

Candidate Name	Centre Number	Candidate Number
		2



**GCE AS/A level**

453/01

**GEOLOGY - GL3  
GEOLOGY AND THE HUMAN  
ENVIRONMENT**

P.M. THURSDAY, 8 January 2009

1¼ hours

**For Examiner's Use only.**

<b>Section A</b>	<b>1</b>	
	<b>2</b>	
<b>Section B</b>	<b>3</b>	
	<b>4</b>	
	<b>5</b>	
<b>Total</b>	<b>50</b>	

**ADDITIONAL MATERIALS**

In addition to this examination paper, you may require a calculator.

**INSTRUCTIONS TO CANDIDATES**

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**

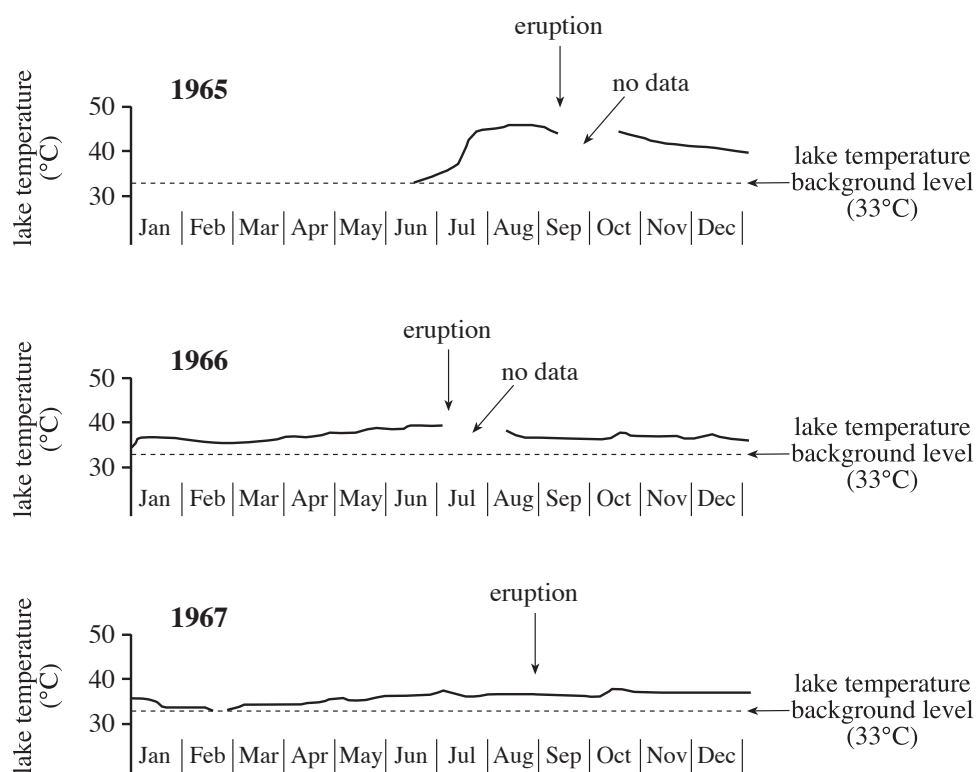
The number of marks is given in brackets at the end of each question or part-question.

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 question.

1. **Figure 1** shows volcanic crater lake temperatures above the background level ( $33^{\circ}\text{C}$ ) before and after the eruptions of Taal Volcano (Philippines) between 1965 and 1967. **Table 1** is a partly completed chart of the changes in crater lake temperatures during this period.



Adapted from: Volcanoes(1997)  
Decker & Decker (W.H. Freeman)

**Figure 1**

Year	Number of degrees above lake background level ( $33^{\circ}\text{C}$ ) at the time of the eruption	Number of months prior to eruption that temperature was recorded above background level ( $33^{\circ}\text{C}$ )
1965	• $^{\circ}\text{C}$	•                                      months
1966	6 $^{\circ}\text{C}$	Temp did not fall to background temperature since previous eruption
1967	4 $^{\circ}\text{C}$	6 months

**Table 1**

- (a) State **two** volcanic hazards associated with crater lakes that might present a danger to the local population. [2]

*Hazard 1* .....

*Hazard 2* .....

