Cambridge O Level

CANDIDATE NAME						

CENTRE NUMBER						CANDIDATE NUMBER				

GEOGRAPHY **2230/02**

Paper 2 Geographical Skills **May/June 2023**

1 hour 45 minutes

You must answer on the question paper.

You will need: Insert (enclosed) Plain paper
1:25 000 survey map (enclosed) Protractor
Calculator Ruler

INSTRUCTIONS
- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- Sketch maps and diagrams should be drawn whenever they serve to illustrate the answer.
- If additional space is needed, you should use the lined pages at the end of this booklet; the question number or numbers must be clearly shown.

INFORMATION
- The total mark for this paper is 60.
- The number of marks for each question or part question is shown in brackets [ ].
- The insert contains additional resources referred to in the questions.

This document has **20** pages. Any blank pages are indicated.

2

Section A: Mapwork skills

1 Study the map extract of an area of Mauritius. The scale is 1:25 000. The heights are in metres. The contour interval is 10 metres.

(a) **(i)** Give the four-figure grid reference for the grid square containing GUIBY PEAK located in the east of the map.

.... [1]

(ii) What type of woodland is found in the grid square containing GUIBY PEAK?

.... [1]

(iii) Calculate the distance along the B76 HUGNIN ROAD from its start in grid square 9397 to the edge of the map in grid square 9395. Show your working.

....

....

.... [2]

(iv) Identify **two** services in grid square 9797.

1 ....

2 ....

[2]

3

(b) Study Fig. 1.1, which shows an area of the map extract.
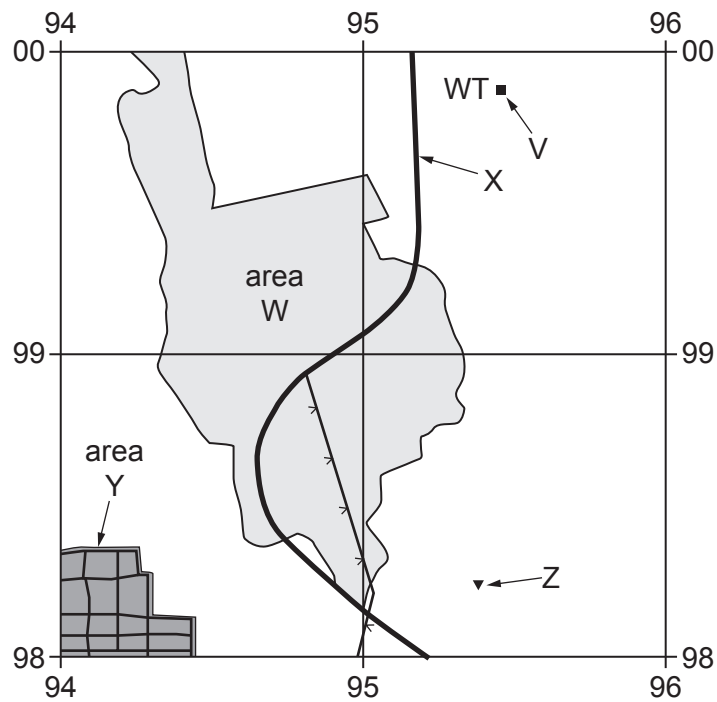
Fig. 1.1

- **(i)** Use the map extract to identify the following shown on Fig. 1.1:

    • feature V

    ....

    • the land use in area W

    ....

    • road X

    ....
    [3]

- **(ii)** Describe the street pattern in area Y.

    ....

    .... [1]

- **(iii)** Give a six-figure grid reference for the trigonometrical station at Z.

    .... [1]

- **(iv)** **On Fig. 1.1, complete the route of the power line** as shown in this area of the map extract. [1]

- **(v)** State the total area covered by the grid squares in Fig. 1.1. Give your answer in square kilometres (km^2).

    .... [1]

(c) (i) In which general compass direction is River Moka flowing?

