

Candidate Name	Centre Number	Candidate Number

WELSH JOINT EDUCATION COMMITTEE
General Certificate of Education
Advanced/Subsidiary Advanced



CYD-BWYLLGOR ADDYSG CYMRU
Tystysgrif Addysg Gyffredinol
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451/01

GEOLOGY – GL1

Foundation Unit

P.M. THURSDAY, 24 May 2007

(1 hour)

	Examiner only.
Question 1	
Question 2	
Question 3	
Question 4	
Total	60

ADDITIONAL MATERIALS

In addition to this examination paper, you will need a copy of the Mineral Data Sheet.

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions 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.

You are reminded that marking will take into account the use of examples and the quality of communication used in your answers.

No certificate will be awarded to a candidate detected in any unfair practice during the examination.

GL1. FOUNDATION GEOLOGY

Answer **all** questions.

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1. **Figure 1a** shows the structure of the oceanic crust of the Atlantic Ocean at locality **A** on the map **Figure 1b**. Layers **Q**, **R** and **S** were formed by basaltic magmatism at an oceanic spreading centre.

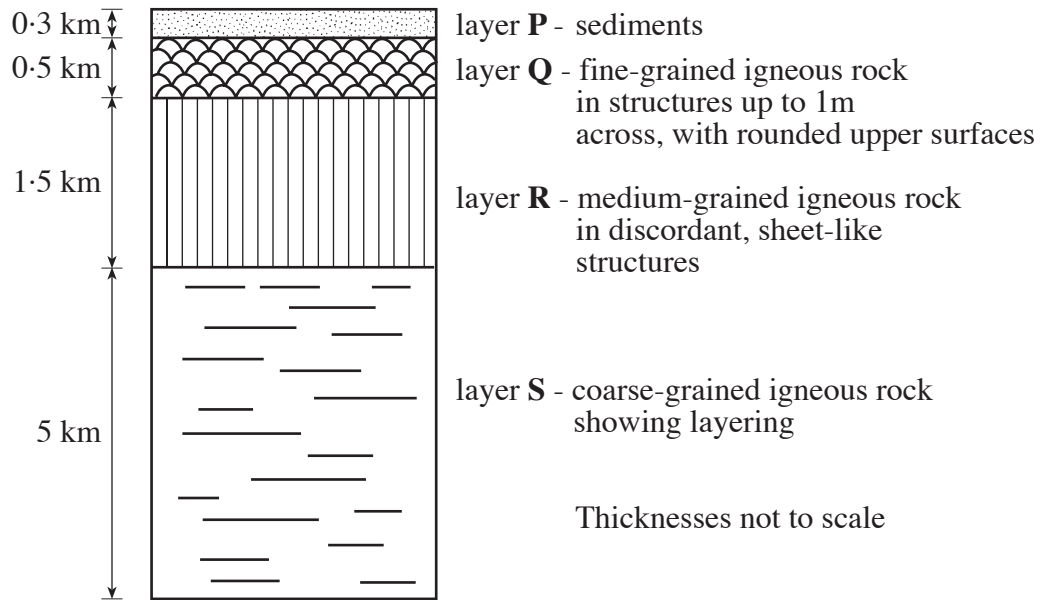


Figure 1a

- (a) (i) Complete **Table 1** by identifying the rock types and naming the structures of the oceanic crust described in **Figure 1a**. [4]

Layer of oceanic crust	Rock type	Name of igneous structure
Q	Basalt	•
R	•	•
S	•	

Table 1

- (ii) Name **two** minerals most likely to be found in the igneous rocks making up the oceanic crust. [2]

Mineral 1

Mineral 2

- (iii) Explain why the igneous rock layers **Q**, **R** and **S** in **Figure 1a** contain crystals of different sizes. [2]

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- (b) (i) Explain how the rounded structures in the basalt of layer **Q** in **Figure 1a** formed. [2]

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- (ii) The magma from which the basalt crystallised originated beneath the oceanic crust. Describe how this magma might have formed. [3]

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- (c) The thickness of the sediments forming layer **P** varies across the Atlantic Ocean. The relative thickness of layer **P** at locality **A** on **Figure 1b** is plotted on the graph, **Figure 1c**.

