



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE
NAME

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CENTRE
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GEOGRAPHY

Paper 4 Alternative to Coursework

0460/41

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 ON ANY BARCODES.

Answer **all** questions.

The Insert contains Photographs A and B, Table 2 and Fig. 2 for Question 1, and Figs 5 and 7 and Table 5 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 **15** printed pages, **1** blank page and **1** Insert.



- 1 Three students in New Zealand were investigating the characteristics of local rivers. They decided to do fieldwork at five sites along the Orere River.

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The two hypotheses which the students tested were:

Hypothesis 1: *Width, depth and wetted perimeter of the river channel increase downstream.*

Hypothesis 2: *Rocks on the river bed become smaller and more rounded downstream.*

- (a) Before beginning their fieldwork the students discussed the fieldwork tasks they needed to do.

- (i) Suggest **three** factors the students should have considered in choosing their five fieldwork sites.

1

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2

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3

.....[3]

- (ii) The students decided to do a trial (pilot) study at a different river site near their school. Give **two** advantages of doing a trial (pilot) study.

1

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2

.....[2]

- (b) To investigate **Hypothesis 1** the students measured the width of the river channel and the depth of the river at points across the channel.

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Photographs A and B (Insert) shows them involved in this work. What equipment are the students using and how are they making their measurements?

width of channel

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depth of river

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.....[4]

- (c) The students measured the depth of the river at 0.5 m intervals across the channel. The results of their measurements at site 3 are shown in Table 1, below.

For
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Use

Table 1

Results at site 3

Distance across channel (m)	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
Depth of river (m)	0.02	0.05	0.07	0.11	0.13	0.17	0.18	0.16	0.21	0.27	0.25	0.15

- (i) Use these results to complete the cross-section of the channel at site 3 and shade in the river channel on Fig. 1 opposite. [2]
- (ii) The wetted perimeter is the part of the channel cross-section which the river touches. This is labelled at site 2 on Fig. 1 (opposite).

Describe a method that the students could use to measure the wetted perimeter.

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..... [2]

- (iii) The wetted perimeter is one factor which affects a river's speed of flow (velocity). Give **two** other factors which also affect the speed of flow of a river.

1

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2

..... [2]

Cross-sections at sites 1–5

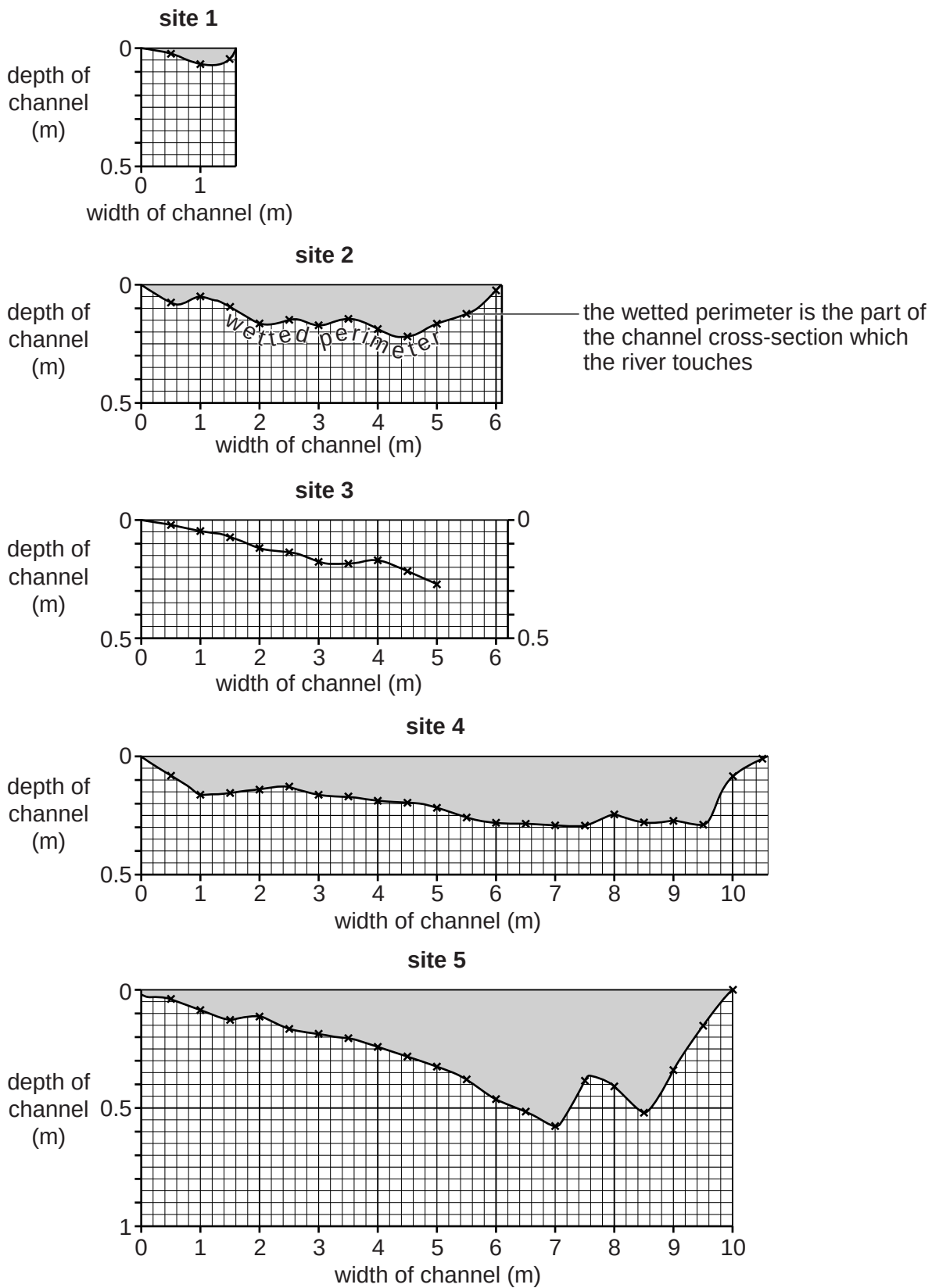
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Fig. 1

