UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER				

GEOGRAPHY **0460/43**

Paper 4 Alternative to Coursework **May/June 2013**

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Calculator
                         Ruler

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name in the spaces provided.
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 IN ANY BARCODES.

Answer **all** questions.

The Insert contains Fig. 1 and Table 5 for Question 1, and Photographs A and B and Table 9 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	
Total	

This document consists of **13** printed pages, **3** blank pages and **1** Insert.

UNIVERSITY *of* CAMBRIDGE
International Examinations

[Turn over

1 A class of students were studying traffic flow at a busy road junction near their school. A sketch map of the road junction is shown in Fig. 1 (Insert).

The students wanted to investigate the following hypotheses:

Hypothesis 1: *Traffic flow changes during the day.*

Hypothesis 2: *Traffic congestion occurs at all sites going towards and away from the road junction.*

The students chose eight sites to do traffic surveys. These are shown on Fig. 1.

They agreed to do four separate counts lasting one hour at the following times:

08.00 to 09.00
11.00 to 12.00
14.00 to 15.00
17.00 to 18.00

(a) (i) Describe how the students would organise the traffic survey. Refer to their planning and recording.

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....[4]

(ii) Suggest **three** difficulties which the students might have had when doing their traffic survey.

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....[3]

**(b)** The results of the students' traffic survey at site 3 are shown in Table 1, below.

Table 1

Traffic survey results for site 3

Time of survey	bikes / motor bikes	cars	vans / minibuses	lorries / buses	Total vehicles
08.00 to 09.00	8	101	38	13	160
11.00 to 12.00	6	107	27	18	
14.00 to 15.00	4	73	29	20	126
17.00 to 18.00	2	41	22	10	75

(i) Complete Table 1 by calculating the total number of vehicles counted between 11.00 and 12.00. [1]

(ii) Use the data in Table 1 to complete the divided bar graph for the traffic survey results between 11.00 and 12.00 on Fig. 2 below. [2]
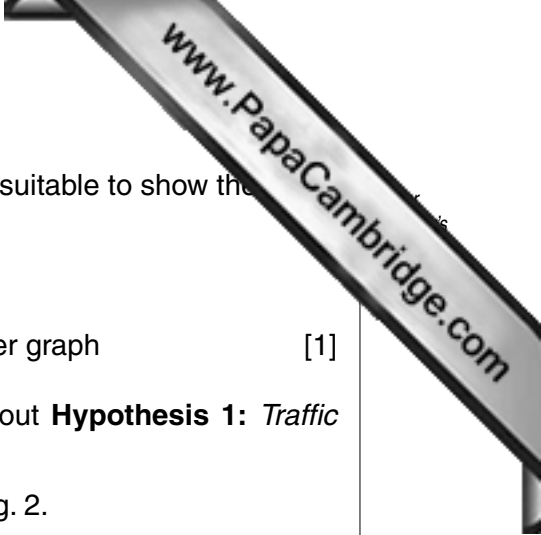
Results of student traffic survey
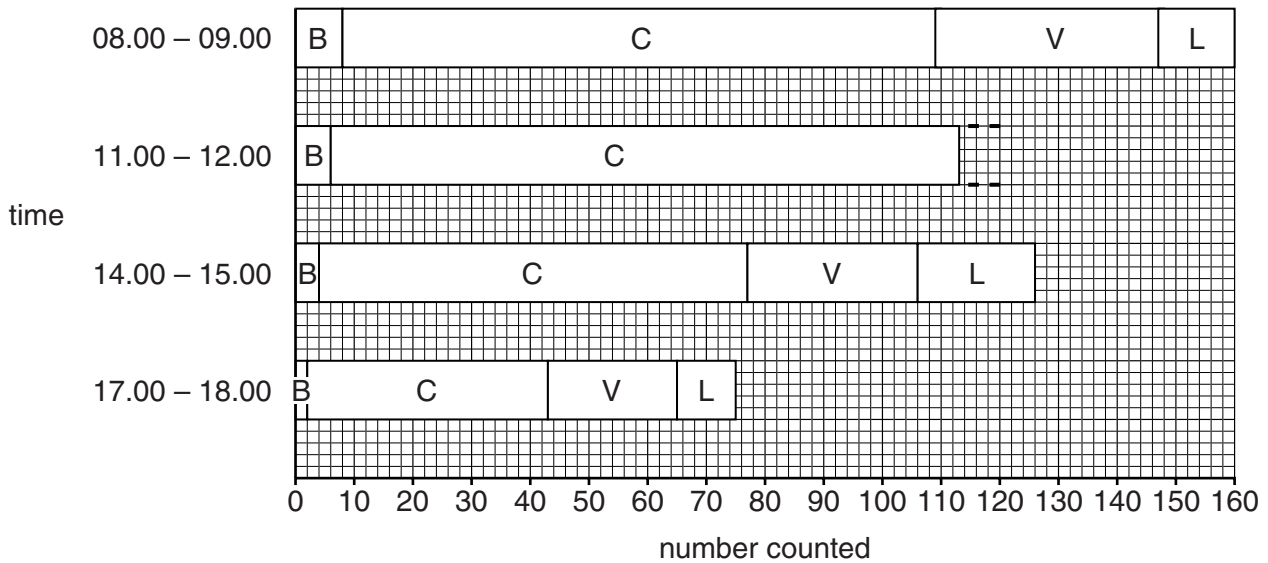
Key

