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

Candidate forename		Candidate surname	

Centre number						Candidate number				

Candidates answer on the Question Paper.

OCR SUPPLIED MATERIALS:

None

OTHER MATERIALS REQUIRED:

Ruler (cm/mm)
Protractor

READ INSTRUCTIONS OVERLEAF

DC (KN/SG) 6056410712 113934/1

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.

_____

_____

_____

_____ **[2]**

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

PLANET	DENSITY (g/cm^3)	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. [1]

(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^3

gas giants _____ g/cm^3 [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.

_____

_____

_____

_____ **[2]**

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

_____

_____ **[1]**

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

_____

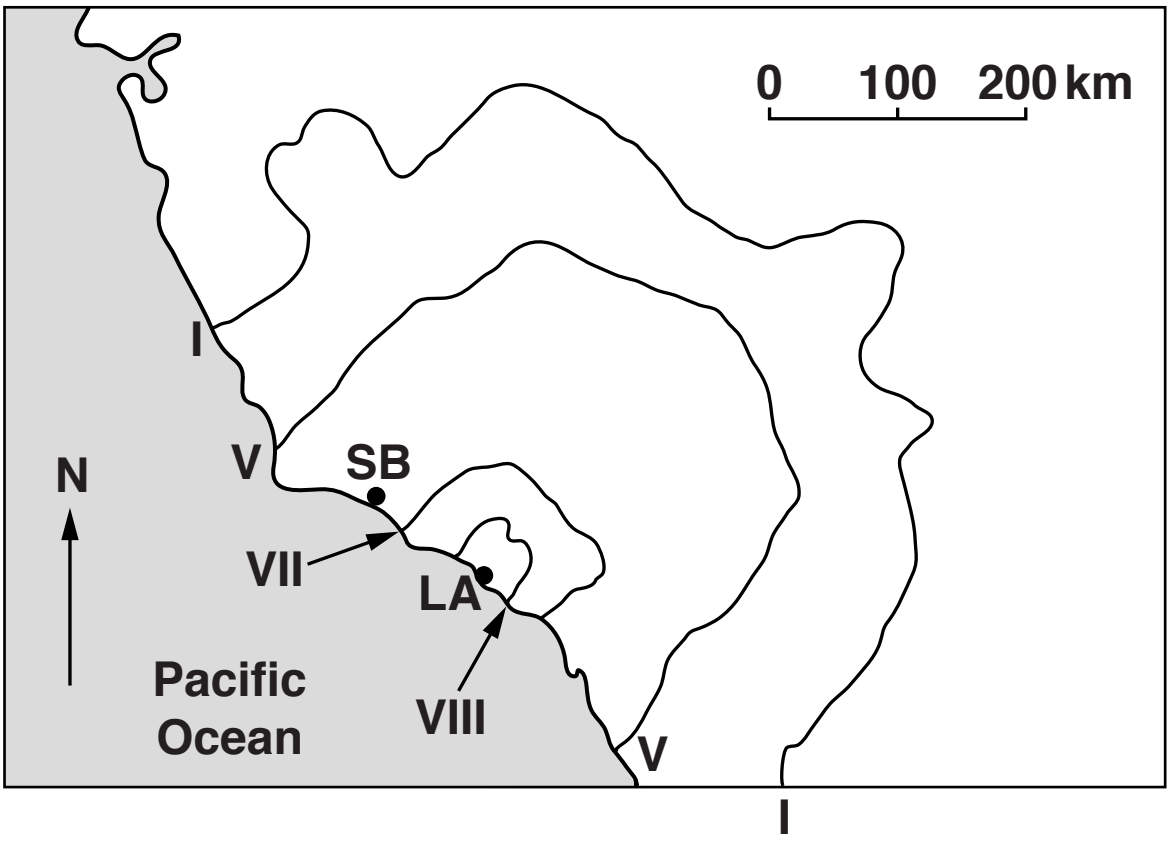
_____ **[1]**

[TOTAL: 8]

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.

