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0460/41

October/November 2016

1 hour 30 minutes

Additional Materials: Calculator
 Ruler

READ THESE INSTRUCTIONS FIRST

DO **NOT** WRITE IN ANY BARCODES.

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.

Sketch maps and diagrams should be drawn whenever they serve to illustrate an answer.

The number of marks is given in brackets [] at the end of each question or part question.

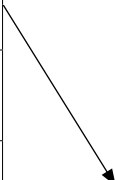
The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

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

2

- 1 Four students were learning about processes which take place in a drainage basin.
- (a) Use arrows to match the processes with the correct definitions in the table below. One has been completed for you.

Process	Definition
Evaporation	Leaves of trees stop rain from reaching the ground
Infiltration	Water moves through the soil
Interception	Water is heated and turns into water vapour
Throughflow	Water soaking into the ground



[2]

The students did some fieldwork to investigate infiltration rates in a park near their school. This is shown in Fig. 1 (Insert).

They tested the following hypotheses:

- Hypothesis 1:** *The infiltration rate varies between different areas in the park.*
- Hypothesis 2:** *The rate of infiltration is faster where there is more vegetation cover and less bare ground.*

3

- (b) To measure the infiltration rate the students used a bottomless cylinder which they pushed into the ground. Inside the cylinder was a scale measured in centimetres. At each measuring site the students poured water into the cylinder up to a height of 10 cm. They recorded the water height in the cylinder at the end of every minute until all the water had infiltrated into the ground.

- (i) Complete the labels on Fig. 2 below to show how the fieldwork was carried out.

