

Candidate Name	Centre Number	Candidate Number
		2



GCE AS/A level

1212/01

New AS

GEOLOGY - GL2α **Investigative Geology**

A.M. TUESDAY, 12 May 2009

1½ hours

ADDITIONAL MATERIALS

In addition to this examination paper, you will need:

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

For Examiner's Use Only	
Question 1	9
2	15
3	9
4	12
5	9
6	6
Total	60

INSTRUCTIONS TO CANDIDATES

Answer **all** questions. Questions 1-3 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 5** 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 **D** 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 sub-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. (a) It is suggested that the outcrop of **Rock Unit A**, in the south west of **Map 1**, is part of an intrusion.
- (i) Complete **Table 1** below by describing **one** piece of evidence from each of **Map 1** and **Photograph 1** (on page 4 of the Resource Sheet) to support the statement that it is an intrusion. [2]

Map 1	•
Photograph 1 taken at Locality I on Map 1	•

Table 1

- (ii) Complete **Table 2** below by describing and explaining **one** piece of evidence from **Specimen A** to support the statement that it is an intrusion. [2]

Specimen A collected from Locality II on Map 1	Description •
	Explanation •

Table 2

(b) The outcrop of **Rock Unit A** changes its trend at **Locality III** on **Map 1**.

(i) Give one reason why there is a change in trend. [1]

.....

(ii) Suggest how this change in trend can be used as evidence for the relative age of **Rock Unit A** at this locality. [1]

.....

(c) Exposures of **Rock Unit B** were studied along the transect line from **K** to **L** on **Map 1**. **Rock Unit B** at **K** is a shale.

The list below contains statements about possible changes seen in the exposures from **K** to **L**.

Tick, in the boxes below, the **three** changes you would predict to occur along the transect from **K** to **L**. [3]

• <i>the rock texture becomes finer</i>	<input type="checkbox"/>
• <i>the rock texture changes from clastic to crystalline</i>	<input type="checkbox"/>
• <i>the textural changes are sudden</i>	<input type="checkbox"/>
• <i>the rock texture shows greater foliation</i>	<input type="checkbox"/>
• <i>the rock texture becomes coarser</i>	<input type="checkbox"/>
• <i>the bedding becomes more obvious</i>	<input type="checkbox"/>
• <i>the rock texture changes from crystalline to clastic</i>	<input type="checkbox"/>
• <i>the textural changes are gradual</i>	<input type="checkbox"/>
• <i>there is increasing mineral alignment</i>	<input type="checkbox"/>

Tick only
three boxes

Total 9 marks

2. **Rock Units C, D and E on Map 1** were deposited
“in a desert environment by fluvial and/or aeolian processes”.

Figure 1 is a simplified sedimentary (graphic) log which was drawn following a survey along transect line **M** to **N** on **Map 1**. The log indicates where **Specimens C** and **D** were collected, as well as where **Photographs 2–4** were taken.

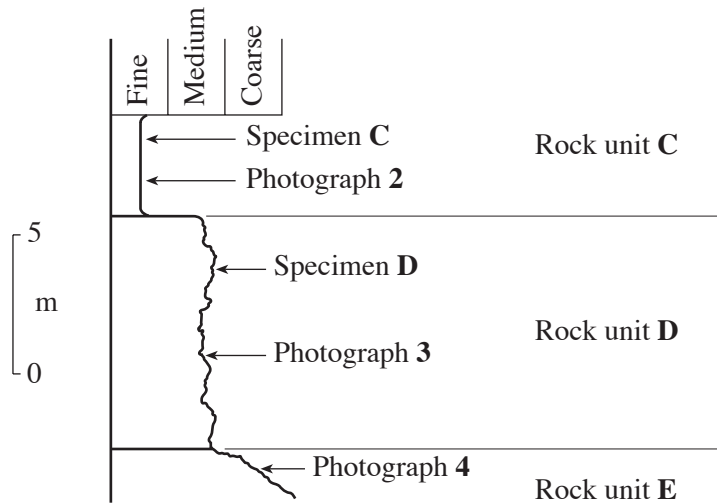


Figure 1

- (a) **Rock Unit C** contains beds of a non-metallic mineral. **Specimen C** was collected from one such bed.

Complete **Table 3** below, by describing **two** tests or observations for different physical properties of **Specimen C**, and the results of these tests. You must use the equipment specified by the supervisor. One of the tests must give a result which is useful for diagnosis. Give the name of **Specimen C**. [5]

	Description of test	Result of test
Test/observation 1	•	•
Test/observation 2	•	•
Name of Specimen C	•	

Table 3

- (b) Measure the distance between the boundaries of **Rock Unit D** along both the transect line **M** to **N** on **Map 1** and on **Figure 1**. Explain any differences in your measurements. [4]

Map 1 m **Figure 1** m

Explanation

.....

