OCR
RECOGNISING ACHIEVEMENT

SPECIMEN

Advanced Subsidiary GCE

GEOLOGY

Unit F791: Global Tectonics

Specimen Paper

F791 QP

Candidates answer on the question paper.
Additional Materials:

Scientific calculator
Protractor

Time: 1 hour

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.

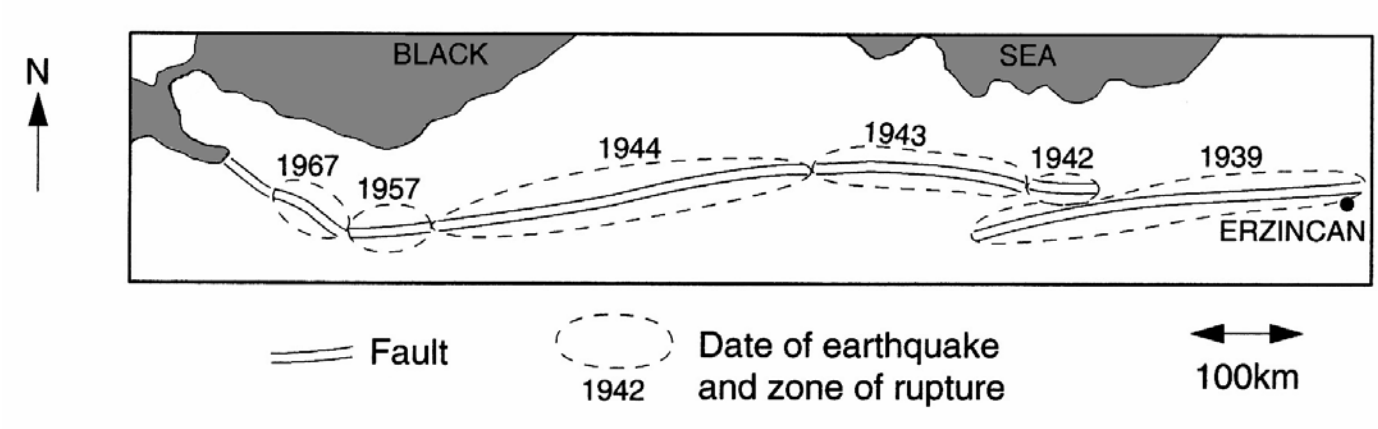
INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [ ] at the end of each question or part question.
- Where you see this icon you will be awarded marks for the quality of written communication in your answer.
- You may use a scientific calculator.
- You are advised to show all the steps in any calculations.
- The total number of marks for this paper is **60**.

FOR EXAMINER'S USE		
Qu.	**Max.**	**Mark**
1	**12**	
2	**13**	
3	**14**	
4	**13**	
5	**8**	
TOTAL	**60**	

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

1 The Anatolian Fault is in Northern Turkey. It is a strike-slip fault which has been the site of a number of major earthquakes.



(a) **(i)** What name is given to the point where an earthquake occurs within the Earth's crust?

.....[1]

(ii) Which scale is used to measure the magnitude of an earthquake?

.....[1]

(b) The pattern of timing of earthquakes shown on the map above was used by geologists to predict the likely location of the next major earthquake.

(i) On the map, shade and label an area where the next earthquake is likely to occur. **[1]**

(ii) Explain why you have chosen this area.

.....

.....

.....

.....[2]

(iii) Explain why geologists are unable to predict future earthquakes exactly.

.....

.....

.....

.....[2]

(c) Describe how the following methods may become useful for earthquake prediction.

(i) detailed measurement of gases

.....

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

(ii) changes in ground level

.....

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

(d) **(i)** Explain the social consequences of publicly predicting earthquakes.

.....

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

(ii) Describe **two** methods currently in use that are designed to reduce the impact of earthquakes on the built environment.

.....

.....

..... .

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

[Total: 12 marks]

2 The Hawaiian island chain is the result of hot spot volcanic activity.

(a) Hawaii is an example of a *hot spot*. Define this term.

