

Surname	Centre Number	Candidate Number
Other Names		0



GCE AS/A level

1212/01

GEOLOGY - GL2α Investigative Geology

A.M. WEDNESDAY, 1 May 2013

1½ hours

		Examiner only
1.	10	
2.	6	
3.	12	
4.	14	
5.	13	
6.	5	
Total	60	

ADDITIONAL MATERIALS

In addition to this examination paper, you will need:

- the Resource Sheet;
- Specimens **A**, **C** and **H**;
- geological equipment for testing specimens;
- the Mineral Data Sheet.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Answer **all** questions. Questions 1-4 may be completed in any order.

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

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

The geology is **not** designed to represent any particular area.

The Mineral Data Sheet and **Map 1** and **Photographs 1** to **3** are provided on separate resource sheets.

These are **not** required by the Examiner.

Strips of plain paper may be obtained from the Supervisor on request.

The strips are **not** required by the examiner.

Three specimens, **A**, **C** and **H**, are provided for use.

All may be tested with the equipment specified by the Supervisor.

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

Marking will take into account the quality of communication used in your answers.

Answer **ALL** the questions in the spaces provided.

Study **Map 1** on the Resource Sheet carefully before answering **Questions 1-6**.

1. **Specimen A** is representative of **Rock Unit A** in the west of **Map 1**.

- (a) Complete **Figure 1** by drawing to scale the texture of **specimen A**. Add a scale to your drawing. [4]

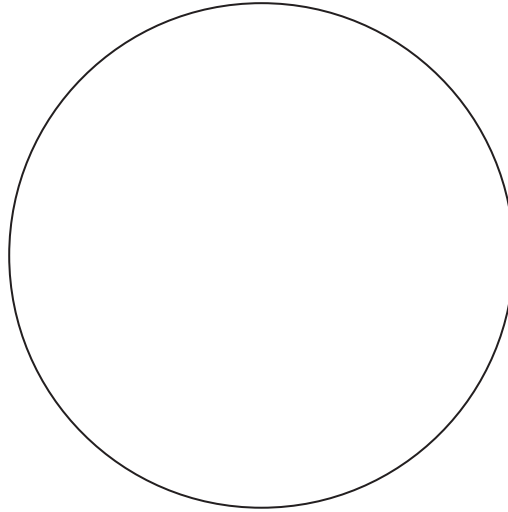


Figure 1

- (b) It has been suggested that **Rock Unit A** is a pluton.

- (i) Complete **Table 1a** by describing **one** piece of evidence from **Map 1** and **one** piece of evidence from the texture of the groundmass of **Specimen A** which could support the statement that **Rock Unit A** is pluton. [2]

	Evidence
Map 1	•
Texture of the groundmass of Specimen A	•

Table 1a

- (ii) Using evidence from the **composition** of **Specimen A** evaluate the statement “**Rock Unit A is gabbro**”. Complete **Table 1b** with your evaluation and state your evidence. [1]

Statement	Evaluation (true/false)	Evidence from the composition of Specimen A
“ Rock Unit A is gabbro ”	•	•

Table 1b

- (c) The list below contains statements about the origin of the texture of **Specimen A**. Tick in the boxes, the **three** statements which best apply to **Specimen A**. [3]

Tick (✓) only
three boxes

- *It formed by cooling at a constant rate*
- *It formed by cooling slowly*
- *It formed by eruption at the Earth’s surface*
- *It formed by deposition in a high energy sedimentary environment*
- *It formed by cooling at two different rates*
- *It formed by cooling rapidly*
- *It formed by regional metamorphism*
- *It formed by cooling beneath the Earth’s surface*
- *It formed by contact metamorphism*

2. **Photograph 1** on page 4 of the Resource Sheet is a fossil.