.... [1]

(ii) Name **one** tributary of the Grand River North West.

.... [1]

(d) **Using the map extract, complete Table 1.1** to compare the relief and drainage in grid squares 9599 and 9896.

Table 1.1

	grid square 9599 (near SÉNÈQUE PEAK)	grid square 9896 (near BEAU CLIMAT)
height	....	....
steepness of slope	....	....
drainage (surface water)	....	....

[3]

(e) There is a sugar factory located in grid square 0097. Give **two** pieces of map evidence to show why this is a good location for a sugar factory.

1 ....

2 ....

[2]

[Total: 20]

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Section B: Geographical skills

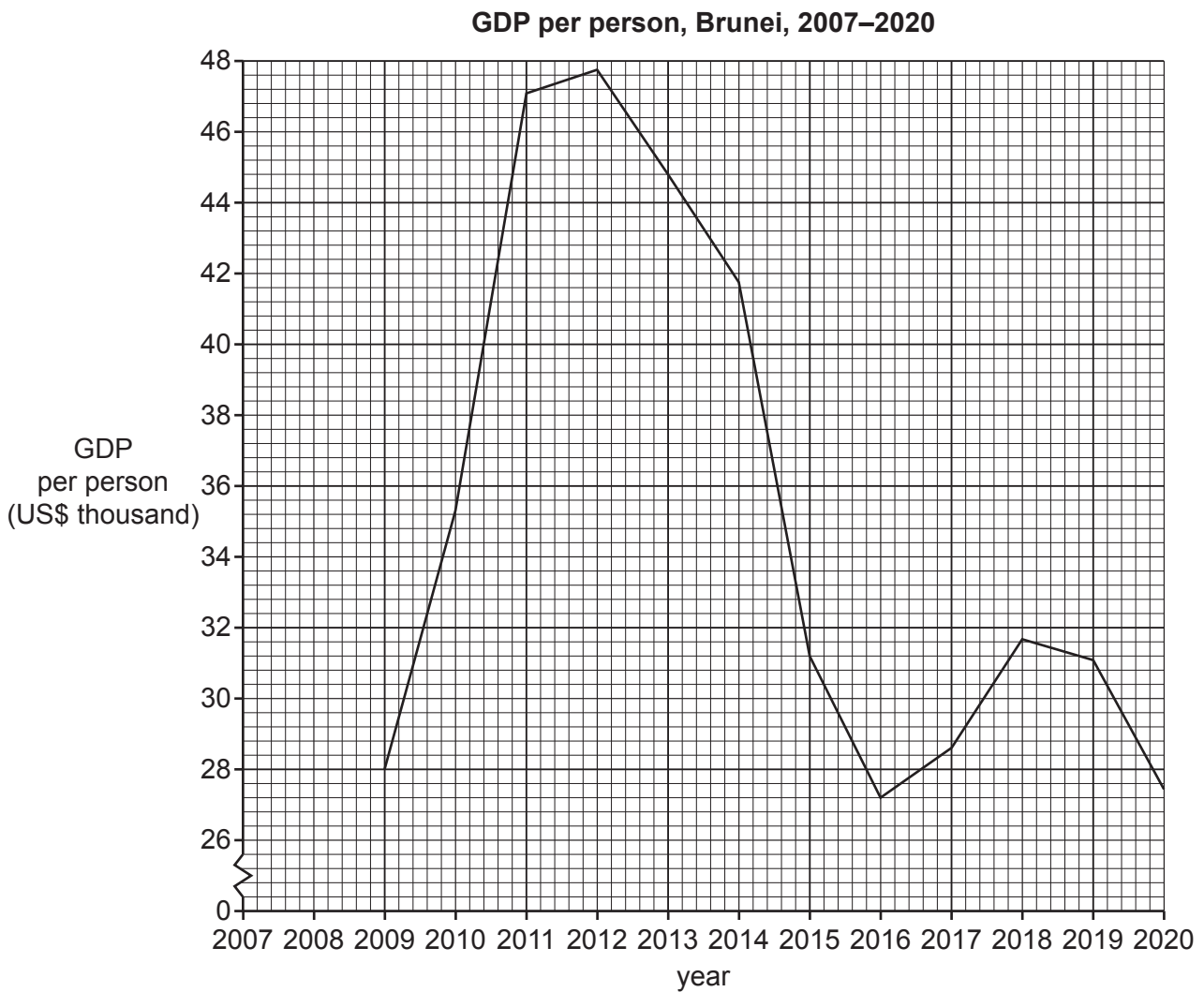**2** **(a)** Study Fig. 2.1, which shows the GDP (Gross Domestic Product) per person of Brunei from 2007 to 2020.