- (iv) The students produced a summary table of their measurements at the five sites. This is shown in Table 2 (Insert).

What conclusion did the students make about **Hypothesis 1: Width, depth and wetted perimeter of the river channel increase downstream?**

Use evidence from Table 2 and Fig. 1 to support the conclusion.

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.....[4]

- (d) The students then made some measurements to investigate **Hypothesis 2: Rocks on the river bed become smaller and more rounded downstream.**

- (i) At each site a student selected 10 rocks at random from the bed of the river. He then measured the size and roundness of the rocks using the equipment shown in Fig. 2 (Insert). Suggest how he made the two measurements.

rock size

.....

roundness of rock

.....[2]

The results of the student's work are shown in Table 3 below.

Table 3

Results of student's work

Site	1	2	3	4	5
Average (mean) rock size (cm)	29.3	24.5	22.5	14.5	3.5
Average Roundness score	1.1	1.9	2.1	3.2	4.4

- (ii) Plot the average rock size and roundness score for site 3 on Fig. 3 below. [2]

For
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Use

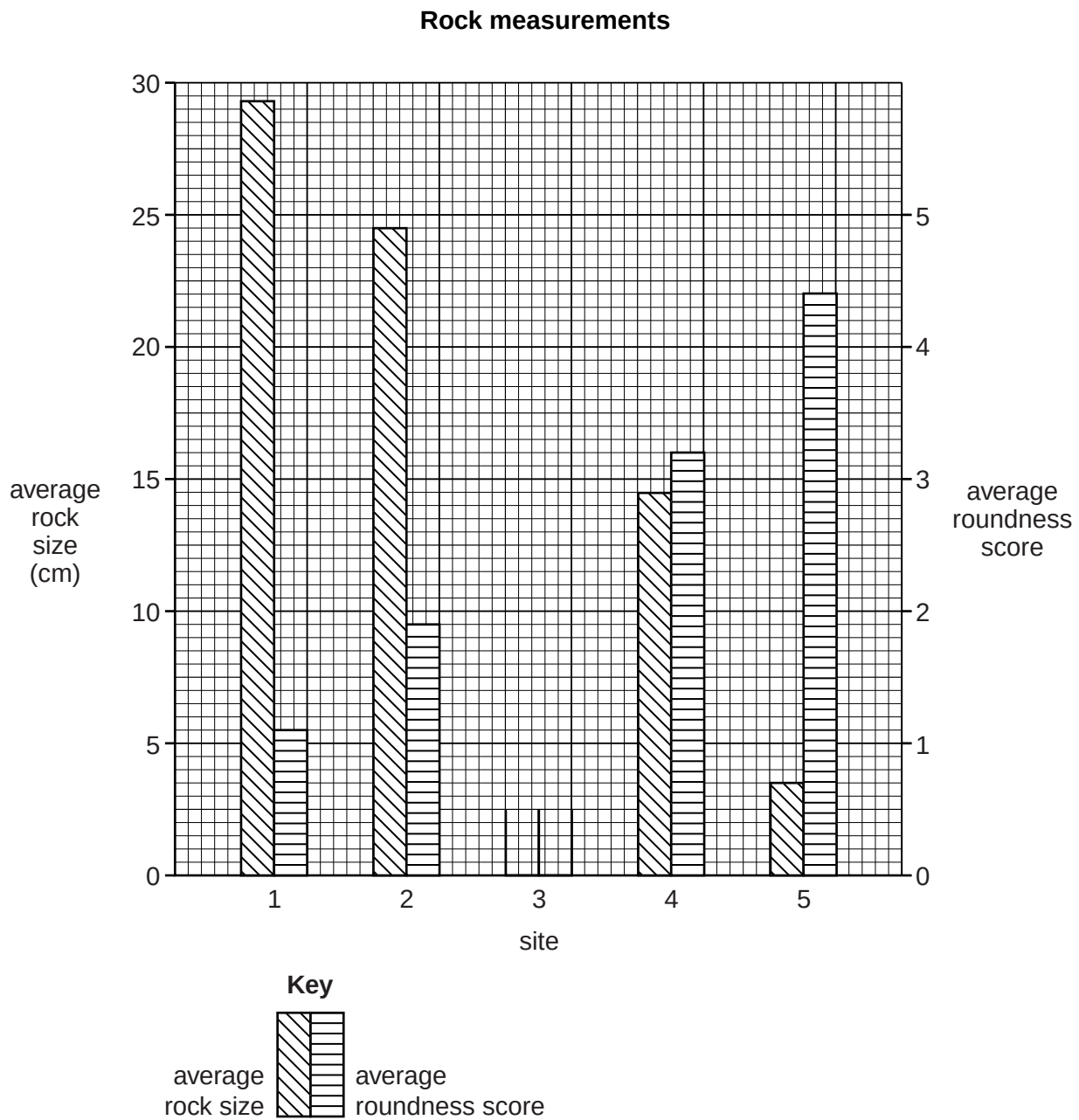


Fig. 3

- (iii) What conclusion would the students make about **Hypothesis 2: Rocks on the river bed become smaller and more rounded downstream?**

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

(iv) Suggest why rock size and roundness change downstream.

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..... [2]

(e) Suggest **four** ways that the students could have improved their data collection methods to make their results for both hypotheses more reliable.

1

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2

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3

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4

..... [4]

[Total: 30 marks]

- 2 A group of students in Botswana visited Jwaneng, a mining town. The mine is open-cast, where most mining is done by blasting and drilling at, or near, the surface.

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- (a) Mining is an important industry in Botswana. This is shown Table 4 below.

Table 4

Economic sectors of Botswana

Economic sector	% of GDP*
Service industries	45
Mining	36
Manufacturing industries	16
Agriculture	3

*GDP is a measurement of the total value of goods and services produced in a country

- (i) Which **one** of the following sectors of industry produces the highest percentage of Botswana's GDP? Circle your answer below. [1]

Primary

Secondary

Tertiary

- (ii) Use the data in Table 4 to complete the pie chart, Fig. 4 below. [2]

