

Surname	Centre Number	Candidate Number
Other Names		2



**GCE AS/A level**

1213/01



S16-1213-01

**GEOLOGY – GL3**

**Geology and the Human Environment**

A.M. MONDAY, 23 May 2016

1 hour 15 minutes

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
<b>Section A</b>		
1.	13	
2.	12	
<b>Section B</b>		
3.	25	
4.		
5.		
<b>Total</b>	<b>50</b>	

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**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**

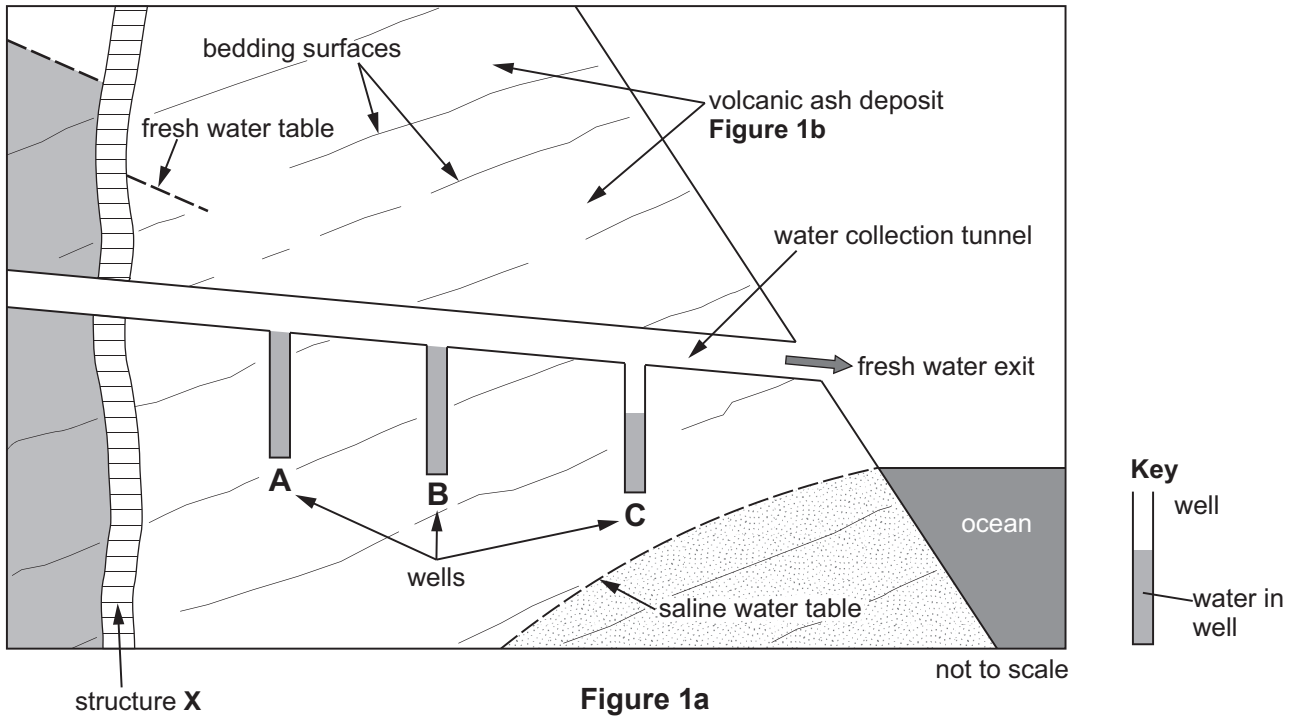
The number of marks is given in brackets at the end of each question or part-question.

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 simplified geological section through part of a volcanic island. It shows one method used to extract the island's fresh water by pumping from wells.



**Figure 1b**

- (a) (i) State the type of igneous body represented by structure X in **Figure 1a**. Give **one** reason for your answer. [2]

*Structure X* .....

