



**GCE AS/A Level**

**1213/01**

**GEOLOGY – GL3**

**Geology and the Human Environment**

**MONDAY, 22 May 2017 – MORNING**

**1 hour 15 minutes plus your additional time allowance**

**Surname** \_\_\_\_\_

**Other Names** \_\_\_\_\_

**Centre Number** \_\_\_\_\_

**Candidate Number** 2 \_\_\_\_\_

<b>For Examiner's use only</b>		
<b>Question</b>	<b>Maximum Mark</b>	<b>Mark Awarded</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**

**A calculator.**

## **INSTRUCTIONS TO CANDIDATES**

**Use black ink, black ball-point pen or your usual method.**

**Write your name, centre number and candidate number in the spaces provided on the front cover.**

**Answer ALL questions from Section A and ONE from Section B.**

**Write your answers in the spaces provided in this booklet.**

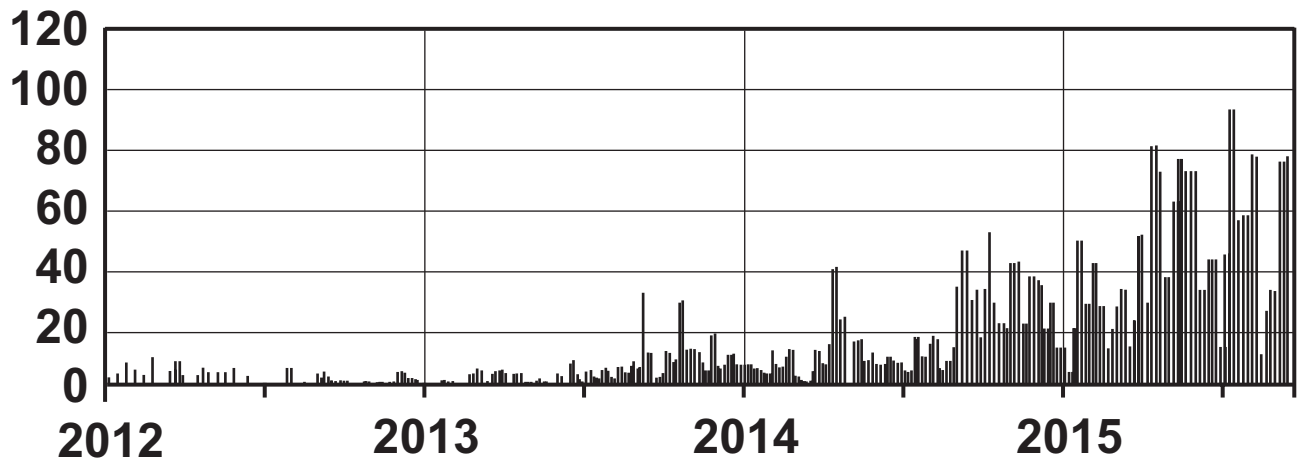
## **INFORMATION FOR CANDIDATES**

**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.**

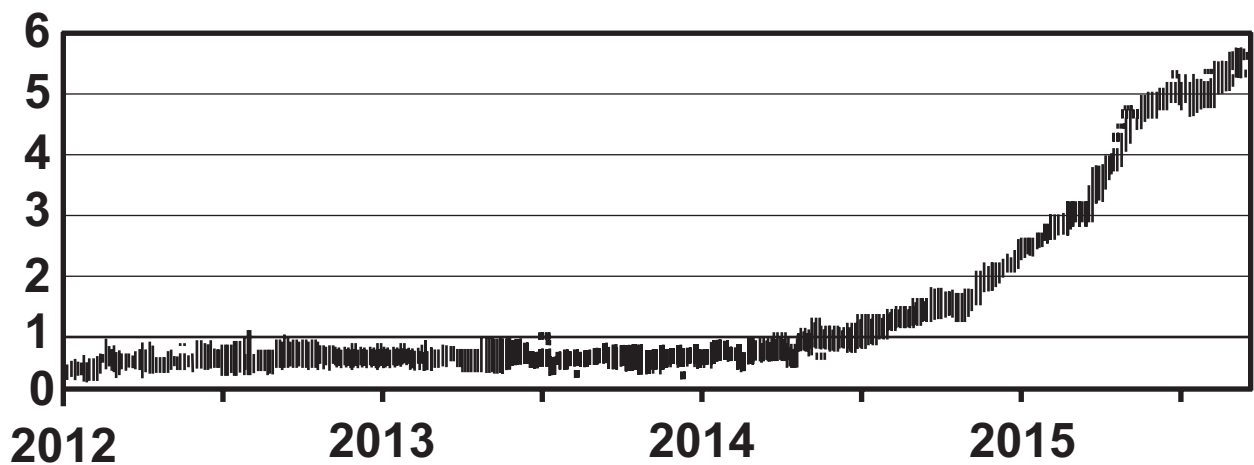
**FIGURE 1a**

**Earthquake frequency  
(per week)**



**FIGURE 1b**

**Increase in the width of  
the caldera (cm/per week)**



**SECTION A**

**Answer BOTH questions 1 and 2 on the lines provided in the questions.**

**1. FIGURE 1a opposite shows the frequency of earthquakes at Mauna Loa in Hawaii. FIGURE 1b opposite shows the increase in the width of the caldera of Mauna Loa. No volcanic eruption was recorded during the time period shown.**

**(a) (i) Describe the pattern of earthquake frequency on Mauna Loa during the time period shown in FIGURE 1a. [2]**

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**1(a) (ii) Describe the relationship between the earthquake frequency in FIGURE 1a (opposite page 4) and change in width of the caldera of Mauna Loa in FIGURE 1b (opposite page 4) during the time period shown. [2]**