Percentage of GDP by economic sector in Botswana

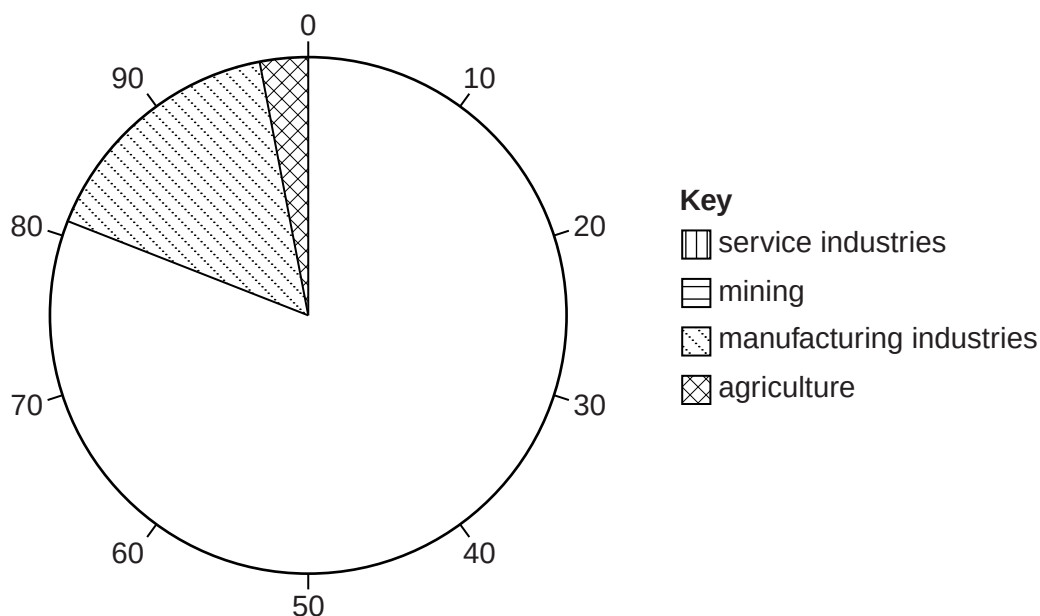


Fig. 4

The two hypotheses which the students tested were:

Hypothesis 1: *The mine has a negative impact on local people in Jwaneng.*

Hypothesis 2: *Workers at the mine gained benefits from moving to Jwaneng.*

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(b) In Jwaneng the students used a questionnaire with local residents to study the impacts of the mine. This questionnaire is shown in Fig. 5 (Insert).

(i) Before using the questionnaire the students thought about the best way to make use of it. They decided to ask the opinions of 50 people.

Describe a suitable sampling method for the students to select 50 people. Explain why you have chosen this method.

Name of sampling method

Description of sampling method

.....

.....

Why this sampling method was chosen

.....

..... [3]

(ii) When they showed their questionnaire to their teacher she suggested that they should start the questionnaire by asking:

'Do you live in Jwaneng?'

Why do you think the teacher made this suggestion?

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..... [2]

(iii) Having completed their survey the students classified their results.

The answers to Question 2 (What do you think are the local benefits of this mine?) and Question 3 (What do you think are the main problems caused by this mine?) are shown in Table 5 (Insert).

Use this data to complete the bar graphs in Figs 6A and 6B opposite. [2]