B   bikes / motorbikes
C   cars
V   vans / minibuses
L   lorries / buses

Fig. 2

[Turn over

(iii) Which **one** of the following types of graph would also be suitable to show the survey results between 11.00 and 12.00?

Circle your answer below.

pie chart   line graph   scatter graph   [1]

(iv) What conclusion would the students at site 3 make about **Hypothesis 1:** *Traffic flow changes during the day*?

Support your decision with evidence from Table 1 and Fig. 2.

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....[4]

(v) Suggest how traffic flows between 08.00 and 09.00 might be different at site 7 from those at site 3 which are shown in Table 1. Look at Fig. 1 (Insert) to help you to answer.

Number of vehicles ....

....

....

Type of vehicles ....

....

....[2]

(c) To test **Hypothesis 2:** *Traffic congestion occurs at all sites going towards and* *from the road junction*, the students used their results to calculate an index of traffic for each site. The index is shown in Table 2 below.

Table 2

Index of traffic flow

vehicle type	number of points allocated*
bike / motor bike	0.5
car	1.0
van / minibus	2.0
lorry / bus	3.0

*more points were allocated to vehicles causing more congestion

The results of using this index between 08.00 and 09.00 at site 3 are shown in Table 3 below.

Table 3

Index of traffic flow for site 3 between 08.00 and 09.00

vehicle type	bikes / motor bikes	cars	vans / minibuses	lorries / buses
number counted	8	101	38	13
points	0.5	1.0	2.0	3.0
Index score	**4**	**101**	**76**	**39**

Total index score between 08.00 and 09.00 at site 3 = **220**

(i) Calculate the index scores for site 3 between 11.00 and 12.00 in Table 4 below. [2]

Table 4

Index score of traffic flow for site 3 between 11.00 and 12.00

vehicle type	bikes / motor bikes	cars	vans / minibuses	lorries / buses
number counted	6	107	27	18
points	0.5	1.0	2.0	3.0
Index score		**107**	**54**	

Total index score between 11.00 and 12.00 at site 3 = **218**

(ii) The results of the index of traffic flow for all 8 survey sites are shown in the [...] (Insert).

The students decided to show their results in a line graph, Fig. 3 below. Use the [...] data in Table 5 to complete the line for site 1. **[2]**