.....

.....

.....

.....

- (c) Use a hand lens to study **Specimen D**. Complete **Figure 2** below, by drawing, to scale, the texture of **Specimen D**. [3]

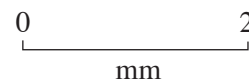
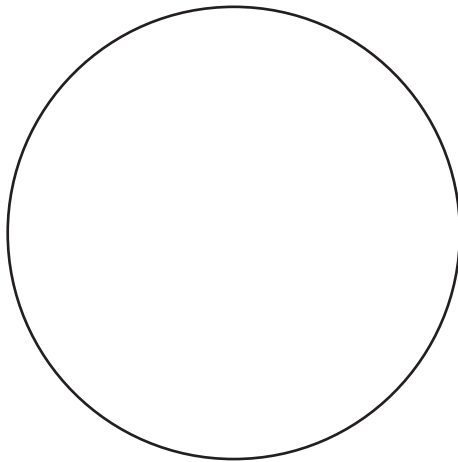


Figure 2

- (d) **Photographs 2–4** on the Resource sheet are representative of **Rock Units C, D and E**. Complete **Table 4** below, indicating in the evaluation column whether each of the statements relating to the **Rock Units** is true or false, by discussing **one** piece of evidence from the relevant photographs. [3]

Statement		Evaluation (true/false)	Evidence
Rock Unit C was deposited by aeolian processes	Photograph 2		•
Rock Unit D was deposited by aeolian processes	Photograph 3		•
Rock Unit E was deposited by aeolian processes	Photograph 4		•

Table 4

Total 15 marks

3. **Photograph 5**, on page 4 of the Resource Sheet, is of a fossil collected from **Rock Unit B** on **Map 1**.

- (a) (i) Complete **Figure 3** below by drawing a scaled diagram of the fossil from the circled area of **Photograph 5**. [5]

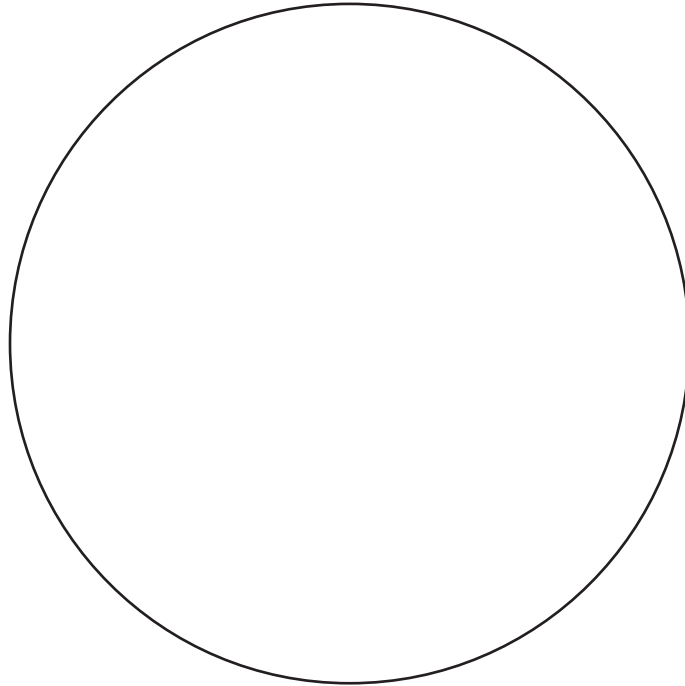


Figure 3

- (ii) *Name of fossil group* [1]

(b) The fossil is preserved as

“a very thin film of the mineral pyrite on a bedding plane of black shale”.

Give **three** statements which suggest how this fossil became preserved. [3]

Statement 1

.....

Statement 2

.....

Statement 3

.....

Total 9 marks

Turn over.

4. (a) Study **Figure 4**, which is a field sketch, drawn looking north west, of a quarry face at **Locality IV** on **Map 1**. **Fault F1** has a dip-slip displacement.

