



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

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**GEOGRAPHY**

**0460/42**

Paper 4 Alternative to Coursework

**October/November 2010**

**1 hour 30 minutes**

Candidates answer on the Question Paper.

Additional Materials: Ruler

**READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name on all the work you hand in.  
Write in dark blue or black pen.  
You may use a soft pencil for any diagrams, graphs or rough working.  
Do not use staples, paper clips, highlighters, glue or correction fluid.  
**DO NOT WRITE ON ANY BARCODES.**

Answer **all** questions.  
The Insert contains Figs 1 and 2 for Question 1, Figs 5 and 6 and Photographs A, B, C, D and E for Question 2.  
The Insert is **not** required by the Examiner.  
Sketch maps and diagrams should be drawn whenever they serve to illustrate an answer.

At the end of the examination, fasten all your work securely together.  
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
Q1	
Q2	
<b>Total</b>	

This document consists of **14** printed pages, **2** blank pages, and **1** Insert.





1 Some students were studying how the characteristics of a river change downstream. They decided to focus their fieldwork investigation on a local river to see if it had similar characteristics of a text book example. These characteristics are shown in Fig. 1 (Insert).

The students agreed to investigate two hypotheses:

**Hypothesis 1:** *The width, depth and cross-sectional area of the river increase downstream.*

**Hypothesis 2:** *Velocity is greater where the river is deeper.*

(a) (i) The students wanted to take measurements at six study sites along the river. Suggest why it was important that they took all their measurements on one day.

.....  
..... [1]

(ii) Suggest **two** other things they had to consider in choosing their investigation sites.

1 .....  
.....  
2 .....  
..... [2]

(iii) In preparation they visited a local stream to do a pilot study. Give **two** advantages of doing a pilot study.

1 .....  
.....  
2 .....  
..... [2]

(b) The students split into two separate groups to do their fieldwork. Each group focused on investigating one hypothesis. The first group investigated **Hypothesis 1**: *The width, depth and cross-sectional area of the river increase downstream.*

(i) The students measured the width of the river channel and the depth of the river at points across the channel. They used the following equipment:

- tape measure or rope,
- metre rule or 30 cm ruler.

Describe how the students would make their measurements.

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..... [3]

(ii) Having made their measurements and recorded them, the students drew a cross-section of the river channel at each site. The cross-section at Site 1 is shown in Fig. 2 (Insert). The results of measurements made at Site 4 are shown in Table 1 below.

**Table 1**

Distance from left bank (m)	0	0.2	0.4	0.6	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2
Depth (m)	0.02	0.08	0.12	0.15	0.22	0.28	0.32	0.38	0.46	0.50	0.46	0.41
Distance from left bank (m)	2.4	2.6	2.8	3.0	3.2	3.4	3.6	3.8	4.0	4.2	4.4	
Depth (m)	0.37	0.34	0.28	0.21	0.18	0.16	0.12	0.08	0.06	0.05	0.01	

Use the results shown in Table 1 to add the following information to Fig. 3 opposite:

- complete the cross-section of the channel,
- shade in the cross-sectional area of the river channel.

[3]