Index of traffic flow at survey sites

survey times

Key

—————— traffic going towards junction

- - - - - - traffic going away from junction

Fig. 3

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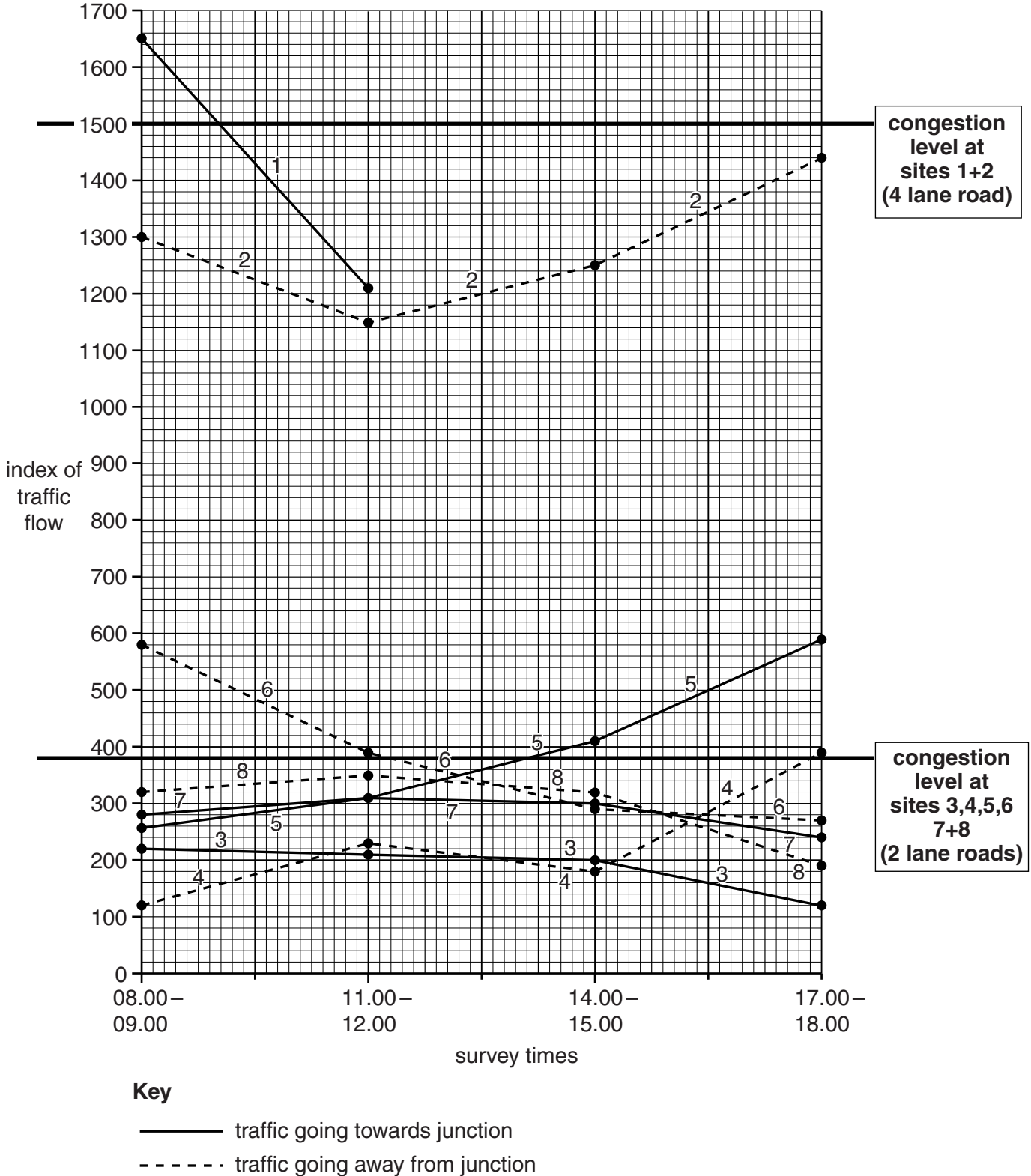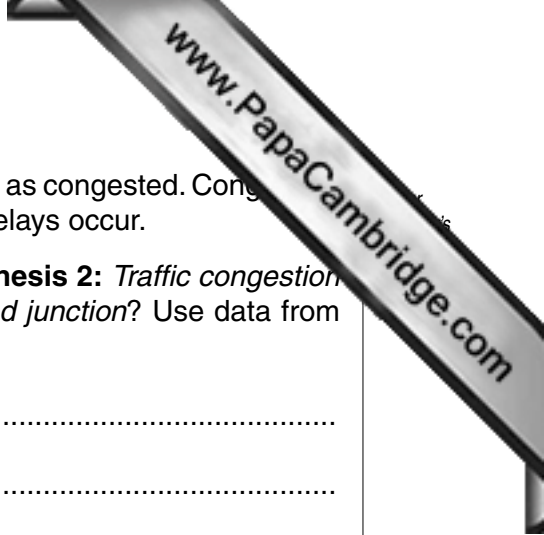**(iii)** Fig. 3 shows the level above which traffic flow is classified as congested. Con[...]
level indicates the traffic flow index above which traffic delays occur.

What conclusion would the students make about **Hypothesis 2:** *Traffic congestion*
occurs at all sites going towards and away from the road junction? Use data from
Fig. 3 to support your answer.

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(d) There is a plan to build a new shopping area at the location shown on Fig. 1 (Insert).
Give **two** effects this development might have on traffic at sites 5 and 6.