GDP per person, Brunei, 2007–2020

Fig. 2.1

(i) In which year between 2009 and 2020 was the GDP per person of Brunei highest?

.... [1]

(ii) Describe the changes in the GDP per person of Brunei between 2009 and 2020.

....

....

....

....

....

.... [3]

(iii) **On Fig. 2.1, plot the following data** for GDP per person of Brunei.

year	GDP per person (US$)
2007	33 000
2008	38 000

[2]

(b) Study Table 2.1, which shows GDP per person data for the ASEAN countries in 2019.

Table 2.1

country	GDP per person (US$)	GDP per person growth rate (%)
Brunei	31 100	2.8
Cambodia	1600	5.5
Indonesia	4100	3.9
Lao PDR	2600	3.9
Malaysia	11 400	3.1
Myanmar	1300	6.0
Philippines	3500	4.7
Singapore	65 800	–0.1
Thailand	7800	1.9
Viet Nam	3400	6.1

(i) Calculate the difference in GDP per person (US$) between Brunei and Indonesia.

.... [1]

(ii) **Complete Table 2.2** to show the rank order of the top three ASEAN countries in 2019 as shown in Table 2.1.

Table 2.2

rank order	GDP per person (US$)	GDP per person growth rate (%)
1	....	....
2	....	....
3	....	....

[2]

(iii) Which country in Table 2.1 had a negative GDP per person growth rate in 2019?

.... [1]

[Total: 10]

3 (a) Study Fig. 3.1 (Insert), which shows where acid rain occurs in the USA.

Use Fig. 3.1 to describe the pattern of acid rain in the USA.

....

....

....

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....

.... [3]