How the infiltration rate was measured

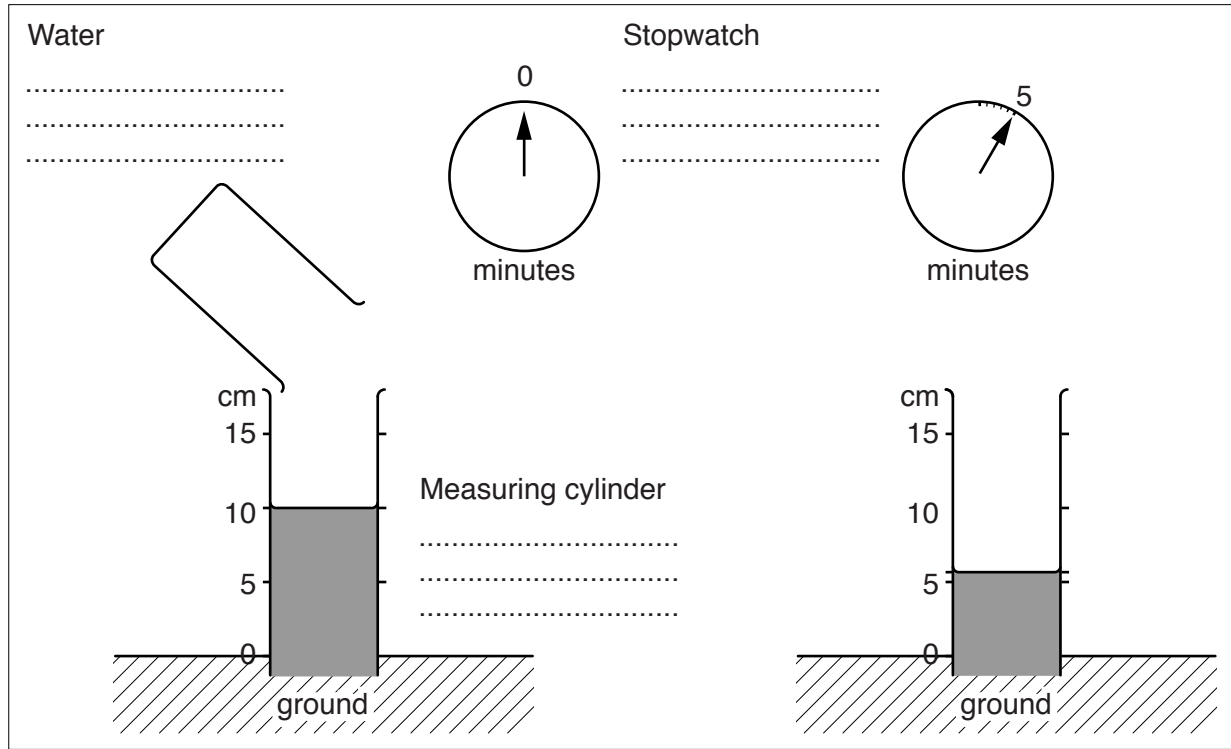


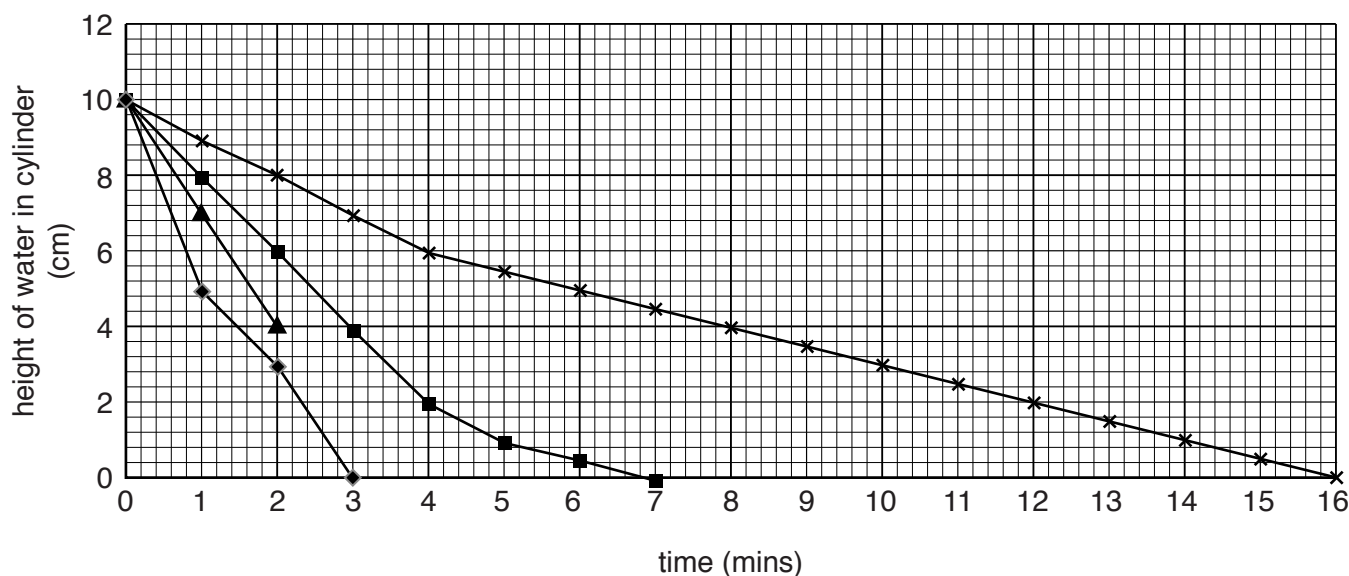
Fig. 2

[3]

4

- (ii) The results of the students' measurements are shown in Table 1 (Insert). Use these results to complete the line for the flower garden in Fig. 3 below. [2]

Speed of infiltration at different sites



Key

- ▲— Flower garden site 1
- Playing field site 2
- ◆— Woodland site 3
- ×— Flood plain site 4

Fig. 3

- (iii) Their teacher made sure that the students understood that the infiltration rate is slower when it takes a longer time for water to soak into the ground.

The students reached the conclusion that **Hypothesis 1: The infiltration rate varies between different areas in the park** was correct. What evidence in Table 1 (Insert) and Fig. 3 suggests that the infiltration rate was slowest on the flood plain and fastest in the woodland? Use data to support your answer.

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..... [3]

5

- (iv) Look again at Fig. 1 (Insert). Give **three** reasons why the infiltration rate varies within the park.

1

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2

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3

..... [3]

- (c) To investigate **Hypothesis 2: *The rate of infiltration is faster where there is more vegetation cover and less bare ground***, the students used a quadrat to estimate the amounts of vegetation cover and bare ground in different areas of the park. A quadrat is shown in Photograph A (Insert).

- (i) Describe how the students used the quadrat.