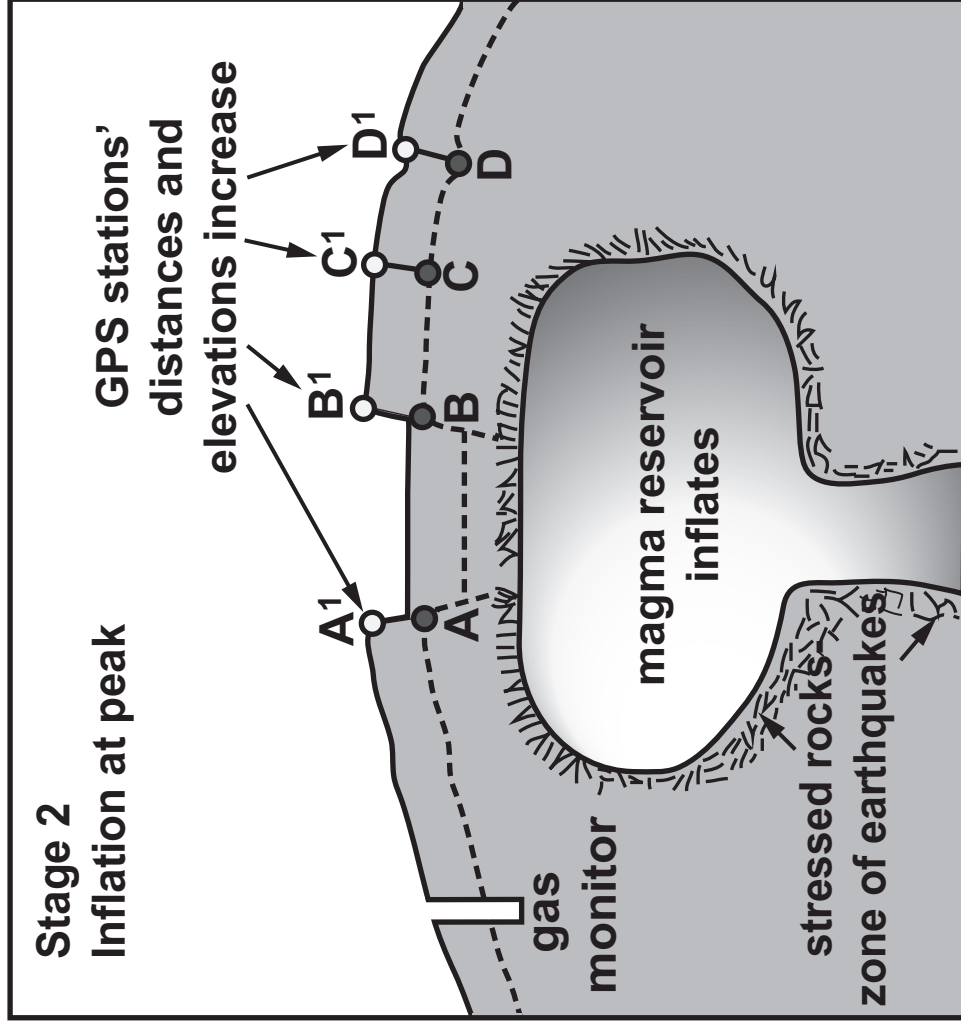
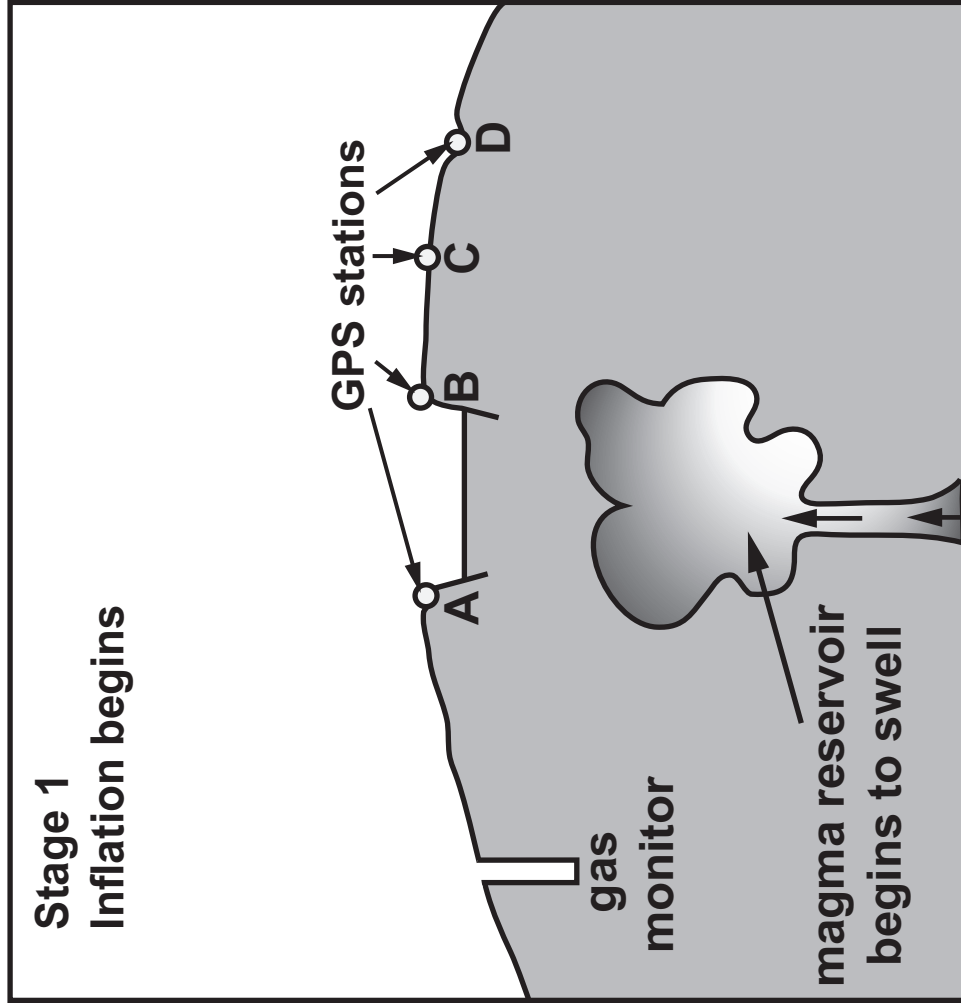