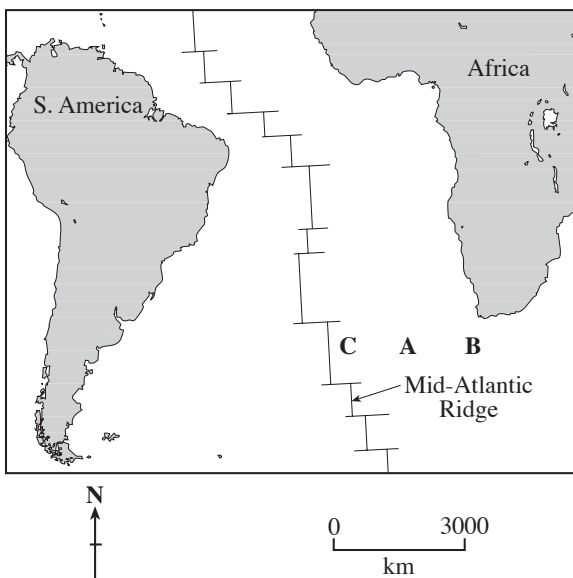


Figure 1b

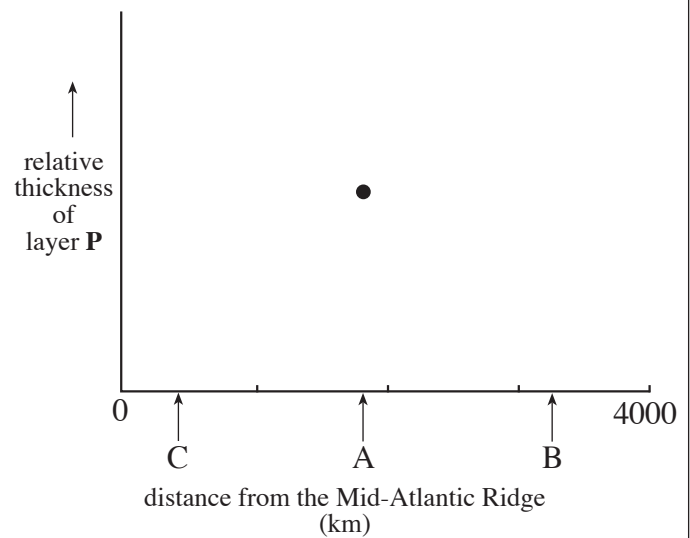


Figure 1c

- (i) Plot onto **Figure 1c** the relative thickness of layer **P** at localities **B** and **C** shown on **Figure 1b**. [1]
- (ii) Explain the variation in thickness of layer **P** which you have shown in **Figure 1c**. [3]

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[Total 17 marks]

Turn over.

2. **Figure 2** shows the geology of a cliff section.