_____

_____ **[1]**

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

_____

_____ **[1]**

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

SCALE VALUE	DESCRIPTION OF EFFECTS
I	Not usually felt by people unless in favourable conditions.
II	Felt only by a few people mainly on the upper floors of buildings. Delicately suspended objects may swing slightly.
III	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.
IV	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.
V	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.
VI	Many frightened and run outdoors; walk unsteadily. Books fall off shelves; some heavy furniture moved. Moderate damage to buildings.
VII	Difficult to stand. Furniture broken. Considerable damage to poorly built structures; some chimneys broken or heavily damaged.
VIII	Considerable damage in normal buildings with a possible partial collapse. Damage great in poorly built structures. Chimneys, monuments, walls fall.
IX	General panic. Damage moderate to great in substantial buildings, with a possible partial collapse. Walls can fall down or collapse.

(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.

_____

_____ **[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?

_____

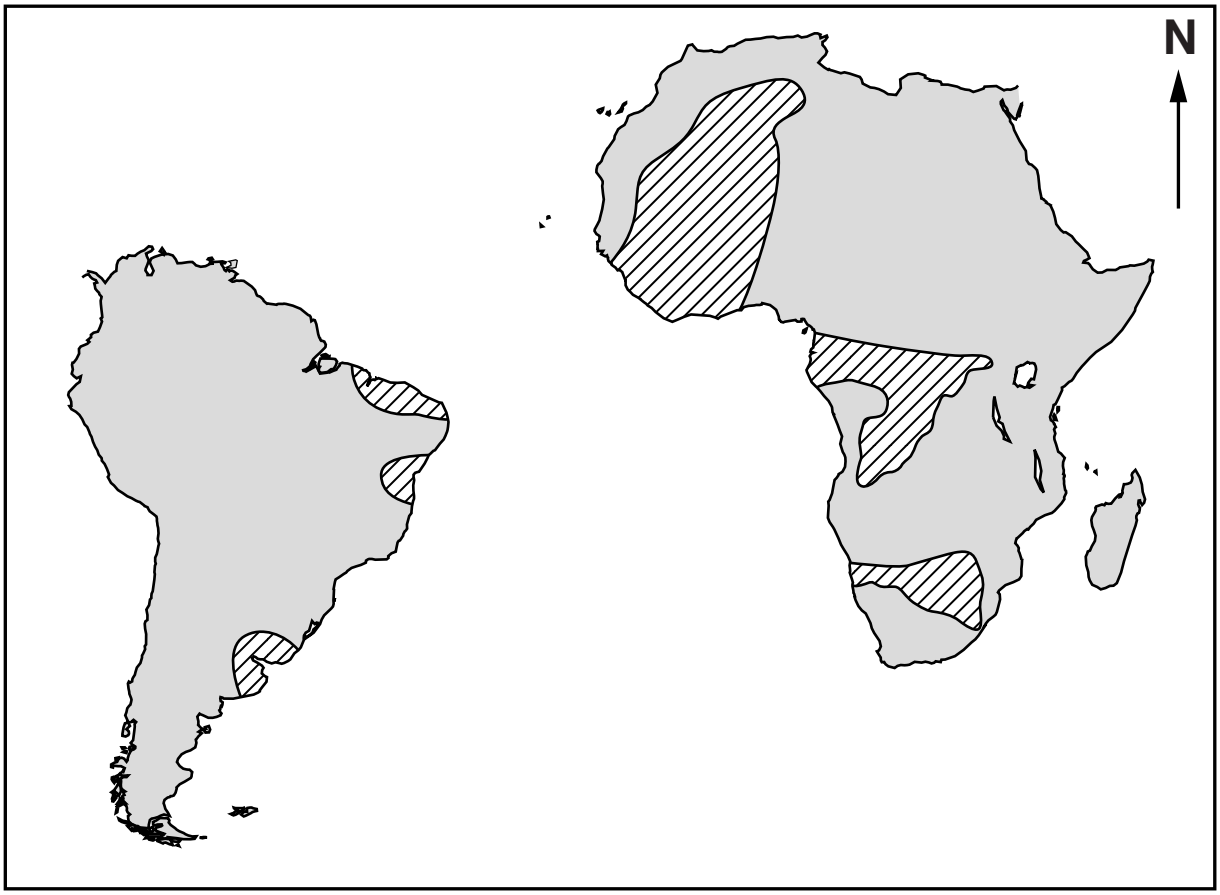
_____ **[1]**

[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.