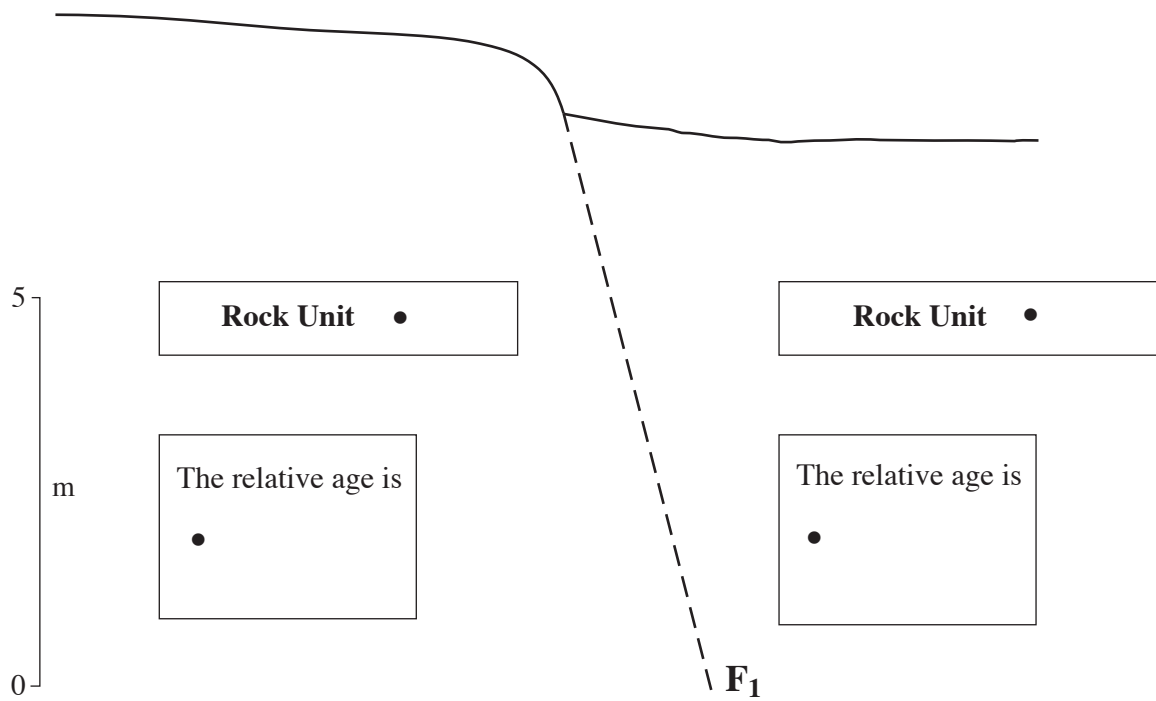


Figure 4

- (i) Clearly label/draw on **Figure 4**:

- the **Rock Units**;
- the younger and older rocks in the relative age boxes;
- arrows to show relative movement.

[3]

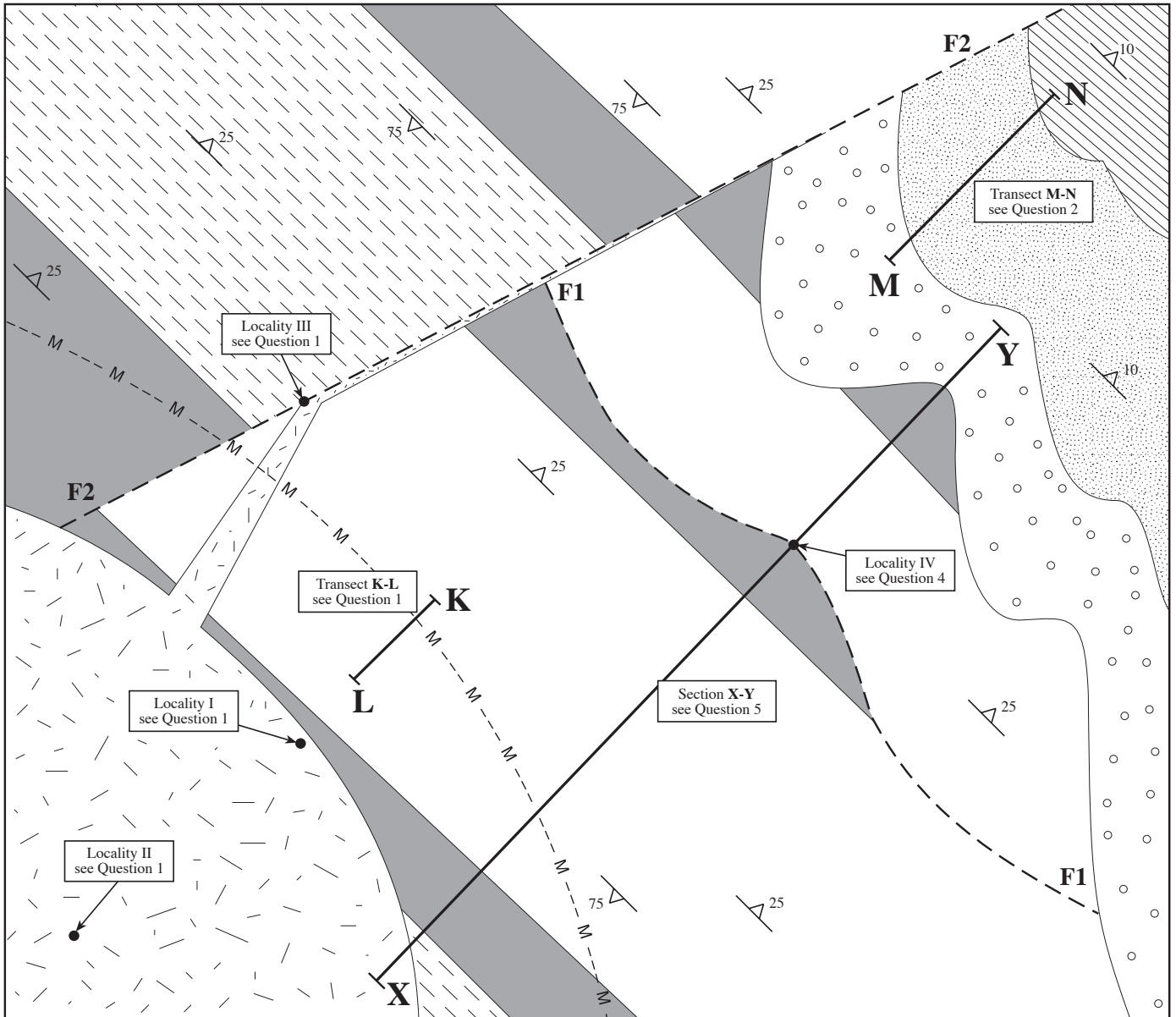
- (ii) **Fault F1** on **Map 1** is dipping towards the