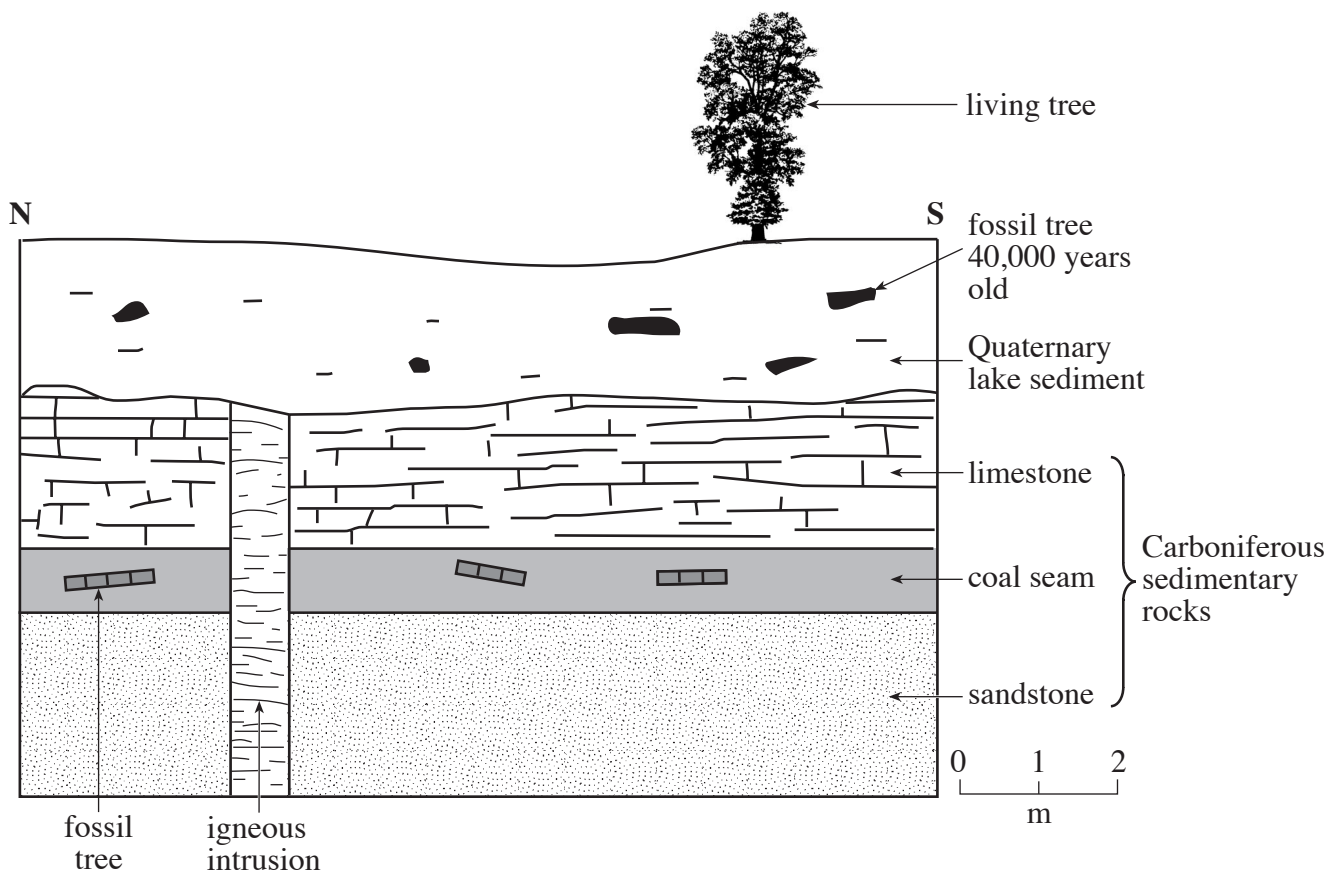


Figure 2

(a) Geological materials can be dated to give a relative age and/or an absolute age.

(i) State what is meant by the term *relative age*.

[1]

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(ii) State the relative age of the igneous intrusion shown in **Figure 2**. Give reasons for your answer.

[2]

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(b) ^{14}C dating makes use of the ratio of ^{14}C to non-radioactive carbon. While an organism is alive, the ratio in the organism remains the same as the ratio in the atmosphere. However, once an organism dies, the ratio in the organism steadily changes compared with that in the atmosphere. This change is used to calculate the date when the organism died.

(i) Suggest why the ratio of ^{14}C to non-radioactive carbon in the **living** tree remains the same as in the atmosphere.

[1]

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- (ii) Describe how the amount of ^{14}C changes in a tree **fossil** over time. Give a reason for your answer. [3]

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- (iii) The half life of ^{14}C is 5730 years. Complete **Table 2** to indicate how suitable ^{14}C dating is for determining the age of the geological features shown in **Figure 2**. Give reasons for your answers. [6]

Geological feature	Suitable for dating by ^{14}C method. Yes/No	Reason(s)
the 40,000 year old fossil tree in the Quaternary sediment		• •
the fossil trees in Carboniferous sedimentary rock		•
the igneous intrusion		•

Table 2

[Total 13 marks]

3. **Figure 3a** shows a specimen of rock **J** collected from the solid geology within the area shown on the geology map, **Figure 3b**.