Cross-section at Site 4

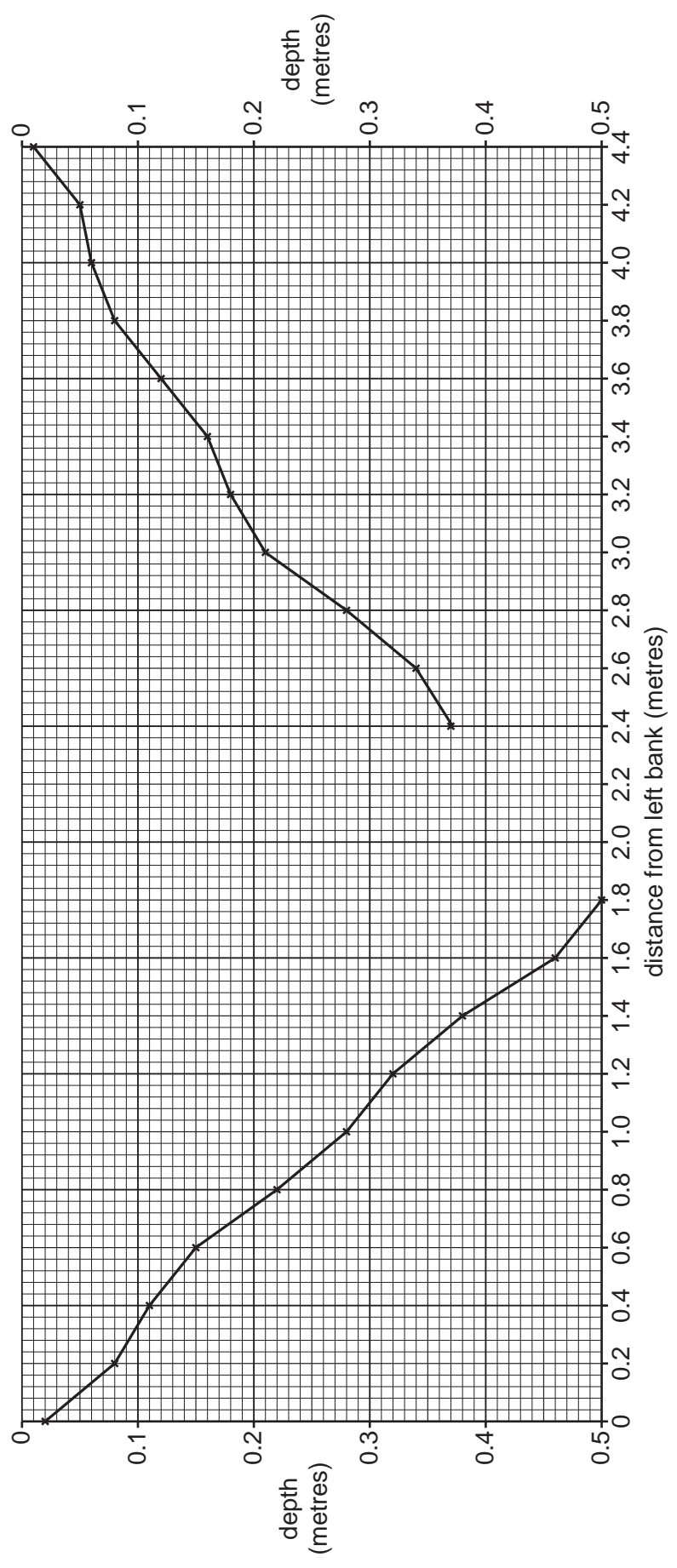


Fig. 3

(iii) The students also calculated the cross-sectional area of the channel at each site. Their calculation for Site 1 is shown below.

Calculation of cross-sectional area at Site 1

$$\begin{aligned} \text{Cross-sectional area} &= \text{width of river (metres)} \times \text{average depth of river (metres)} \\ &= 2.6 \times 0.14 \\ &= 0.36 \text{ sq metres} \end{aligned}$$

The width of the river at Site 4 was 4.4 metres and the average depth was 0.23 metres. Using this data calculate the cross-sectional area at Site 4 below. [2]

Calculation of cross-sectional area at Site 4

$$\begin{aligned} \text{Cross-sectional area} &= \text{width of river (metres)} \times \text{average depth of river (metres)} \\ &= \\ &= \end{aligned}$$

(iv) Describe **two** differences between the cross-sections at Site 1 shown in Fig. 2 (Insert) and Site 4 shown in Fig. 3.

- 1 .....
- .....
- 2 .....
- ..... [2]

- (v) The summary table of measurements made at the six sites is shown in the table below. Insert your answer from **b(iii)** into the table.

**Table 2**

Site	Distance from source (km)	Width of river (m)	Average depth (m)	Cross-sectional area (sqm)
1	2.60	2.6	0.14	0.36
2	6.00	3.1	0.16	0.50
3	11.40	3.6	0.20	0.72
4	14.60	4.4	0.23	
5	16.40	4.4	0.27	1.19
6	22.00	7.3	0.25	1.83

Do these results agree with **Hypothesis 1**: *The width, depth and cross-sectional area of the river increase downstream?* Identify a result that does not fit the general pattern.

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.....[2]

- (c) The second group of students were investigating **Hypothesis 2**: *Velocity is greater where the river is deeper.* They needed to measure the velocity of the river at each of the six survey sites. Two possible methods to make these measurements were to use **either** a flow meter **or** floats and a stopwatch.