- (a) (i) Complete **Figure 2** below by drawing the fossil shown in **Photograph 1** using the scale provided. [4]

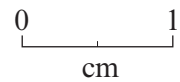
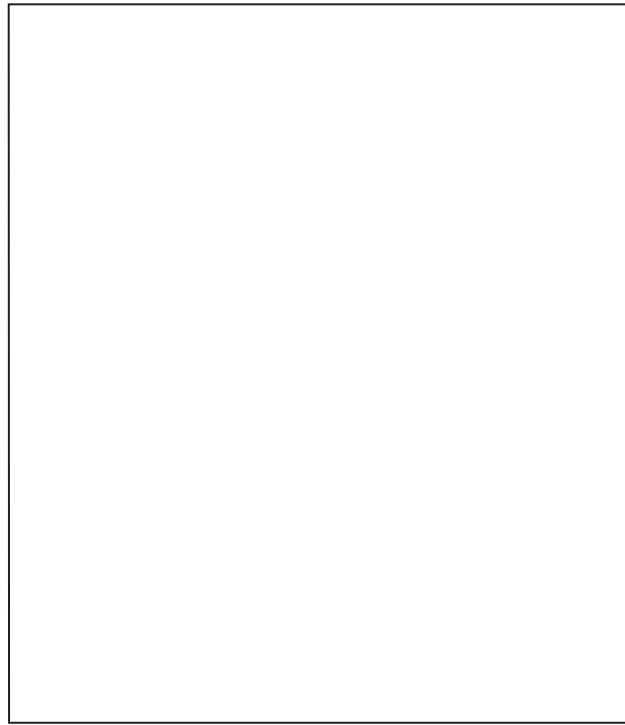


Figure 2

- (ii) The list below contains descriptions of shells. Tick (✓) **one** of the boxes alongside the statements to indicate which **one** of the descriptions best applies to the fossil in **Photograph 1**. [1]

A shell comprising:

- a single valve
- 2 valves of equal size
- 2 valves of unequal size
- a coiled and chambered shell

- (b) Identify the fossil group to which the fossil in **Photograph 1** belongs. [1]

.....

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3. Two specimens were collected from **Rock Unit C**. **Specimen C** was collected from **Locality I** on **Map 1** and is representative of **Rock Unit C**. **Figure 3** is a drawing of the texture of a specimen of marble collected from **Rock Unit C** at **Locality II** on **Map 1**.

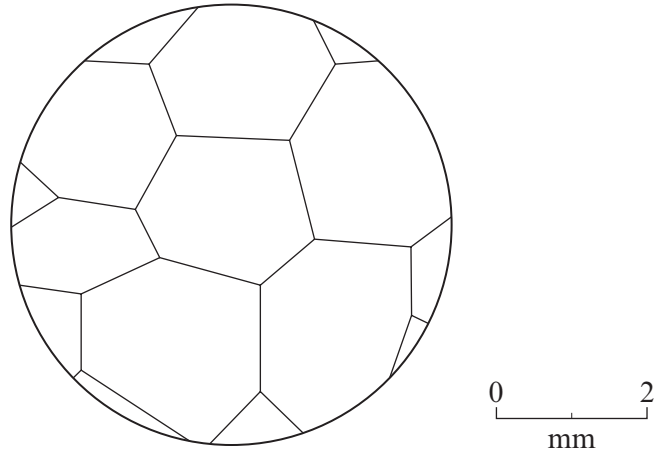


Figure 3

- (a) Complete **Table 3a** using evidence from **Specimen C** and **Figure 3**. For **Specimen C** you must refer to a diagnostic test using the equipment provided by the supervisor. [6]

	Evidence from Specimen C Locality I	Evidence from Figure 3 Locality II
Crystalline texture (yes/no)	<ul style="list-style-type: none"> No 	<ul style="list-style-type: none">
Mean size of grains/crystals (mm)	<ul style="list-style-type: none"> 	<ul style="list-style-type: none">
Composition	Test and result <ul style="list-style-type: none"> Conclusion/composition <ul style="list-style-type: none"> 	Composed of calcium carbonate
Name of rock	<ul style="list-style-type: none"> 	Marble

Table 3a

- (b) **Rock Unit D** on **Map 1** is igneous. Explain how the presence of marble at **Locality II** on **Map 1** indicates that **Rock Unit D** is igneous. [2]

Explanation

.....

.....

- (c) **Photograph 2** on page 4 of the Resource Sheet shows structures in **Rock Unit D** at **Locality III** on **Map 1**.
A student has concluded that on the evidence of **Map 1** and **Photograph 2**, "**Rock Unit D is a sill**".