Answers to Questions 2 and 3

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Local benefits of this mine

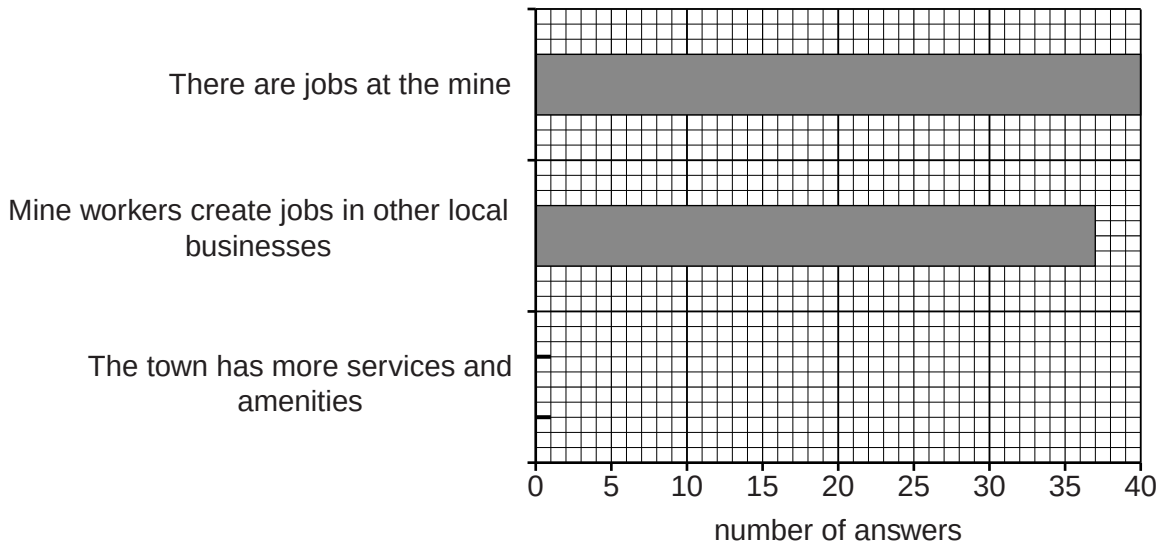


Fig. 6A

Main problems of this mine

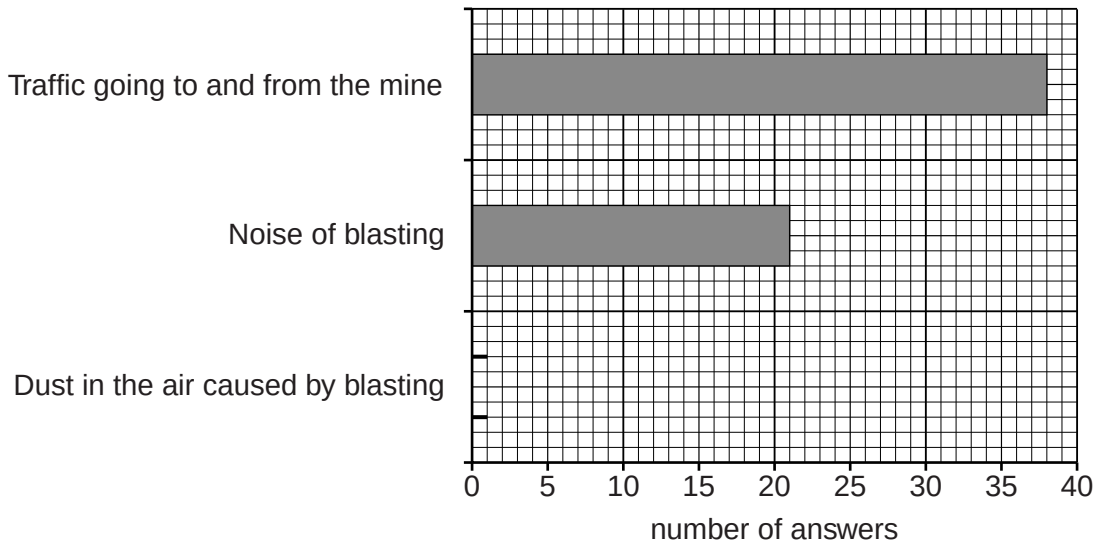


Fig. 6B

- (iv) Answers to Question 4 (Overall do you think this mine is good or bad for local people?) are shown in Table 6 below.

For
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Use

Table 6

Answers to Question 4

Good for local people	42 people
Bad for local people	8 people

What conclusion did the students make about **Hypothesis 1: *The mine has a negative impact on local people in Jwaneng?*** Support your answer with evidence from Tables 5 and 6 and Figs 6A and 6B.

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.....[4]

- (v) Suggest **three** ways to overcome the problems of the mine suggested in answers to Question 3 in the questionnaire shown in Table 5.

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2

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3

.....[3]

Question 2(c) begins on page 14

- (c) The students used a different questionnaire to investigate **Hypothesis 2: Workers at the mine gained benefits from moving to Jwaneng.**

This questionnaire, which they used with workers at the mine, is shown in Fig. 7 (Insert).

- (i) The students decided to plot the answers to Question 1 (In which town did you live before you moved to work at the mine?) on the flow line map, Fig. 8 below.

