



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

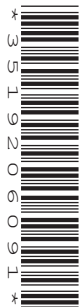
CANDIDATE
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GEOGRAPHY

0460/42

Paper 4 Alternative to Coursework

October/November 2017

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Calculator
 Protractor
 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.

Write your answer to each question in the space provided.

If additional space is required, you should use the lined pages at the end of the booklet.

The question number(s) must be clearly shown.

Answer **all** questions.

The Insert contains Figs. 1, 2 and 6 and Tables 1, 2 and 3 for Question 1, and Figs. 8 and 9 and Tables 4 and 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.

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 **18** printed pages, **2** blank pages and **1** Insert.

1 Students in Brazil did fieldwork to investigate infiltration. Infiltration is the process by which water soaks into the soil.

(a) The students worked in two groups to do their fieldwork in a river valley. They created two transects (A and B) going away from the river. These are shown in Fig. 1 (Insert).

Which **one** of the following pieces of equipment would they use to create a transect? Tick (✓) your answer.

Equipment	Tick (✓)
callipers	
clipboard	
quadrat	
rope	
ruler	

[1]

The hypotheses investigated by the students were:

Hypothesis 1: *The infiltration rate decreases as distance from the river increases.*

Hypothesis 2: *The infiltration rate decreases as soil moisture content increases.*

Soil moisture content is the quantity of water in the soil.

(b) (i) To investigate **Hypothesis 1** the students in group A collected data to measure the rate (speed) of infiltration at equal distances along transect A. Fig. 2 (Insert) shows the method they used to do this. Describe how the students measured the rate (speed) of infiltration to get the results shown in Table 1 (Insert).

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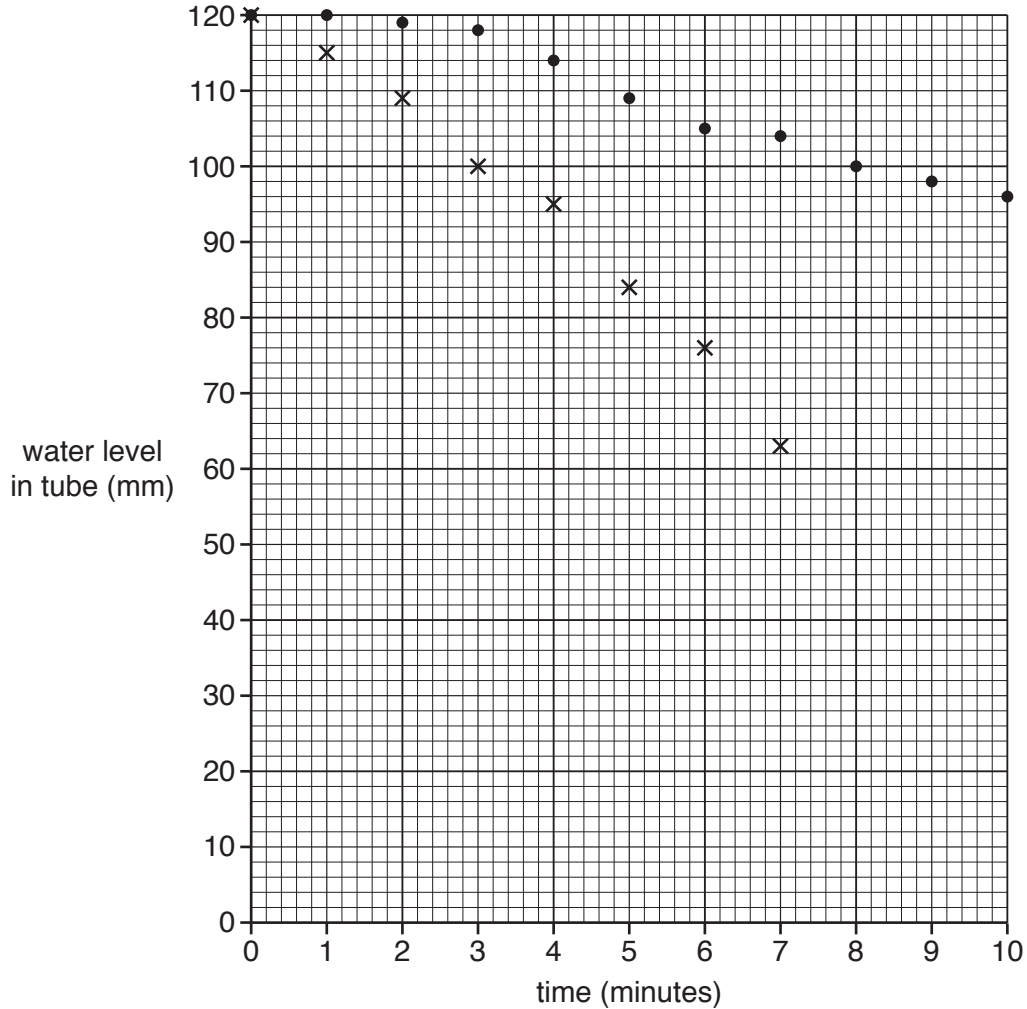
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- (ii) The students recorded the water level in the tube every minute for 10 minutes or until there was no water left. The results of their measurements at sites 4 and 7 are shown in Table 1 (Insert).