(b) Study Fig. 3.2, which shows the changes in emissions of sulfur dioxide (SO_2) and nitrogen oxides (NO_x) in the USA between 1995 and 2020.
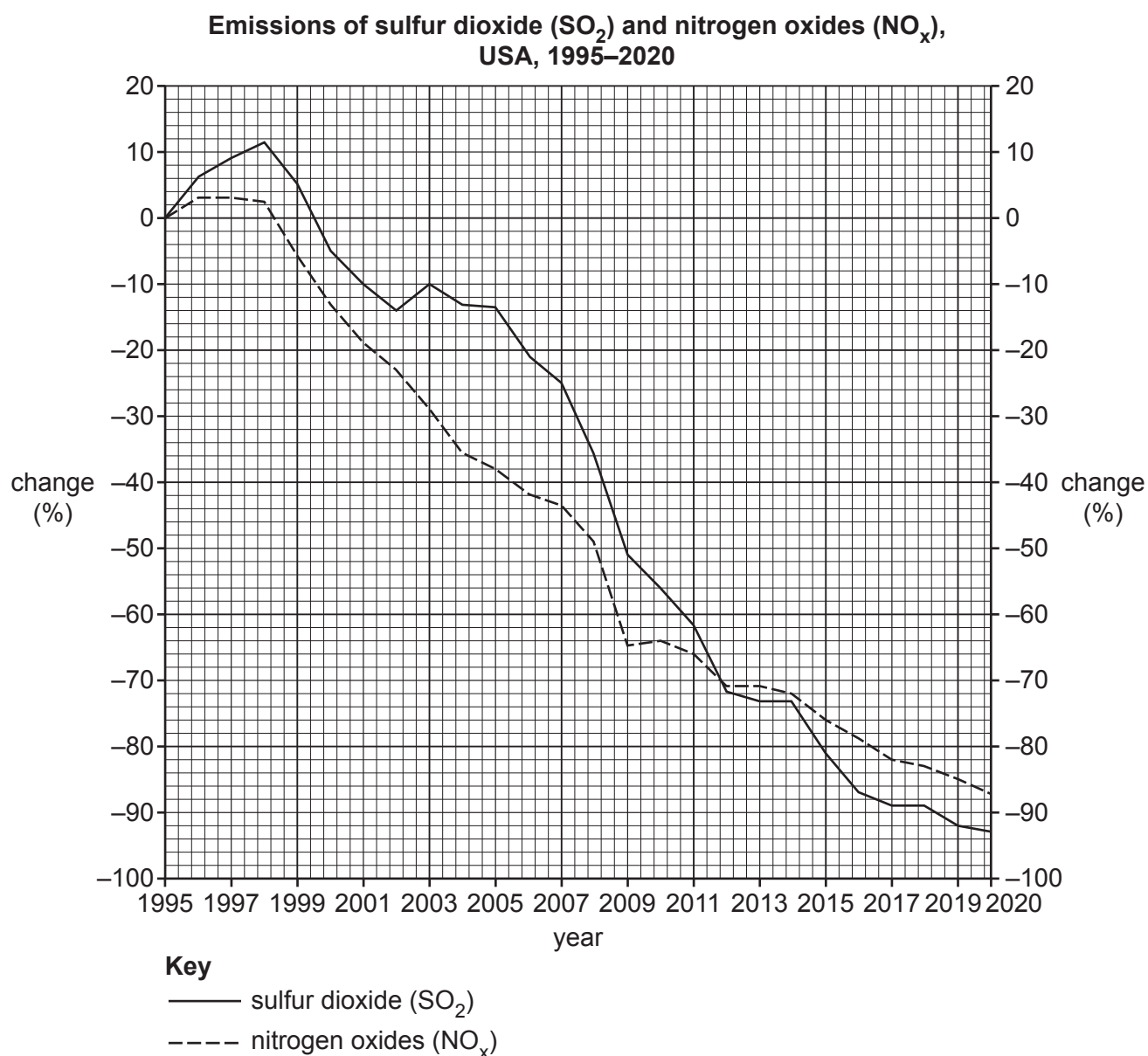
Emissions of sulfur dioxide (SO_2) and nitrogen oxides (NO_x), USA, 1995–2020

Key
—— sulfur dioxide (SO_2)
– – – nitrogen oxides (NO_x)

Fig. 3.2

Compare the emissions of sulfur dioxide (SO_2) and nitrogen oxides (NO_x) between 1995 and 2020.

....

....

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....

.... [3]

(c) Study Fig. 3.3, which shows the effects of acid rain on aquatic environments.

pH levels of water at which organisms can survive

organisms	critical pH level					
	pH 6.5	pH 6.0	pH 5.5	pH 5.0	pH 4.5	pH 4.0
trout	▨	▨	▨	▨		
bass	▨	▨	▨			
perch	▨	▨	▨	▨	▨	
frogs	▨	▨	▨	▨	▨	▨
salamanders	▨	▨	▨	▨		
clams	▨	▨				
crayfish	▨	▨	▨			
snails	▨	▨	▨			
mayfly						

increasing acidity →

Key

▨ pH level of water at which organism can survive

Fig. 3.3

(i) **Complete the graph on Fig. 3.3** to show that mayfly can survive in water with pH levels of 5.5. [1]

(ii) Which aquatic organism can survive in the most acidic water?

.... [1]

(d) Describe **two** ways that acid rain can be reduced.

1 ....

....

2 ....