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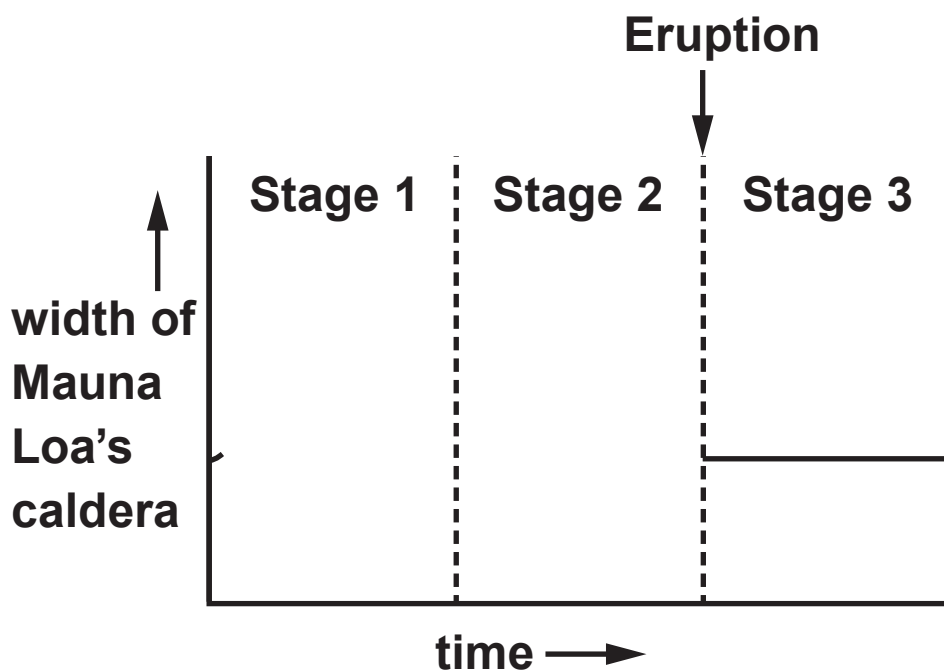
**FIGURE 1c**