- (b) Complete **Table 1** to show
  - (i) the number of degrees the crater lake temperature rose above its background level at the time of the **1965** eruption, [1]
  - (ii) the number of months before the **1965** eruption that the crater lake temperature was recorded above its background level (33°C). [1]

- (c) Explain why volcanic crater lake temperatures might rise prior to an eruption. [2]

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- (d) Explain how the data (**Figure 1** and **Table 1**) suggest that crater lake temperatures alone might not be reliable in forecasting eruptions of Taal Volcano. [3]

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- (e) Using your knowledge, explain the use of **one** other method that might be employed in predicting volcanic eruptions. [3]

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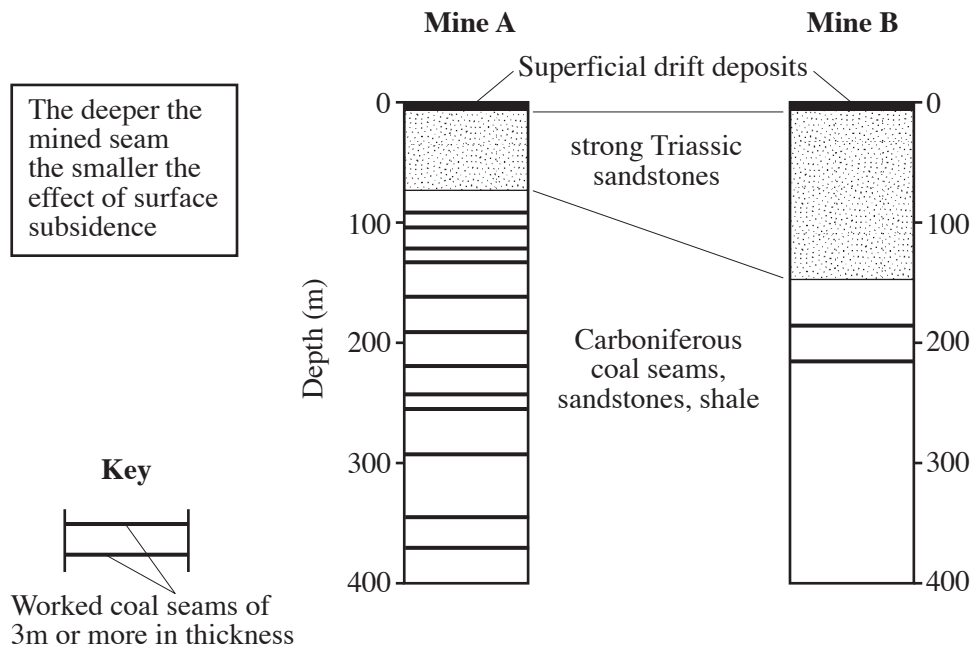
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**Total 12 marks**

2. **Figure 2** shows data affecting mining subsidence at two coal mines (A and B).



**Figure 2**

Mining factors	Mine A	Mine B
Date of initial mining	1922	1962
Depth to water table	10m	12m
Thickness of superficial drift deposit	8m	6m
Thickness of Triassic sandstones	63m	•
Depth of deepest worked seam	•	213m
Number of worked coal seams of 3 metre or more in thickness	12	2
Total surface subsidence to date (since initial mining)	3.36m	0.08m

**Table 2**

Refer to **Figure 2** and **Table 2**.

(a) Complete **Table 2** by estimating:

(i) the depth of the deepest worked seam in **Mine A**, [1]

(ii) the thickness of Triassic sandstones in **Mine B**. [1]

(b) Explain how mining can result in subsidence at the surface. [2]

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(c) Assess the effects of any **three** mining factors in **Table 2** that might account for the difference in the total subsidence of **Mine A** compared to **Mine B**. Explain your answers. [6]

*Factor 1* .....

*Explanation* .....

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*Factor 2* .....

*Explanation* .....

.....

*Factor3* .....

*Explanation* .....

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(d) Using your knowledge, describe **one** geological hazard, **other than subsidence**, often associated with abandoned mine workings. [3]

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**Total 13 marks**

**SECTION B**

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

You are advised to make use of examples where possible in your answer.

**EITHER,**

3. (a) Describe the properties of aquifers that enable them to store groundwater. [10]  
(b) Explain the geologically related hazards that may result from the overuse of aquifers. [15]

**OR,**

4. (a) Describe the use of **two** of the following methods used in geological site investigations:  
(i) electrical resistivity  
(ii) geological maps  
(iii) seismic **reflection**  
(iv) rock and soil sampling [10]  
(b) Explain why geological and geotechnical data must be taken into account when selecting a suitable site for building in an area underlain by **granite**. [15]

**OR,**

5. (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** 1. tsunamis  
**Or** 2. mass movement. [15]