Towns where miners at Jwaneng mine previously lived

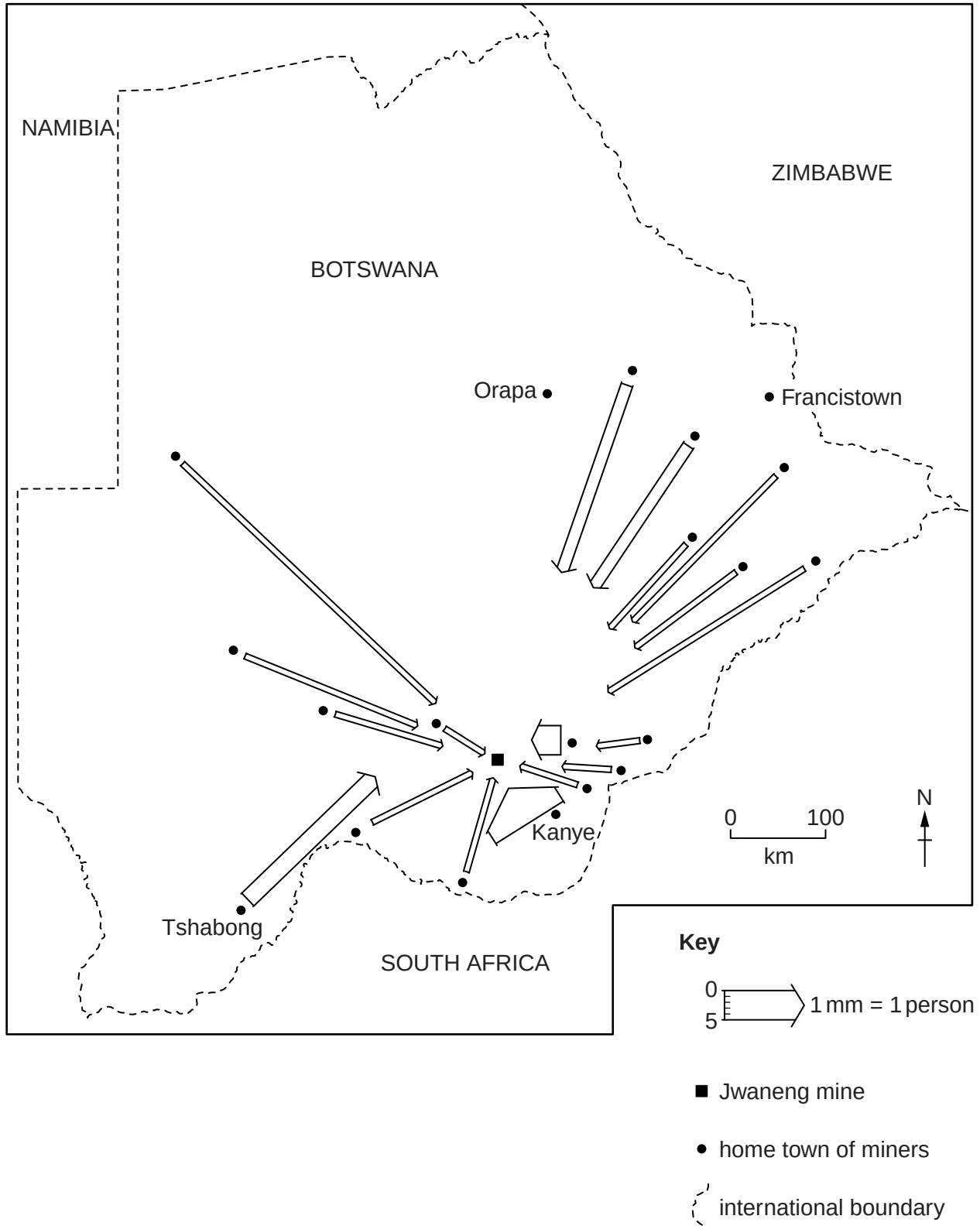


Fig. 8

Plot the information in Table 7 below onto Fig. 8 (opposite).

Table 7

Town	Number of workers
Orapa	5
Francistown	1

[2]

- (ii) Describe **three** features of the distribution of the towns where miners lived before they came to work at Jwaneng.

1

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2

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3

..... [3]

- (iii) Why is the flow line map shown in Fig. 8 an appropriate method to show this data?

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..... [2]

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- (iv) Some answers to Question 2 (Why did you move to work at the mine?) are shown in Table 8 below.

The students reached the conclusion that **Hypothesis 2: Workers at the mine gained benefits from moving to Jwaneng** was generally correct.

Which **three** answers in Table 8 best support their conclusion? Tick your **three** choices below.

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Table 8

**Answers to Question 2:
Why did you move to work at the mine?**

Answers	Tick ✓
Working in a mine is better paid than jobs in my home town	
No qualifications to get any other job	
Not allowed to work in South Africa where wages are higher	
Relatives already worked at the mine	
Send money to my family back home	
There are no jobs in my home town	

[3]

- (d) The students could have asked the mine workers about problems of working at the mine. Suggest **three** possible problems for these workers.

1

.....

2

.....

3

..... [3]

[Total: 30 marks]

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