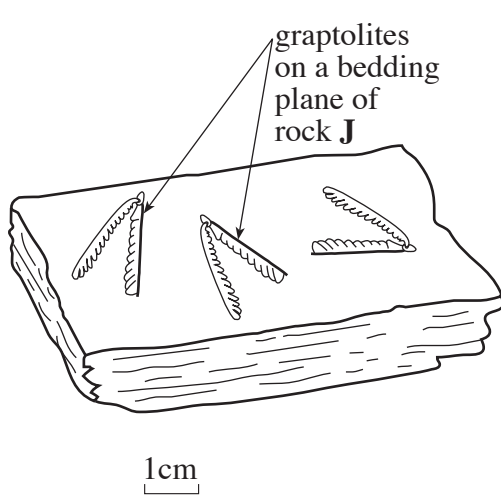


Figure 3a

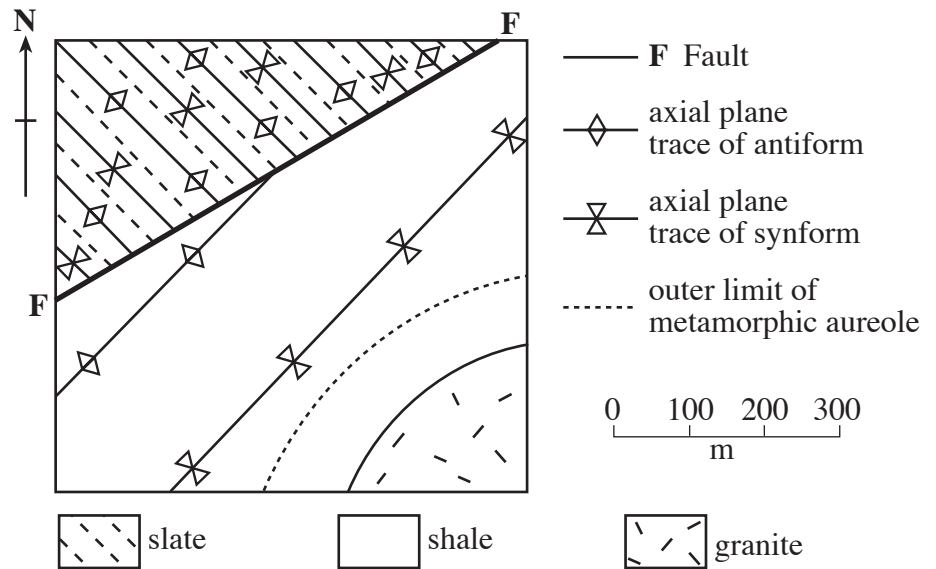


Figure 3b

- (a) Mark on **Figure 3b**, (using the label **J** →), a possible location from which rock **J** in **Figure 3a** was collected. [1]
- (b) With reference to **Figure 3b**, describe how the slate formed. [3]

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- (c) Refer to **Figure 3b**.

- (i) State **two** differences between the folding in the slate and the folding in the shale. [2]

1.

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2.

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- (ii) State the strike directions of the foliation that would be found in the **slate**. [1]

Strike directions

- (d) Using evidence from **Figure 3b**, state which side of the fault (Northwest or Southeast) is more likely to be the downthrow side. Explain your answer. [2]

Downthrow side

Explanation

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- (e) Describe **one** fold or fault formed as a result of tectonic stress. Name the type of stress involved in its formation.

You may wish to make specific reference to your fieldwork (or other example you have studied) and illustrate your answer with a labelled diagram(s). [5]

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[Total 14 marks]

4. **Figure 4** shows a reconstruction of a past marine environment.