- (i) Complete **Table 3b** by indicating in the evaluation column whether the student's conclusion that "**Rock Unit D is a sill**" could be true or false and by explaining the piece of evidence indicated. [3]

Evidence	Evaluation (true/false)	Explanation
The outcrop pattern of Rock Unit D on Map 1	•	•
The presence of the structures in Rock Unit D (Photograph 2)	•	•
The rocks at Locality I and II on Map 1	•	•

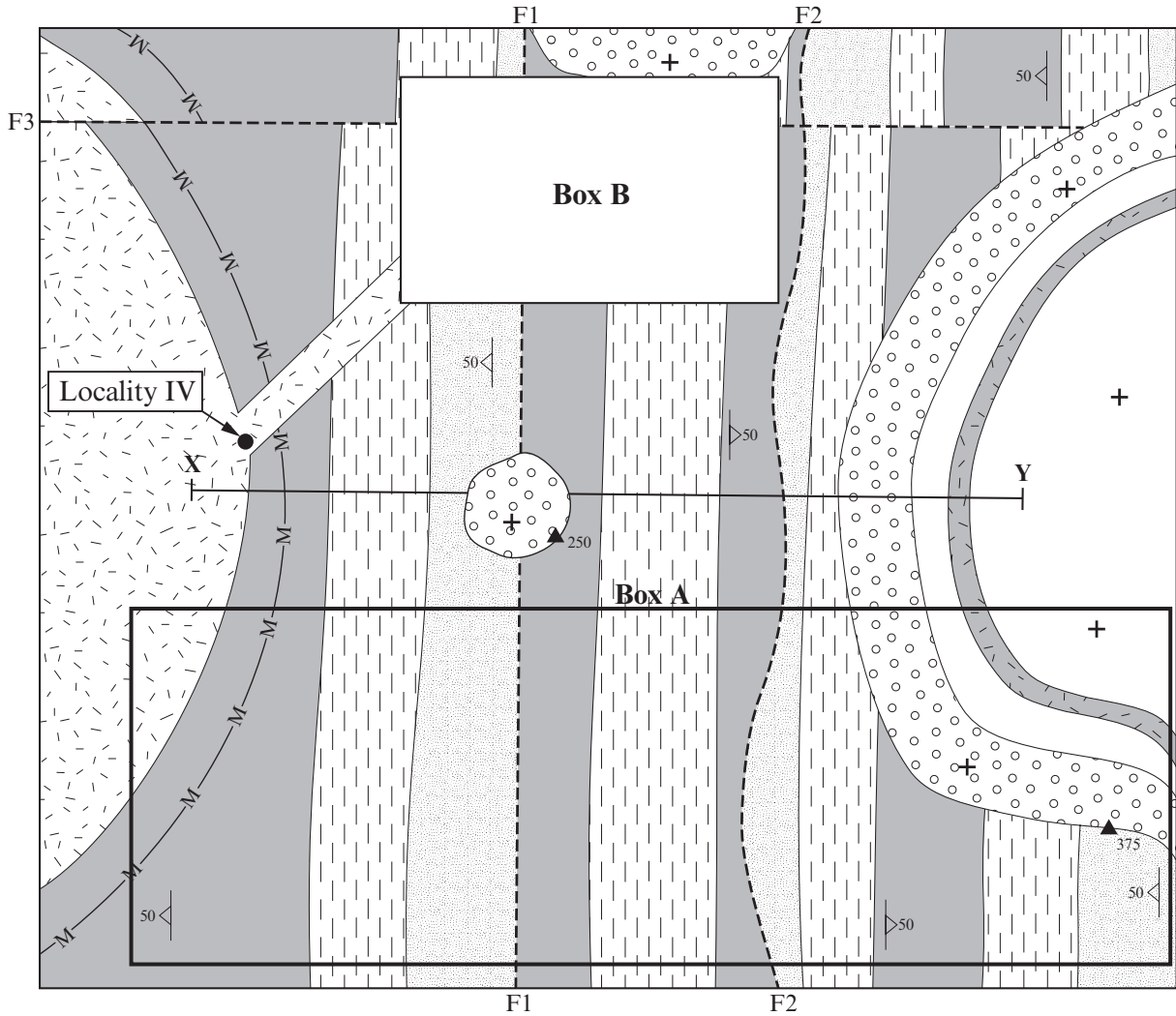
Table 3b

- (ii) Identify the igneous body (sill, dyke or lava flow) formed by **Rock Unit D**. Tick (✓) **one** of the boxes below. [1]

