

Monday 2 June 2014 – Morning

A2 GCE GEOLOGY

F794/01 Environmental Geology

Candidates answer on the Question Paper.

OCR supplied materials:

None

Other materials required:

- Electronic calculator
- Ruler (cm/mm)

Duration: 1 hour




Candidate forename		Candidate surname	
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Centre number						Candidate number				
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INSTRUCTIONS TO CANDIDATES

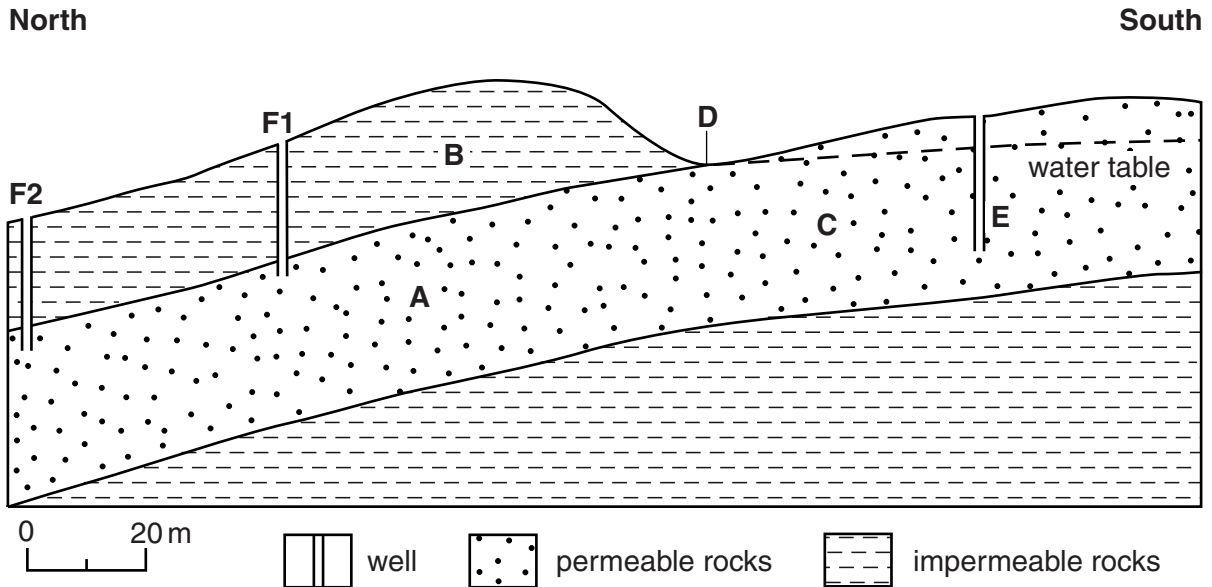
- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. If additional space is required, you should use the lined pages at the end of this booklet. The question number(s) must be clearly shown.
- Do **not** write in the bar codes.

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 **60**.
-  Where you see this icon you will be awarded marks for the quality of written communication in your answer.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.
- This document consists of **16** pages. Any blank pages are indicated.

Answer **all** the questions.

- 1 The diagram below shows a cross-section through an area that is used for groundwater supply.



- (a) (i) On the diagram, label the extent of the recharge zone. [1]
- (ii) Match the features in the table below with the letters **A** to **E** on the diagram. Each letter should only be used once.

Feature	Letter
aquiclude	
confined aquifer	
spring	
unconfined aquifer	
water table well	

[3]

- (iii) Explain why the spring may produce water that is suitable for drinking.

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.....

..... [1]

(iv) Describe and explain **one** similarity and **one** difference between the wells labelled at **F1** and **F2** on the diagram.