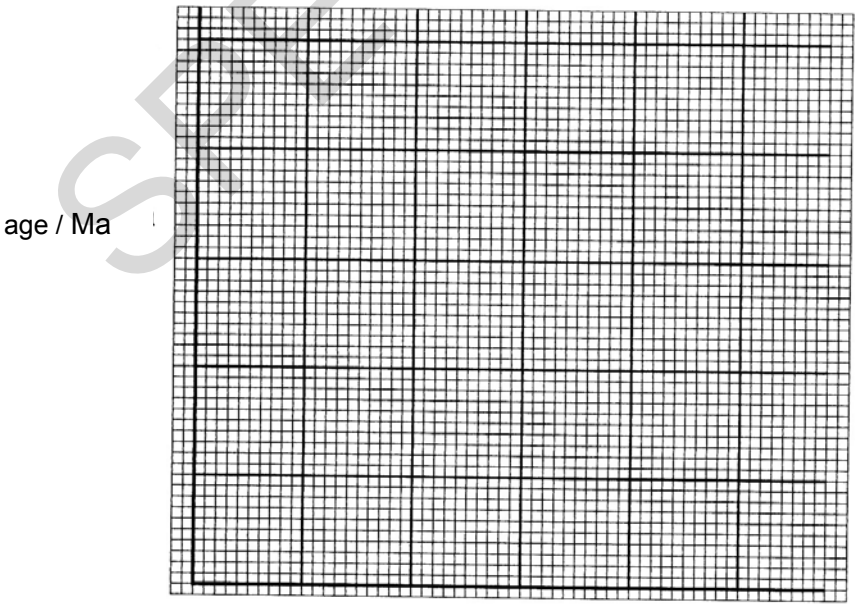
.....

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

(b) The following data relates to the Hawaiian island chain.

average age of rocks / Ma	distance from Hawaii / km
0	0
1	80
3.5	350
5	510
7	800
10	1100

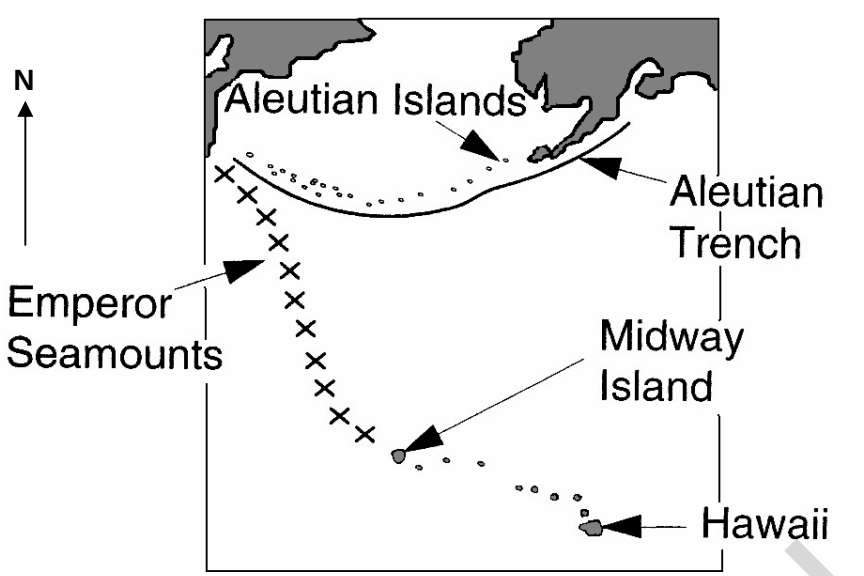
(i) Plot a graph to show the average age of rocks against distance from Hawaii and draw a line of best fit.



[3]

(ii) Determine the average rate of sea floor movement over the hot spot in centimetres per year.

Average rate of movement = ... cm year^{-1} **[2]**



(iii) Using your average rate of movement, predict the age of rocks on Midway Island, 2400 km from Hawaii.

Age of rocks on Midway Island ..... **[1]**

(c) Explain how the pattern of islands and seamounts was produced by plate movement and the hot spot.

.....

.....

.....

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

(d) **(i)** Describe and explain the pattern of earthquakes in the Aleutian Islands area.

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

.....

.....

.....

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

(ii) Explain the likely geological processes that produced the Aleutian Islands.

.....