Sill Dyke Lava flow

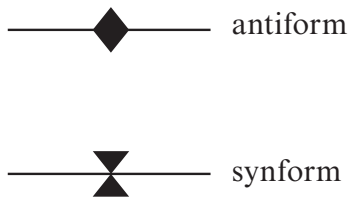
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4. **Map 2** below is a reduction of **Map 1**. The key for the Rock Units is the same as for **Map 1**.



Map 2

- (a) Clearly draw and label within **Box A** on **Map 2** the axial plane traces (APT) of an **antiform** and a **synform**.
Label them as appropriate with the following symbols. [2]



- (b) With reference to **Rock Unit G** on **Map 1**, calculate the throw of **Fault F2**.
Show your working. [2]

..... metres

(c) With reference to Map 1 tick **one** of the boxes below to state the relative ages of **Faults F1** and **F2**. Give a reason for your answer. [2]

Tick (✓) only **one** box

Fault F1 is older than **Fault F2**

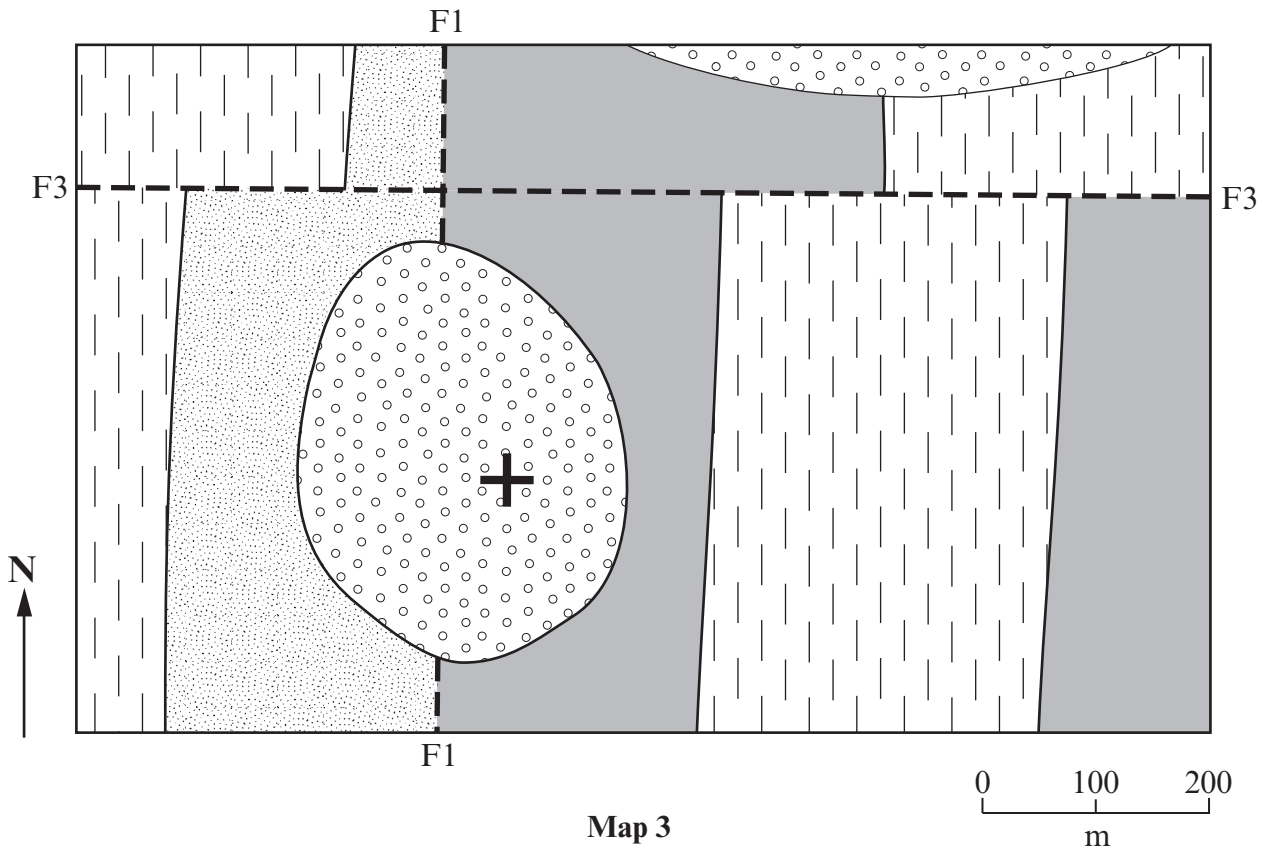
Fault F1 is younger than **Fault F2**

Fault F1 and **Fault F2** are the same age

Reason

.....

.....