*Reason* .....

- (ii) Explain why the fresh water table is at different heights on either side of structure X. [2]

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- (iii) Draw a line on **Figure 1a** to show the continuation of the fresh water table. [2]

- (b) (i) Describe the texture of the volcanic ash in **Figure 1b**. [2]

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- (ii) Explain why the volcanic ash makes a good aquifer. [2]

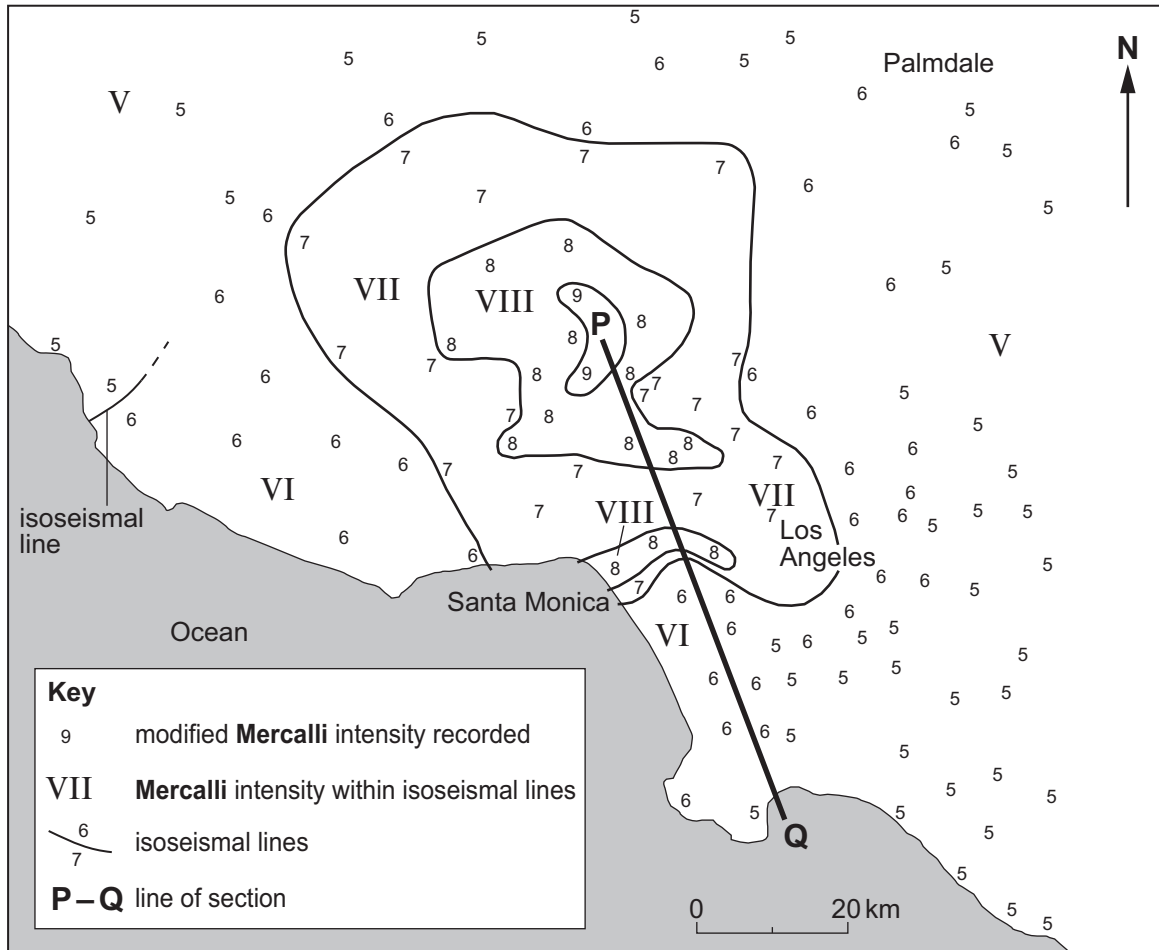
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- (c) Explain why the over-extraction of fresh water in **Figure 1a** might lead to a future water supply problem. [3]

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2. **Figure 2a** is a simplified map of Southern California showing intensity data from the 1994 Northridge earthquake (magnitude 6.7).