Use these results to **complete the measurements** for site 4 in Fig. 3 below. [2]

Results of measurement of water height at two sites on transect A



Key

- x site 4
- site 7

Fig. 3

- (iii) The students then calculated the infiltration rate at each site. Their calculation for site 4 is shown below.

$$\begin{aligned} \text{Infiltration rate} &= \frac{\text{fall in water level (mm)}}{\text{time (min)}} \\ &= \frac{70}{10} \\ &= 7.0 \text{ mm per min} \end{aligned}$$

Use the data in Table 1 to show the calculation which produced the result for site 7 in the space below. [1]

$$\begin{aligned} \text{Infiltration rate} &= \frac{\text{fall in water level (mm)}}{\text{time (min)}} \\ &= \dots\dots\dots \\ &= 2.4 \text{ mm per min} \end{aligned}$$

- (iv) The measurements of distance from the river and infiltration rate at the different fieldwork sites on transect A are shown in Table 2 (Insert). The students plotted these results on a graph, Fig. 4 below. **Complete the graph** by plotting the result for site 7. [1]

Infiltration rate at the sites on transect A

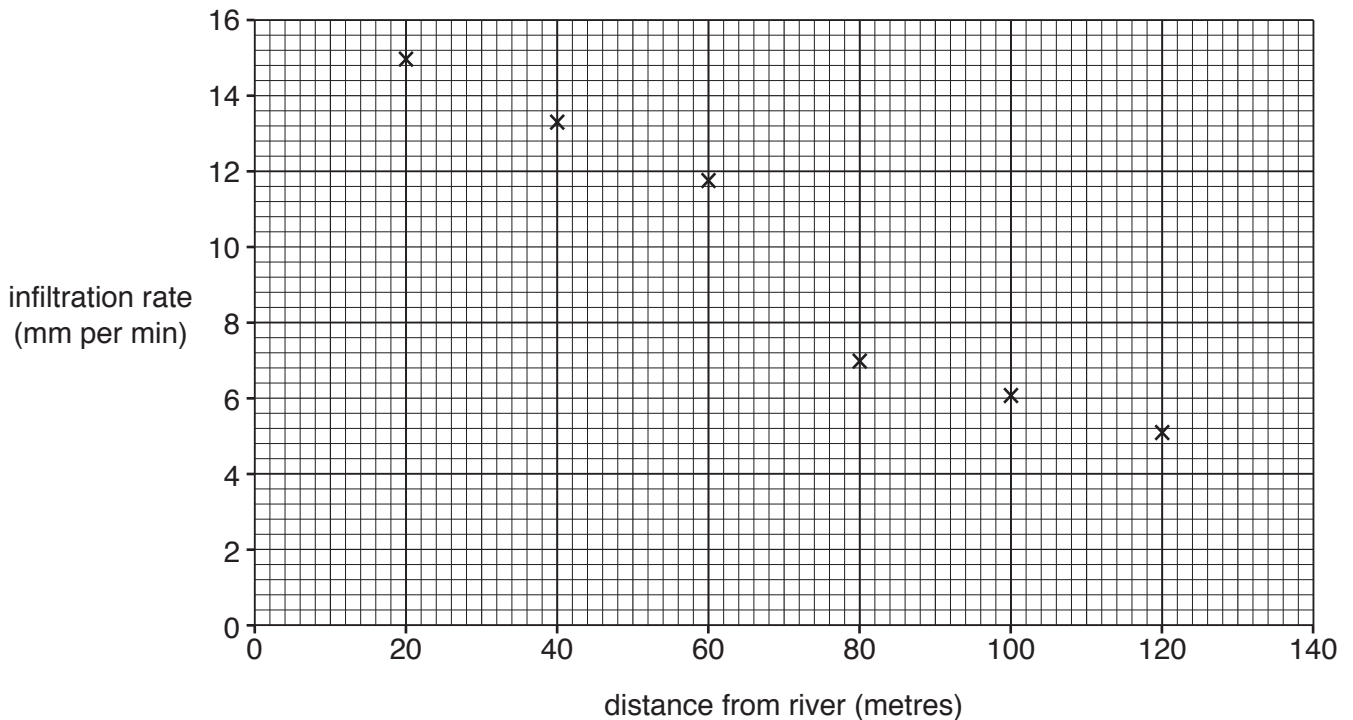


Fig. 4

(v) What conclusion would the students in group A make about **Hypothesis 1**: *The infiltration rate decreases as distance from the river increases*? Support your answer with evidence from Fig. 4 and Table 2.

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(c) The students in group B did the same fieldwork along transect B shown in Fig. 1 (Insert). Their results are shown in Fig. 5 below.

Infiltration rate at the sites on transect B

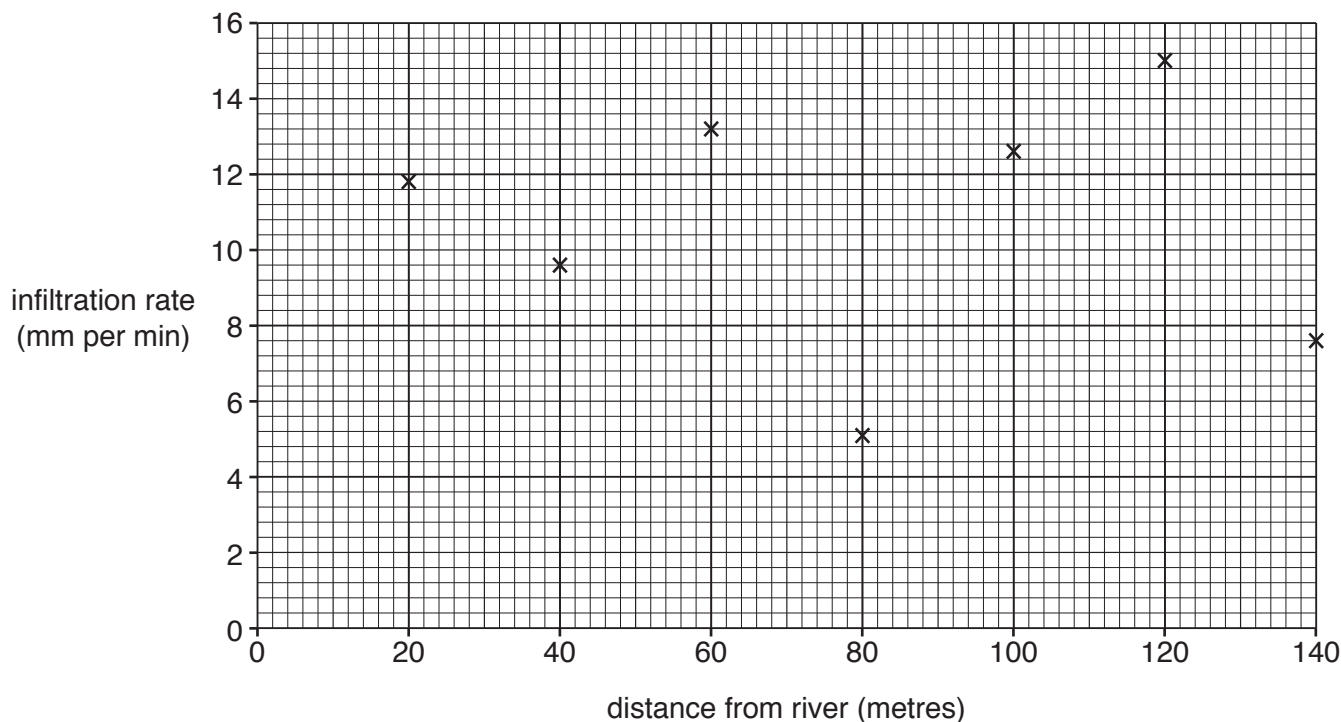


Fig. 5

(i) Compare the results of the two groups on transects A and B. Use evidence from Figs. 4 and 5 in your answer.

