

Surname	Centre Number	Candidate Number
Other Names		2



**GCE AS/A level**

1213/01

**GEOLOGY - GL3**

**GEOLOGY AND THE HUMAN ENVIRONMENT**

A.M. WEDNESDAY, 23 May 2012

1¼ hours

			<b>Examiner only</b>
<b>Section A</b>	<b>1.</b>	<b>13</b>	
	<b>2.</b>	<b>12</b>	
<b>Section B</b>	<b>3.</b>	<b>25</b>	
	<b>4.</b>		
	<b>5.</b>		
<b>Total</b>		<b>50</b>	

**ADDITIONAL MATERIALS**

In addition to this examination paper, you will need a calculator.

**INSTRUCTIONS TO CANDIDATES**

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions from Section A and **one** from Section B.

Write your answers in the spaces provided in this booklet.

**INFORMATION FOR CANDIDATES**

The number of marks is given in brackets at the end of each question or part-question.

Candidates are reminded that marking will take into account the use of examples and the quality of communication used in answers, especially in the structured essay.

## SECTION A

Answer both questions 1 and 2 on the lines provided in the questions.

1. **Figure 1a** is a map of the Campi Flegrei caldera, Italy, showing variation in surface uplift between 1970 and 1985. **Figure 1b** is a graph showing changes in surface height above base level related to the monthly numbers of earthquakes (seismicity) recorded near Pozzuoli between 1970 and 1995.