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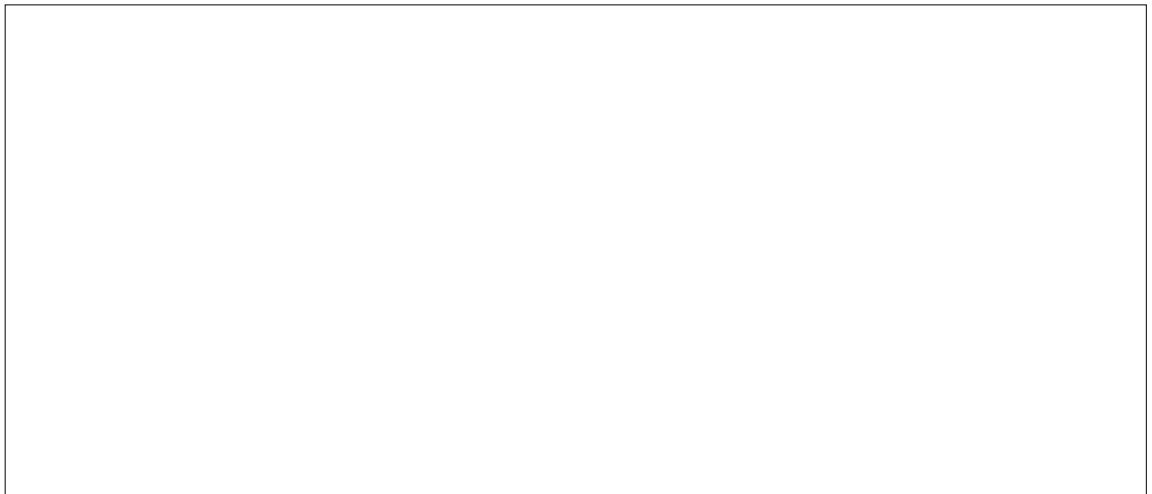
..... [2]

(b) (i) Define the term *water table*.

.....

..... [1]

(ii) Draw a labelled diagram to show the effect that pumping water from a well has on the water table. Using ideas about hydrostatic pressure, explain why this effect occurs.



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..... [2]

[Total: 10]

2 (a) Britain had 400 million tonnes of proven coal reserves in mines operating in 2010. The total output of coal from British mines was 17.8 million tonnes in 2010. Approximately 10.4 million tonnes of coal came from opencast mines and 7.4 million tonnes of coal came from underground mines.

(i) Define the term *reserves*.

.....
..... [1]

(ii) Calculate the percentage of coal that was produced from opencast mines in Britain in 2010. Give your answer to one decimal place.

..... % [1]

(iii) For how many years will Britain's proven coal reserves last at the 2010 rate of production? Give your answer to one decimal place.

..... years [1]

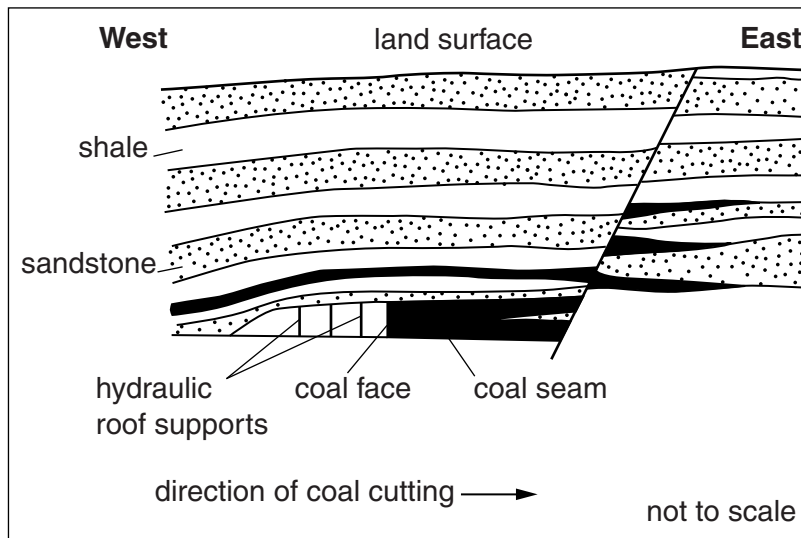
(b) Describe how coal is mined by opencast methods.

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

(c) Explain why more coal is produced from opencast mines than from underground mines.