....
[2]

[Total: 10]

Section C: Geographical investigation

4   A class of students in the UK were studying how a river changes downstream. As part of their study they did some fieldwork on the River Cuckmere drainage basin.

The students investigated the following hypotheses:

Hypothesis 1: *The area of the cross-section of the river channel increases downstream.*

Hypothesis 2: *The gradient (angle of slope) of the river decreases downstream.*

The students chose four sites to do their fieldwork at different distances downstream of one of the tributaries. The sites are shown in Fig. 4.1 (Insert).

(a) Suggest **two** things the students needed to consider when choosing their fieldwork sites.

1 ....

....

2 ....

....
[2]

(b) To investigate **Hypothesis 1:** *The area of the cross-section of the river channel increases downstream*, the students measured the width and the depth of the river channel at each site.

(i) Study Fig. 4.2 (Insert), which shows equipment used in river investigations.

Which **two** pieces of equipment would the students use to measure the width of the river channel? Tick (✓) the correct answers.

equipment	tick (✓)
chains	
metre ruler	
tape measure	
callipers	
stop-watch	
float	
clinometer	
ranging poles	

[2]

(ii) To measure the depth of the river the students divided the width of the river into 10 equally spaced points across the channel.

Which **one** of the following describes this method of sampling?

Circle your answer:

biased   random   stratified   systematic
[1]

12

(c) The students used their results to draw a cross-section of the river channel at each site. These are shown in Fig. 4.3 (Insert).

Describe **two** differences between the cross-section at Site 3 and the cross-section at Site 4.

1 ....

....

2 ....

....

[2]

(d) The students used their measurements to calculate the area of the cross-section of the river channel at each site. Their results are shown in Table 4.1.

Table 4.1

site number		width (m)	mean (average) depth (m)	area of cross-section (m^2)
1	upstream	1.07	0.12	0.13
2		1.80	0.23	0.41
3		5.90	0.48	2.83
4	downstream	9.65	0.62	5.98

(i) Which **one** of the following is the correct calculation to work out the area of the cross-section of the river channel? Tick (✓) the correct answer.

calculation	tick (✓)
width – mean (average) depth	
width + mean (average) depth	
width × mean (average) depth	
width ÷ mean (average) depth	

[1]

(ii) What conclusion would the students make about **Hypothesis 1:** *The area of the cross-section of the river channel increases downstream*? Use data from Table 4.1 and Fig. 4.3 to support the conclusion.

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.... [3]

(e) To collect data for **Hypothesis 2:** *The gradient (angle of slope) of the river decreases downstream*, the students measured the gradient of the river bed using the ranging poles, clinometer and tape measure shown in Fig. 4.2 (Insert).

(i) Describe how the students used the ranging poles, clinometer and tape measure shown in Fig. 4.2 to measure the gradient.

....

....

....

....

....

.... [3]

(ii) The students worked in two groups. Group A made four measurements at each site and Group B made one measurement at each site. Suggest why the results of Group A would be more reliable than the results of Group B.

....

.... [1]

(f) The results of Group A's measurements are shown in Table 4.2.

Table 4.2

Gradient (angle of slope) results

site number		angle measurement (°)				
		1	2	3	4	average
1	upstream	12	9	7	8	9
2	↓	11	10	18	9	12
3		7	6	7	8	7
4	downstream	5	5	2	4	4

(i) Which site (1 to 4) has the largest variation in measurements?

Site ....

[1]

(ii) Study Fig. 4.4, which shows a method chosen by one student to present the results in Table 4.2.