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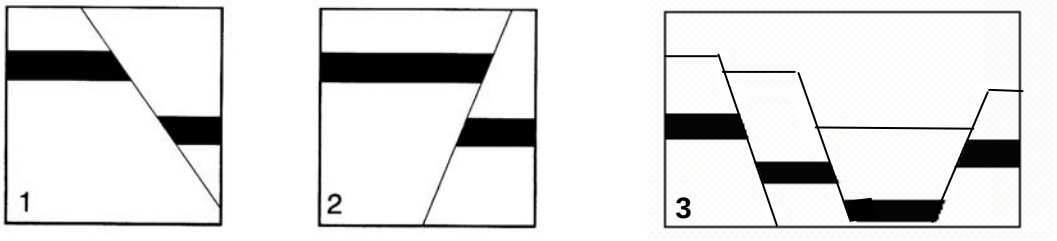
..... **[2]**

[Total: 13 marks]

[Turn over

3 The diagrams below are cross sections of beds that have been displaced by faults.



(a) **(i)** Name the fault structures shown above

1.....

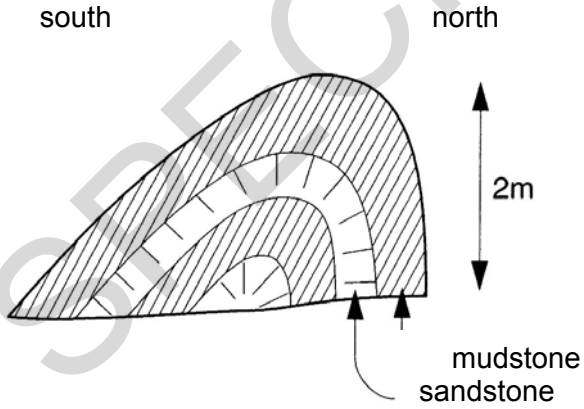
2.....

3..... **[3]**

(ii) What type of force formed fault structure **2**?

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

(b) The diagram below shows a cross section of a fold structure.



(i) On the diagram above, label

- a cleavage plane
- the fold crest. **[2]**

(ii) The above fold is an antiform. Explain what additional evidence would be required to determine if this fold is an anticline or a syncline.

.....

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

[Turn over

(iii) Describe, using technical terms, the characteristic features of the fold.

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

.....

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

(iv) Explain how the joints and cleavage planes shown in the diagram opposite were formed.
Your explanation must include the following technical terms:

tension **compression** **competent** **incompetent**.

Joints .....

.....

.....

.....

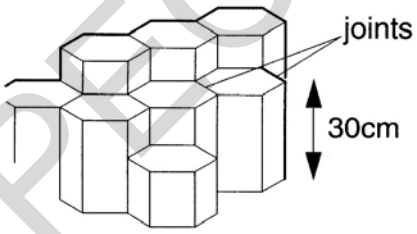
Cleavage planes .....

.....

.....

..... **[4]**

(c) The diagram shows joints in an igneous rock.



Explain how these joints form.

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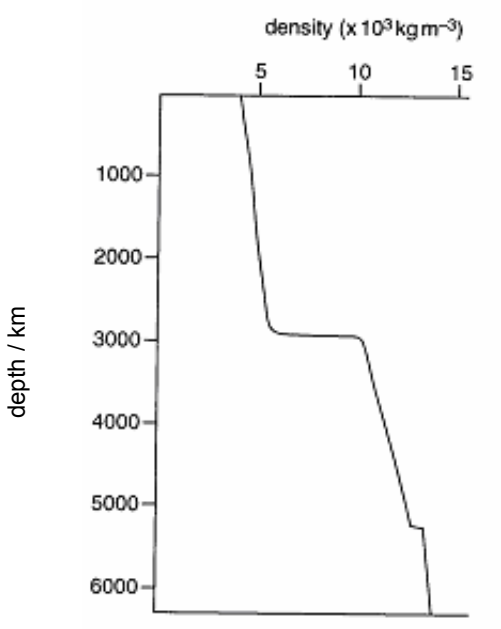
..... **[2]**

[Total: 14 marks]

4 The graph below shows the increase in density with depth within the Earth.



(a) **(i)** Clearly label on the graph the position of the

- mantle
- Gutenberg discontinuity
- inner core. **[2]**

(ii) Explain why there is a sudden change in density at 2900 km.

.....

.....

.....

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

(iii) Evaluate the evidence that suggests that the core of the Earth is composed of iron and nickel.

.....

.....

.....