1(b) FIGURE 1c opposite is a model showing two of three commonly observed stages during the course of a typical eruption cycle of Mauna Loa.

FIGURE 1d below is a partially completed graph showing changes in the width of Mauna Loa's caldera during a typical eruption cycle.

FIGURE 1d



- (i) With reference to FIGURE 1c, complete the graph FIGURE 1d to show how the width of the caldera at Mauna Loa is likely to change before and during a typical eruption. [2]



**1(b) (iii) Using FIGURE 1c (opposite page 6) explain how the monitoring of gas emissions could provide additional information in the prediction of future eruptions at Mauna Loa. [3]**

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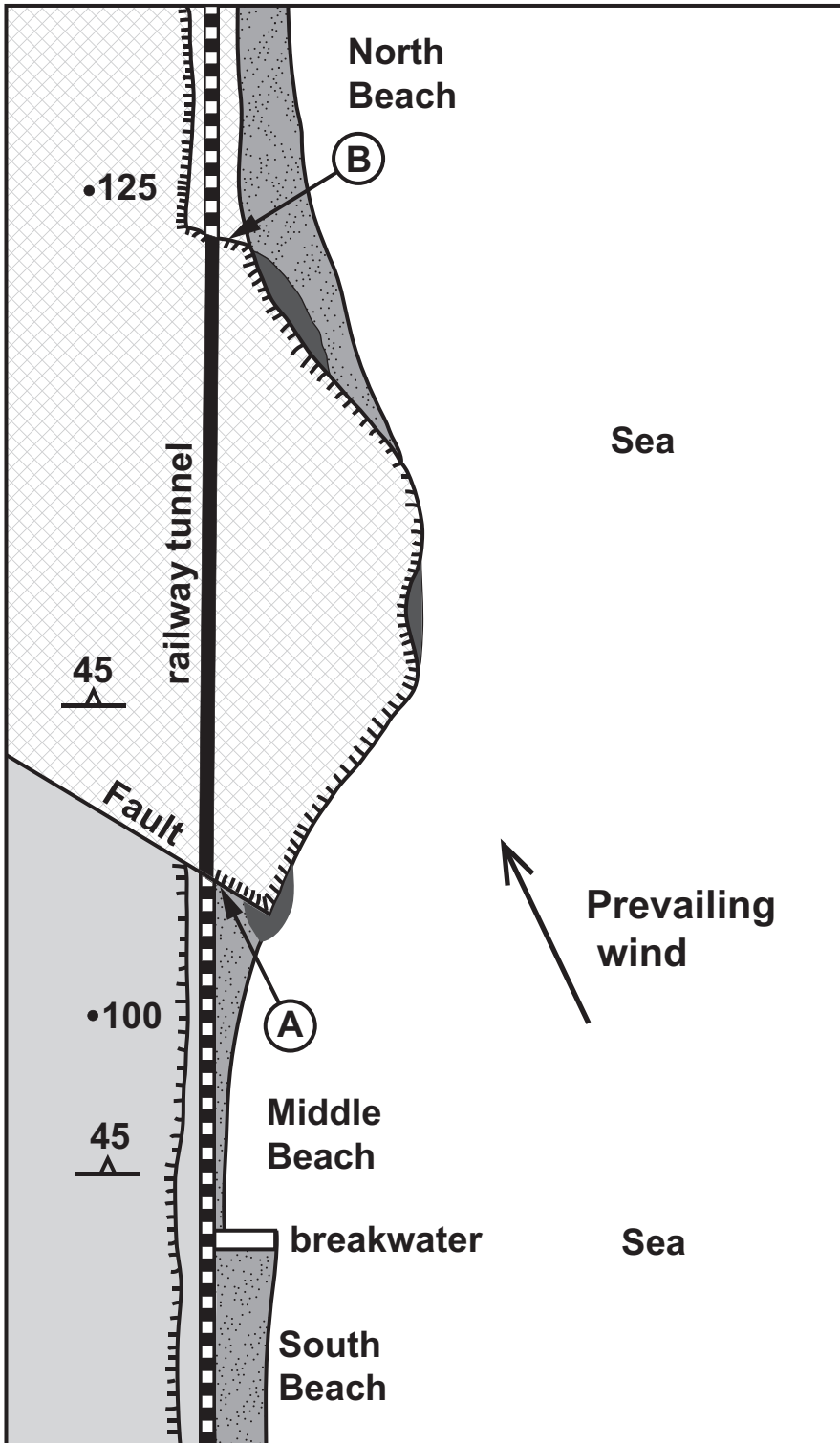
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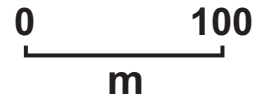
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**FIGURE 2b**



**Key**

-  cliff collapse
-  vertical slope
-  spot height in metres
-  dip direction and angle
-  well jointed sandstone
-  shale
-  beach
-  railway



Prevailing wind

2. **FIGURE 2a** is a table showing rock strength information for sandstone and shale. The higher the value the stronger the rock.

**FIGURE 2a**

<b>Rock</b>	<b>Unweathered rock strength MPa</b>	<b>Weathered rock strength MPa</b>	<b>Dip of Beds</b>
<b>sandstone</b>	<b>40</b>	<b>5</b>	<b>45°</b>
<b>shale</b>	<b>30</b>	<b>5</b>	<b>45°</b>

