GCE AS

B480U10-1

MONDAY, 15 MAY 2023 - MORNING

GEOLOGY – AS COMPONENT 1

GEOLOGICAL ENQUIRIES

1 hour 30 minutes plus your additional time allowance

Surname

First name(s)

Centre Number

Candidate Number

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ADDITIONAL MATERIALS

In addition to this examination paper, you will need:

- **the Resource Sheet**
- **SPECIMENS B, C, L and N**
- **the Photographs of Specimens Sheet**
- **geological equipment for testing specimens**
- **the Mineral Data Sheet**
- **a calculator**
- **a protractor**
- **a ruler**

INSTRUCTIONS TO CANDIDATES

Use black ink, black ball-point pen or your usual method. You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces on the previous 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 and MAP 1 and PHOTOGRAPH 1 are provided on separate resource sheets.

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

Four specimens, B, C, L and N, 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 5(c)

Answer ALL questions.

Study MAP 1 on the Resource Sheet before answering QUESTIONS 1–7.

1 SPECIMEN C is representative of ROCK UNIT C on MAP 1.

(a) (i) Complete FIGURE 1 opposite by drawing the texture of SPECIMEN C to the scale provided. [3 marks]

(ii) State the name of SPECIMEN C. [1 mark]

1 (b) Describe the environment of deposition of SPECIMEN C. [3 marks]

7

2 SPECIMEN B is representative of ROCK UNIT B on MAP 1.

(a) State the name of SPECIMEN B. Give TWO pieces of evidence for your answer. [3 marks]

Name

Evidence 1

Evidence 2

2 (b) **PHOTOGRAPH 1 on the resource sheet shows ROCK UNIT A.**

A student has concluded that ROCK UNIT B was produced from the same intrusive event as ROCK UNIT A. Using SPECIMEN B, PHOTOGRAPH 1 and MAP 1 evaluate this conclusion. [4 marks]

7

3 SPECIMEN L is a modern shell representative of bivalve fossils found in ROCK UNIT C on MAP 1.

(a) (i) Draw in FIGURE 3a opposite the INTERNAL view of SPECIMEN L to the scale provided. [3 marks]

(ii) Label a muscle scar on FIGURE 3a. [1 mark]

(iii) Label the pallial sinus on FIGURE 3a. [1 mark]

(b) The length of fifteen bivalve fossils found in ROCK UNIT C was measured. These measurements are given in TABLE 1.

TABLE 1

Length (cm)	Tally
$0 < x \leqslant 3$	III
$3 < x \leqslant 6$	𝍸 IIII
$6 < x \leqslant 9$	II
$9 < x \leqslant 12$	I

3 (i) Draw a histogram on FIGURE 3b opposite using the data in TABLE 1. [2 marks]

(ii) State the modal group of the data in TABLE 1. [1 mark]

(iii) A student has concluded that the fossil bivalves form a life assemblage. Evaluate the reliability of this conclusion given the data provided. [4 marks]

12

4 SPECIMEN N was collected from a vein within ROCK UNIT D.

(a) SPECIMEN N can be identified by diagnostic tests. Complete TABLE 2 by:

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

TABLE 2

Description of test/ observation	Result of the test/ observation described
Scratch SPECIMEN N with a copper coin	•
•	•

4 (b) State the name of SPECIMEN N. [1mark]

_____

_____

4

5 FIGURE 5 opposite shows the variation in mean crystal size along transect P–Q on MAP 1.

Refer to FIGURE 5.

(a) Describe the change in mean crystal size along transect P–Q. [3 marks]

5 (b) **With reference to sampling methods, explain how the data may have been collected. [3 marks]**

(c) **Explain the change in mean crystal size along the transect P–Q on FIGURE 5 and MAP 1. [6 QER]**

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6 Refer to FAULT F1 and FAULT F2 on MAP 1.

