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Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

5786934216

GEOGRAPHY **0460/43**

Paper 4 Alternative to Coursework **May/June 2015**

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 an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

The Insert contains Photographs A and B, Table 1 and Figs 1 and 4 for Question 1, and Fig. 7 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.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **15** printed pages, **1** blank page and **1** Insert.

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CAMBRIDGE International Examinations

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1 Students in southern USA read a newspaper report about pollution in a local river. They decided to do some fieldwork to investigate this. However, before they started their fieldwork, their teacher warned them about the possible dangers of working in polluted water. She also suggested some precautions they might take to protect themselves.

(a) (i) Suggest **two** dangers which their teacher may have warned them about when working in polluted water, and suggest how they might protect themselves whilst testing the level of pollution in the river.

Danger 1 .....

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Protection .....

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Danger 2 .....

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Protection .....

.....[4]

(ii) First the students did a visual survey of the river. Suggest **two** ways that they would be able to see from the river bank if the river was polluted.

1 .....

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2 .....

.....[2]

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(b) The students agreed on two hypotheses to investigate.

Hypothesis 1: *Water pollution increases as you go downstream.*

Hypothesis 2: *The Biotic Index decreases as you go downstream.*

The Biotic Index is a way of measuring water pollution by looking at the animals that live in the river.

To measure the level of water pollution the students decided to measure pH and oxygen levels in the river and do a simple foam test.

- pH is a measure of the acidity of water. The pH score decreases as water becomes more acidic. More acidic water means that pollution is more likely.
- The oxygen level of water decreases as it becomes more polluted.

The students used a digital meter to measure the pH of the water. This meter is shown in Photograph A (Insert).

(i) Describe **two** ways in which the students could make sure that their measurements were reliable.

1 .....

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2 .....

.....[2]

(ii) To measure the oxygen level and to do the foam test the students took samples of river water back to school. One student described the classroom tests in her fieldwork notebook. This is shown in Fig. 1 (Insert).

Suggest **two** reasons why these two tests may not be as reliable as using a digital meter.

1 .....

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2 .....

.....[2]

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The students made the three measurements at five sites downstream. The results of their fieldwork are shown in Table 1 (Insert).

Fig. 2, below, shows how pH values change downstream.

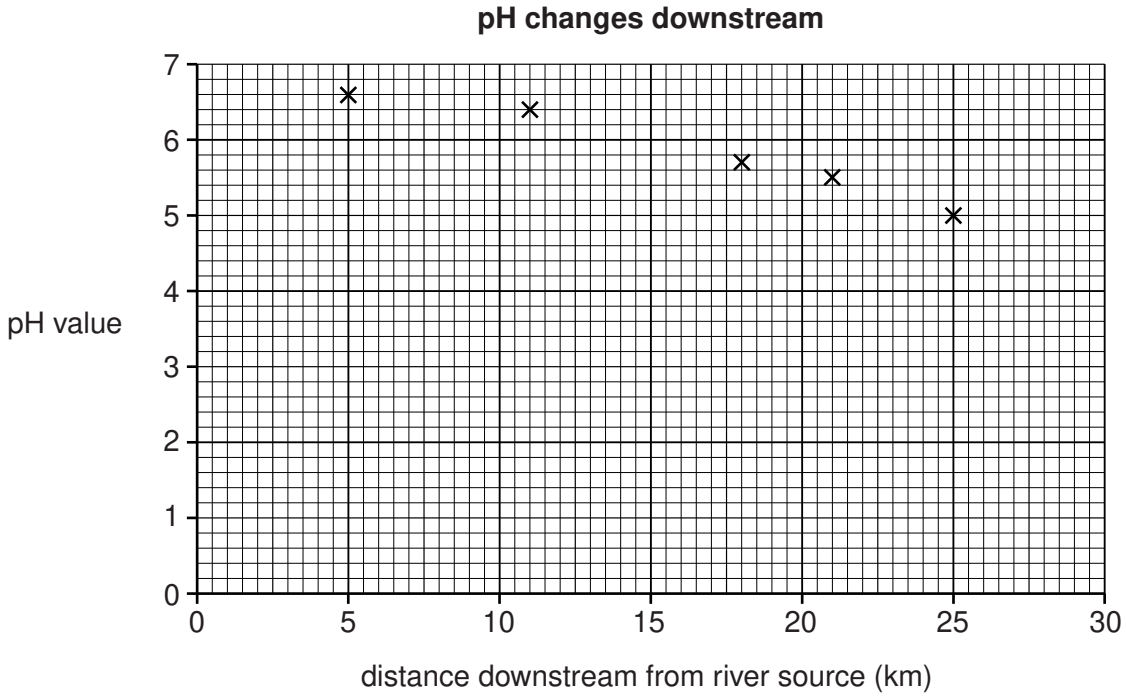


Fig. 2

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(iii) Use the results in Table 1 (Insert) to complete Fig. 3 below. [2]

