OCR
RECOGNISING ACHIEVEMENT

Tuesday 11 June 2013 – Afternoon

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

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Candidate forename		Candidate surname	

Centre number						Candidate number				

INSTRUCTIONS TO CANDIDATES

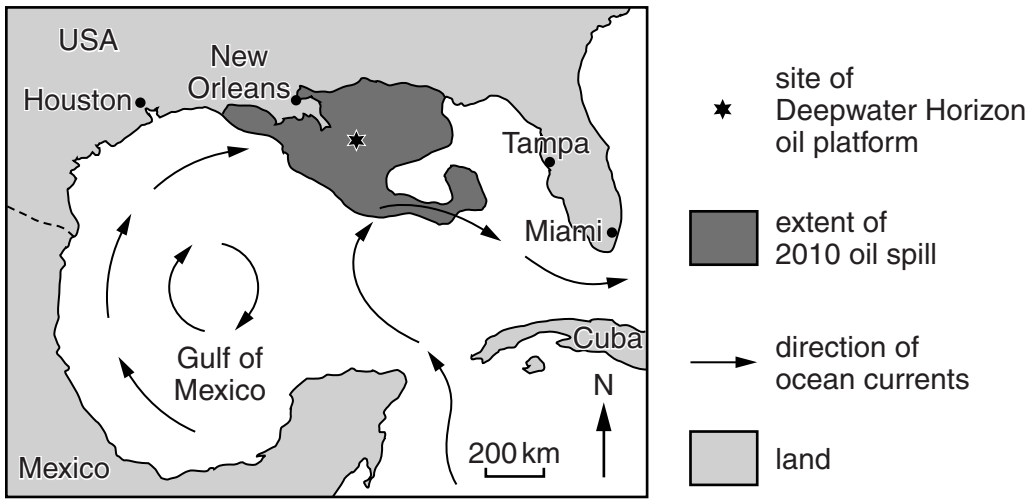
- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. If additional space is required, you should use the lined page 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 **12** pages. Any blank pages are indicated.

Answer **all** the questions.

1 The map below shows the Gulf of Mexico where there are economic quantities of oil. The extent of the 2010 Deepwater Horizon oil spill is shown.



(a) The oil is found mainly in sandstone reservoir rocks with evaporite cap rocks.

(i) Describe **two** properties of sandstone that make it a suitable reservoir rock for oil.

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.....

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

(ii) What property of evaporites makes them good cap rocks for oil?

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

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

(iii) Explain why gravity surveys can be used to locate evaporite cap rocks and salt dome traps.

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

(b) On April 20th 2010 there was a blowout on the Deepwater Horizon oil drilling platform resulting in a large oil spill in the Gulf of Mexico.

(i) Describe an oil blowout and explain its likely cause.

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

(ii) An estimated 2500 barrels of oil leaked into the Gulf of Mexico every hour and the oil spill lasted for 86 days. Calculate the total amount of oil spilled.

..... barrels **[1]**

(iii) 800 000 barrels of oil were captured by containment methods. What percentage of the total oil spilled is this? Give your answer to one decimal place.

..... % **[1]**

(c) Offshore oil spills are very damaging to the environment. Describe the likely environmental effects of:

(i) the light fraction of oil;

.....

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

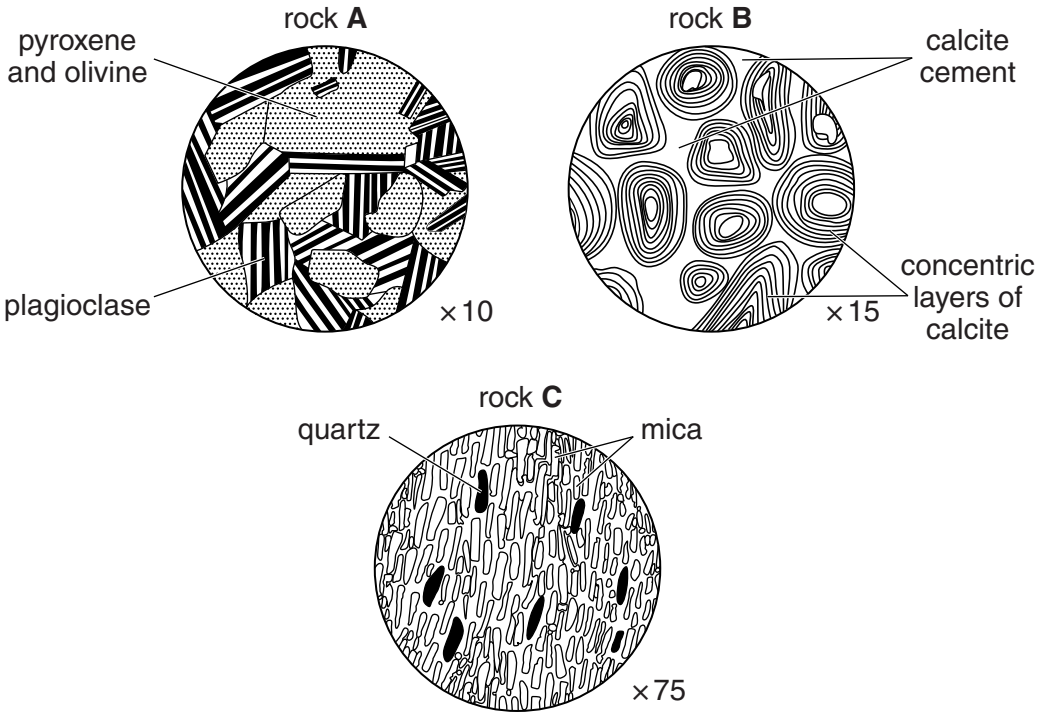
(ii) the heavy fraction of oil.