(a) Complete TABLE 3 to compare FAULT F1 and FAULT F2. [4 marks]

TABLE 3

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

6 (b) **Calculate the displacement of FAULT F2 in kilometres. Show your working. [2 marks]**

_____km

6

7 **The topographic profile opposite was taken along the line X - Y on MAP 1. [12 marks]**

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**
- **Draw and label any FAULTS**
- **Mark on the extent of any metamorphic aureoles**
- **PROJECT the rock units and structures ABOVE the ground surface to illustrate any cross-cutting relationships. [12 marks]**

END OF PAPER

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

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For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1	7	
2	7	
3	12	
4	4	
5	12	
6	6	
7	12	
Total	60	

FIGURE 1

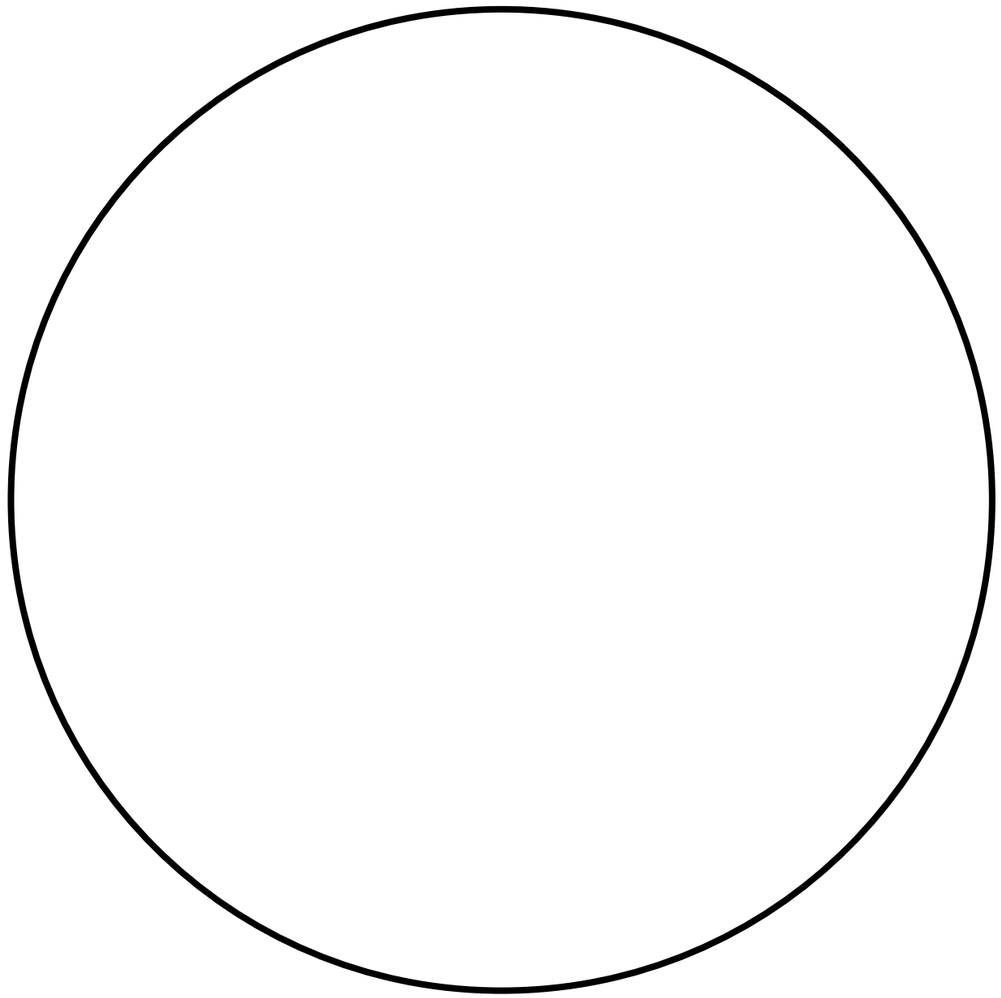


FIGURE 3a

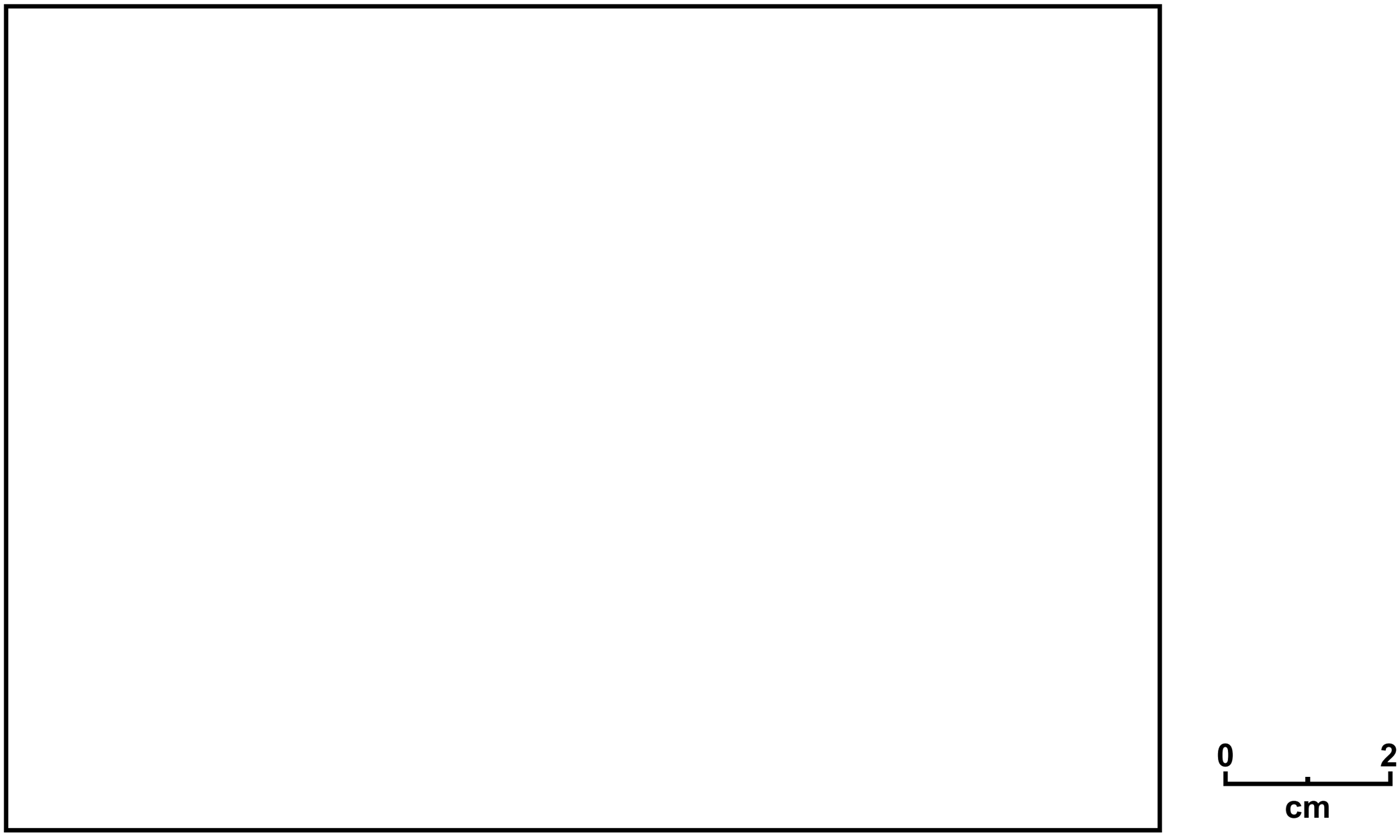


FIGURE 3b

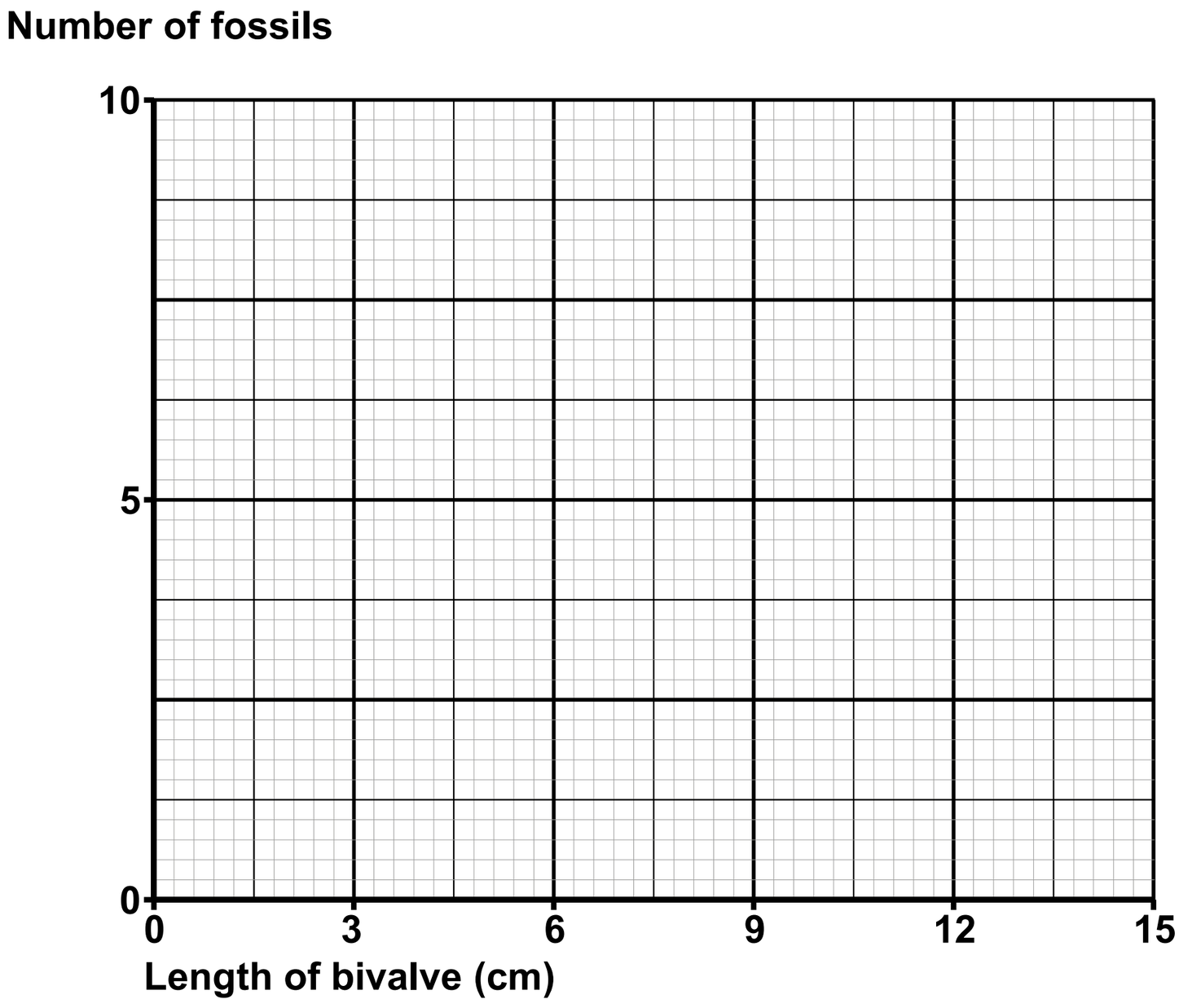
