Surname	Centre Number	Candidate Number
First name(s)		2

GCE AS

B480U10-1

Z22-B480U10-1

MONDAY, 16 MAY 2022 – MORNING

GEOLOGY – AS component 1
Geological Enquiries

1 hour 30 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**18**	
2.	**6**	
3.	**8**	
4.	**10**	
5.	**5**	
6.	**13**	
Total	**60**	

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ADDITIONAL MATERIALS

In addition to this examination paper, you will need:

- the Resource Sheet
- Specimens **A**, **D** and **E**
- geological equipment for testing specimens
- the Mineral Data Sheet
- a calculator
- a ruler
- a protractor

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

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

Answer **all** questions.

Write your answers in the spaces provided in this booklet. If you run out of space, use the additional page(s) at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

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

The Mineral Data Sheet, **Map 1** and **Photographs 1** and **2** are provided on separate resource sheets.

Three specimens, **A**, **D** and **E**, are provided for use.

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

The assessment of the quality of extended response (QER) will take place in question **4**(c).

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

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

1. **Rock Units A** and **B** on **Map 1** are igneous bodies.

(a) (i) State **one** piece of evidence from **Map 1** which confirms that **Rock Unit A** is a pluton. [1]

.....

.....

(ii) Suggest **one** other piece of evidence you might expect to investigate in the field, which could support that **Rock Unit A** is a pluton. [1]

.....

.....

(b) **Specimen A** contains quartz, feldspar and mica.

Complete **Table 1** to explain how you would distinguish between the following minerals found in **Specimen A**.

You may only use a test/observation once.
You may wish to refer to the Mineral Data Sheet. [4]

	Test/observation	Result
Quartz and feldspar	•	•
Feldspar and mica	•	•

Table 1

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(c) (i) State **two** pieces of evidence from **Map 1** which confirm that **Rock Unit B** is a dyke. [2]

.....

.....

.....

(ii) **Rock Unit B** is a mafic rock. Name **one** mineral which would support this statement. [1]

.....

(iii) Explain why **Rock Unit B** may have originated from the partial melting of peridotite. [2]

.....

.....

.....

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(d) **Table 2** contains measurements of crystals within **Rock Unit A**.

Crystal Size (mm)
3
5
24
45
6
6
27
5
28
7

Interquartile range	•
Standard deviation	14.38

Table 2

(i) Calculate the interquartile range of **Rock Unit A**. Show your working and insert the interquartile range calculated in the relevant row above. [3]

(ii) A student stated that **Rock Unit A** has undergone two stages of cooling. Using **Table 2**, explain the evidence that might suggest that this is correct. [2]

.....

.....

.....

(iii) Evaluate the effectiveness of using the interquartile range and standard deviation to describe the crystal size distribution in **Rock Unit A**. [2]

.....

.....

.....

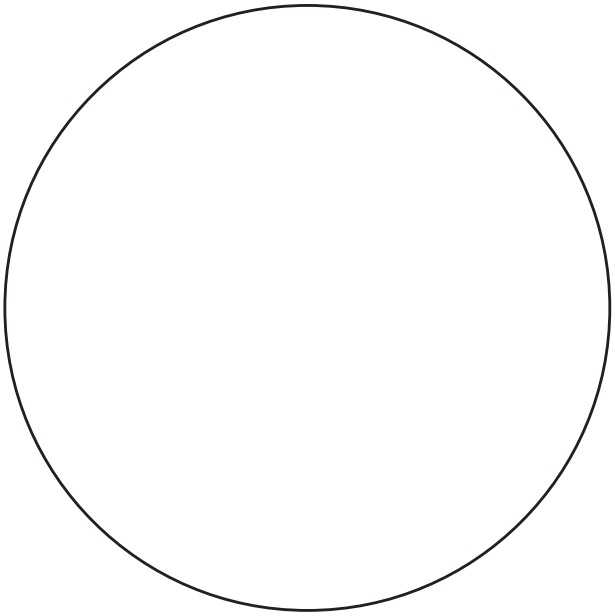
18

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2. **Specimen D** is representative of **Rock Unit D** on **Map 1**.