.....

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

[Total: 11]

2 The thin section diagrams below show three rocks that have economic uses.



(a) (i) Identify the rocks **A**, **B** and **C** shown above.

rock **A** ..... rock **B** .....

rock **C** ..... **[3]**

(ii) Assess the properties of rocks **A** and **B** to suggest an economic use for each. Give reasons for your answers.

use for rock **A** .....

reasons .....

.....

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

use for rock **B** .....

reasons .....

.....

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

(iii) Rock **C** is often used for roof tiles. Explain why it is suitable for this purpose.

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

(b) (i) Describe how industrial rocks and minerals can be extracted by quarrying.

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

(ii) What type of geological material is extracted by dredging?

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

(c) Explain **two** geological factors that can cause landslips.

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

[Total: 14]

3 **(a)** Explain the difference between the terms *ore mineral* and *gangue mineral*.

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

(b) Describe and explain how gravity settling can form ore deposits of iron.

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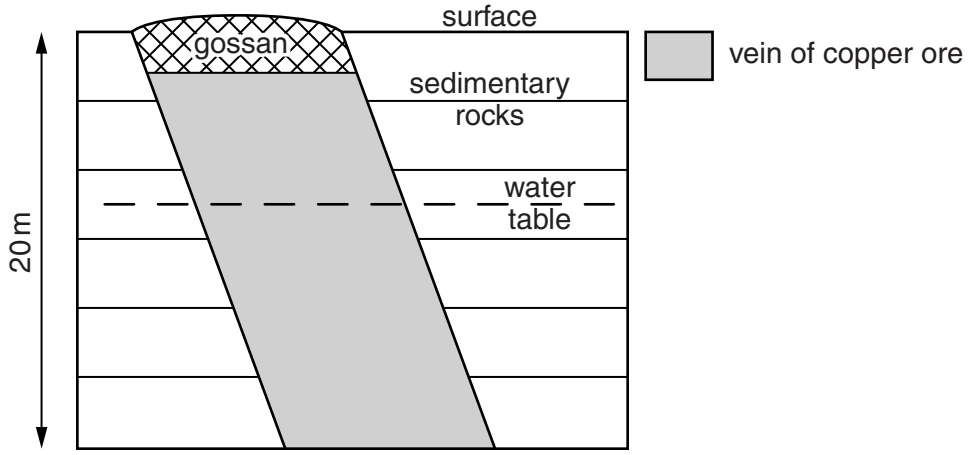
..... **[3]**

(c) The diagram below shows a cross section through a vein of copper ore that has undergone secondary enrichment.



(i) The primary ore has a grade of 0.5% copper. Mark and label on the cross section above:

- an area where the % of copper is $<$ 0.5%
- an area where the % of copper is $>$ 0.5%.

[1]

(ii) Describe the processes of oxidation and reduction that cause secondary enrichment of copper.

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

(d) Describe and explain how ore deposits of uranium form in sandstones.

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

(e) **(i)** Uranium is the energy source in nuclear power stations. Explain why nuclear energy is non-renewable.

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

(ii) Evaluate the suitability of granite as a rock in which to construct an underground repository for the safe storage of nuclear waste.

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

[Total: 13]

Question 4 begins on page 8

4 **(a)** Complete the table below to show the characteristics of different ranks of coal.