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- (ii) As the results of the two groups were different their teacher checked their measurements and calculations and agreed that they had not made any errors. Suggest why the two groups got different results. Look at Fig. 1 to help you to answer.

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- (d) To investigate **Hypothesis 2: *The infiltration rate decreases as soil moisture content increases***, the two groups of students measured the soil moisture content at each sampling site along their transects. Fig. 6 (Insert) shows students' fieldwork notes which describe the two different methods that the groups used.

- (i) Suggest **three** advantages of method 2 for measuring soil moisture content.

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- (ii) The results for transects A and B are shown in Table 3 (Insert). Use this data to plot the results at site 3 on transect B in Fig. 7 below. [2]

Results of measurements of infiltration rate and soil moisture content

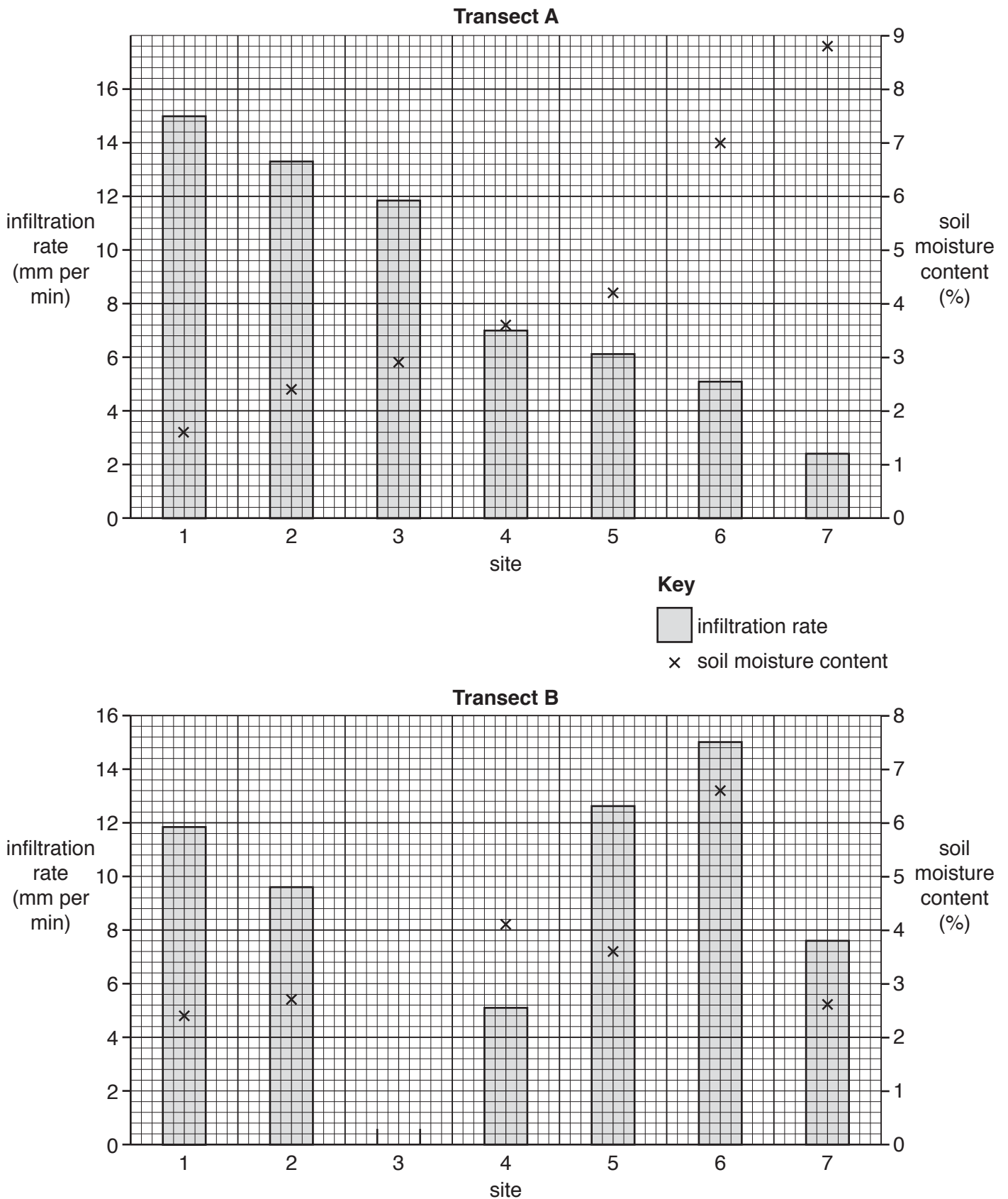


Fig. 7

- (iii) Which group’s results agree with **Hypothesis 2: *The infiltration rate decreases as soil moisture content increases***? Circle your decision below.

Group A on Transect A

Group B on Transect B

Support your decision with evidence from Fig. 7 and Table 3.

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- (e) If the students repeated their infiltration measurements after a week of heavy rain, how and why would the infiltration rates be different?

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.....[2]

- (f) The area around the river where the students did their fieldwork is a popular tourist area. Suggest how and explain why people walking in the area might affect the infiltration rate.

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[Total: 30 marks]

- 2 Students in the UK wanted to investigate how areas of their city were different from each other. In particular they decided to find out about differences in the quality of the urban environment and access to local services.

The students selected six sites to do their fieldwork in different areas of the city. These are shown in Fig. 8 (Insert).

The students decided to test the following hypotheses:

Hypothesis 1: *The quality of the urban environment improves as distance from the city centre increases.*

Hypothesis 2: *Access to local services is better further away from the city centre.*

- (a) To investigate **Hypothesis 1** the students did an environmental quality survey at one site in each area of the city. Their recording sheet is shown in Fig. 9 (Insert).

- (i) Describe how the students would use the recording sheet.

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- (ii) Explain how an environmental quality survey should be organised and carried out to make sure that results are reliable.

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(b) The results of the environmental quality survey are shown in Table 4 (Insert).

(i) Identify **one** difference in the quality of the urban environment between each of the following areas:

- Tettenhall and Pendeford

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- Whitmore Reans and Low Hill

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..... [2]

(ii) Use the data in Table 4 to **complete the bi-polar graph** for Low Hill in Fig. 10 below. [1]