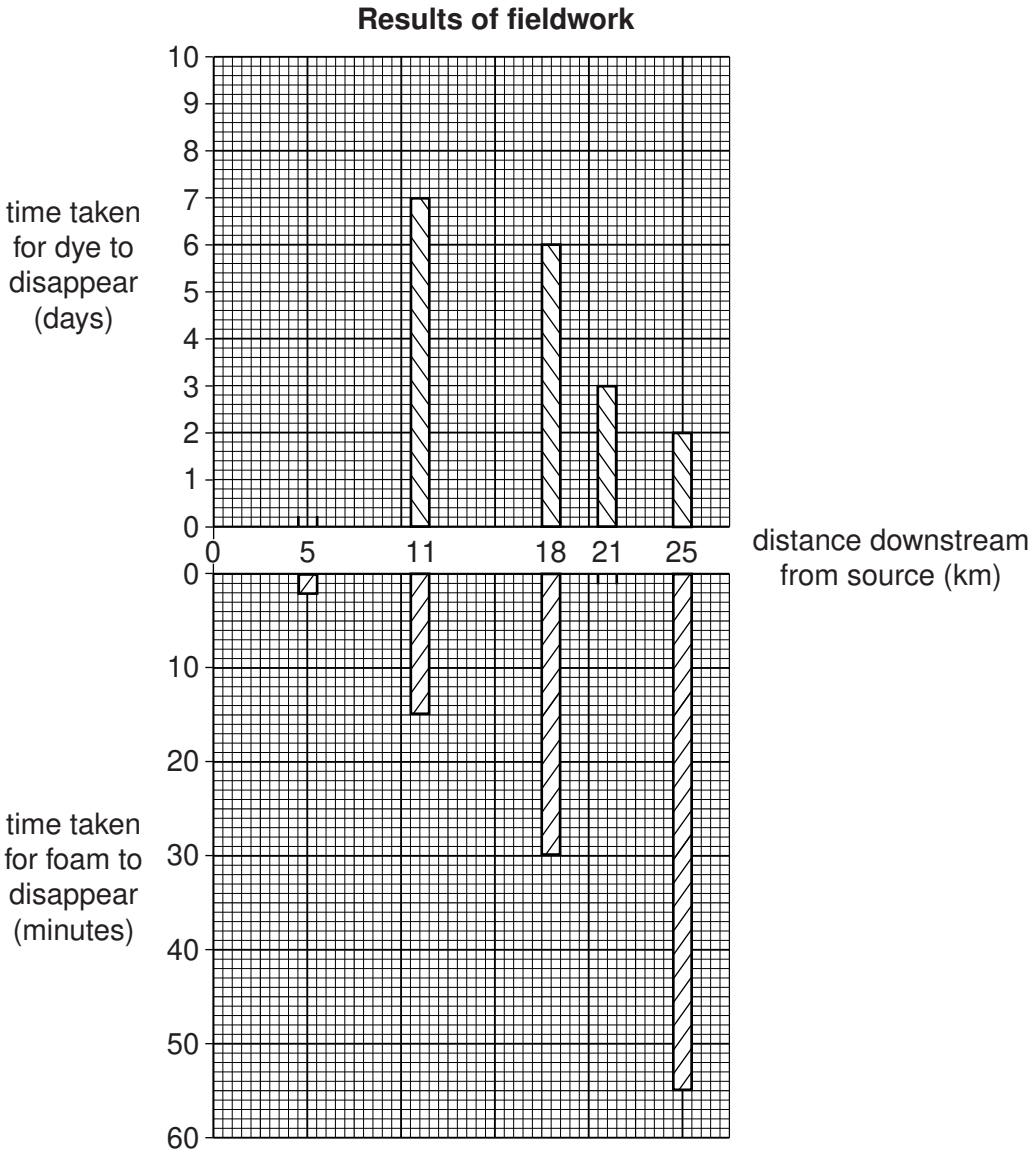


Fig. 3

(iv) Do the results shown in Figs 2 and 3 support **Hypothesis 1:** *Water pollution increases as you go downstream*? Use data to support your conclusion.