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

(d) The diagram below shows a cross-section through an underground coal mine.



(i) Name and describe the method of coal mining shown on the diagram.

name

description

.....

.....

.....

[3]

(ii) Describe and explain **two** geological problems, shown on the diagram, which might make the coal uneconomic to work as mining continues to the east.

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[2]

(iii) State the problem that can occur at the surface as a consequence of this type of mining.



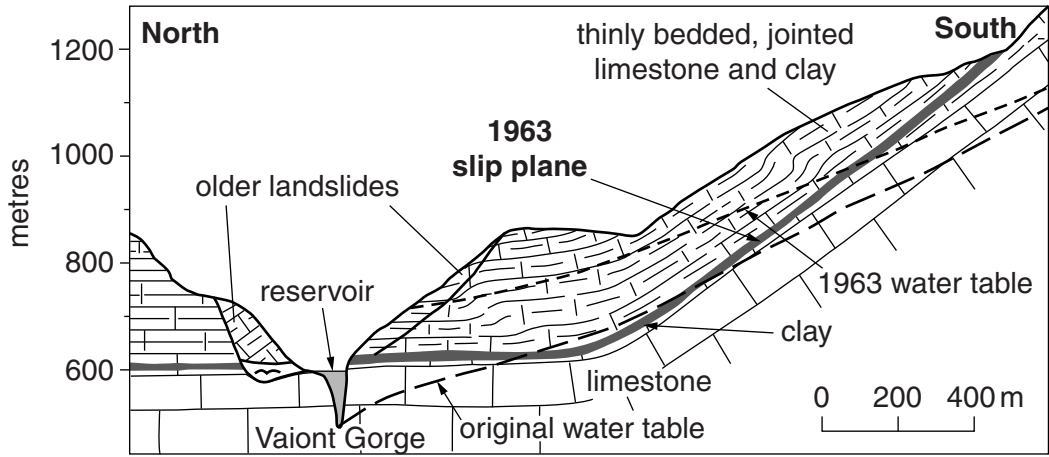
In your answer, you should use the appropriate technical term, spelled correctly.

..... [1]

[Total: 13]

3 (a) Study the information and geological cross-section below, about the Vaiont Dam disaster.

The 262 metre high Vaiont concrete arch dam was completed in 1961. After a period of prolonged and heavy rainfall in October 1963, an estimated 270 million m³ of limestone and clay slid down the southern side of the valley into the reservoir. The dam did not collapse but the rock debris that fell into the reservoir caused a large wave of water to overtop the dam, causing flooding downstream.



(i) Explain why the geology made a landslide likely on the south side of the valley.

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..... [3]

(ii) How did the prolonged and heavy rainfall contribute to the landslide?

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..... [2]

(b) Name and describe the geological materials used in the manufacture of concrete.

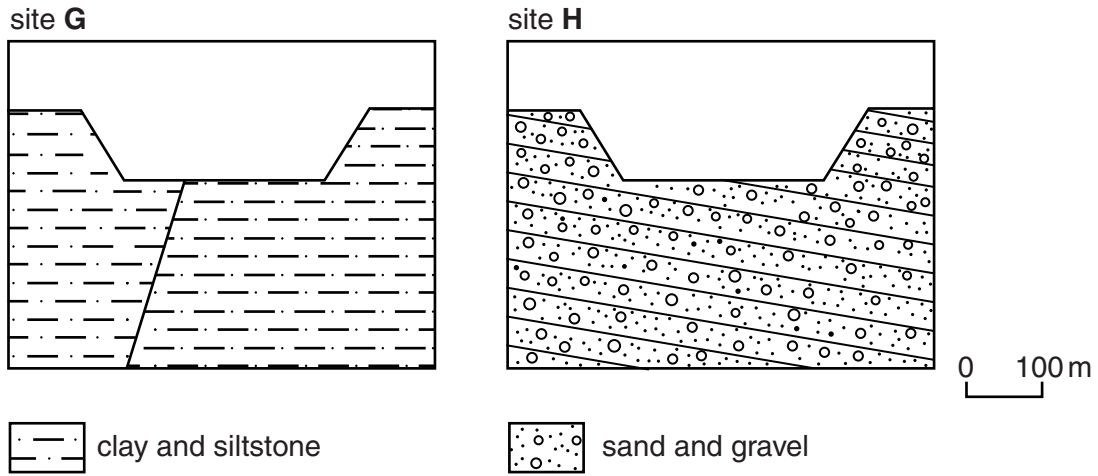
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..... [2]

(c) The cross-section diagrams below show two abandoned quarries that could be used for landfill waste disposal.



