



GCE AS/A Level – **LEGACY**

**1212/01**

**GEOLOGY – GL2a**

**Investigative Geology**

**WEDNESDAY, 25 APRIL 2018 – MORNING**

**1 hour 30 minutes plus your additional time allowance**

**Surname** \_\_\_\_\_

**Other Names** \_\_\_\_\_

**Centre Number** \_\_\_\_\_

**Candidate Number** 2 \_\_\_\_\_

<b>For Examiner's use only</b>		
<b>Question</b>	<b>Maximum Mark</b>	<b>Mark Awarded</b>
<b>1.</b>	<b>8</b>	
<b>2.</b>	<b>9</b>	
<b>3.</b>	<b>5</b>	
<b>4.</b>	<b>6</b>	
<b>5.</b>	<b>12</b>	
<b>6.</b>	<b>4</b>	
<b>7.</b>	<b>12</b>	
<b>8.</b>	<b>4</b>	
<b>Total</b>	<b>60</b>	

## **ADDITIONAL MATERIALS**

**In addition to this examination paper, you will need:**

- **the Resource Sheet;**
- **Specimens A, B, and E;**
- **geological equipment for testing specimens;**
- **the Mineral Data Sheet;**
- **a protractor.**

## **INSTRUCTIONS TO CANDIDATES**

**Use black ink or black ball-point pen or your usual method.**

**Answer ALL questions.**

**Write your name, centre number and candidate number in the spaces on the front cover.**

**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, B, and E, are provided for use.**

**Specimens A, B, and E may be tested with the equipment specified by the supervisor.**

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

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

**Tick (✓) only  
THREE boxes**

**It is poorly sorted**

**It is crystalline**

**It is the product of fluvial processes**

**It formed by slow cooling**

**It is porous**

**It is coarse grained**

**It is the product of aeolian processes**

**It is well sorted**

**It is the product of marine processes**

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

**Study MAP 1 on the Resource Sheet carefully before answering QUESTIONS 1-8.**

- 1. SPECIMEN A and PHOTOGRAPH 1 on page 4 of the resource sheet are representative of ROCK UNIT A on MAP 1.**
  - (a) The list opposite contains statements about ROCK UNIT A. Select the THREE statements which best apply to ROCK UNIT A. [3]**

**1(b) SPECIMEN A is dominated by two minerals.  
Giving a reason for each mineral, state the names  
of these TWO minerals. You may wish to use the  
equipment provided by the supervisor and to refer  
to the MINERAL DATA SHEET. [4]**

**Mineral 1**

**Name** \_\_\_\_\_

**Reason** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Mineral 2**

**Name** \_\_\_\_\_

**Reason** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

1(c) **PHOTOGRAPH 1** on page 4 of the resource sheet shows structure **J** found within **ROCK UNIT A** on **MAP 1**. A student correctly identified that the paleocurrent direction that formed this structure was **TOWARDS THE NORTH-WEST**. Use this information to select the most likely compass direction the camera was pointing towards when the photograph was taken.

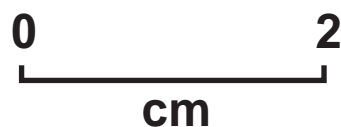
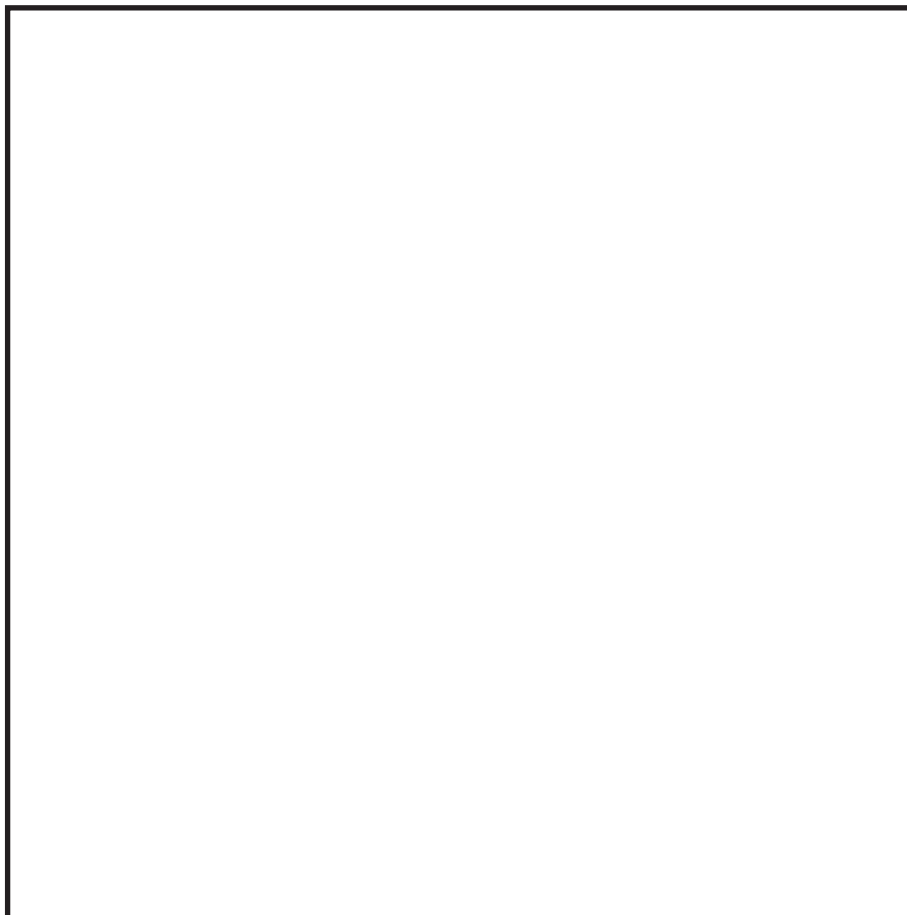
Tick (✓) **ONE** box below with your answer. [1]

