

**ADVANCED SUBSIDIARY GCE****GEOLOGY**

Economic and Environmental Geology

2833/01

Candidates answer on the question paper

OCR Supplied Materials:

None

Other Materials Required:

- Electronic calculator
- Ruler (cm/mm)

Wednesday 20 May 2009**Afternoon****Duration: 45 minutes**

Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

INFORMATION FOR CANDIDATES

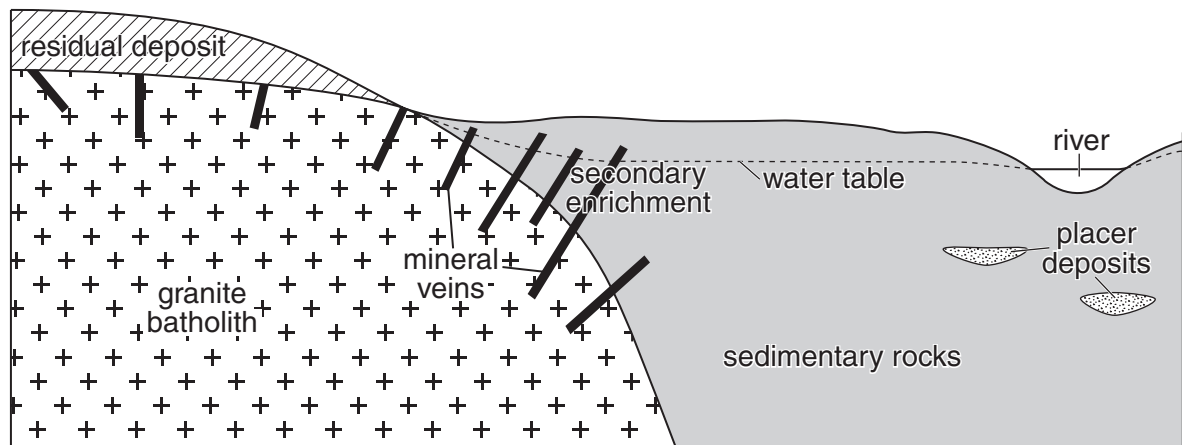
- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **45**.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculation.
- This document consists of **12** pages. Any blank pages are indicated.

FOR EXAMINER'S USE

Qu.	Max.	Mark
1	11	
2	13	
3	21	
TOTAL	45	

Answer **all** the questions.

- 1 The cross section below shows the distribution of metallic mineral deposits in sedimentary rocks surrounding a granite intrusion.



- (a) Geological processes have concentrated metallic ore minerals at a number of locations shown on the cross section.

(i) Define the term *concentration factor*.

.....
 [1]

- (ii) The placer deposits shown on the cross section contain 8% tin. The average crustal abundance of tin is 0.002%. Calculate the concentration factor for tin.

.....
 [1]

- (b) (i) Name the ore found in a residual deposit of aluminium.

..... [1]

- (ii) Describe how residual deposits of aluminium form.

.....

 [2]

- (c) (i) Name the ore mineral likely to be formed by secondary enrichment of copper.

..... [1]

- (ii) Draw a labelled diagram to explain how the grade of copper ore can be increased by the process of secondary enrichment.

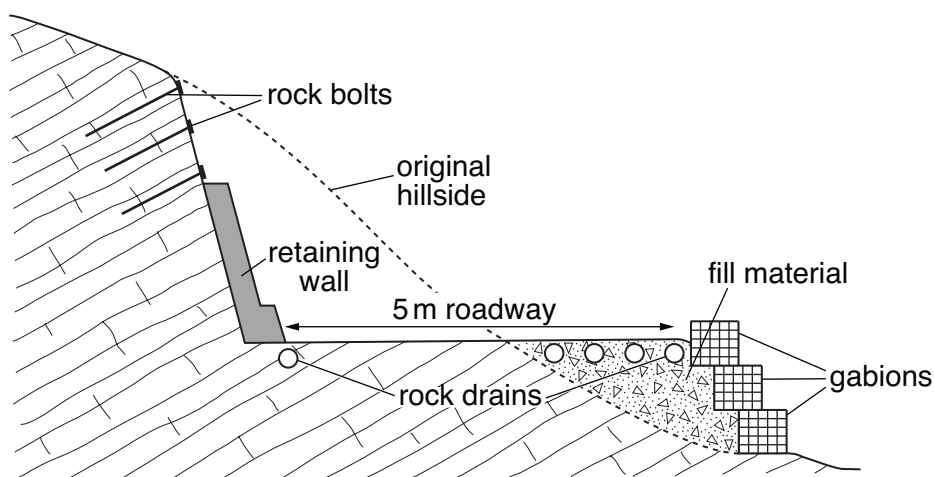
.....
.....
.....
..... [3]

- (d) Explain why metal mining is an example of unsustainable resource exploitation.

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

[Total: 11]

- 2 (a) The diagram below shows a roadway that has been built across a hillside.



- (i) State **one** advantage and **one** disadvantage of using the cut and fill method to construct the roadway.

advantage

.....

disadvantage

..... [2]

- (ii) Use the diagram to describe how each of the following methods is used to stabilise rocks:

rock bolts

.....

retaining wall

.....

rock drains

.....

gabions

..... [4]

- (b) Explain why it is difficult to stabilise weathered rock in road cuttings.