(d) Map 3 shows the geology in the blank area (**Box B**) on Map 2. Map 2 shows part of a dyke emerging from the pluton at **Locality IV**. Clearly draw and label on Map 3 the continuation of this dyke which:

- has a NE–SW strike
- is 100 m wide
- is older than **Rock Unit G**
- is older than **Fault F3**

[4]

(e) Mineral **Specimen H** was found in a mineral vein associated with **Fault F1**.

(i) Complete **Table 4** by

- stating the result of the test/observation described,
 - describing **one other** test/observation which is a **useful** property for diagnosis and stating the result.
- [3]

Description of test/observation	Result of the test/observation described
<ul style="list-style-type: none"> • Scratch the mineral with a steel pin 	<ul style="list-style-type: none"> •
<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> •

Table 4

(ii) Identify mineral **Specimen H**.

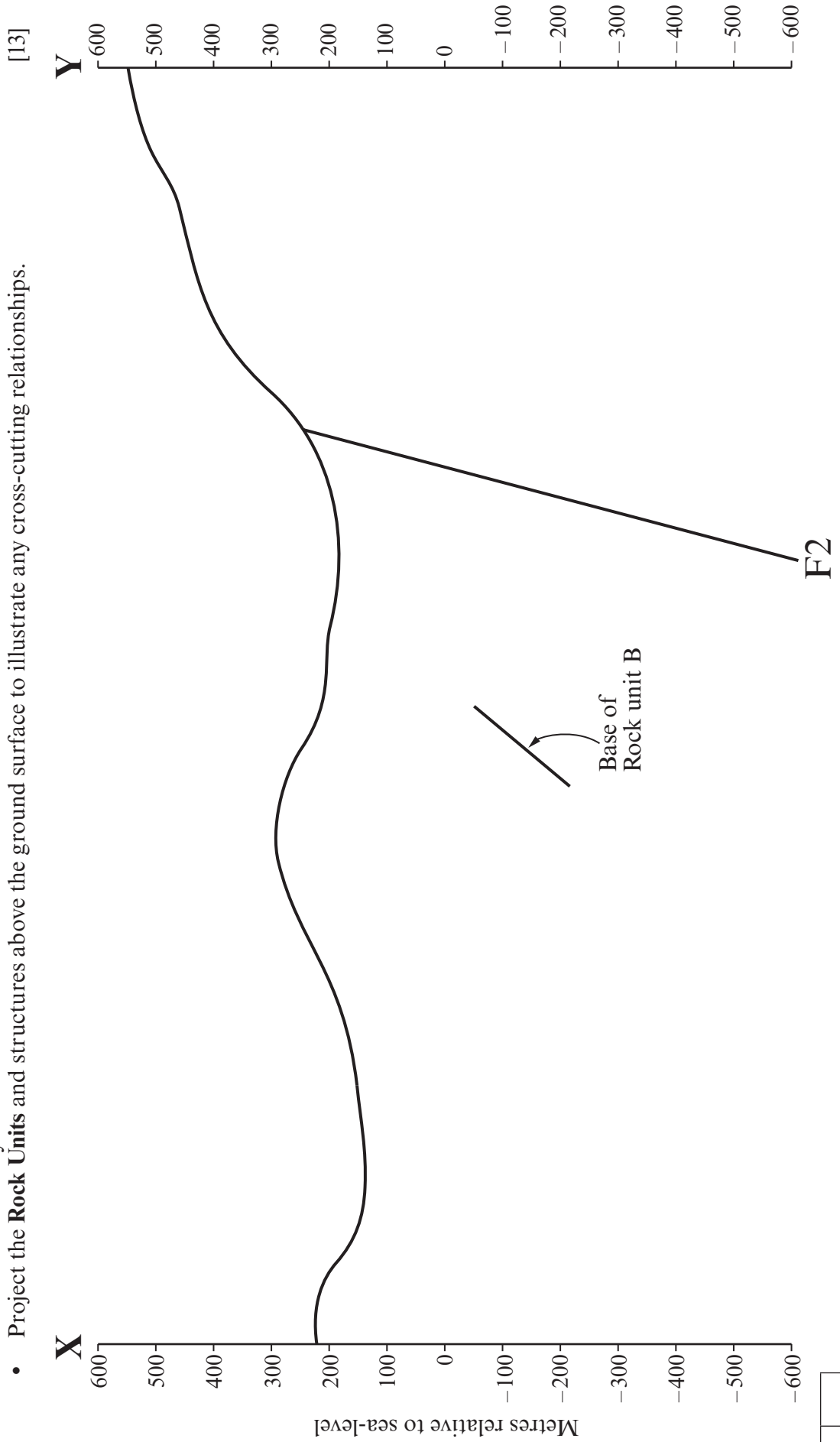
[1]