north-west    north-east    south-west    south-east

2. Study SPECIMEN B which is a valve of a modern shell commonly preserved as fossils in ROCK UNIT B on MAP 1.

(a) Draw a scaled, INTERNAL diagram of SPECIMEN B.

Label on your diagram TWO hard parts of this fossil group. [4]



**2(b) Name, giving a reason the fossil group represented by SPECIMEN B. [2]**

**Name of fossil group** \_\_\_\_\_

\_\_\_\_\_

**Reason** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_





3. MAP 1 shows the outcrop of ROCK UNIT C.

(a) With reference to the evidence in MAP 1 ONLY, indicate by ticking the relevant box, the most likely type of igneous body represented by ROCK UNIT C. Give TWO reasons for your answer. [3]

lava flow

dyke

sill

pluton

Reason 1 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Reason 2 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**3(B) PHOTOGRAPH 2 on page 4 of the resource sheet shows STRUCTURE M found within ROCK UNIT C on MAP 1 at LOCALITY I. Identify STRUCTURE M and suggest how it formed. [2]**

**Name of structure** \_\_\_\_\_

**Explanation of how it formed** \_\_\_\_\_

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**4(a) PHOTOGRAPH 3 shows a photomicrograph that is representative of ROCK UNIT H.**

**(i) Name the MINERAL present in the rock shown in PHOTOGRAPH 3. [1]**

**MINERAL name \_\_\_\_\_**

**(ii) With reference to the texture shown in PHOTOGRAPH 3 name the ROCK shown by ticking the correct box.**

**Tick (✓) only ONE box. [1]**

**oolitic limestone   conglomerate   chalk   orthoquartzite**

4(b) Draw in FIGURE 4 the texture of ROCK UNIT H that you would expect to observe at LOCALITY II on MAP 1. [3]

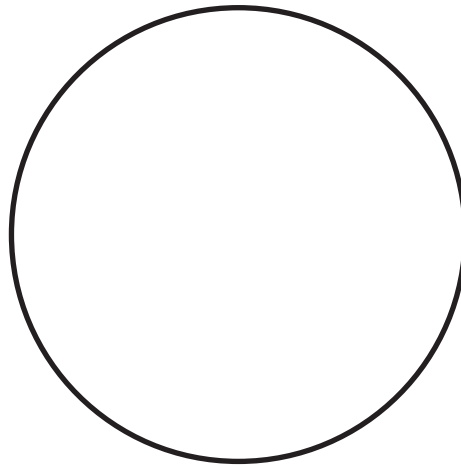


FIGURE 4

4(c) Select the most likely name for the ROCK found at LOCALITY II. Tick (✓) only ONE box. [1]