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....[2]

(e) Suggest **three** ways to reduce traffic congestion in urban areas.

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[Total: 30 marks]

[Turn over

2 Two groups of students were investigating the characteristics of a local river which flo[ws] 15 km from its source to the sea. They wanted to investigate possible reasons for change[s in] velocity (speed of flow) downstream. They carried out their fieldwork at five sites along th[e] course of the river.

They decided to test the following hypotheses:

Hypothesis 1: *Velocity increases as the river bed slopes more steeply.*

Hypothesis 2: *Velocity increases as the wetted perimeter of the river channel increases.*

(a) Before they began the fieldwork their teacher spoke to them about safety in and around the river. Suggest **two** pieces of advice their teacher could have given them.

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....[2]

(b) First the students used a floating object to measure velocity over a distance of 10 metres. The results from Group A at site 1 are shown in Fig. 4 below.

River recording sheet

Study site: 1   Group A

Measuring velocity

Time for a floating object to travel 10 metres:
Test 1   48 seconds
Test 2   71 seconds
Test 3   59 seconds
Test 4   61 seconds
Test 5   43 seconds

Fig. 4

(i) Name **three** different pieces of equipment the group would use to carry out their fieldwork at this site.

1 ....

2 ....

3 ....[3]

(ii) Calculate the average velocity at site 1 using the results shown in Fig. 4.

Show your working and your answer in the box below.

Study site: 1   Group A

Average (mean) length of time to float 10 metres =

Average velocity = $\dfrac{distance}{average\ time}$

Average velocity =   metres per second

(iii) When they had completed their measurements at site 1 the two groups compared their results. These results are shown in Table 6 below.

Table 6

Times for a floating object to travel 10 metres at site 1

	Group A	Group B
Test 1	48 seconds	38 seconds
Test 2	71 seconds	27 seconds
Test 3	59 seconds	49 seconds
Test 4	61 seconds	29 seconds
Test 5	43 seconds	31 seconds

Suggest **two** reasons why the results obtained by the two groups were different.

1 ....

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2 ....

....[2]

[Turn over
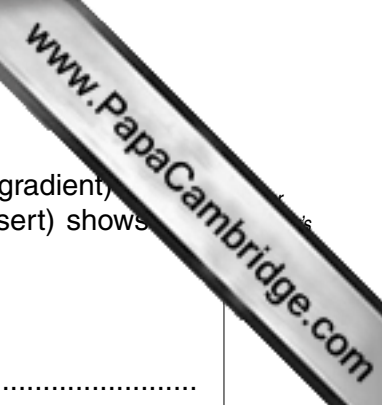
(iv) At each site the students also measured the downstream slope (gradient) river bed using a clinometer and ranging poles. Photograph A (Insert) shows measurement being taken.

Describe how the students measured the downstream slope.

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....[3]

(v) The downstream slope and average velocity results which group B obtained at the five sampling sites are shown in Table 7 below.

Table 7

Results of group B

site	gradient (degrees)	average velocity (m/s)
nearest source 1	8	0.29
2	6	0.43
3	5	0.37
4	3	0.46
5 nearest mouth	1	0.47

What conclusion would the students have made about **Hypothesis 1:** *Velocity increases as the river bed slopes more steeply*?

Use evidence from Table 7 to support the conclusion.

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....[3]

(c) To investigate **Hypothesis 2:** *Velocity increases as the wetted perimeter of the channel increases*, the students needed to measure the width of the river channel and the depth of the river at each site.

(i) Complete Fig. 5 below to identify the **two** different pieces of equipment used to measure the width of the river. [2]
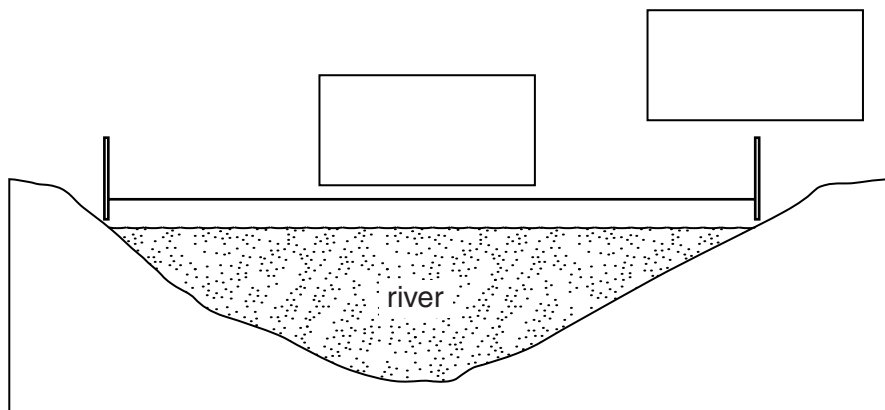

Fig. 5

(ii) The students measured the depth of the river every 0.5 m across the channel.