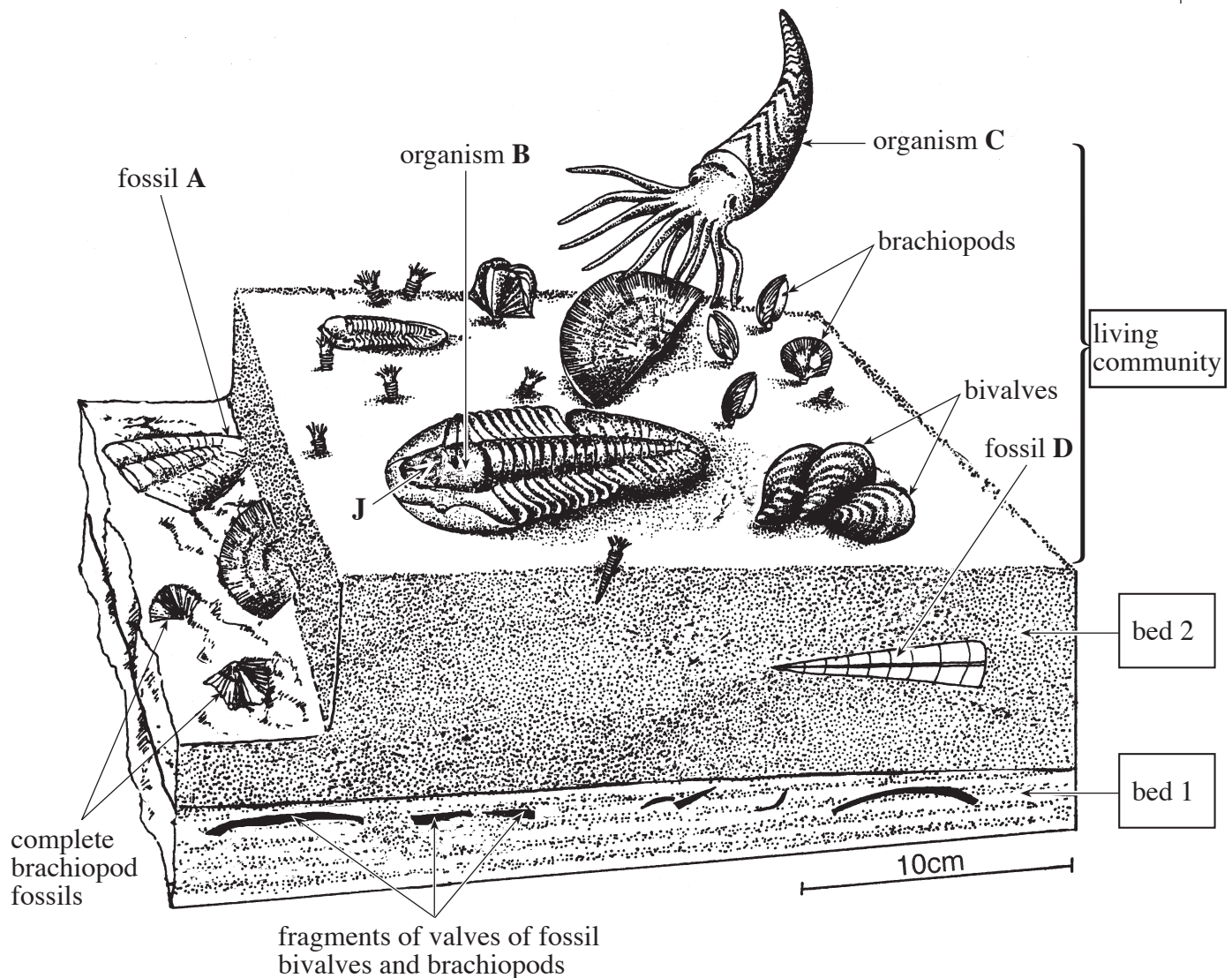


Figure 4

(a) Refer to **Figure 4**.

(i) Name the fossil group to which fossil A belongs.

[1]

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(ii) Name the feature labelled **J** on the cephalon of organism B.

[1]

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(b) Using evidence from **Figure 4**, and/or your knowledge, state **two** ways by which brachiopods could be distinguished from bivalves.

[2]

1.

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2.

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- (c) An organism of type **C** is represented in the fossil record as fossil **D**. Explain why not all the parts of organism **C** are preserved in fossil **D**. [2]

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- (d) Fossil brachiopod valves may be composed of quartz, although during life they would have been composed of calcite. Explain how the composition of the valves may have changed during fossilisation. [3]

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- (e) The fossils in **bed 1** are part of a *death assemblage*.

- (i) Explain what is meant by a *death assemblage*. [2]

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- (ii) Describe the evidence for **bed 1** containing a *death assemblage*. [2]

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- (iii) The brachiopods in **bed 2** are preserved complete, unlike those in **bed 1**. Explain what this suggests about how and why conditions may have changed as the beds were deposited. [3]

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[Total 16 marks]

