THE QUESTION NUMBER(S) MUST BE CLEARLY SHOWN.**

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