

--

--	--	--	--	--

--	--	--	--

0460/41

May/June 2017

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.

- 1 Students at a school in Northern Ireland visited a country park to investigate how relative humidity of the air and temperature might vary within a small area. The country park is shown in Fig. 1 (Insert).

- (a) (i) The wooden box shown in Photograph A (Insert) is located in the country park. What is the name given to this type of wooden box?

.....[1]

- (ii) Explain why this wooden box is located in position **X** on Fig. 1.

.....

.....

.....

.....[2]

- (iii) The wooden box contains a wet and dry bulb thermometer to measure relative humidity of the air. Which **two** of the following weather measuring instruments would also be placed in the wooden box? Tick your choices.

	Tick (✓)
anemometer	
barometer	
maximum-minimum thermometer	
rain gauge	
wind vane	

[2]

The students decided to investigate the following hypotheses:

Hypothesis 1: *Relative humidity is higher in areas where the ground cover is vegetation.*

Hypothesis 2: *Temperatures are higher nearer to buildings.*

- (b) (i) Which **one** of the following is the correct definition of relative humidity? Tick your choice below.

	Tick (✓)
the maximum amount of water vapour in the air in hot temperatures	
the percentage of water vapour in the air compared with the total water vapour it could hold at that temperature	
the amount of moisture in the air	
the amount of moisture in the air after a heavy rainstorm	

[1]

- (ii) Relative humidity is calculated using a relative humidity table like the one shown in Fig. 2 (Insert).

An example of how relative humidity is calculated is shown below.

Dry bulb temperature = 18 °C
 Wet bulb temperature = 14 °C
 Temperature difference = 4 °C
 Relative humidity = 64%

Use the relative humidity table (Fig. 2 Insert) to calculate the relative humidity in the example below:

Dry bulb temperature = 14 °C

Wet bulb temperature = 11 °C

Temperature difference = °C

Relative humidity = % [2]

- (c) The students selected 10 measuring sites in and around the country park. These are shown in Fig. 1 (Insert). At each site they used an instrument that is both a digital hygrometer and thermometer to measure relative humidity and temperature. This instrument is shown in Fig. 3 (Insert).

- (i) Give **three** advantages of using a digital measuring instrument such as the one shown in Fig. 3.

1

.....

2

.....

3

..... [3]

- (ii) Which **one** of the following methods is most likely to cause the results to be **unreliable**? Tick your choice.

	Tick (✓)
A student makes measurements at 08:00, 12:00 and 16:00 hours and calculates the average.	
Two students use different digital instruments to measure at the same time at each site and compare their results.	
A student makes the measurements at sites 1 – 5 in the morning and sites 6 – 10 in the afternoon.	
One student stands at each site and all the students make the measurements at the same time.	

[1]

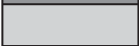
(d) The results of the students' measurements of relative humidity are shown in Table 1 (below).

Table 1

Relative humidity at the 10 measuring sites

Site	1	2	3	4	5	6	7	8	9	10
Location	Building courtyard	Lawn	Meadow	Woodland	Lakeside	Lakeside	Car park	Woodland	Garden	Village
Ground cover	Gravel	Grass	Grass	Trees	Sand and shingle	Sand	Tarmac	Trees	Bushes and plants	Tarmac
Relative Humidity (%)	73	73	76	74	75	73	77	75	74	75

Key

	vegetation ground cover
	non-vegetation ground cover

(i) Use these results **to complete Fig. 4** (below) to show the relative humidity at site 2. [1]