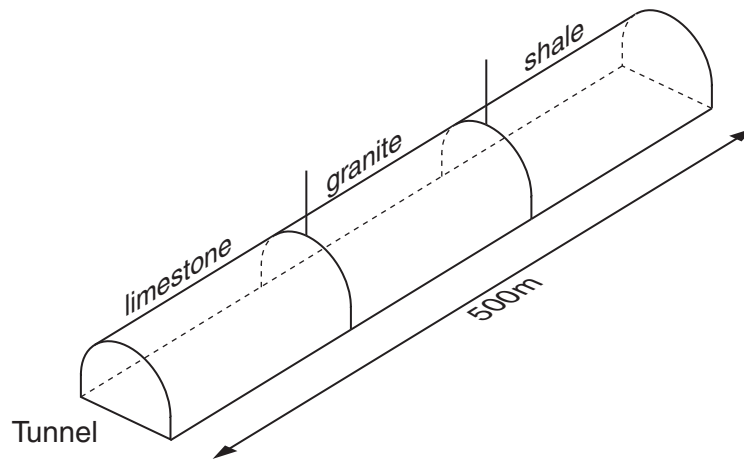
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.....

..... [2]

- (c) It is proposed to tunnel through the rock types shown in the diagram below.



Engineering geologists use a scale for rock strength similar to that shown below.

CLASS	I	II	III	IV	V
description	very strong rock	strong rock	fair rock	weak rock	very weak rock
safe cut slope angle	more than 70°	65°	55°	45°	less than 45°
tunnel support	none	some rock bolts	many rock bolts	rock bolts + shotcrete	steel ribs
stand up time for span unsupported	15 m span = 20 years	10 m span = 1 year	5 m span = 1 week	2 m span = 12 hours	1 m span = 30 mins

- (i) Write granite and shale in the correct class for each in the table below. The limestone has been completed as class III.

class I	class II	class III	class IV	class V
		limestone		

[2]

- (ii) Describe the geological problems that could be encountered during construction of the tunnel through each of the rock types shown on the diagram.

limestone

.....

granite

.....

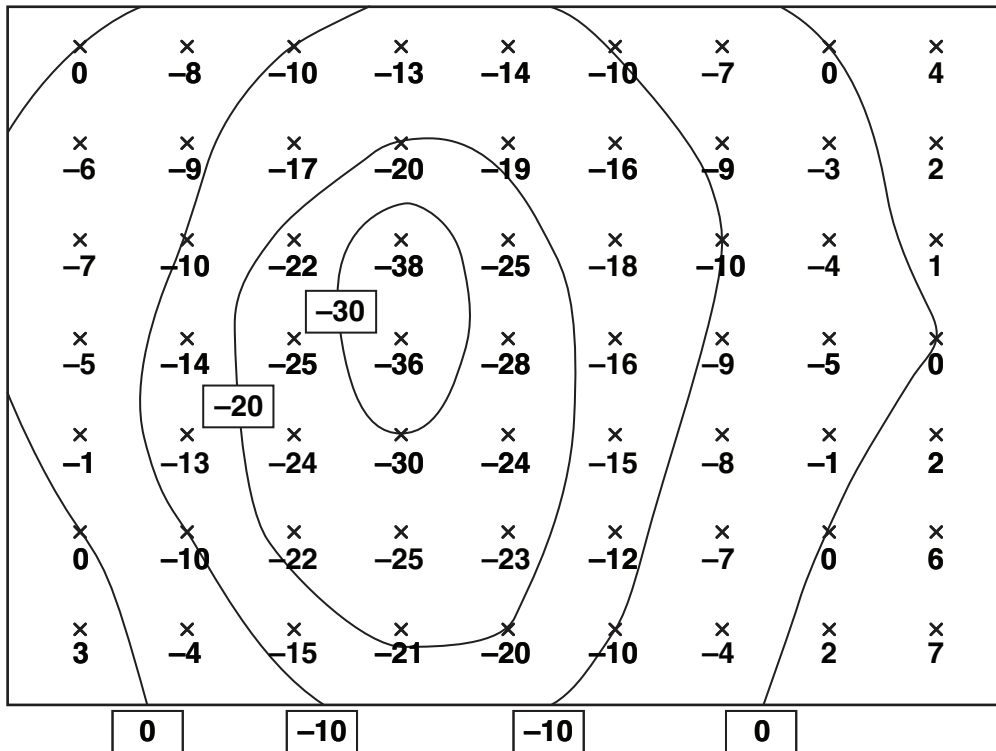
shale

..... [3]

[Total: 13]

Turn over

- 3 (a) An oil exploration company has carried out a gravity survey of an area. The map below shows lines of equal gravity values at 10 milligal intervals.



- (i) What type of potential oil trap does the gravity map show? Explain your answer.

.....

.....

.....

.....

.....

..... [3]

- (ii) Mark a **D** on the map where you would carry out exploration drilling for oil. [1]

- (b) (i) Describe **two** factors that affect the percentage recovery of oil from reservoir rocks.

.....

.....

.....

..... [2]

- (ii) Describe a secondary recovery method that could be used to increase the percentage of oil recovered.

.....

.....

.....

..... [2]

- (c) Describe **one** environmental problem which might result from offshore extraction of oil.

.....

..... [1]

- (d) (i) Describe the environment in which coal forms.

.....

.....

.....

.....

.....

..... [3]

- (ii) Define the term *rank*.

.....

..... [1]

- (iii) State **one** difference between bituminous coal and anthracite.

.....

..... [1]

..... [7]

END OF QUESTION PAPER

Optional extension sheet. If you use this lined page to complete an answer to any question, the question number **must** be clearly shown.

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10
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11
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