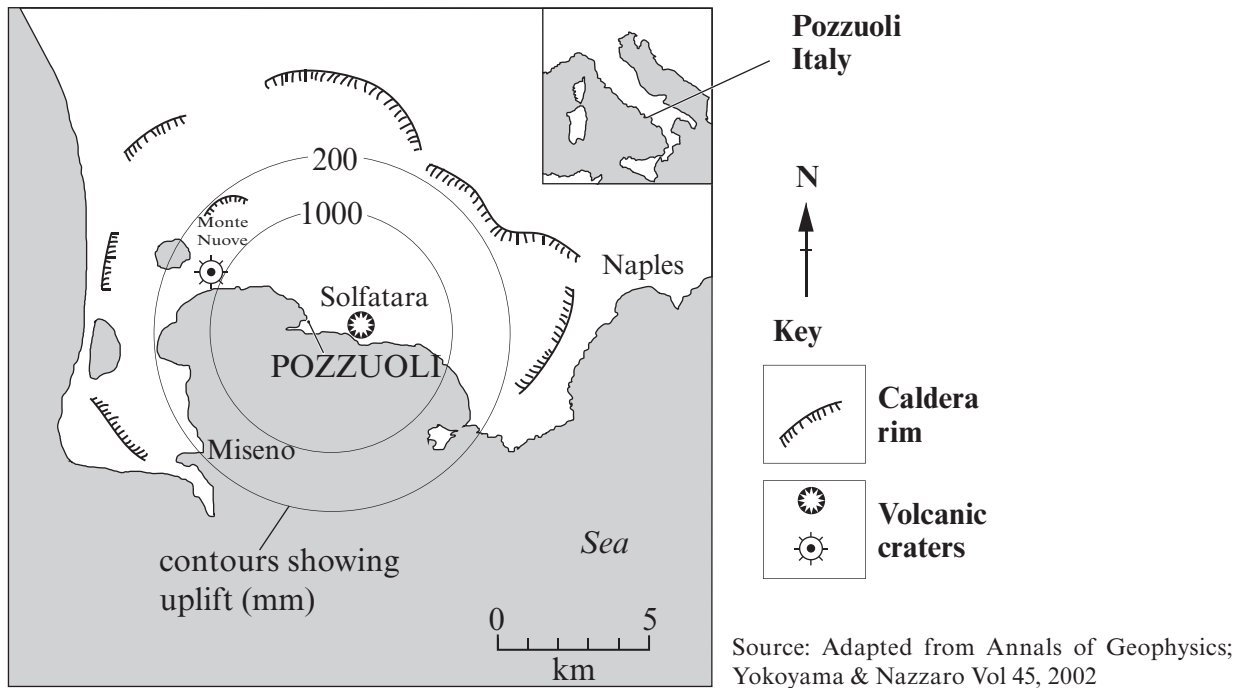


Figure 1a

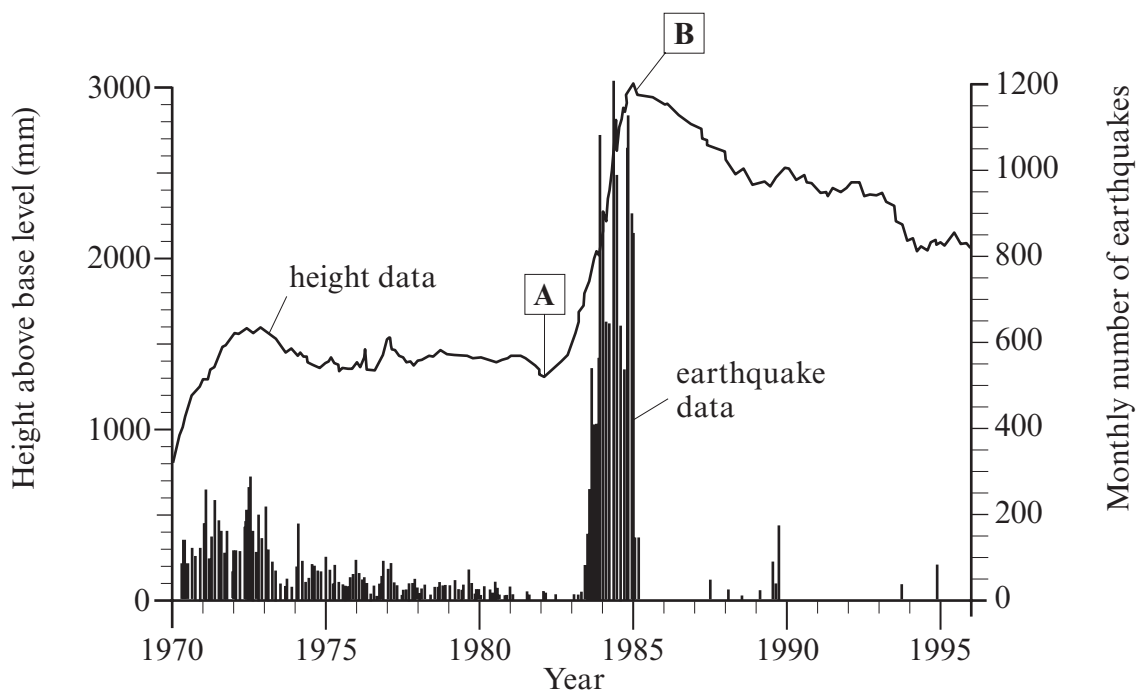


Figure 1b

(a) Mark, with an arrow (labelled **X**), the point on **Figure 1a** where the maximum uplift might be predicted. [1]

(b) Using **Figure 1b**:

(i) Describe the change in height at Pozzuoli between **1970** and **1995** by completing **Table 1**. [3]

Time period	Lowest reading (mm)	Highest reading (mm)	Maximum uplift (mm) between 1970 and 1995
January 1970 to January 1982	<b>800</b>	•	
January 1982 to January 1995	•	<b>3000</b>	

**Table 1**

(ii) Calculate the mean rate of uplift in the 1095 days between point **A** (January 1982) and point **B** (January 1985). Show your working. Give your answer in **millimetres per day** ( $\text{mm day}^{-1}$ ). [2]

*Rate of uplift* .....  $\text{mm day}^{-1}$

(c) Using **Figure 1b**:

(i) Describe the change in monthly earthquake numbers between **1970** and **1995**. [2]

.....

.....

.....

(ii) Describe the correlation between earthquakes and uplift in Pozzuoli. [2]

.....

.....

.....

(d) With reference to the evidence from **Figure 1a** and **Figure 1b**, explain why the Pozzuoli region was considered to be at risk from a volcanic eruption between **1970** and **1985**. [3]

.....