Relative humidity at sites with different ground cover

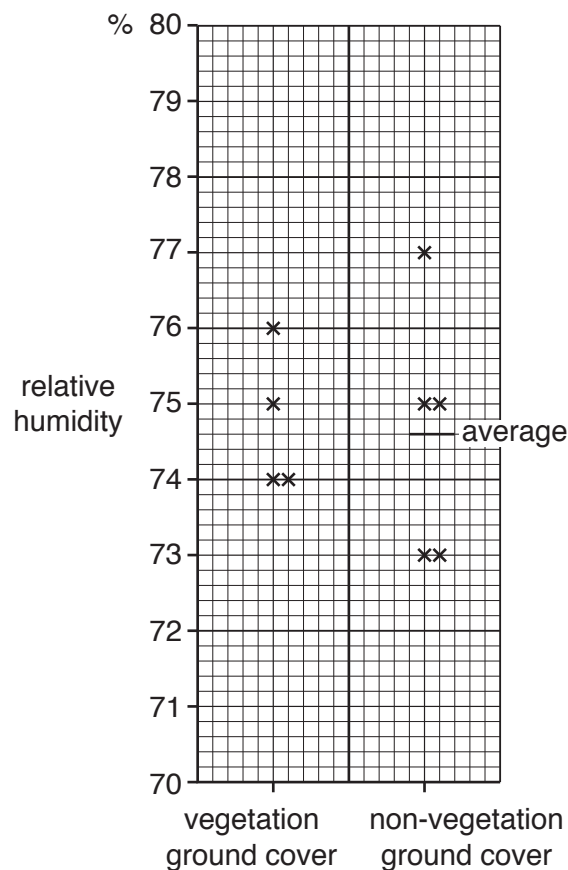


Fig. 4

- (ii) The average (mean) relative humidity for measurements made at sites where the ground cover is vegetation was 74.4%. In the space below show the calculation which produced this answer using data from Table 1. [1]

Answer 74.4%

- (iii) Draw a horizontal line on Fig. 4 to show the average relative humidity for measurements made at sites where the ground cover is vegetation. [1]
- (iv) Is **Hypothesis 1**: *Relative humidity is higher in areas where the ground cover is vegetation* true or false? Circle your choice below. Justify your decision using evidence from Figs. 1 and 4 and Table 1.

Hypothesis is true

Hypothesis is false

.....

.....

.....

.....

.....

.....[3]

(e) The temperature measurements at each site are shown in Table 2 (below).

Table 2

Temperature at the 10 measuring sites

Site	1	2	3	4	5	6	7	8	9	10
Temperature (°C)	14.1	13.9	13.6	12.3	12.7	12.7	13.5	12.5	13.7	14.2

(i) On Table 2 **circle the three sites** where the highest temperatures were measured. [1]

(ii) Fig. 5 (below) shows variation in temperature in the country park. Use the results in Table 2 **to complete the 13°C isoline** on Fig. 5. [2]