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..... [3]

6

- (ii) The students' fieldwork results are shown in Table 2 (Insert). Use these results to plot on Fig. 4 below the percentage of vegetation cover and the percentage of bare ground in the flower garden. [1]

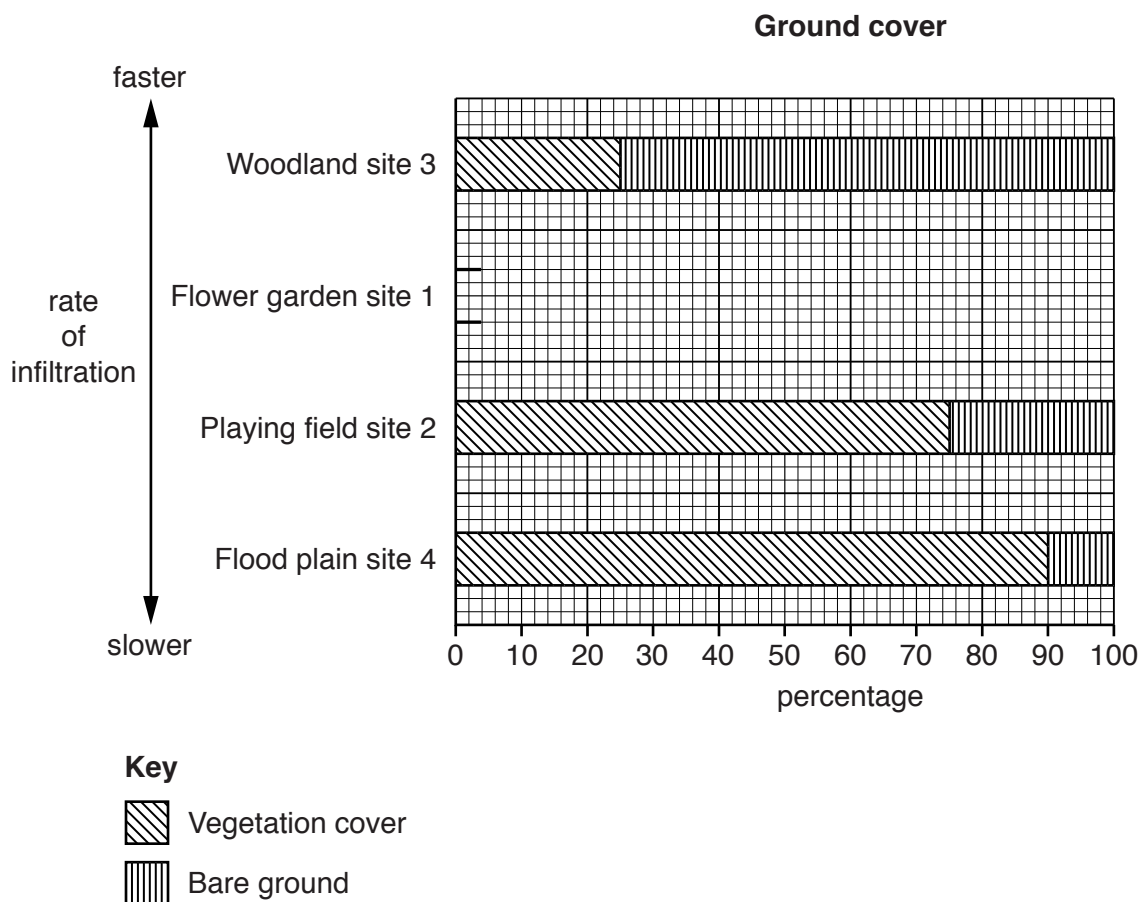


Fig. 4

- (iii) The students made the conclusion that **Hypothesis 2: The rate of infiltration is faster where there is more vegetation cover and less bare ground** was incorrect. Use evidence from Fig. 4 to support this conclusion.

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..... [3]

- (iv) Suggest why there would be no infiltration on the playground shown in Fig. 1 (Insert).

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..... [2]

7

(d) To extend their fieldwork the students decided to investigate the impact of people walking across the grassland and creating a path, which is shown in Fig. 1 (Insert). This is known as ‘footpath erosion’.

(i) The students stretched a tape measure across the path and measured the distance from the tape to the ground at equal intervals. Each of the four students had a different task in the investigation. Complete the table below by suggesting tasks for the other three students.

Student	Investigation task
1	Hold the tape measure at one side of the path
2	
3	
4	

[3]

(ii) Using their results a student drew a diagram of the cross section of the path. This is shown in Fig. 5 below.

How deep is the path at its deepest point?