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.....[4]

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(v) Suggest **two** reasons why water pollution levels may vary along a river.

1 .....

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2 .....

.....[2]

(c) To investigate **Hypothesis 2:** *The Biotic Index decreases as you go downstream*, the students did the investigation described in Fig. 4 and shown in Photograph B (Insert) at the five sites along the river.

(i) Before the students began working at the five fieldwork sites they did a pilot study at a place on the river near to their school. Give **two** advantages of doing a pilot study.

1 .....

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2 .....

.....[2]

(ii) Explain why the students disturbed the river bed when carrying out the fieldwork.

.....

.....[1]

(iii) Explain why the students needed to identify the different types of animals found at each site while sampling.

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.....[1]

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(d) Fig. 5 below shows the students' recording sheet for site 3. They recorded their results using a tally method.

(i) Complete Fig. 5 below by recording the following information using the tally method.

Type of animal species	Number found
Scud	2
Dragonfly	5

[1]

Recording sheet for site 3

Group 1	Biotic score	Number found	Group 2	Biotic score	Number found	Group 3	Biotic score	Number found
Caddisfly	10	–	Sowbug	8	///	Midgefly	5	/
Mayfly	10	–	Damselfly	7	//	Blackfly	5	/
Stonefly	10	–	Crayfish	7	///	Mosquito	4	–
Water penny	10	–	Clam	6	–	Snail	4	–
Riffle beetle	9	/	Scud	6		Leech	2	–
Dobsonfly	9	–	Dragonfly	6		Aquatic worm	1	–

Fig. 5

(ii) Calculate the total Biotic score for Dragonfly at site 3 in Table 2 below. The total Biotic score is calculated by multiplying the Biotic score of a species by the number of this species found. [1]

Table 2

Biotic Index scores at Site 3

Species	Biotic score of species	Number of each species found	Total Biotic score
Riffle beetle	9	1	9
Sowbug	8	3	24
Damselfly	7	2	14
Crayfish	7	3	21
Scud	6	2	12
Dragonfly	6	5	
Midgefly	5	1	5
Blackfly	5	1	5
Total		18	120

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(iii) Table 3 below shows a summary of the students' results at the 5 sites.

The average Biotic Index score is the total Biotic score divided by the number of animals.

Table 3

Students' Biotic Index results

	Unpolluted ← Quality of water → Very polluted			
	Group 1 species	Group 2 species	Group 3 species	Average Biotic Index score at the site
Site 1	10	6	0	136/16 = 8.5
Site 2	8	9	0	134/17 = 7.9
Site 3	1	15	2	120/18 = **6.7**
Site 4	0	11	5	100/16 = 6.3
Site 5	0	9	7	91/16 = **5.7**

Use the results in Table 3 to plot the average Biotic Index score for sites 3 and 5 on Fig. 6 below. Site 3 is 18 km downstream and site 5 is 25 km downstream. [2]