- (i) Choose **one** of these methods and describe how the students would do the investigation.

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.....[3]

- (ii) For the method which you did **not** choose, give **one** advantage and **one** disadvantage of this method.

Advantage .....

.....

Disadvantage .....

..... [2]

- (iii) The students' results are shown in Table 3 below.

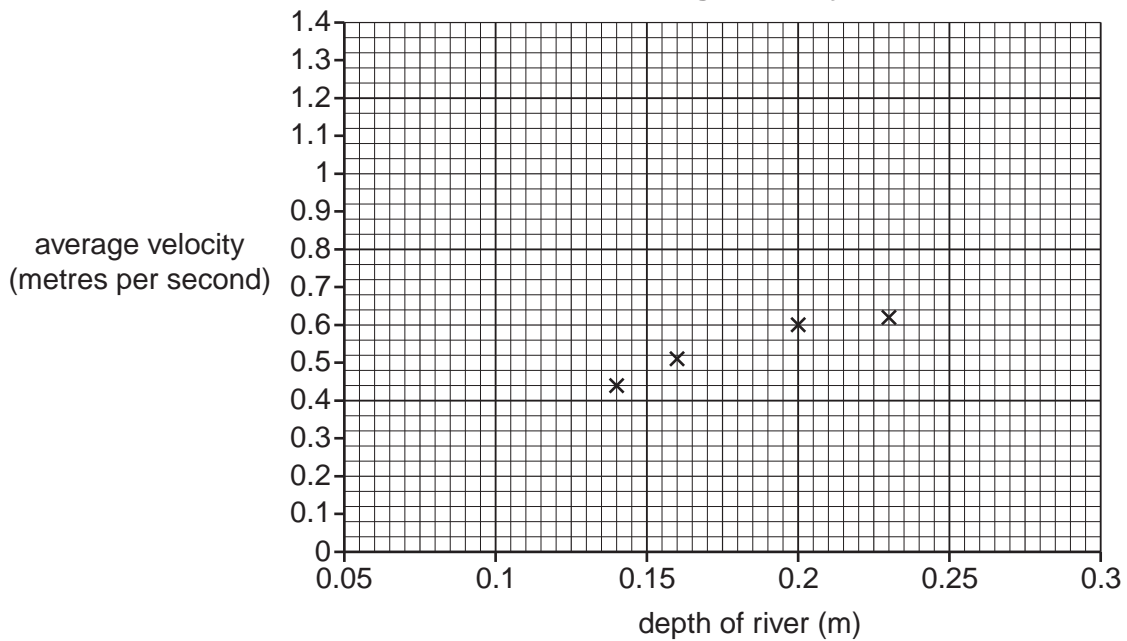
**Table 3**

Study site	Average depth (m)	Average velocity (metres per second)
1	0.14	0.44
2	0.16	0.51
3	0.20	0.60
4	0.23	0.62
5	0.27	1.20
6	0.25	1.30

The students plotted these results on a scatter graph, Fig. 4 below. Complete Fig. 4 by adding the results for sites 5 and 6.

[2]

**Scatter Graph to show relationship between depth of river and average velocity**



**Fig. 4**



(iv) To what extent do you agree with **Hypothesis 2**: *Velocity is greater where the river is deeper?* Use the information in Fig. 4 to help you to answer.

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..... [3]

(d) Whilst making their measurements, one observant student noticed how the river valley was different at the six sites. How could the student record these differences during fieldwork?

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..... [3]

[Total: 30 marks]

2 A group of students decided to do an investigation about the location of high technology industries. They wanted to discover more about some location factors which they had studied in their course. These factors are shown in Fig. 5 (Insert). The students based their hypotheses on two of these factors.

**Hypothesis 1:** *Companies in high technology industries are usually located near to other similar high technology companies.*

**Hypothesis 2:** *Companies in high technology industries need highly skilled or trained employees.*

To begin their investigation the students visited an industrial area on the edge of the city where they lived. This industrial estate is shown in Fig. 6 (Insert) and Photograph A (Insert).

(a) Look at Fig. 6 and Photograph A.

(i) Which landscape feature is labelled X on Photograph A?  
..... [1]

(ii) What is the number of the building labelled Y on Photograph A?  
..... [1]

(b) Look at Photographs B to E (Insert). They show different views of the industrial estate. Describe features of the landscape and buildings shown in the photographs.