(a) Complete **Figure 2** by drawing the texture of **Specimen D** to the scale provided. [3]



×**20**

Figure 2

(b) State the name of the rock forming **Specimen D**. Give **two** pieces of evidence for your answer. [3]

Name .....

Evidence 1 .....

.....

Evidence 2 .....

.....

6

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3. **Specimen E** is a plaster cast of a fossil found in **Rock Unit E** on **Map 1**.

(a) (i) Draw in **Figure 3a** the cephalon of **Specimen E** to the scale provided. [3]

(ii) Label the glabella. [1]

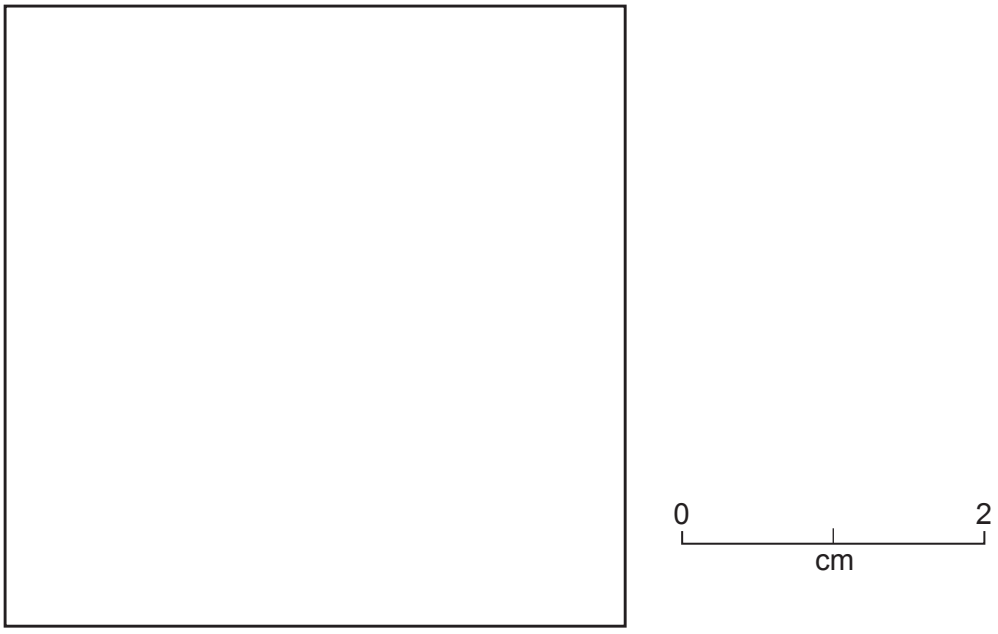


Figure 3a

(b) **Figures 3b**, **3c** and **3d** show structures found within **Rock Unit E**.



Figure 3b

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4 cm

Figure 3c



5 cm

Figure 3d

Tick **(✓) one** of the boxes below to indicate the structure most likely to have been formed by the activity of the fossil represented by **Specimen E**. [4]

Figure 3b	**Figure 3c**	**Figure 3d**
☐	☐	☐

Justify your answer.

.....

.....

.....

.....