How the Biotic Index changes downstream

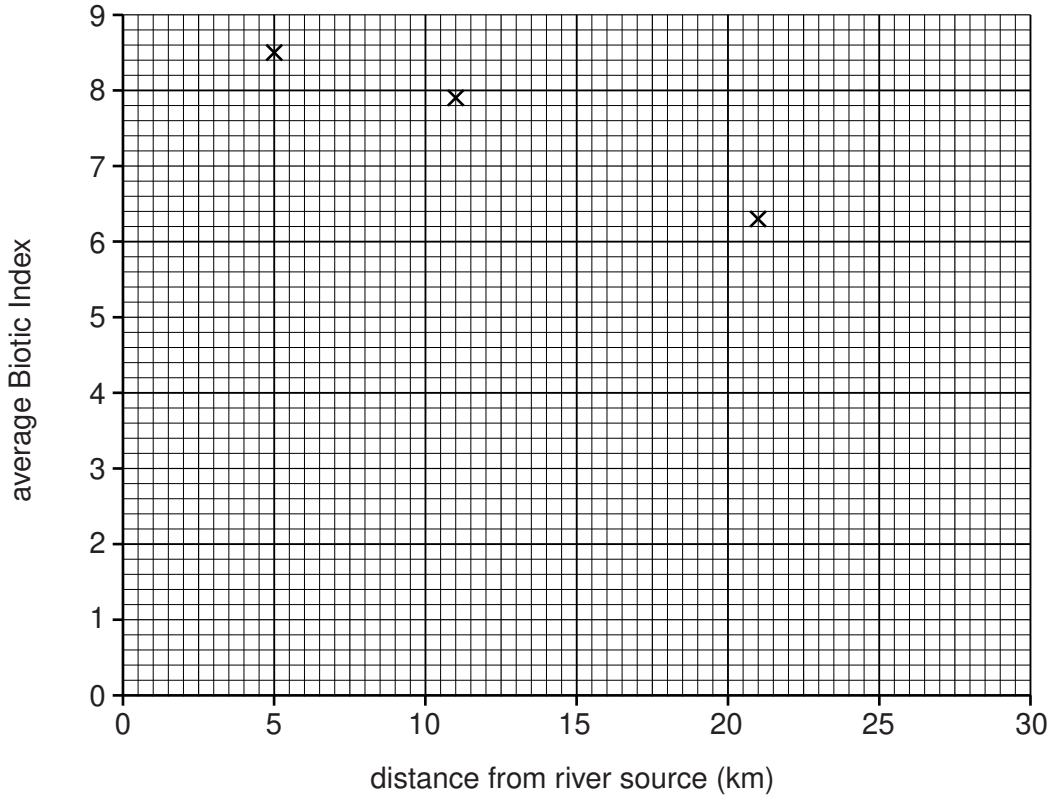


Fig. 6

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(iv) The students came to the conclusion that **Hypothesis 2:** *The Biotic Index decreases as you go downstream* was correct. What evidence from Table 3 and Fig. 6 supports their conclusion?

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.....[2]

(v) Look again at Fig. 4 and Table 3. How does the data about animal species in Table 3 also show that the water becomes more polluted downstream?

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.....[2]

[Total: 30 marks]

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2 Six students in Mumbai, India, wanted to find out more about people who lived in an area of the city. This was an area of squatter houses which had been improved during the previous 30 years by residents with help from the local authority.

They decided to investigate the following hypotheses:

Hypothesis 1: *Most families moved to Mumbai for employment.*

Hypothesis 2: *There are more benefits than problems for those living in the area of squatter houses.*

The students decided that the best way to test their hypotheses was to ask some people who lived in the area to answer a questionnaire.

(a) Their first task was to produce their questionnaire, which is shown in Fig. 7 (Insert).

(i) The students then had to decide on a suitable sample size of people to answer their questionnaire. One student suggested a sample of 20 people; another student suggested a sample of 500 people. These suggestions were not approved by their teacher.

Explain why:

a sample of 20 people is too small; .....

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a sample of 500 people is too big. .....

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.....[2]

(ii) Describe a sampling method for how the students could choose 100 people to complete the questionnaire. Explain why you have chosen this method.

Name of sampling method .....

Description of method .....

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Explanation for choice .....

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.....[3]

(iii) The students considered including more questions in their questionnaire, but decided not to.

Suggest **two** other questions they could have used to find out more about migration to the squatter settlement.

1 .....

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2 .....

.....[2]

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(b) The results of Question 1 in the questionnaire are shown in Table 4 below.

Table 4

Answers to Question 1:
What was the main reason you moved to live here?

Reason given	Percentage of residents
To look for work	31
Get a job to earn money to look after my family	23
To give my children the chance to go to school	13
Better living conditions than where I lived in the countryside	5
This is the only house I could afford	10
To join other members of the family	18
Total number of answers	100

(i) Use the results in Table 4 to complete Fig. 8 below. [2]

Answers to Question 1

What was the main reason you moved to live here?