Landscape .....  
.....  
.....  
.....  
.....  
Buildings .....  
.....  
.....  
..... [4]

- (c) To investigate their hypotheses, the students did a survey of the companies industrial estate. An example of a completed survey sheet is shown below.

**Example of completed survey sheet**

Unit number of company building on industrial estate	<b>300</b>
Type of industrial sector	<b>Environmental</b>
Number of employees	<b>40</b>

- (i) Suggest why the students did not include the name of the company on their survey sheet.

.....  
 ..... [1]

- (ii) The students produced a summary table of the results of their survey. They then grouped the companies into common industrial sectors. Fig. 7, below, shows companies in the computer/telecommunications sector.

**Companies in the computer/telecommunications sectors**

Unit number of the company building (shown on Fig. 6)	Number of employees in the company
2	19
10	26
23	15
216	39
230	40
240	89
290	95

**Fig. 7**

Locate these companies on Fig. 6.

Describe the distribution within the industrial estate of companies in the computer/telecommunications sector.

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 .....  
 .....  
 .....  
 ..... [3]

(iii) Fig. 8, below, shows the overall results of the survey. Use data from Fig. 8 to complete Fig. 9.

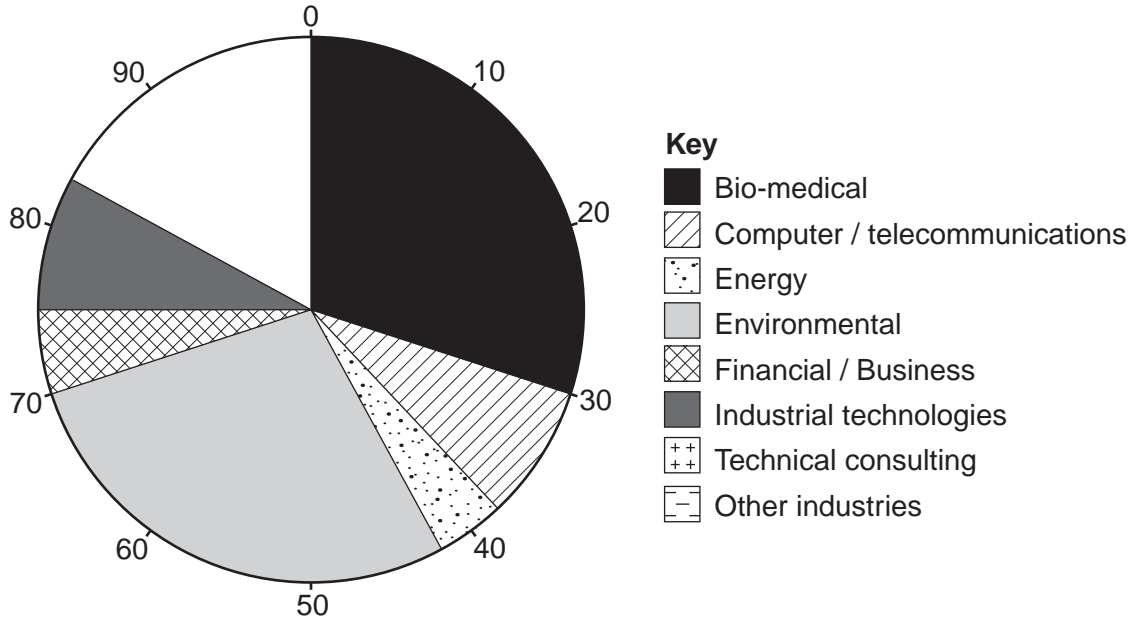
**Results of survey**

High technology industries on the industrial estate	Number of companies	Percentage of total number of companies	Average number of employees
Bio-medical	28	30	61
Computer / telecommunications	8	8	46
Energy	4	4	30
Environmental	26	28	38
Financial / Business	5	5	53
Industrial technologies	7	8	27
Technical consulting	6	6	23
Other industries	10	11	71
<b>Total</b>		<b>100</b>	

**Fig. 8**

(iv) Use the percentage data in Fig. 8 to complete Fig. 9 below using the key provided. [2]

**Percentage of total number of companies**



**Fig. 9**

(v) Why did the students come to the conclusion that **Hypothesis 1: Companies in high technology industries are usually located near to other similar high technology companies** is true? Use the results in Figs 8 and 9 to support your answer.