**Figure 2a**

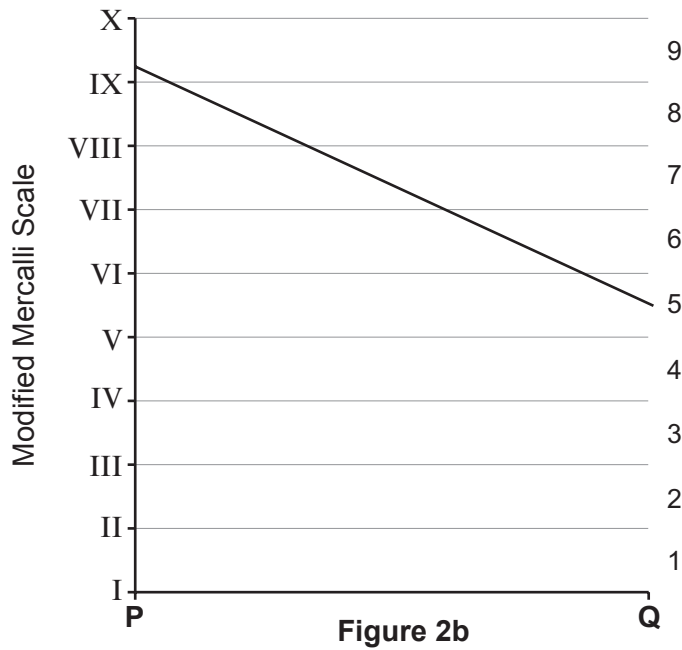
Refer to **Figure 2a**.

- (a) (i) Using a labelled arrow ( $\downarrow$  E), mark the most likely position of the earthquake epicentre on **Figure 2a**. [1]
- (ii) Complete **Figure 2a** by drawing in the intensity contour (isoseismal line) to represent the modified Mercalli intensity value **VI (6)**. [2]

- (b) For each of the Mercalli intensity descriptions below, complete the chart by assigning the correct Mercalli intensity value from the following: VI, IX, XII. [2]

Modified Mercalli intensity descriptions	Modified Mercalli intensity value
vibrations - similar to a passing lorry	III
waves form on ground surface	
ground cracks, pipes break	
trees sway, falling objects	

- (c) **Figure 2b** shows the expected relationship between modified Mercalli intensity values and distance along the line **P–Q** on **Figure 2a**.



- (i) Describe and explain the relationship on **Figure 2b**. [2]

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(ii) Using **Figure 2a**, draw a line on **Figure 2b** to show how the **observed** Mercalli intensity varies with distance along the transect **P–Q**. [2]

(iii) With reference to **Figure 2a** and **Figure 2b**, explain why Mercalli values do not always follow the expected relationship. [3]

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**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. (a) Describe the geological factors that need to be considered in order to avoid ground instability in major civil engineering works. [10]
- (b) Explain how civil engineering can be used to avoid interference with the coastal system (coastal erosion and deposition, longshore drift). [15]

**OR,**

4. (a) Describe how surface groundwater pollution can result from **each** of the following human activities. [10]
- (i) Waste disposal  
(ii) Mining
- (b) For **one** of the human activities in (a), explain how the problems associated with groundwater pollution might be overcome or reduced. [15]

**OR,**

5. (a) Describe the extent to which **two** of the following can be used to predict earthquakes. [10]
- (i) Groundwater levels and pressure  
(ii) Ground movement  
(iii) Radon gas emissions
- (b) Using one or more case studies explain the relationship between earthquakes and active fault zones. [15]