(i) Describe and explain **one** advantage and **one** disadvantage of using site **G** for landfill waste disposal.

advantage

.....

disadvantage

.....

[2]

(ii) Explain why site **H** would be a poor choice for landfill waste disposal.

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..... [2]

(iii) Describe and explain **one** ground improvement strategy that could be used to improve site **H** for landfill waste disposal.

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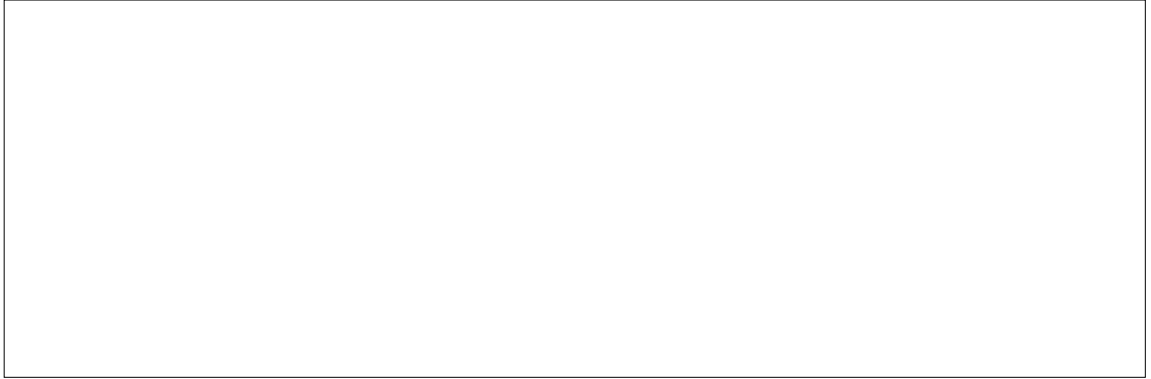
..... [2]

[Total: 13]

4 Geophysical techniques can be used to explore for both hydrocarbons and metallic mineral deposits.

(a) Seismic reflection surveys can be used to explore for hydrocarbons.

(i) Describe how a seismic reflection survey is carried out. You may use a diagram to help your answer.



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..... [2]

(ii) How can data from a seismic reflection survey be interpreted to identify potential oil and gas traps?

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..... [2]

(c) Magnetic surveys can be used to explore for metallic mineral deposits. The results of a small-scale magnetic survey along a transect are shown in the table.

Distance along transect (m)	0	10	20	30	40	50	60	70
Magnetic reading (nT)	4500	4510	4600	4650	4580	4520	4510	4510