	Lignite	Bituminous Coal	Anthracite
Colour		black	black
Appearance	dull, with plant fragments	dull and shiny layers	
Density (g/cm^3)	0.8		1.5

[3]

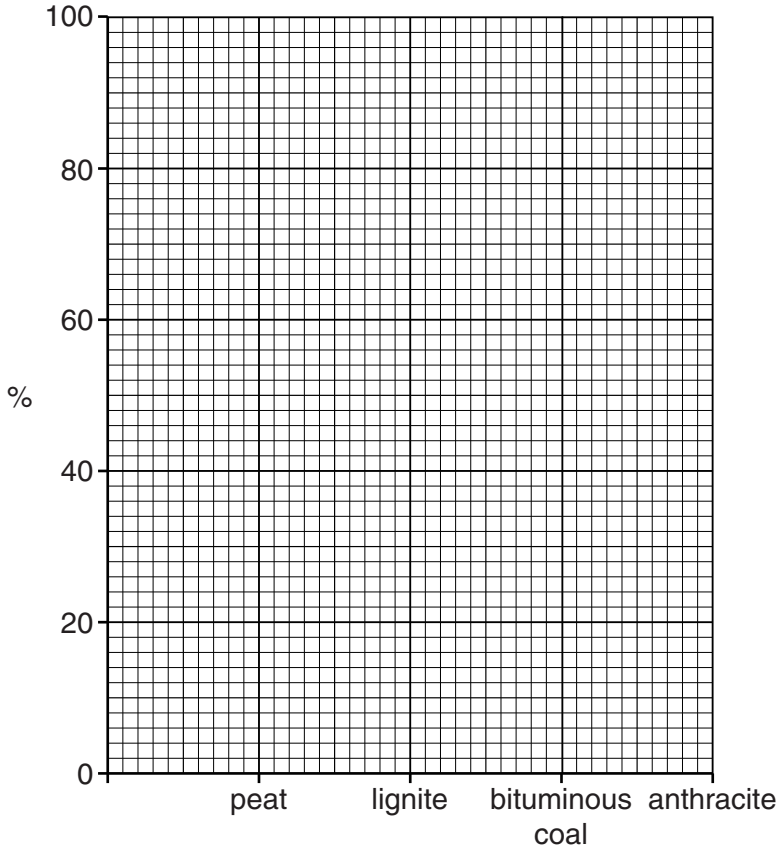
(b) The table below shows the average chemical compositions of different ranks of carbonaceous deposits.

	Peat	Lignite	Bituminous Coal	Anthracite
Carbon (%)	53	71	84	93
Hydrogen (%)	8	7	6	3
Nitrogen (%)	2	1	1	1
Oxygen (%)	37	21	9	3

(i) On the grid below, plot values and draw lines to show the changes in:

- carbon content
- total volatile content.

Label each line.



[2]

(ii) Describe and explain the process responsible for these changes in composition.

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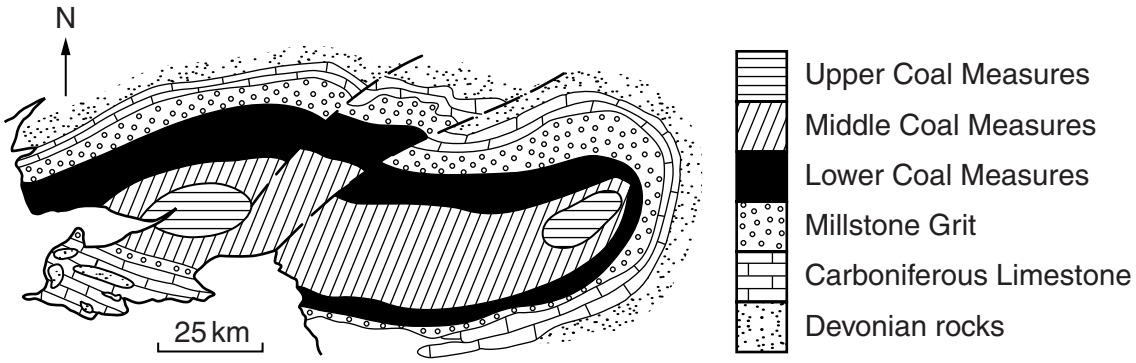
..... **[2]**

(c) The map below shows the geology of the South Wales coalfield.



(i) Parts of the South Wales coalfield are exposed and parts are concealed. Explain the difference between an exposed and a concealed coalfield.

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

(ii) The coal occurs in repeated deltaic sequences. What name is given to these repeated sedimentary sequences?

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

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

(iii) Draw and label a simplified north-south cross section diagram to show the broad structure of the South Wales coalfield.

[2]

(iv) Coal production from the South Wales coalfield has been disrupted by faulting. Draw a labelled cross section diagram to show how a **reverse** fault could disrupt coal production.

[2]

[Total: 14]

5 Describe the geological conditions leading to the formation of springs as a result of lithology, faults and unconformities.

Diagrams are essential to illustrate your answer.

..... **[8]**

[Total: 8]

END OF QUESTION PAPER

ADDITIONAL ANSWER SPACE

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