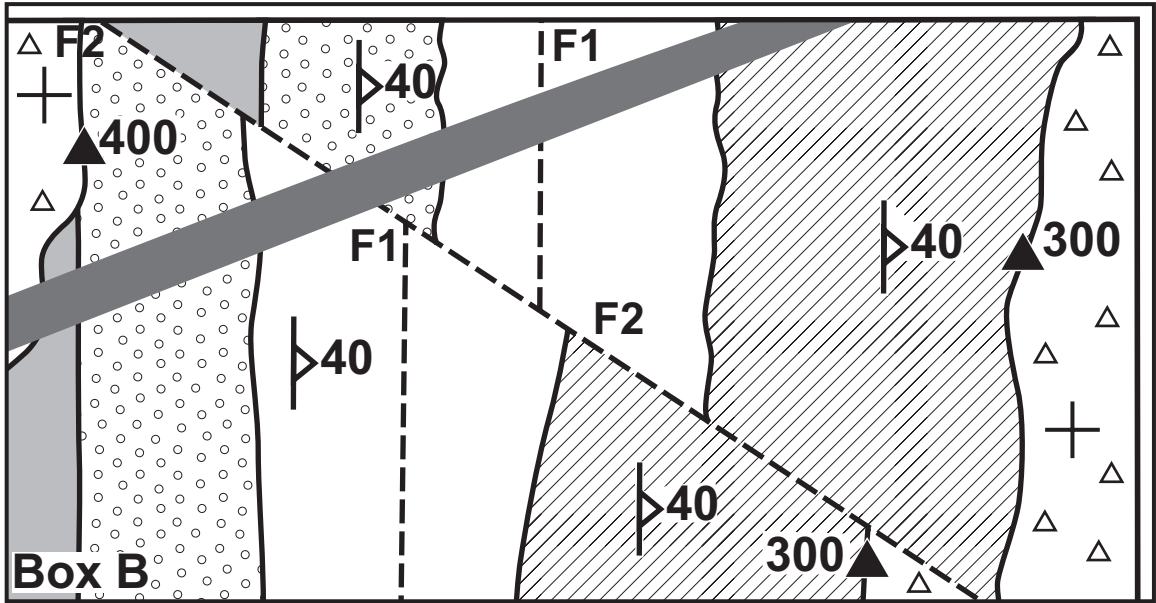
orthoquartzite

schist

marble

slate

6



**MAP 2**

5. **MAP 2 opposite shows the outcrop pattern in BOX B on MAP 1. The key is the same as that for MAP 1.**
- (a) **Refer to MAP 1 and MAP 2. The base of ROCK UNIT B has been displaced by FAULTS F1 and F2. Calculate the VERTICAL displacement of ROCK UNIT B caused by FAULT F1. [1]**

**Vertical displacement = \_\_\_\_\_**

5(b) Refer to MAP 1 and MAP 2.

State the types of fault represented by faults **F1** and **F2** by completing TABLE 5. For each fault state the evidence that enables this classification to be made. [4]

Fault	Type, tick (✓) ONE box for each fault		Evidence
F1	Dip-slip <input data-bbox="411 958 552 1097" type="checkbox"/>	Strike-slip <input data-bbox="737 958 877 1097" type="checkbox"/>	-
F2	Dip-slip <input data-bbox="411 1218 552 1357" type="checkbox"/>	Strike-slip <input data-bbox="737 1218 877 1357" type="checkbox"/>	-

TABLE 5

**5(c) FAULT F1 on MAP 1 has a dip of  $90^\circ$  (vertical dip). A student classified the fault as being a NORMAL fault. Evaluate this statement giving reasons for your answers. [2]**

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**5(d) In the spaces below, complete the sequence of geological events represented in the area of BOX B on MAP 1 in order of age, OLDEST AT THE BASE. ROCK UNITS A, D and H have been inserted.**

**Complete the boxes opposite in order of age by using the appropriate ROCK UNIT letters given in the key to MAP 1.**

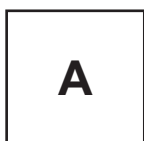
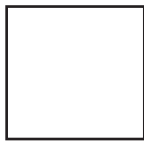
Clearly mark and label with horizontal arrows the position of FAULT F1 and FAULT F2:

← FAULT F1

← FAULT F2

[5]