.....cm

[1]

Cross section of the path across the grassland

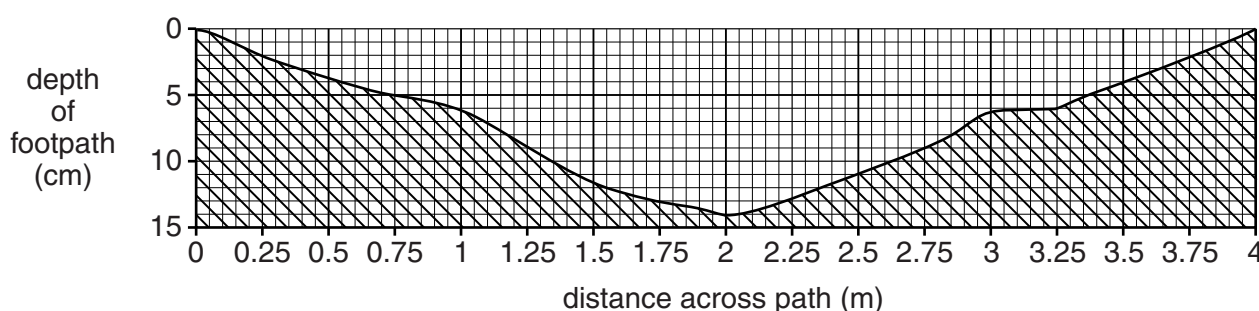


Fig. 5

(iii) Describe how footpath erosion may affect infiltration.

.....
 [1]

(iv) Suggest **three** ways to prevent footpath erosion from happening in the park.

1

 2

 3
 [3]

[Total: 30 marks]
[Turn over]

2 Students in the UK were studying a settlement in the rural-urban fringe which used to be a farming village. They wanted to investigate how the area had changed. Their study area is located on a main road which goes to a nearby city and links to the motorway.

(a) Before beginning their fieldwork the students looked at a map in the library which showed housing areas in the settlement.

(i) What type of information source is this map? Circle your answer below.

primary questionnaire secondary stratified [1]

(ii) Using the map from the library the students drew a base map which is shown in Fig. 6 (Insert). Use the information on this map to complete the table below which describes the different types of houses. One has been completed for you.

Description of housing area	Area (A, B, C or D)
Modern estate containing curved roads and cul-de-sacs	
Old cottages built when the settlement was a farming village	C
Houses built in a linear arrangement along both sides of the main road	
Houses built on the river flood plain	

[2]

(iii) Suggest **two** reasons for the expansion of the settlement in the rural-urban fringe.

1
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2
..... [2]

Some of the students investigated the following hypotheses:

Hypothesis 1: *Most people have lived in the settlement for more than ten years.*

Hypothesis 2: *Working people who have lived in the settlement for the longest time travel furthest to work.*

- (b) (i) The students were able to complete their survey of residents at the houses marked with an X on Fig. 6 (Insert). They visited the houses between 13.00 hours and 17.00 hours on a working day.
Give **one** advantage and **two** disadvantages of their survey method.

Advantage

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Disadvantages

1

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2

..... [3]

- (ii) At each house the students asked the residents to complete the questionnaire survey which is shown in Fig. 7 (Insert).
- The results of Question 1 on their questionnaire are shown in Table 3 below.

Table 3

Question 1: How many years have you lived in the settlement?

	Number of people				
Time (years)	Area A	Area B	Area C	Area D	Total
less than 5	2	8	0	0	10
5 to 10	0	2	0	1	3
11 to 20	1	0	1	0	2
21 to 35	0	0	4	0	4
more than 35	2	0	10	4	16
Total	5	10	15	5	35

10

Use Table 3 to plot the results to the responses ‘21 to 35 years’ and ‘more than 35 years’ on the histogram, Fig. 8 below. [2]