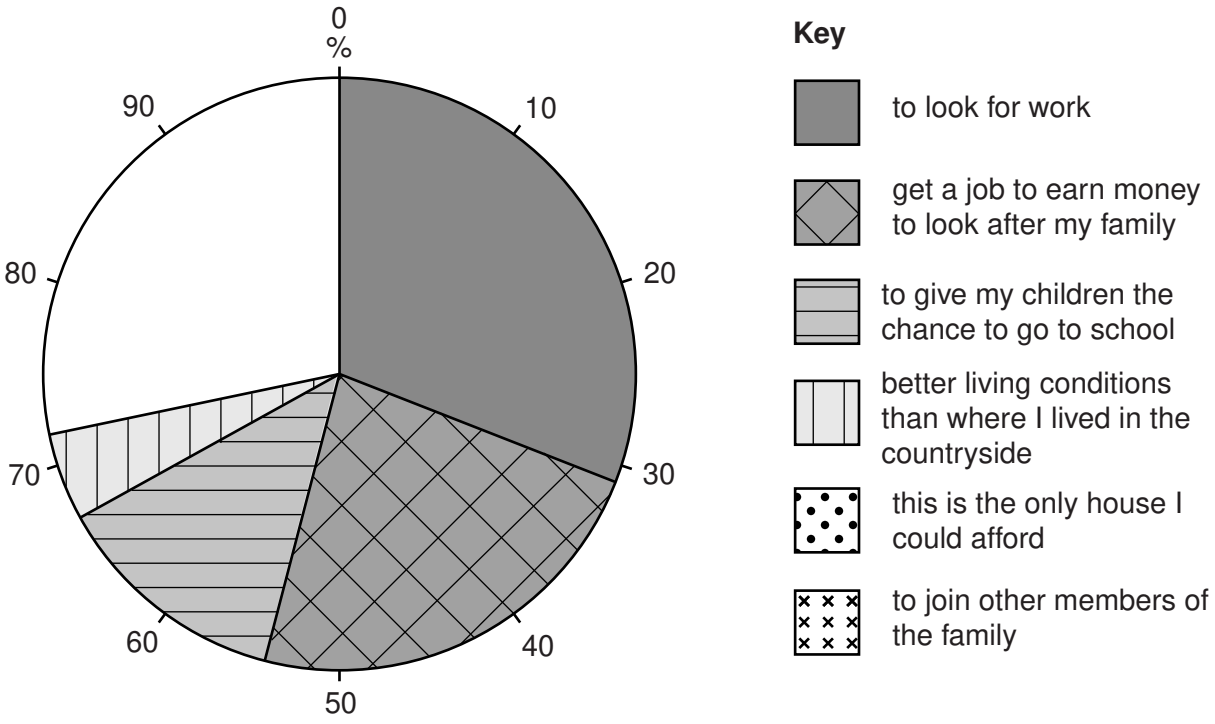


Fig. 8

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(ii) Do these results support **Hypothesis 1:** *Most families moved to Mumbai for employment*? Support your answer with evidence from Table 4 and Fig. 8.

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(c) To investigate **Hypothesis 2:** *There are more benefits than problems for those living in the area of squatter houses*, the students included Questions 2 and 3 in the questionnaire. The results of these questions are recorded in Table 5 below.

Table 5

Answers to Question 2: What are the main benefits of living here?
and Question 3: What are the main problems of living here?

Benefits	Number
Self-help schemes to improve houses	58
Clean water brought to houses through pipes	56
Jobs in local factories and workshops	44
New schools built for older children	**40**
Safe electricity supply from underground cables	39
Clinics built to care for children and older people	33
Total	270
Problems	Number
Open drains and sewers which attract rats	64
House is too small with too few rooms	**57**
Risk of flooding	53
Disease spreads quickly in unhygienic conditions	47
Danger of fire	36
Jobs are poorly paid and working hours are long	29
Lack of privacy because houses are close together	25
Total	311

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(i) Use the results in Table 5 to complete Figs 9 and 10 below. [2]

Results of Question 2
What are the main benefits of living here?