_____

_____ **[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 _____

_____

2 _____

_____

[2]

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

_____

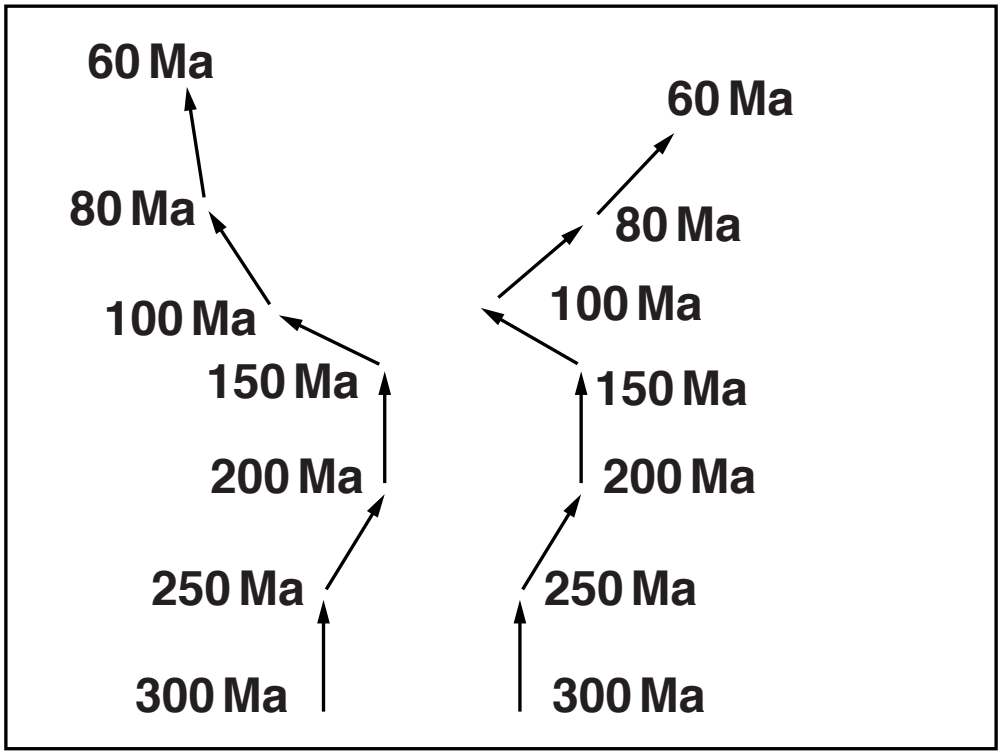
_____

_____

_____ **[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]**

(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.

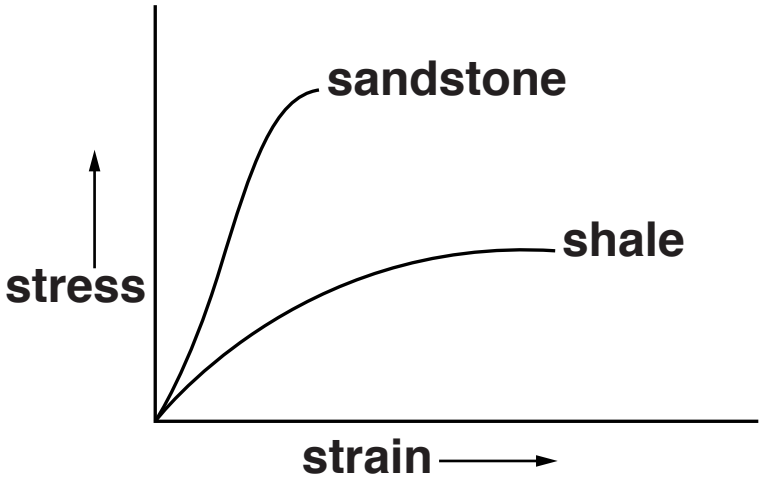
[4]

[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.

_____

_____ **[1]**

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

_____

_____

_____

_____

_____

_____ **[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]**

(d) Recumbent folds and nappes are common structures found in fold mountain chains. Describe clearly their key features. You may draw labelled diagrams to help you make your descriptions.

Nappe	Recumbent fold
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]

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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