**FIGURE 2b** opposite is a map of a coastal area with a railway line.

**2(a) Describe and explain the difference in rock strength between weathered and unweathered SANDSTONE in FIGURE 2a (page 9). [2]**

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**(b) Refer to FIGURE 2b (opposite page 9). Explain why the presence of the breakwater has put the stability of the railway line at Middle Beach at risk. [3]**

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2(c) (ii) For either location **A** or location **B** in **FIGURE 2b** (opposite page 9), describe and explain **ONE** method that could be used on the cliff face to stabilise the slope. [3]

Location **A** or **B**



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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 potential volcanic hazards that may result from ash fall and pyroclastic flows. [10]**
- (b) Explain how the destructive effects of lava flows, lahars and volcanic gases can be effectively controlled to reduce risk. [15]**

**OR,**

**4(a) Describe and explain the causes of tsunamis. [10]**

**(b) Discuss the factors that affect the level of devastation in coastal areas following a tsunami.**

**[15]**

**OR,**

**5(a) Describe the problems associated with the overuse of aquifers. [10]**

**(b) With reference to THREE of the following explain the geological factors that have to be taken into consideration in the construction of a multi storey building.**

- **rock type**
- **rock structure**
- **depth to water table**
- **depth to rock head**
- **radon gas**

**[15]**