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

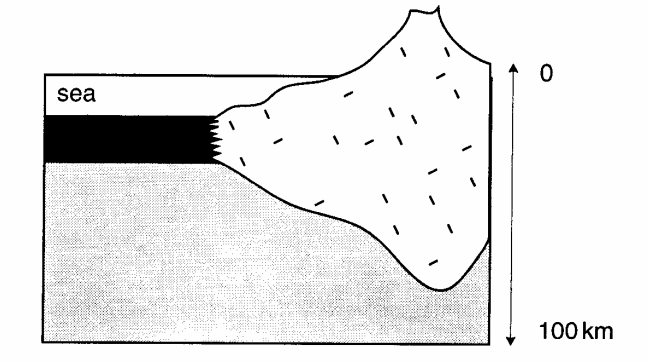
(b) Which other planets in the solar system are believed to have a dense core?

.....

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

[Turn over

(c) The diagram below shows a cross section through the lithosphere.



(i) Label on the diagram above

- the Moho
- continental crust
- oceanic crust. **[2]**

(ii) Complete the table to show the differences in age and composition between continental and oceanic crust.

	age range (/Ma)	composition
continental crust		
oceanic crust		

[2]

(iii) Name the layer below the lithosphere.

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

[Total: 13 marks]

5 Describe **four** pieces of evidence for the process of sea floor spreading. You may use diagrams to illustrate your answer.

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.....**[Total: 8 marks]**

Paper Total [60]

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OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Advanced Subsidiary GCE

GEOLOGY F791 MS

Unit F791: Global Tectonics

Specimen Mark Scheme

The maximum mark for this paper is **60**.

This document consists of **6** printed pages and **2** blank pages.

Question Number	Answer	Max Mark
1(a)(i)	focus / foci	[1]
(ii)	Richter	[1]
(b)(i)	to west / left of 1967 quake zone	[1]
(ii)	seismic gap theory / area which hasn't had one yet / locked section of fault / progression of activity (from east to west) through time / earthquakes on fault	[2]
(iii)	earthquakes don't show an exact pattern in time / cannot predict size / magnitude of earthquakes with accuracy / difficult to spot pre-cursor events / cannot predict exact location along a locked section / lack of appropriate technology/facilities / random along fault plane / any other reasonable explanation	[2]
(c)(i)	concentration of radon increases before earthquakes occur / radon is radioactive so its concentration can be measured easily / radon gas dissolved in ground water / helium as an alternative gas released prior to earthquake	[1]
(ii)	can measure tilt of rocks using tiltmeter or strain gauges / stretching of rocks can be measured by the use of lasers - accurate measurement of distance / ground swells due to strain before earthquake occurs / sag ponds – depressions	[1]
(d)(i)	evacuation or migration / saving of lives / allows preparation / falling property values / insurance or litigation / problem of false alarms / causing panic / inability to evacuate urban areas in available timescale	[1]
(ii)	base isolation systems – teflon or rubber pads or springs or rollers flexible steel girders for high rise buildings strong foundations and reinforced structures extra masses at top of building - reduces motion	[2]
2(a)	hot magma from a mantle plume rising towards surface / magma at a fixed point punches hole through oceanic crust to produce shield volcano / volcanic activity away from plate margin	[1]
(b)(i)	correct points line of best fit suitable scales on axes	[3]
(ii)	11 cm per year	[2]

Question Number	Answer	Max Mark
(iii)	answer between 20.9 (million years) and 22.9 (million years) nb ecf from (a) (ii) working e.g. 2400 km / 110 km per million years = 21.8 million years	[1]
(c)	plate is moving over fixed hot spot / as plate moves volcanoes form above hot spot in succession / each island produced is younger than the one before forming a chain / change in direction of spreading in past	[2]
(d)(i)	subducted plate moves downwards / inclined zone of seismicity formed (Benioff zone) / earthquakes getting deeper away from the trench / causes friction with overlying plate causing earthquakes QWC mark for correct use and spelling of subduction / subducted plate / Benioff zone of seismicity (1)	[2]
(ii)	as subducting plate descends it begins to melt or partially melts / volcanic activity as molten material / magmas rise to the surface / formation of island arc	[2]
3(a)(i)	1. normal fault 2. reverse fault 3. graben or rift valley	[3]
(ii)	compression	[1]
(b)(i)	cleavage plane as lines parallel to the fold axial plane (labels must be accurate) fold crest at highest point of the fold	[1] [1]
(ii)	need age of rocks so that oldest rocks are found in the centre	[1]
(iii)	asymmetrical fold with left limb dipping 40° north and the right 80° / south limb dips more steeply QWC mark for correct use and spelling of asymmetric as the technical term (1)	[1]
(iv)	joints only in **competent** rocks like sandstone / limestone which are brittle joints are **tension** structures at the crest of the fold cleavage only in **incompetent** rock like clay which is plastic cleavage is formed by **compression** as clay minerals align parallel to axial plane of the fold	[1] [1] [1] [1]
(c)	contraction on cooling of the magma slow, steady cooling around cooling centres forms hexagons	[1] [1]