Bi-polar graph to show environmental quality scores in Low Hill

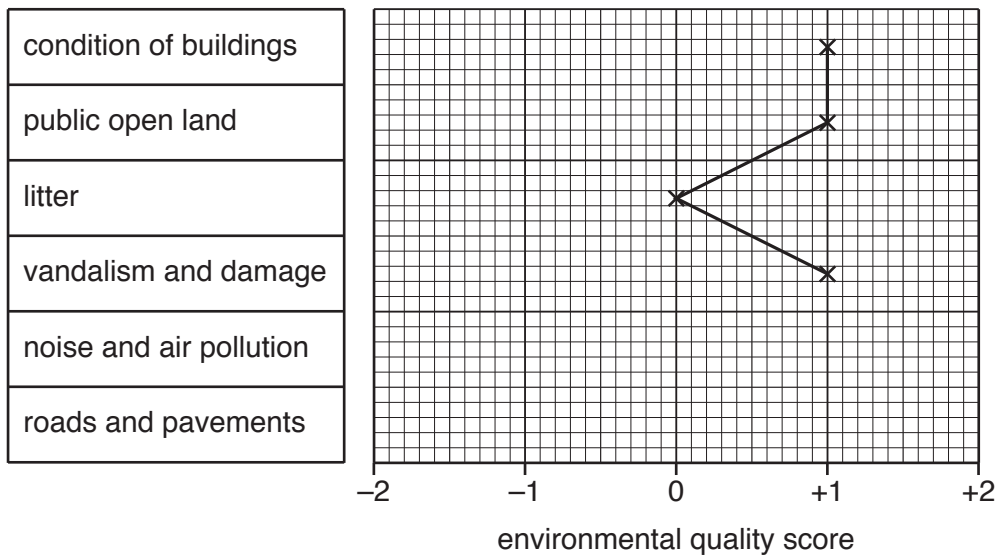
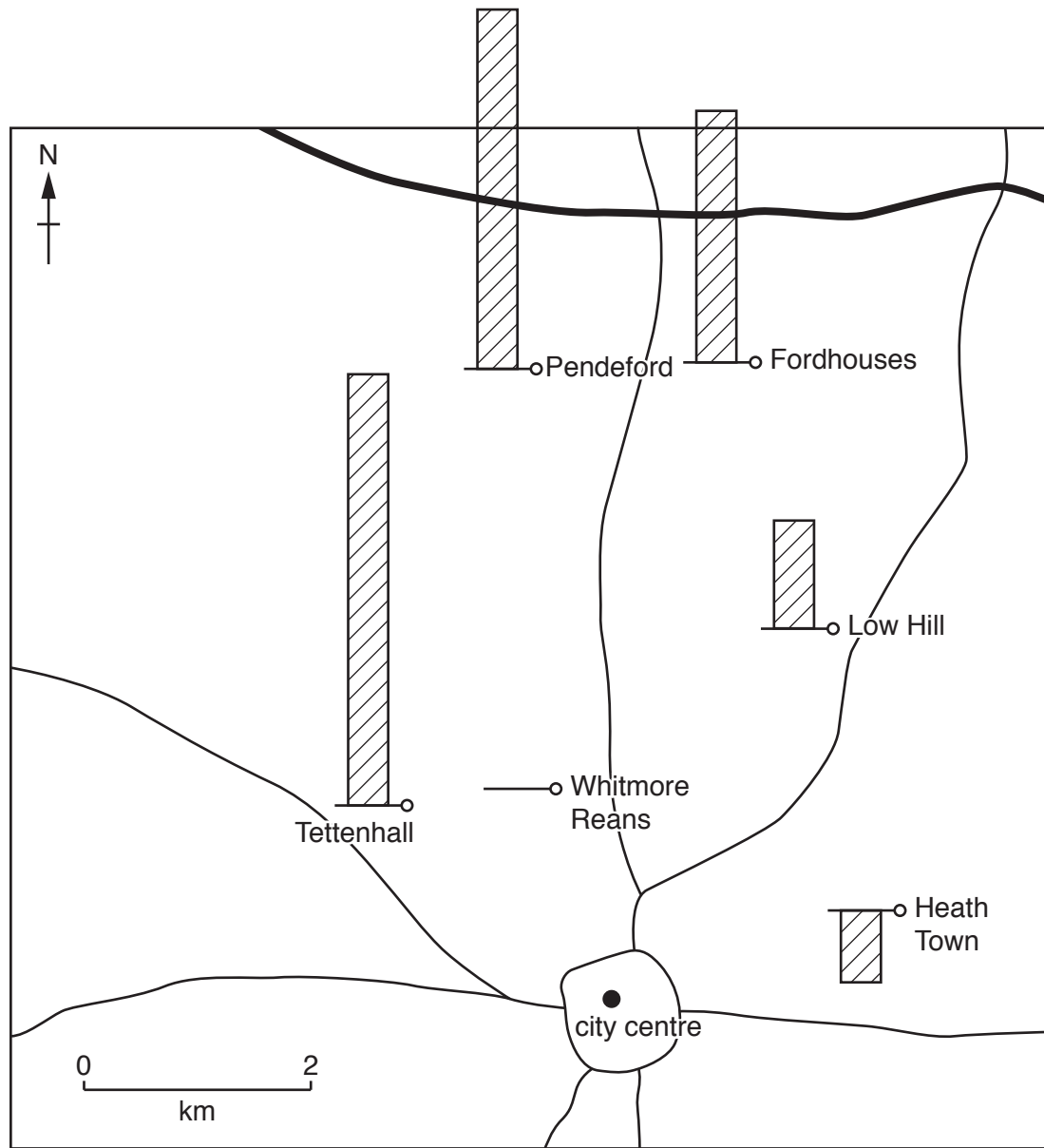


Fig. 10

- (iii) Using the data in Table 4 the students plotted the total environmental quality score for each area on Fig. 11 below. Use the scale to **plot the total environmental quality score** for Whitmore Reans on Fig. 11. [1]

Total environmental quality score for each area



environmental quality score scale

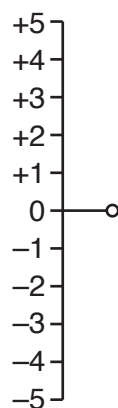


Fig. 11

- (iv) Which **one** of the following conclusions about **Hypothesis 1: *The quality of the urban environment improves as distance from the city centre increases*** is correct? Support your decision with evidence from Fig. 11 and Table 4.