Their results for site 1 are shown in Table 8, below.

Table 8

Results for site 1

Distance across channel (m)	0.5	1.0	1.5	2.0	2.5	3.0
Depth of river (m)	0.18	0.20	0.25	0.40	0.30	0.20

Use these results to complete Fig. 6 below, the cross-section of the channel at site 1. [2]

Cross-section of channel at site 1

width of channel (m)

Fig. 6

[Turn over
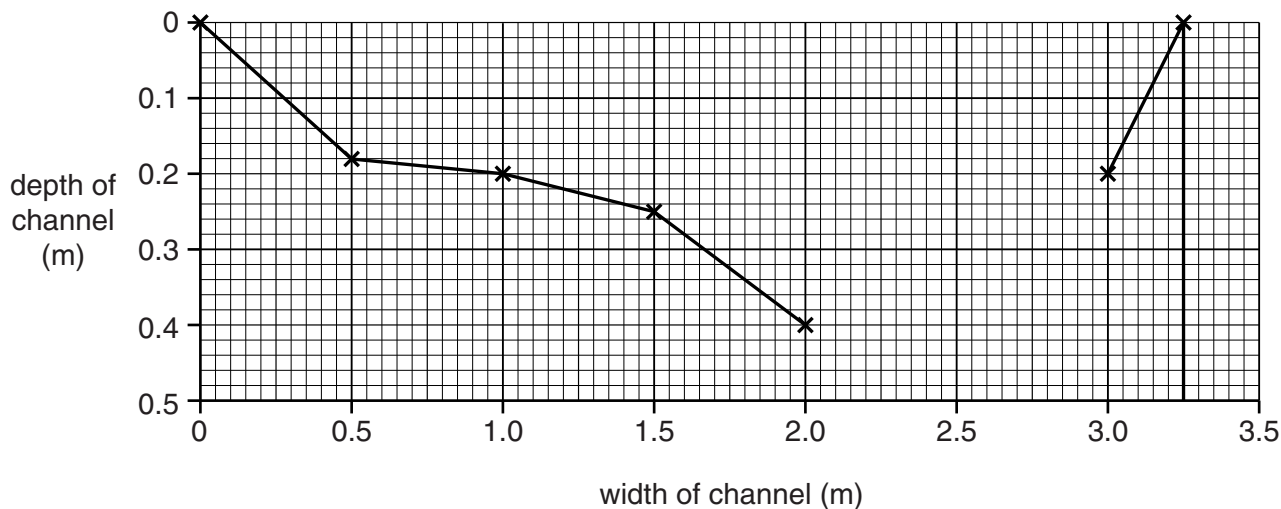
(iii) Photograph B (Insert) shows how students measured the wetted perimeter [of the] river. The wetted perimeter is the part of the channel cross-section which the [water] touches.

Their method is described in Fig. 7, below, which is part of a student's fieldwork notebook.

Extract from fieldwork notebook

> <u>Measuring the wetted perimeter</u>
> The tape measure was placed along the bed of the river, starting and finishing at water level on both banks.
> To make the method more accurate a student walked along it to cross the river.

Fig. 7

The students' results are shown in Table 9 (Insert). Use these results to complete Fig. 8 below by plotting the result for site 1. [1]