[1]

NW	NE	SE	SW
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

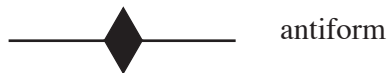
Tick only **one** box

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



Map 2

- (i) Clearly draw and label on **Map 2**, the axial plane trace of an antiform (anticline) on either side of **Fault F2**, labelling using the following symbol,



[2]

- (ii) Tick **one** box below to indicate which statement correctly describes the folding on **Map 2**. [1]

NE – SW trending, limbs of equal dip

NW – SE trending, limbs of unequal dip

Tick only **one** box

NE – SW trending, limbs of unequal dip

NW – SE trending, limbs of equal dip

Turn over.

- (c) **Fault F2** has a strike-slip movement. **Figure 5** below, illustrates how geologists describe the sense of movement of such faults, by looking across the fault line for the displaced feature.

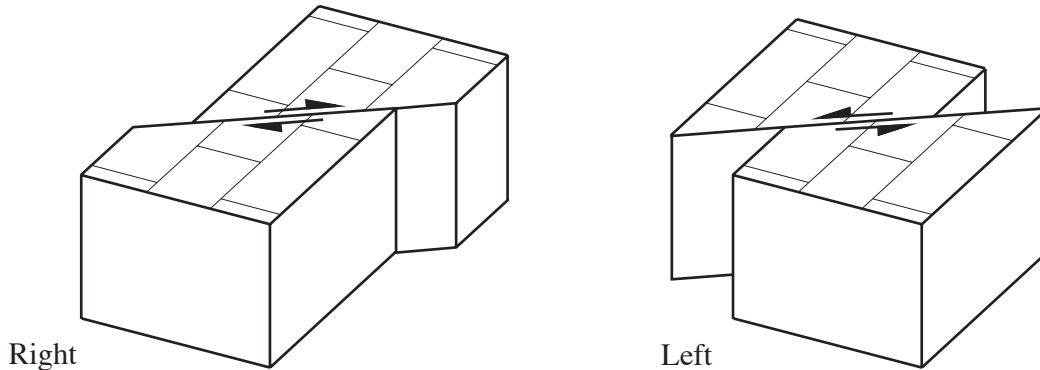


Figure 5

- (i) Giving **one** piece of evidence from **Map 1**, state the dip of **Fault F2**. [2]

Dip

Evidence

- (ii) State the sense of movement of **Fault F2**, giving one piece of evidence from **Map 1**. [2]

Movement

Evidence

- (iii) The amount of displacement along **Fault F2** on **Map 1** is approximately: [1]