Name of mineral Specimen H

5. The topographic profile below was taken along line X-Y on Map 1. Part of the base of **Rock Unit B** and **Fault F2** have been inserted.

Complete the sketch of the geological cross-section along this line using Map 1.

- Draw the **Rock Units**. Use similar ornament or letters for these as on Map 1.
- Draw and label any **faults** using the letters on Map 1, drawing arrows to show movement.
- Draw and label any **fold axes**.
- Project the **Rock Units** and structures above the ground surface to illustrate any cross-cutting relationships.



6. Features of igneous or sedimentary rocks can be used as way up criteria.

Using an annotated diagram(s)

- Name **one** feature of an igneous or sedimentary rock which can be used as a way up criterion
- Show **how** your chosen feature can be used to determine the way up
- **Explain** the **origin** of your chosen feature

Credit will only be awarded to answers which relate to **one** of the following. Tick (✓) **one** box to indicate your choice.

- Your fieldwork observation of **one** rock exposure
- **Photograph 2** (on page 4 of the Resource Sheet) which is representative of **Rock Unit D** on **Map 1**
- **Photograph 3** (on page 4 of the Resource Sheet) which is representative of **Rock Unit E** on **Map 1**

An annotated diagram(s) will be expected in your answer.

[5]

Photograph 1 For use in Question 2



Photograph 2 For use in Questions 3 and 6

Taken at **Locality III** on **Map 1** looking east



© Colin Vosper

Photograph 3 For use in Question 6

Taken at **Locality V** on **Map 1** looking west



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(1212-01B)