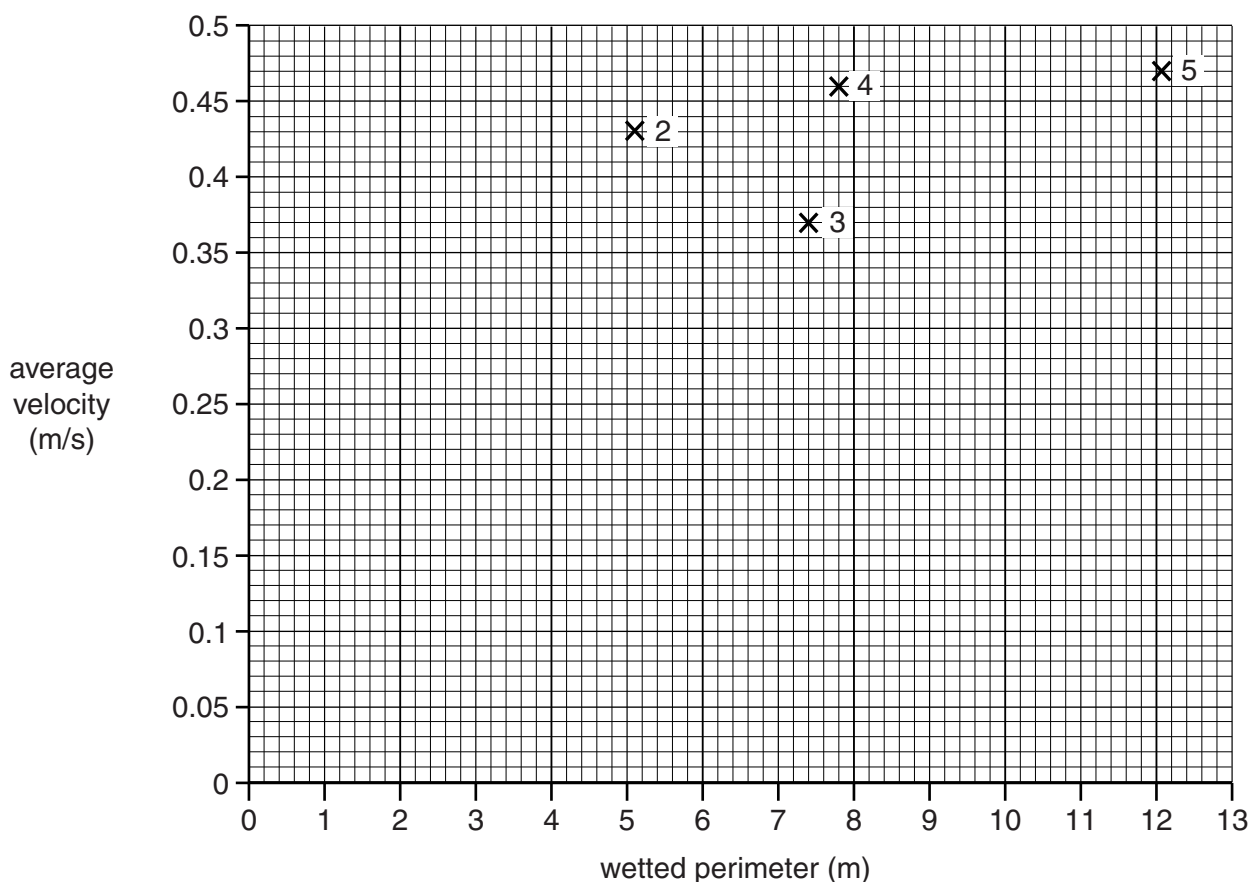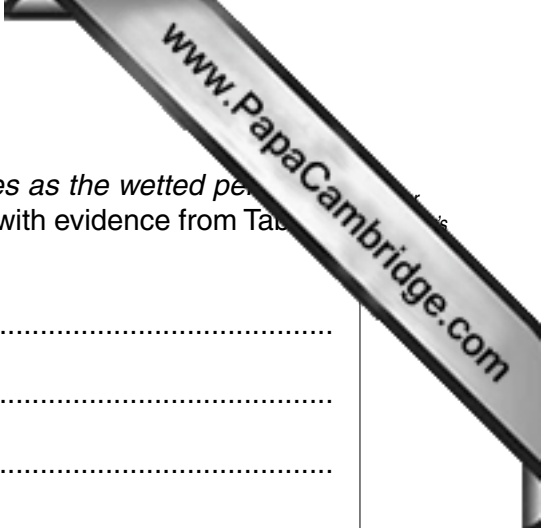**Scatter graph of length of wetted perimeter and average velocity**

Fig. 8

(iv) Do their results support **Hypothesis 2:** *Velocity increases as the wetted pe...* *of the river channel increases*? Support your conclusion with evidence from Ta... and Fig. 8.

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(v) Suggest **two** disadvantages of their method for measuring the wetted perimeter in a large river.

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....[2]

(d) To extend their fieldwork the students investigated the impact of people on the river. State **one** impact people may have on a river. Describe how the impact could be investigated.

Impact of people

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Investigation

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[Total: 30 marks]

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