500 m

1000 m

1250 m

1500 m

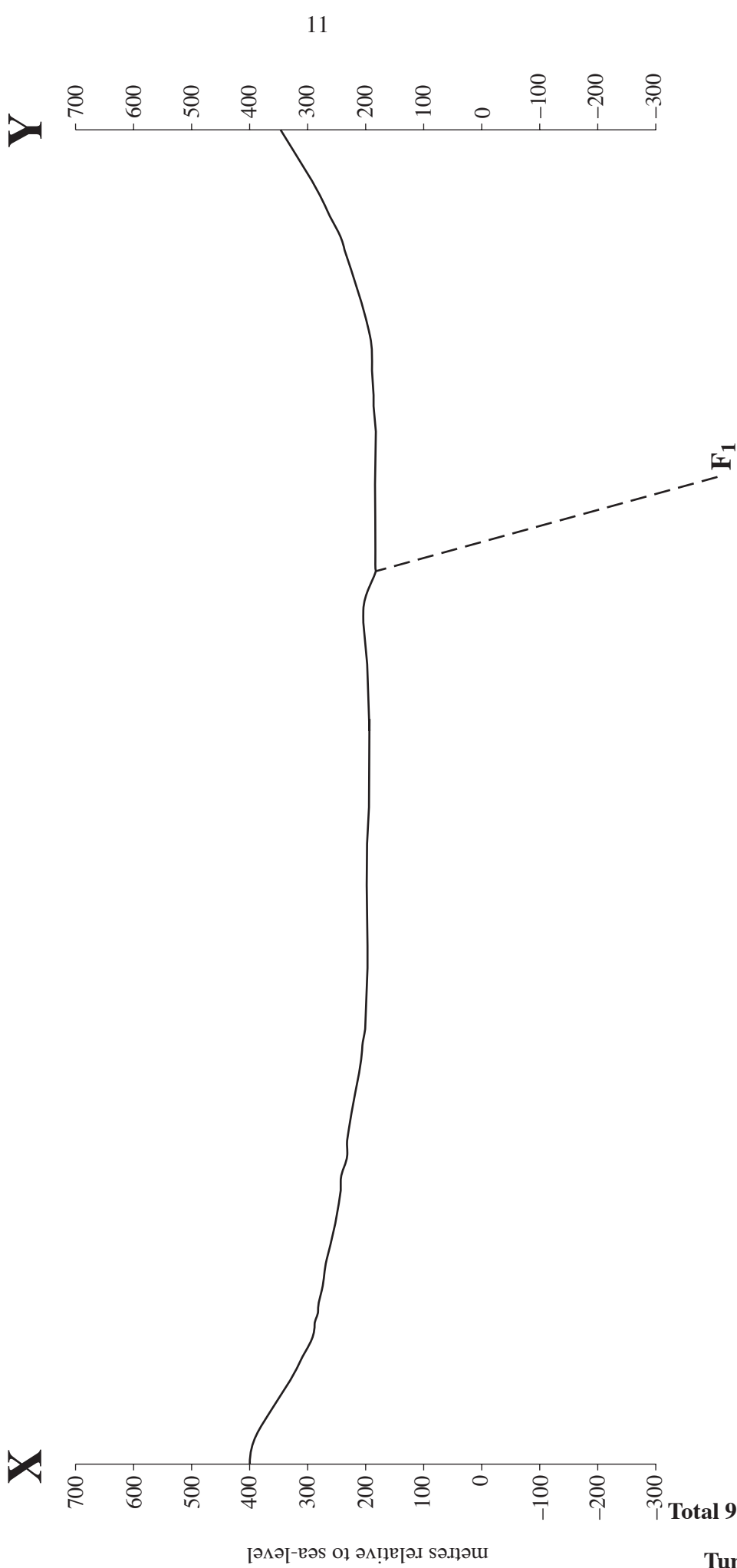
Tick only **one** box

Total 12 marks

The topographic profile below was taken along line **X-Y** on **Map 1**. **Fault F₁** has been inserted.

- Complete the sketch of the geological cross-section along this line.
- Label a **fold axis**.
- Project the **Rock Units**, the fault and the fold axis above the ground surface to illustrate any cross-cutting relationships.
- Use similar ornament, or letters for the **Rock Units** as on **Map 1**.

[9]



Total 9 marks

Turn over.

6. **Figure 1** on page 4 gives the relative age of **Rock Units C, D** and **E**. This order has been established by applying the *principle of superposition of strata*.

Explain how this principle is applied to establish the relative age of these **Rock Units**.
Your answer should refer to any of the following:

- your fieldwork observations
- **Map 1**
- **Figure 1** (on page 4)
- **Photographs 2-4** (on page 4 of the Resource Sheet)

You may use annotated diagrams.

[6]