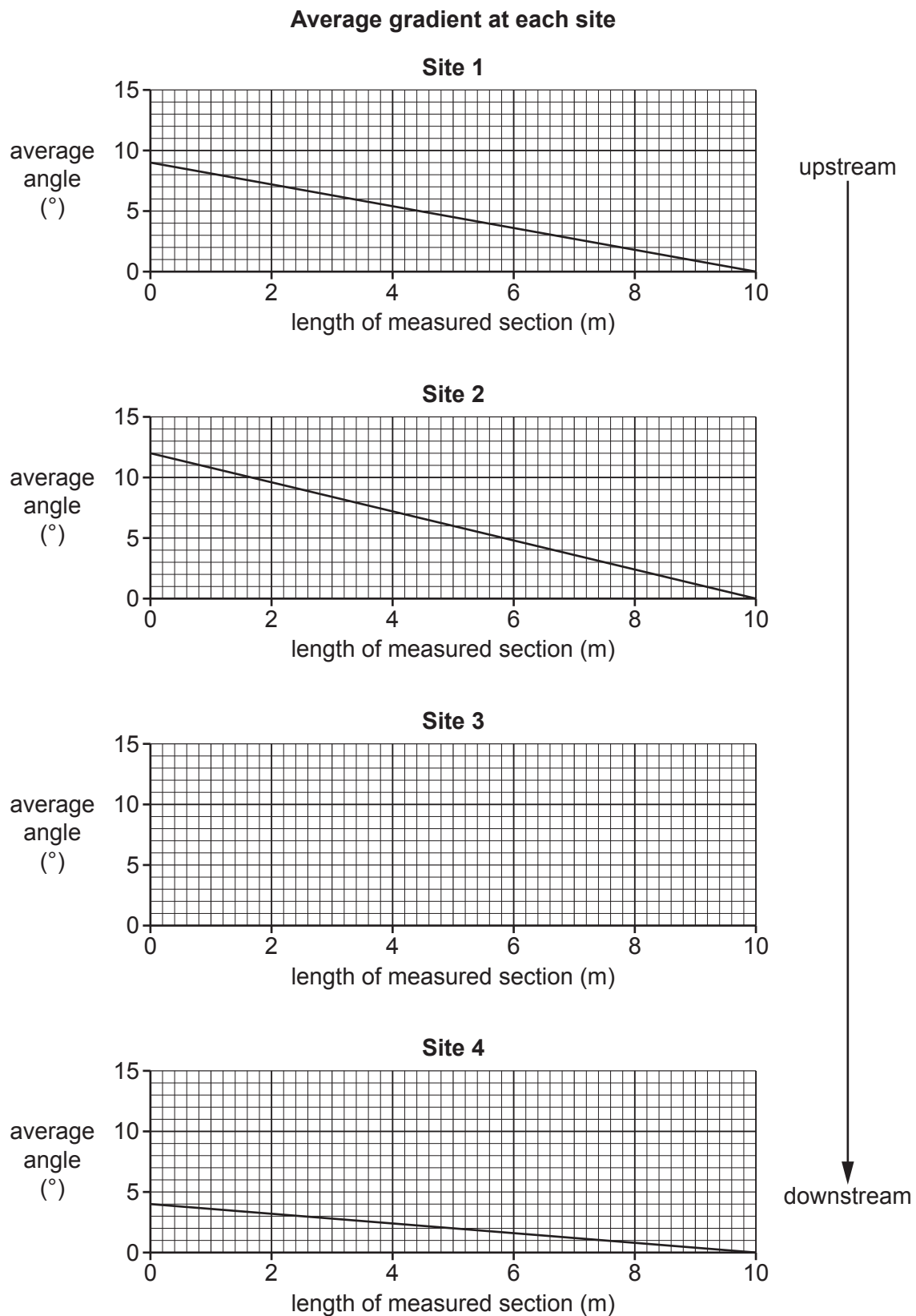**Plot the average gradient for Site 3 on Fig. 4.4** using the results in Table 4.2. [1]

Average gradient at each site

Fig. 4.4

(iii) Do the results shown in Table 4.2 and Fig. 4.4 support **Hypothesis 2:** *The gradient (angle of slope) of the river decreases downstream*? Support your answer with data from Table 4.2 and Fig. 4.4.

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.... [3]

[Total: 20]

Additional pages

If you use the following pages to complete the answer(s) to any question(s), the question number(s) must be clearly shown.

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