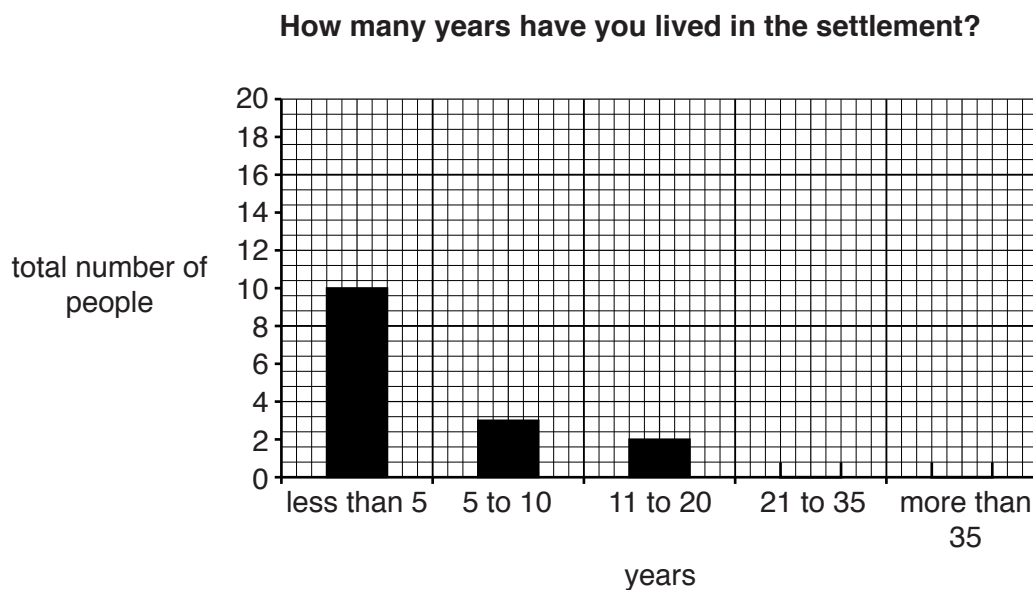


Fig. 8

- (iii) Do the results of Question 1 support **Hypothesis 1: *Most people have lived in the settlement for more than ten years?*** Support your conclusion with data from Fig. 8 and Table 3.

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..... [2]

- (iv) Describe the main differences in how long people had lived in the settlement between areas **B** and **C**. Use statistics from Table 3 in your answer.

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..... [3]

(c) The answers to all questions from the questionnaire are shown in Table 4 (Insert).

(i) Plot the answers given by residents 34 and 35 on Fig. 9 below. [2]

Answers to Questions 1 and 2

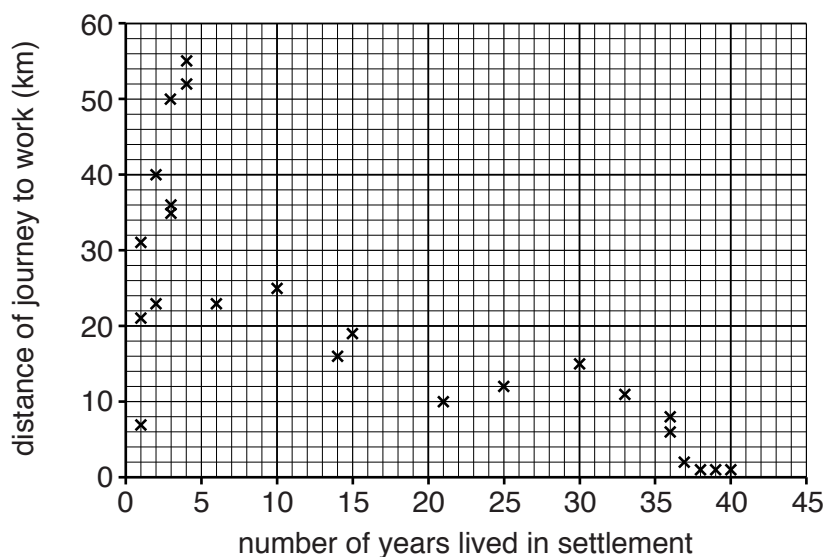


Fig. 9

(ii) What conclusion would the students make about **Hypothesis 2: Working people who have lived in the settlement for the longest time travel furthest to work?** Circle your decision below and support the decision with evidence from Fig. 9.

Hypothesis 2 is correct

Hypothesis 2 is incorrect

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..... [4]

(iii) Suggest why the relationship between the two variables shown in Fig. 9 occurs.

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..... [2]

12

- (d) Another group of students used the answers from Question 3 in the questionnaire to consider why residents live in the settlement.
- (i) Use the answers in Table 4 (Insert) to complete the reasons which are listed in rank order in Table 5 below. [1]

Table 5

Reasons for living in the settlement

Main reason for living in the settlement	Number of residents
Quick journey to work in the city	14
Work or worked in the old village	7
	6
	5
	3

- (ii) Which **one** of the following would be most suitable for a student to display the data shown in Table 5? Circle your answer. [1]
- Flow map Pie graph Scatter graph Spider diagram
- (iii) Which **one** conclusion below is correct for Question 3 in the questionnaire? Tick your choice. [1]

Conclusion	Tick (✓)
Over half the residents have a quick journey to work in the city	
The natural environment is the main attraction	
More people work in the old village than in the city	
More people have moved into the settlement than were born in it	

13

- (e) Describe a piece of fieldwork, other than using a questionnaire, which the students could do to compare the shops and services in different villages in the rural-urban fringe.

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..... [4]

[Total: 30 marks]

[illegible]

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