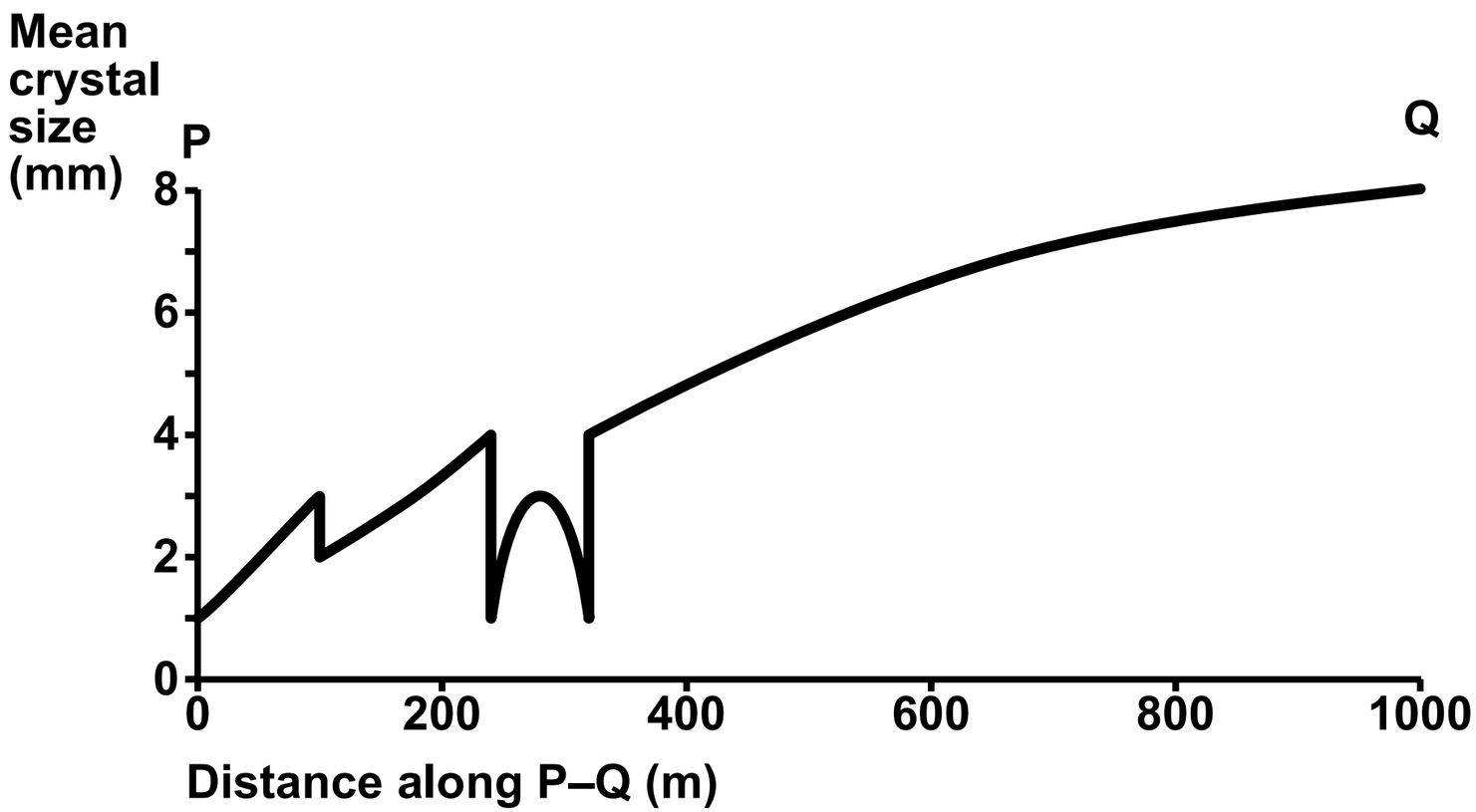
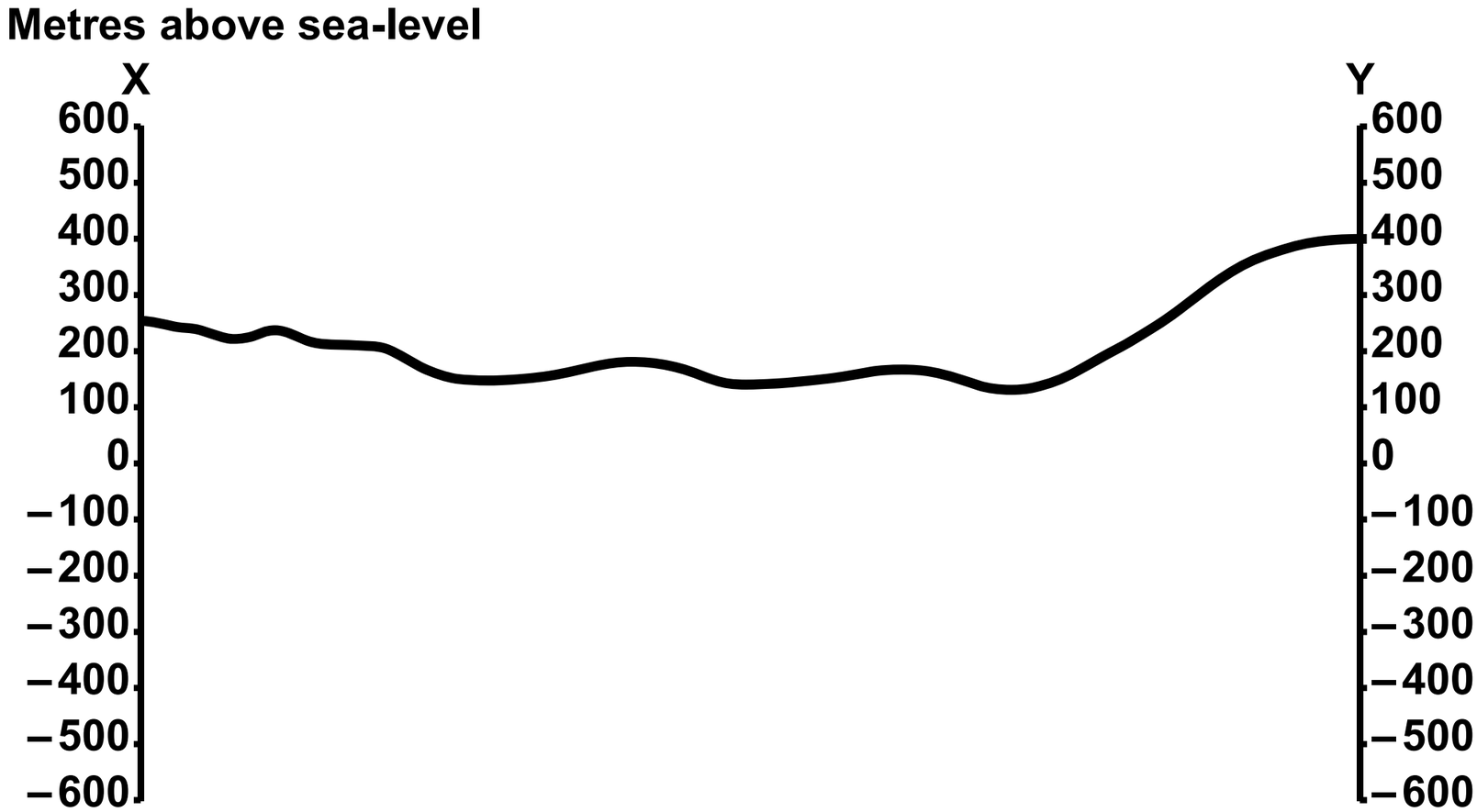


FIGURE 5


Mean crystal size (mm)
P
Q
8
6
4
2
0
0
200
400
600
800
1000
Distance along P–Q (m)


Metres above sea-level
X
Y
600
500
400
300
200
100
0
–100
–200
–300
–400
–500
–600