Question Number	Answer	Max Mark
4(a)(i)	mantle above 2900 km Gutenberg at 2900 km inner core below 5000 km all 3 correct is 2, 1or 2 correct is 1	[2]
(ii)	above 2900 km the mantle rocks are silicates while below the core is iron and nickel or iron-nickel alloy	[1] [1]
(iii)	metallic meteorites are made of iron-nickel alloy or iron and nickel whole Earth density is 5.5 gm/cm^3 but surface rocks are lower at 2.8 gm/cm^3 so must be dense core and iron-nickel is correct density (12 gm/cm$^{3)}$	[1] [1]
(b)	Mercury, Venus, Mars all 3 correct is 2, 1or 2 correct is 1	[2]
(c)(i)	Moho as line at base continental crust as dashed area oceanic crust as black area all 3 correct is 2, 1or 2 correct is 1	[2]
(ii)	continental crust: age 0 to 3900Ma composition granitic oceanic crust: age 0 to 180Ma composition basaltic if just younger and older do not allow	[1] [1]
(iii)	asthenosphere	[1]
5	presence of (mid) oceanic ridge as major feature in centre of oceans with axial rift in centre	[1] [1]
	higher gravity anomaly above MOR due to excess of mass where magma rising up / new rock / volcanoes	[1] [1]
	high heat flow above the MOR due to rising magma and volcanoes / lava reaching the surface	[1] [1]
	frequent small <u>shallow</u> earthquakes along line of MOR / transform faults / axial rift faults / due to rising magma	[1] [1]
	age of ocean crust increasing away from the ridge as new sea floor forms in centre / from 0 my near MOR to 180 Ma further away symmetrical either side of MOR	[1] [1]
	sediment gets thicker away from MOR as ooze forms from microfossils very slow rate of sedimentation / rate of 1mm per 1000 years / no time for sediment to form at MOR which is age < 1 million years	[1] [1]
	positive and negative magnetic stripes formed due to reversals symmetrical pattern on either side of ridge of magnetic anomalies	[1] [1]

Question Number	Answer	Max Mark
5 cont'd	any four points 2 max for any piece of evidence any other valid evidence eg hotspots, layered structure of crust, ocean widening, continents moving apart, transform faults allowing changes in rate of movement between sections of MOR with one mark for a simple statement and a second mark for detail treat labelled diagrams as text	**[8]**
	Paper Total	**[60]**

Assessment Objectives Grid (includes QWC)

Question	AO1	AO2	AO3	Total
1(a)(i)	1			1
1(a)(ii)	1			1
1(b)(i)		1		1
1(b)(ii)		2		2
1(b)(iii)		1	1	2
1(c)(i)	1			1
1(c)(ii)	1			1
1(d)(i)			1	1
1(d)(ii)	2			2
2(a)	1			1
2(b)(i)		3		3
2(b)(ii)		2		2
2(b)(iii)		1		1
2(c)	1	1		2
2(d)(i)	2			2
2(d)(ii)	1	1		2
3(a)(i)	1	2		3
3(a)(ii)	1			1
3(b)(i)		2		2
3(b)(ii)	1			1
3(b)(iii)		1		1
3(b)(iv)	2	2		4
3(c)	1	1		2
4(a)(i)		2		2
4(a)(ii)	1	1		2
4(a)(iii)	2			2
4(b)	2			2
4(c)(i)		2		2
4(c)(ii)	2			2
4(c)(iii)	1			1
5	3	3	2	8
Totals	**28**	**28**	**4**	**60**

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