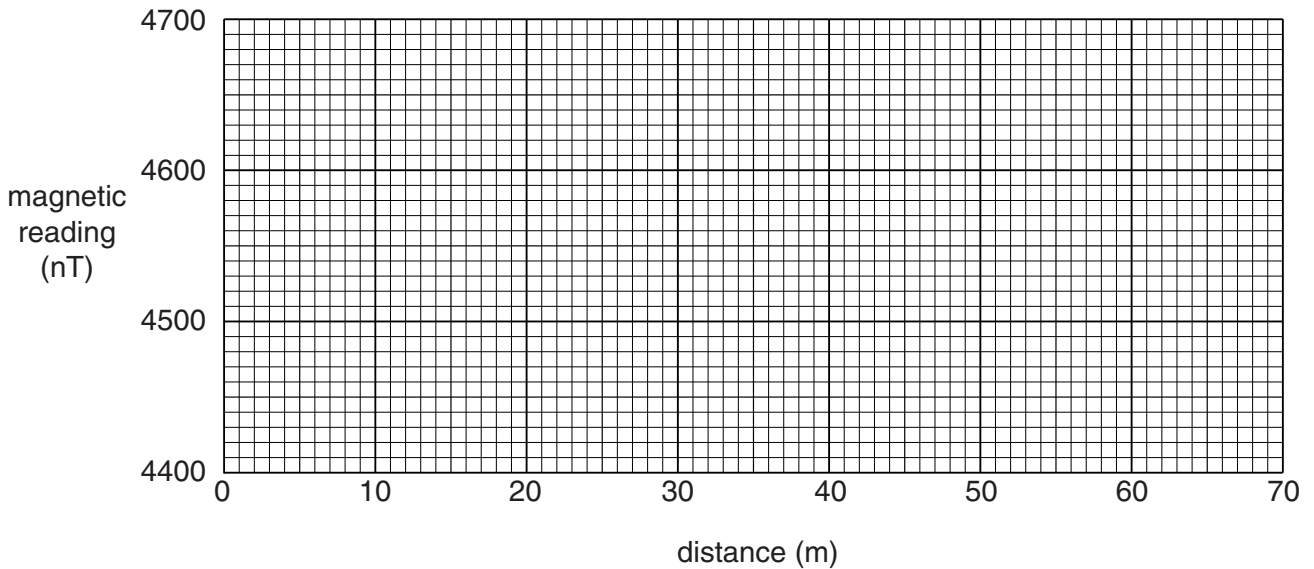
(i) Name the instrument that would have been used to carry out the magnetic survey.



In your answer, you should use the appropriate technical term, spelled correctly.

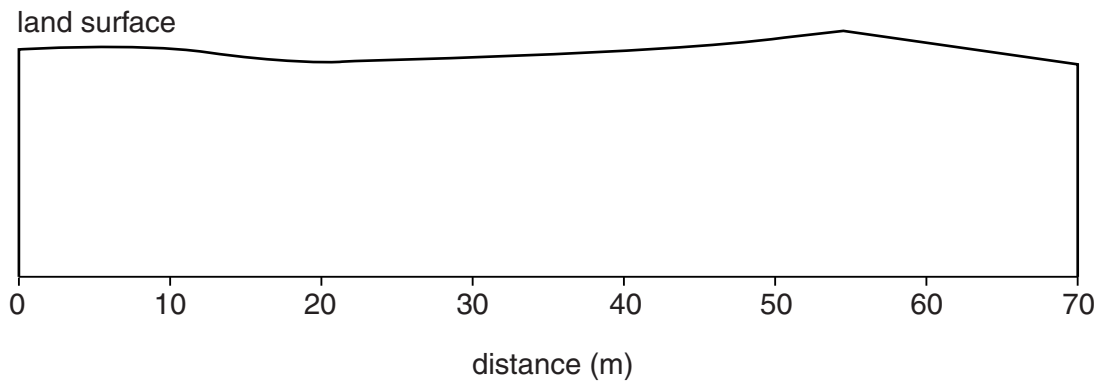
..... [1]

(ii) Plot the magnetic data on the grid below and complete the line graph. Draw and label a horizontal line to show the background reading of 4510 nT (nanoTeslas).



[2]

(iii) By interpreting the pattern on your graph, complete the sketch cross-section below to show the probable location of an igneous intrusion.



[1]

(iv) Suggest the likely rock that forms the intrusion. Explain your answer.

.....
..... [1]

(d) Describe and explain the formation of residual deposits.

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

[Total: 16]

ADDITIONAL ANSWER SPACE

If additional answer space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margins.

A large area of lined paper for writing answers. It features a vertical margin line on the left side and horizontal dotted lines for writing. The lines are evenly spaced and extend across the width of the page.

A large rectangular area with a solid vertical line on the left side and horizontal dotted lines extending across the page, providing a space for writing answers.



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