GCE AS/A level

1212/01-B

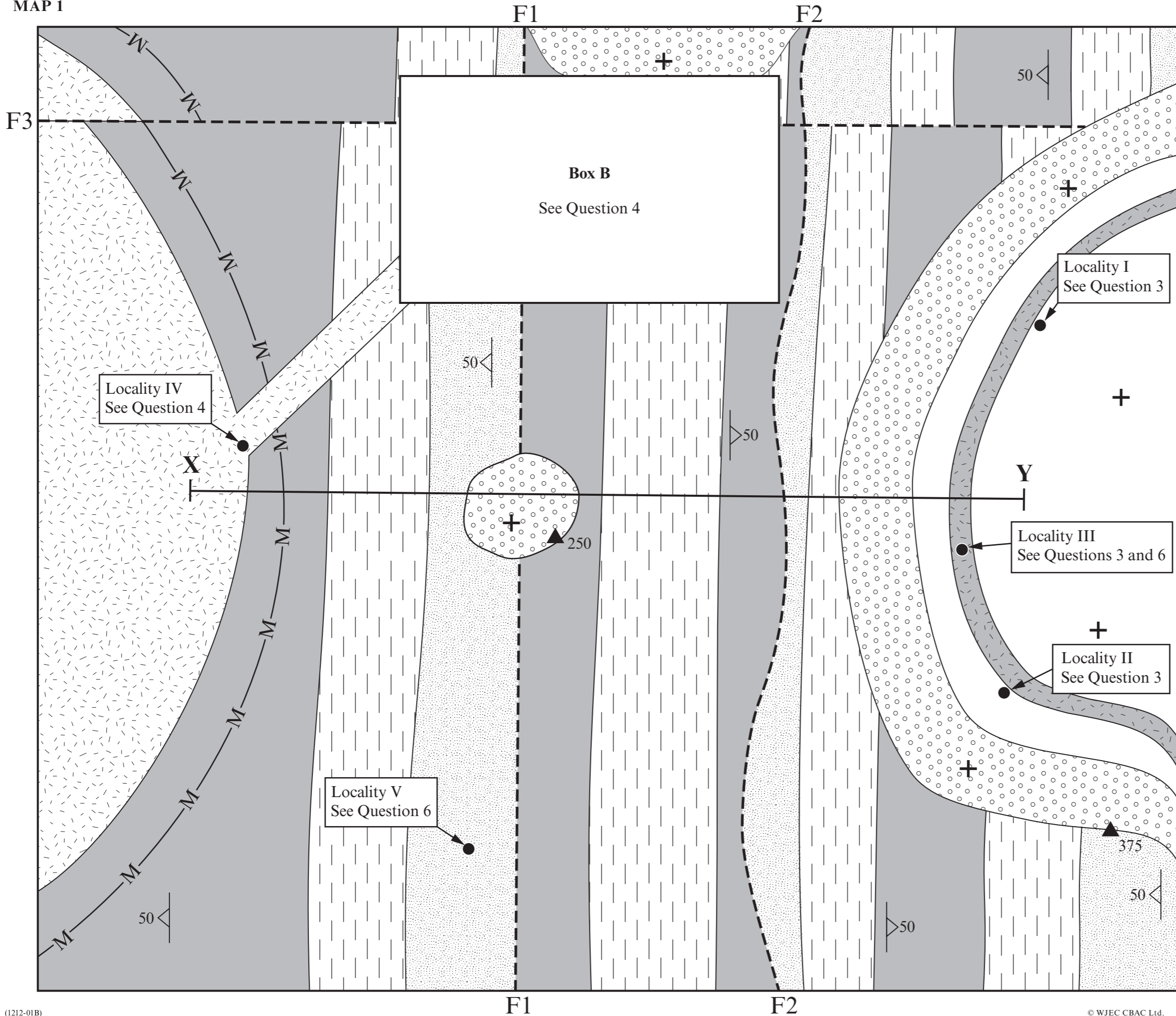
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Investigative Geology
RESOURCE SHEET

A.M. WEDNESDAY, 1 May 2013





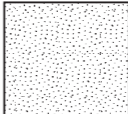
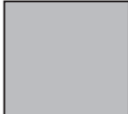
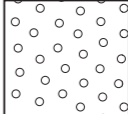

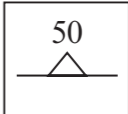

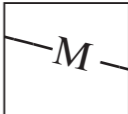
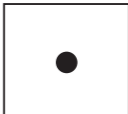

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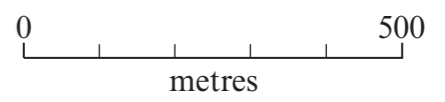
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The rock units are not in order of age. Their ornament is not necessarily representative of rock type.

-  Rock Unit A (Specimen A)
-  Rock Unit B
-  Rock Unit C (Specimen C)
-  Rock Unit D (Photograph 2)
-  Rock Unit E (Photograph 3)
-  Rock Unit F
-  Rock Unit G
-  Fault
-  50 Dip of bed
-  + Horizontal bed
-  M Limit of metamorphic aureole
-  • Locality numbers
-  ▲ Spot Height (metres above sea level)



Turn over.