Conclusion	Tick (✓)
Hypothesis 1 is true	
Hypothesis 1 is partly true	
Hypothesis 1 is false	

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- (c) To investigate **Hypothesis 2: *Access to local services is better further away from the city centre***, the students asked residents in each area to tell them how much time they took to walk to different services.

The students used a random sampling method to select people to interview.

Describe this method and give **one** advantage of the method.

Description

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Advantage

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.....[2]

(d) Fig. 12 below is an example of a partly completed survey sheet.

Survey sheet

Name of residential area: Pendeford				
How many minutes does it take you to walk to the nearest service for each of the following?				
Circle your answer				
Park	less than 5	between 5 and 15	between 16 and 30	more than 30
Supermarket	less than 5	between 5 and 15	between 16 and 30	more than 30
Primary school	less than 5	between 5 and 15	between 16 and 30	more than 30
Secondary school	less than 5	between 5 and 15	between 16 and 30	more than 30
Doctors' surgery / Health centre	less than 5	between 5 and 15	between 16 and 30	more than 30
Bus stop	less than 5	between 5 and 15	between 16 and 30	more than 30
City centre shops	less than 5	between 5 and 15	between 16 and 30	more than 30
Local store	less than 5	between 5 and 15	between 16 and 30	more than 30

Fig. 12

(i) Complete Fig. 12 using the following information.

- Time taken to walk to the nearest park: 7 minutes;
- Time taken to walk to the nearest secondary school: 40 minutes. [2]

(ii) Why might the question used in the survey (How many minutes does it take you to walk to the nearest service for each of the following?) result in an answer that is **not** useful?

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.....[2]

- (iii) When the students had completed the survey they produced a 'household convenience index' by giving a score to each answer circled on the survey sheet. The scoring system is shown below.

Time taken	Score
less than 5 minutes	4
between 5 minutes and 15 minutes	3
between 16 minutes and 30 minutes	2
more than 30 minutes	1

Use this scoring system **to complete Fig. 13**, below, which shows the household convenience index for one person's answers in Low Hill. Insert the score for the local store and the total index score. [2]

Household convenience index result in Low Hill

Name of residential area: Low Hill					
How many minutes does it take you to walk to the nearest service for each of the following?					
Circle your answer					Score
Park	less than 5	between 5 and 15	between 16 and 30	more than 30	4
Supermarket	less than 5	between 5 and 15	between 16 and 30	more than 30	3
Primary school	less than 5	between 5 and 15	between 16 and 30	more than 30	3
Secondary school	less than 5	between 5 and 15	between 16 and 30	more than 30	2
Doctors' surgery / Health centre	less than 5	between 5 and 15	between 16 and 30	more than 30	3
Bus stop	less than 5	between 5 and 15	between 16 and 30	more than 30	4
City centre shops	less than 5	between 5 and 15	between 16 and 30	more than 30	1
Local store	less than 5	between 5 and 15	between 16 and 30	more than 30	
Total household convenience index score					
Percentage household convenience score					75%

Fig. 13

(e) The students then calculated a percentage household convenience score for each area of the city. These results are shown in Table 5 (Insert).