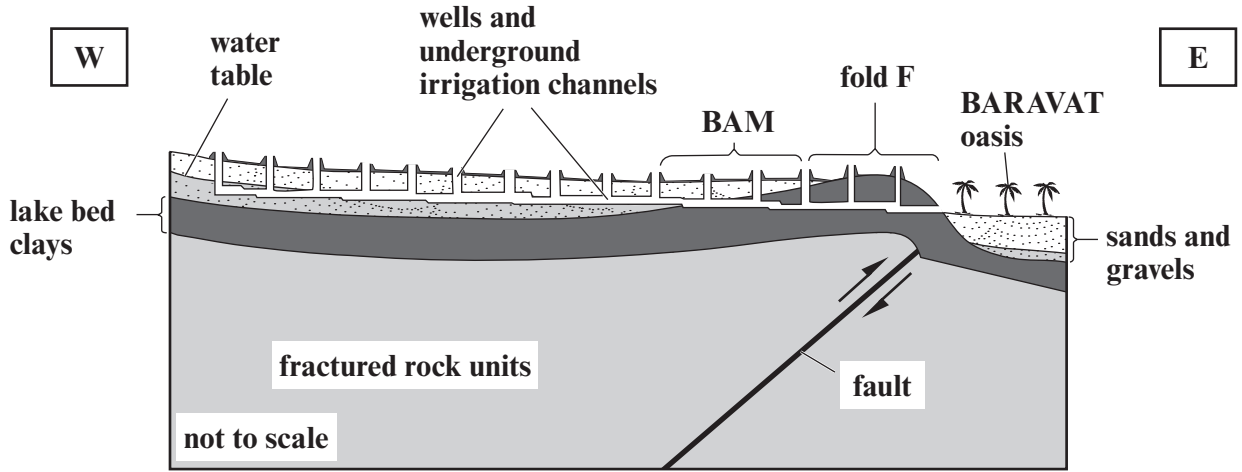
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**Total 13 marks**

2. **Figure 2** shows the geological setting around the city of Bam, Iran. **Table 2** outlines details of the city and its destruction by an earthquake in December 2003.



Source: James Jackson; Phil. Trans. R. Soc. A (2006) 364, 1911–1925

**Figure 2**

At 5.26 am on 26<sup>th</sup> December 2003, Bam was at the epicentre of a moderate earthquake that destroyed much of the ancient city. The focus was at 8 km to 10 km depth and was caused by a fault beneath the city. Measuring 6.5 on the Richter scale, more than 43,000 people were killed. 90% of the buildings in Bam were of traditional sun baked clay brick (adobe) with thick heavy roofs.

Bam is in a desert region which owes its existence to a reliable supply of water. It is located here because the repeated faulting and the local geology provide the favourable conditions needed to store groundwater which is then transported by underground channels for use in irrigation and as a domestic supply.

**Table 2**

(a) Refer to **Figure 2** and **Table 2**.

(i) Describe **two** characteristics of the Richter scale. [2]

1. ....
2. ....

(ii) Mark on **Figure 2**, with a star labelled **F (\*F)**, the probable **focus** of the Bam earthquake. [1]

(iii) **Explain three** pieces of evidence from the data that indicate why the Bam earthquake, of moderate magnitude, was so destructive. [3]

1. ....

.....

2. ....

.....

3. ....

.....

(b) The sands and gravels in **Figure 2** were deposited by fast flowing rivers. Describe **two** likely characteristics of these sediments that make them suitable as an aquifer. [2]

1. ....

2. ....

(c) Refer to **Figure 2**.

Repeated movement along the fault has folded the beds above (**fold F**).

(i) Name the type of fold structure (labelled **fold F**). [1]

.....

(ii) Explain how the local geology has provided favourable conditions for groundwater storage. [3]

.....

.....

.....

.....

**Total 12 marks**

## SECTION B

*Answer **one** question from this section on the following pages.*

*The marks you will be awarded in your essay take into account:  
evidence of geological knowledge and understanding;  
the use of geological examples;  
legibility, accuracy of spelling, punctuation and grammar;  
the selection of an appropriate form and style of writing;  
the organisation of material, and use of geological vocabulary.*

**EITHER,**

3. Using one or more case studies:

- (a) Describe the volcanic hazards associated with pyroclastic flows. [10]
- (b) Explain the difference in the hazards typically associated with the eruption of
- (i) basaltic magmas,
- and**
- (ii) andesitic magmas. [15]

**OR,**

4. (a) Account for the devastation sometimes caused by tsunamis in coastal areas. [10]
- (b) Describe how the problems associated with **one** of the following hazards might be overcome or reduced:
- Either** tsunamis
- Or** earthquakes. [15]

**OR,**

5. (a) Describe the influence of geological structure (bedding, joints, faults and cleavage) on the stability of rock cuttings and tunnels. [10]
- (b) With reference to one or more case studies, explain the geological hazards associated with mining activities. [15]









Dotted lines for writing.