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..... [2]

(vi) Explain why high-technology companies are usually located near to other similar companies.

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.....  
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..... [3]

(vii) Whilst doing their survey, the students found out that companies in the 'other industries' sector shown in Fig. 8 included services such as a nursery, gym, restaurant and leisure centre.  
Suggest **two** reasons why such companies would locate on this industrial estate.

1 .....  
.....  
2 .....  
..... [2]

(d) To investigate **Hypothesis 2: Companies in high technology industries need skilled or trained employees**, the students looked again at Fig. 8.

(i) Use the data from Fig. 8 to complete Fig. 10 below.

[2]

Average number of employees in each sector

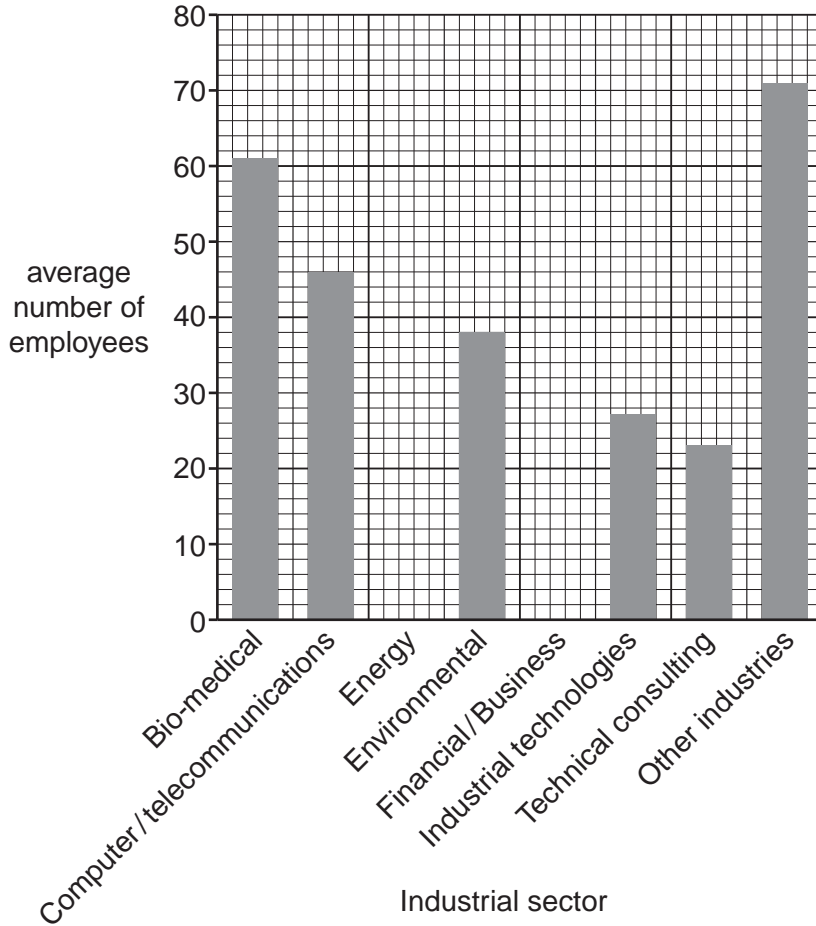


Fig. 10

(ii) The students realised that this data by itself was not sufficient to make a conclusion about **Hypothesis 2**. Therefore they visited the biggest company on the industrial estate to find out more details about its employees. Suggest **three** questions that would help the students to reach a conclusion about **Hypothesis 2**.

1 .....

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2 .....

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3 .....

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[3]

(e) Having completed their study, the students decided to do a further investigation to look at the other factors which affect the location of high technology industries shown in Fig. 5 (Insert).

These two factors are:

- High technology industries need good transport links.
- High technology industries need small quantities of raw materials.

Suggest how they could carry out an investigation into **one** of these factors.

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..... [4]

[Total: 30 marks]

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*Copyright Acknowledgements:*

Question 2 Figure 6                      © Map; Cambridge Science Park.  
Question 2 Photos A–E                    © Photographs; Cambridge Science Park.

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