(i) **Complete Fig. 14 below** by plotting the percentage household convenience score for Fordhouses. [1]

Household convenience score of each area

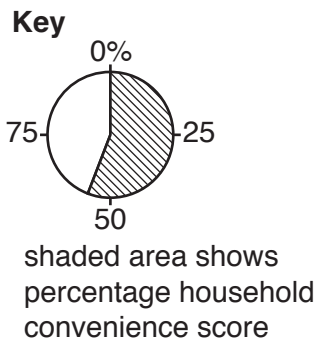
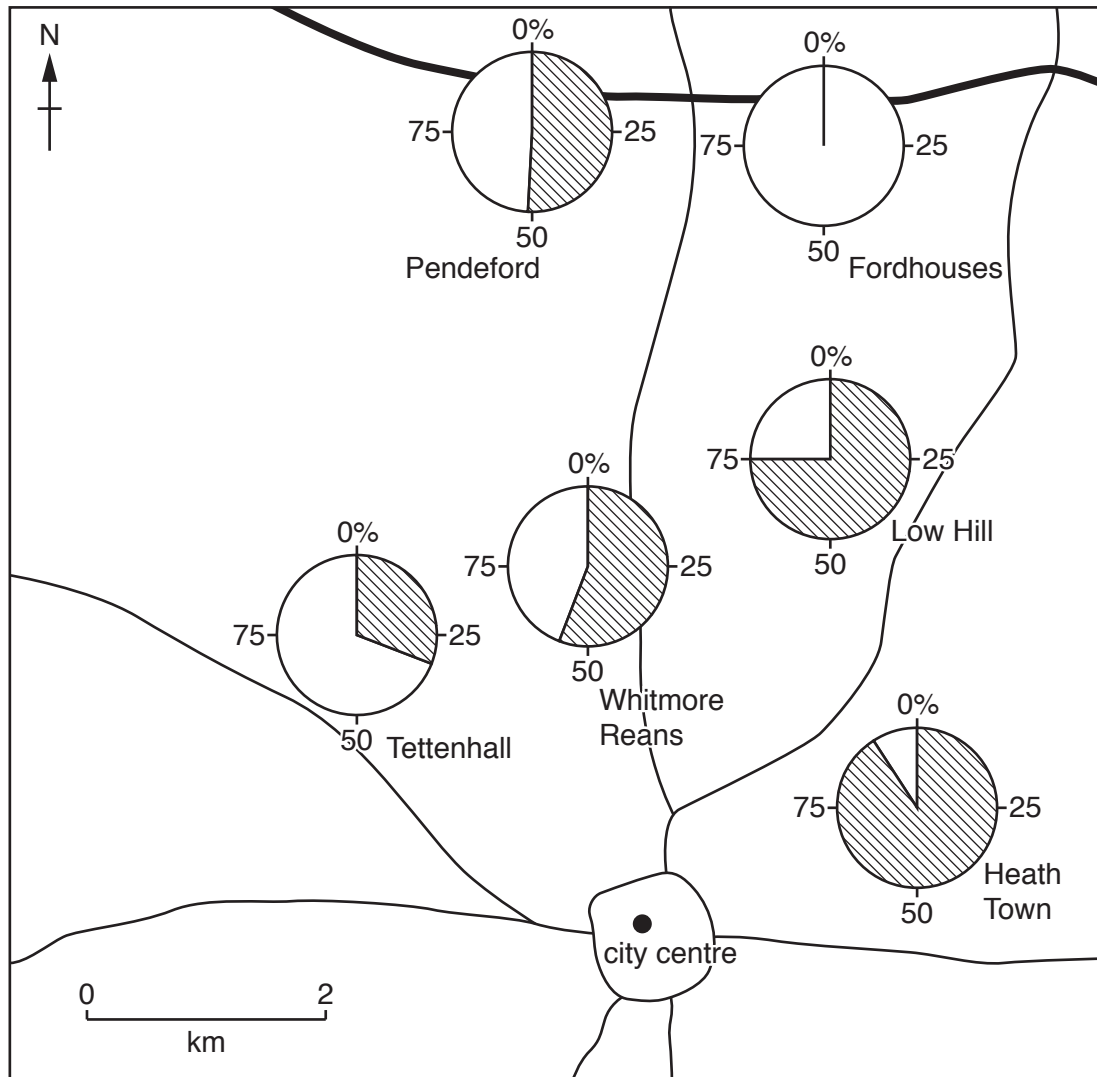


Fig. 14

- (ii) What conclusions would the students make about **Hypothesis 2: Access to local services is better further away from the city centre?** Support your decision with evidence from Fig. 14 and Table 5.

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- (f) For extension work the students wanted to investigate how the amount of traffic might vary between different areas of the city. Describe a fieldwork method for this investigation.

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[Total: 30 marks]

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