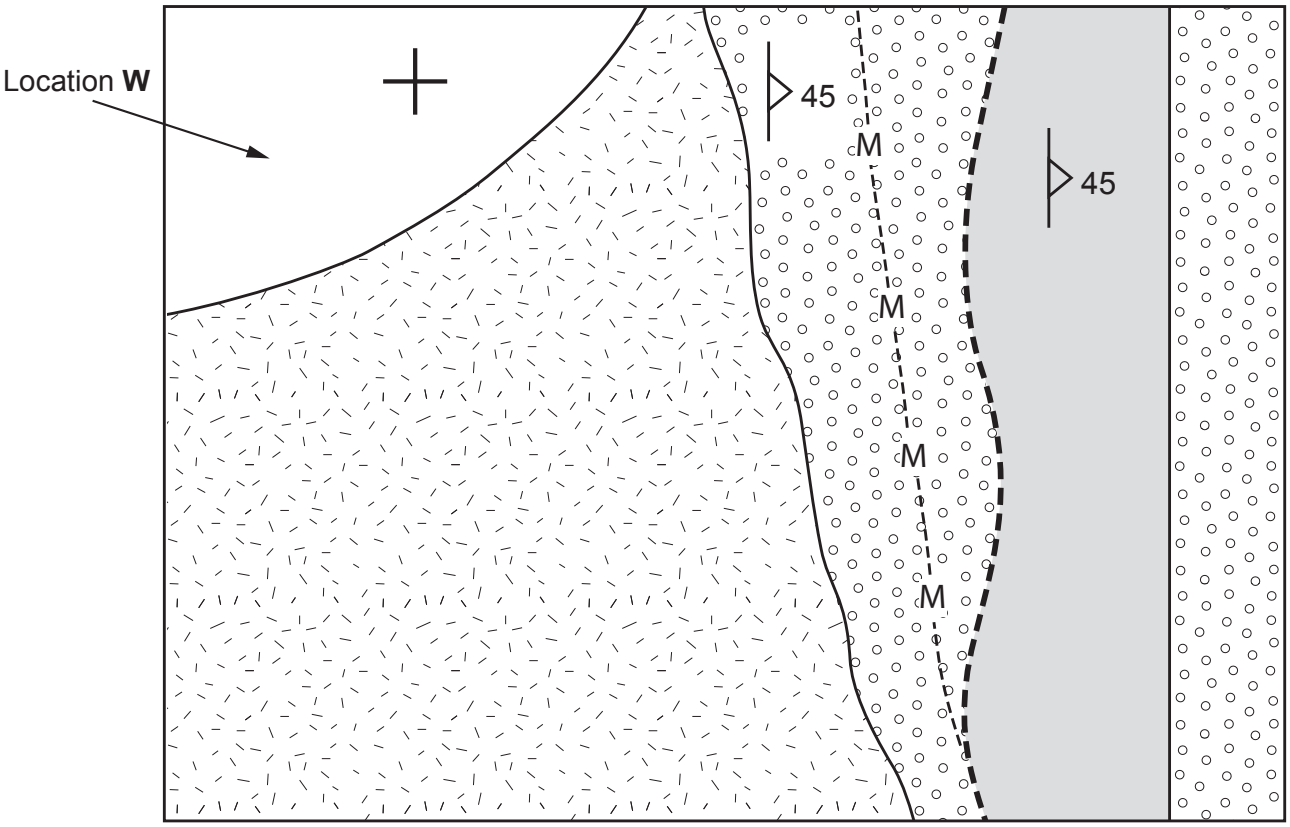
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4. **Map 2** shows the geology in **box J** on **Map 1**. The key for the rock units is the same as for **Map 1**.



Map 2

(a) Label an unconformity on **Map 2** using an arrow labelled U (◄—U). [1]

.....

(b) **Photograph 1** on the Resource Sheet shows a clast collected from Location **W** within **Rock Unit C** on **Map 2**. **Photograph 2** on the Resource Sheet is a photomicrograph of the rock shown in **Photograph 1**.

State the name of the rock shown in **Photographs 1** and **2**. Give **two** pieces of evidence for your answer. [3]

Name .....

Evidence 1 .....

.....

Evidence 2 .....

.....

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(c) A student suggested that the clast collected from **Rock Unit C**, shown in **Photograph 1**, cannot have been derived from any rocks shown on **Map 2**.

Evaluate this statement with reference to:

- age relationships
- rock types
- type of metamorphism
- **Map 2**

[6 QER]

10

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5. Refer to faults **F1**, **F2** and **F3** on **Map 1**.
Complete **Table 3** to compare Faults **F1**, **F2** and **F3**. [5]

	F1	F2	F3
Direction of dip of fault plane	east	•	southeast
Relative movement of hanging wall	•	upwards	upwards
Estimated dip angle of fault plane	80°	70°	•
Fault type [normal, reverse, thrust, strike-slip]	•	reverse	•