**YOUNGEST**



**OLDEST**

**Tick (✓) only  
TWO boxes**

**Shallow lake**

**Tropical swamp**

**Deep tidal marine**

**Glacial lake**

**Tidal oxygenated marine**

**Non-tidal low oxygen marine**

**Shallow marine**

**6(a) SPECIMEN E is representative of ROCK UNIT E on MAP 1. Giving a reason name the rock forming SPECIMEN E. [2]**

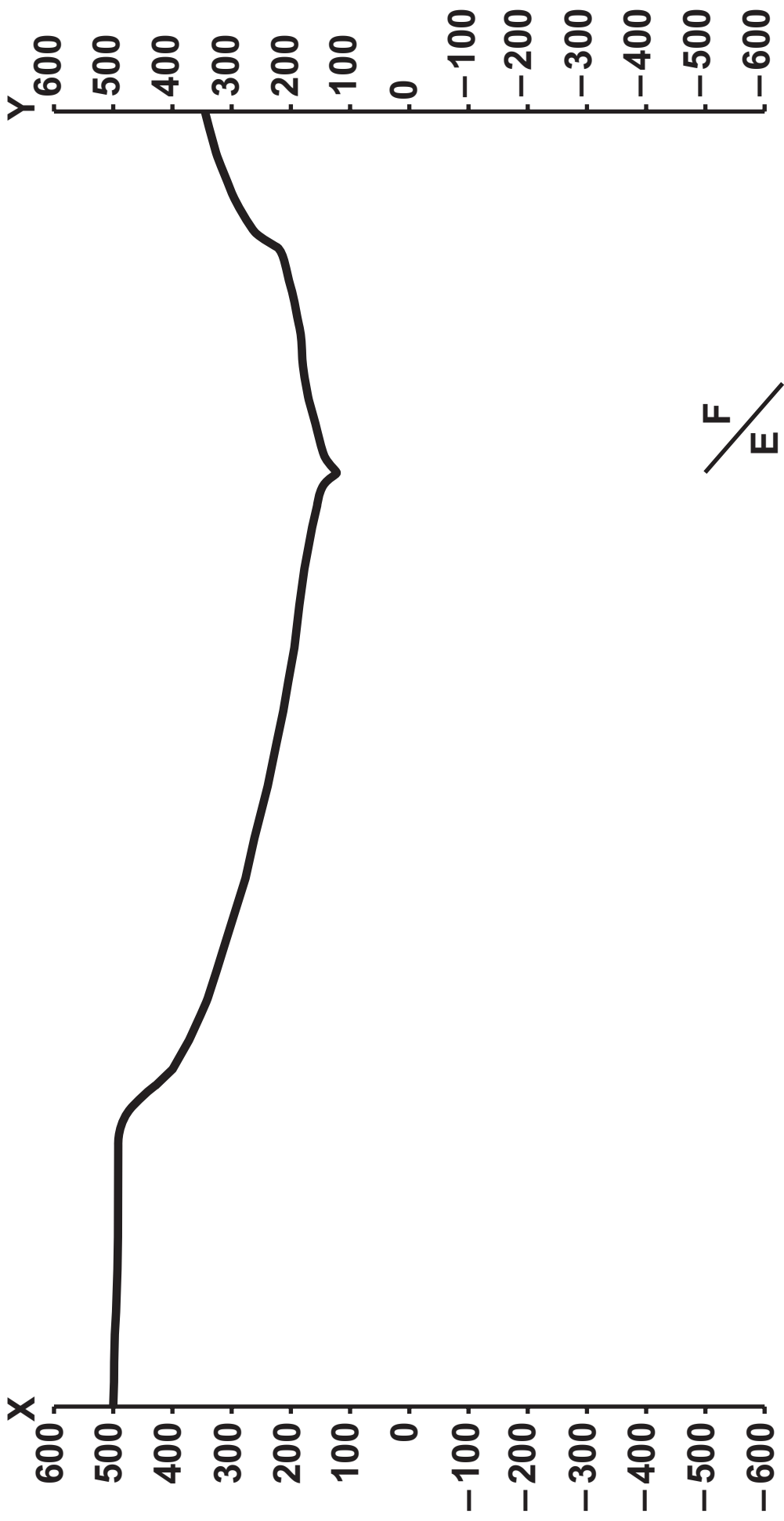
**Name of rock** \_\_\_\_\_

**Reason** \_\_\_\_\_

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**(b) A student correctly concluded that ROCK UNITS H and E formed in a similar environment. Select TWO boxes opposite to identify the properties of this environment. [2]**



7. The topographic profile opposite was taken along the line **X-Y** on **MAP 1**.  
Part of the boundary between **ROCK UNIT E** and **ROCK UNIT F** has 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 those as on **MAP 1**.
- Draw and **LABEL** any **FOLD AXES**, with the correct **SYMBOL**.
- **PROJECT** the rock units and structures **ABOVE** the ground surface to illustrate any cross-cutting relationships. [12]

8. **Sedimentary structures can be used as WAY UP criteria.**

**Using an annotated diagram(s):**

- Name ONE sedimentary structure which can be used to determine the way up of a sedimentary sequence.**
- Show HOW your chosen sedimentary structure can be used to determine the way up of a sedimentary sequence.**
- EXPLAIN the origin of your chosen sedimentary sequence.**

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

- Your fieldwork observation of ONE rock exposure.
  
- PHOTOGRAPH 1 (on page 4 of the Resource Sheet) which is representative of ROCK UNIT A on MAP 1.

An annotated diagram(s) MUST be used in your answer. [4]

**END OF PAPER**

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