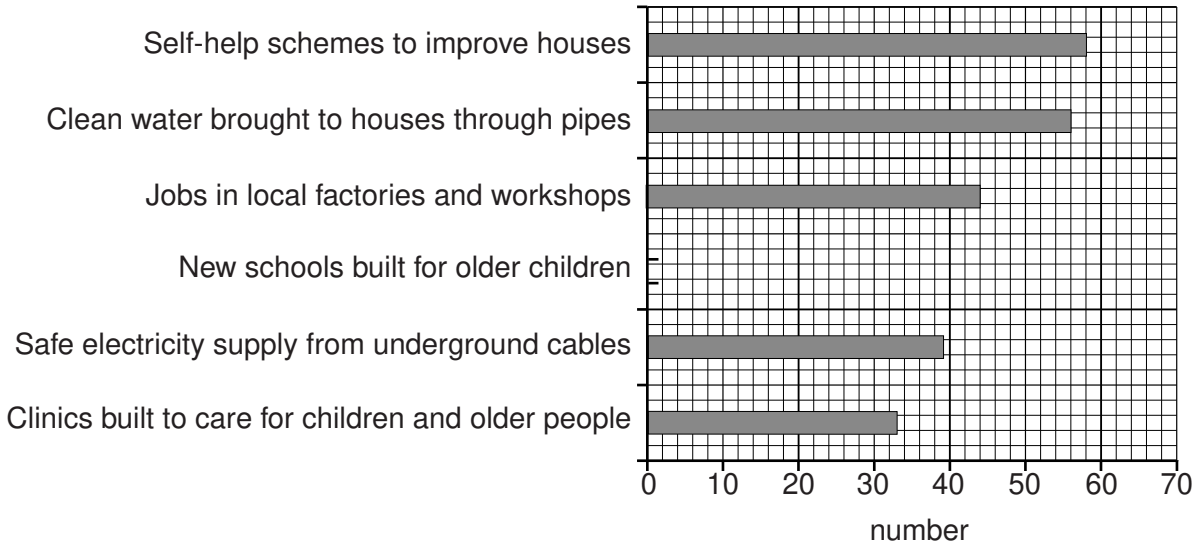


Fig. 9

Results of Question 3
What are the main problems of living here?

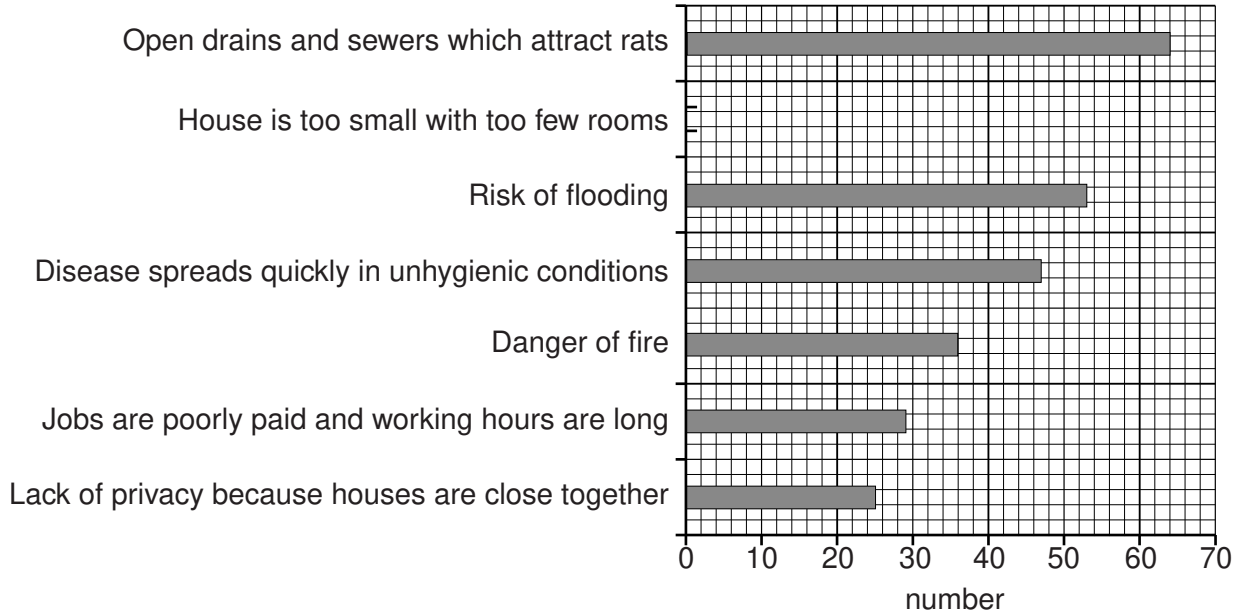


Fig. 10

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(ii) Two of the problems suggested in Table 5 are 'danger of fire' and 'risk of flooding'. Explain why these are common problems in a squatter settlement.

Danger of fire .....

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Risk of flooding .....

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.....[4]

(iii) Do the answers to Questions 2 and 3 support **Hypothesis 2:** *There are more benefits than problems for those living in the area of squatter houses*?

Explain your conclusion by using data from Figs 9 and 10 and Table 5.

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(d) Suggest **three** difficulties of doing fieldwork in a squatter settlement.

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3 .....

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(e) Two other students decided to extend their fieldwork and investigate housing conditions in the area.

Describe how they could collect information but do **not** include a questionnaire.

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[Total: 30 marks]

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