Table 3

5

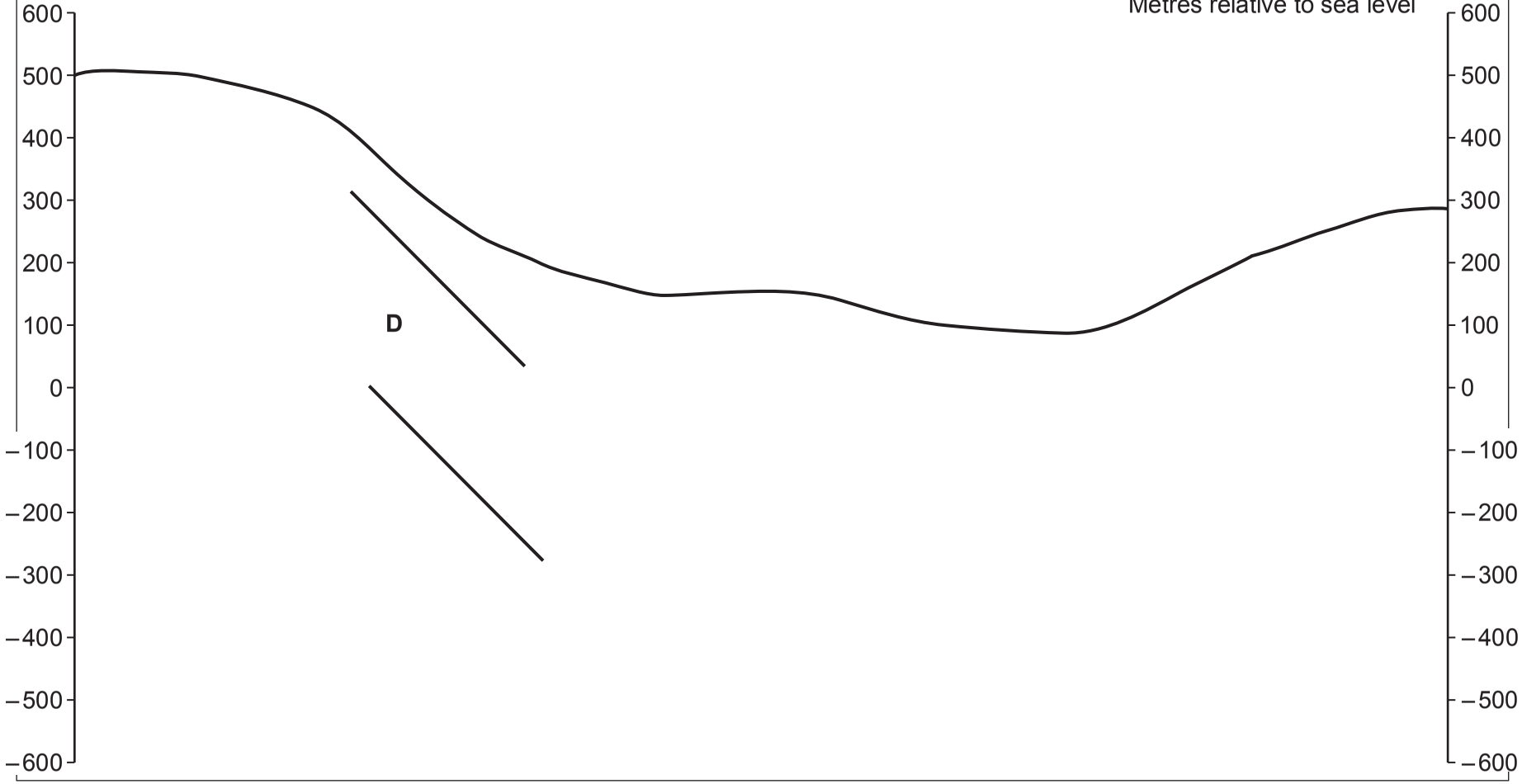
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6. The topographic profile below was taken along the line **X–Y** on **Map 1**.

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**
- boundaries of **Rock Unit D** have been added
- draw and label any **fold axes**, with the correct symbol
- mark on the extent of any metamorphic aureoles
- **project** the rock units and structures **above** the ground surface to illustrate any cross-cutting relationships.

[13]



END OF PAPER

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Turn over.

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Question number	Additional page, if required. Write the question number(s) in the left-hand margin.

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Acknowledgements:

Figure 3b: R. Humphreys
Figure 3c: http://www.wildsingapore.com/wildfacts/
Figure 3d: http://www.thisoldearth.net/Geology_Online-1_Subchapters.cfm?Chapter=5&Row=3

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