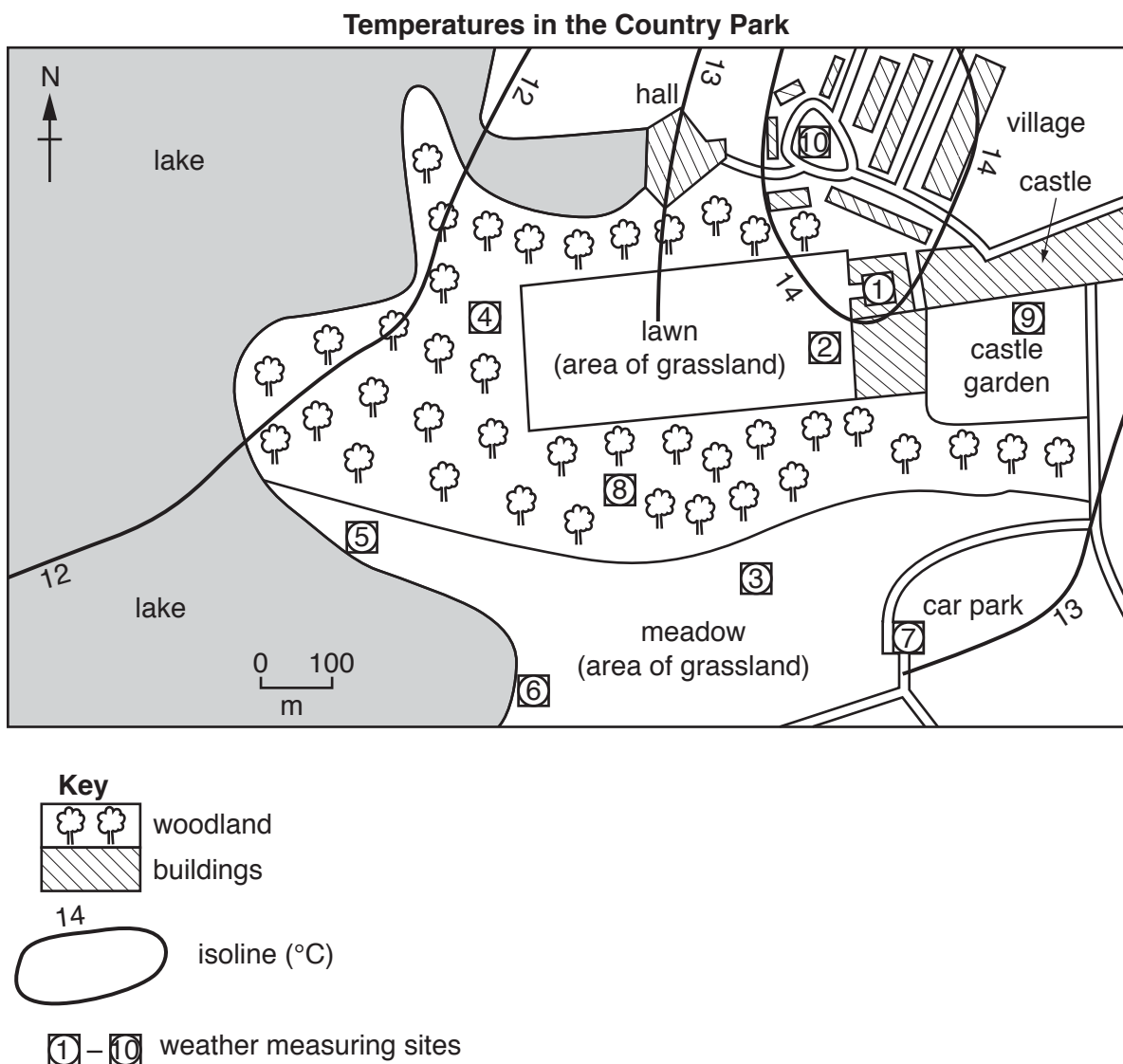


Fig. 5

- (iii) What is your conclusion about **Hypothesis 2: Temperatures are higher nearer to buildings?** Support your conclusion with data from Fig. 5 and Table 2.

.....

.....

.....

.....

.....

.....[3]

- (iv) Suggest **two** reasons for the variation in temperatures shown on Fig. 5.

1

.....

2

.....[2]

- (f) The recording instrument shown in Photograph B (Insert) is a sunshine recorder. Describe how students would use a sunshine recorder to measure the amount of sunlight in 24 hours.

.....

.....

.....

.....

.....

.....

.....

.....[4]

[Total: 30 marks]

- 2 Students from Auckland, New Zealand, were investigating different topics about their city. One group did fieldwork to investigate how the amount of traffic and number of pedestrians changed with increasing distance from the city centre.

(a) Describe **two** common features of buildings in a city centre.

- 1
-
- 2
-[2]

The students decided to test the following hypotheses:

Hypothesis 1: *The amount of traffic decreases as distance from the city centre increases.*

Hypothesis 2: *Pedestrian numbers decrease as distance from the city centre increases.*

- (b) To test these hypotheses the students chose counting sites along four roads going from the city centre towards the edge of the city. These are shown on Fig. 6 (Insert).

- (i) The students did a 15-minute traffic count at 08:00, 13:00 and 18:00 hours. Describe how the students would carry out their traffic count at each site.

-
-
-
-
-
-
-
-[4]

- (ii) The students calculated the average results of the three traffic counts done at each site. These are shown in Table 3 (Insert). Use the data in Table 3 **to complete sites B, C and D** on road 4 in Fig. 7 (below). [3]

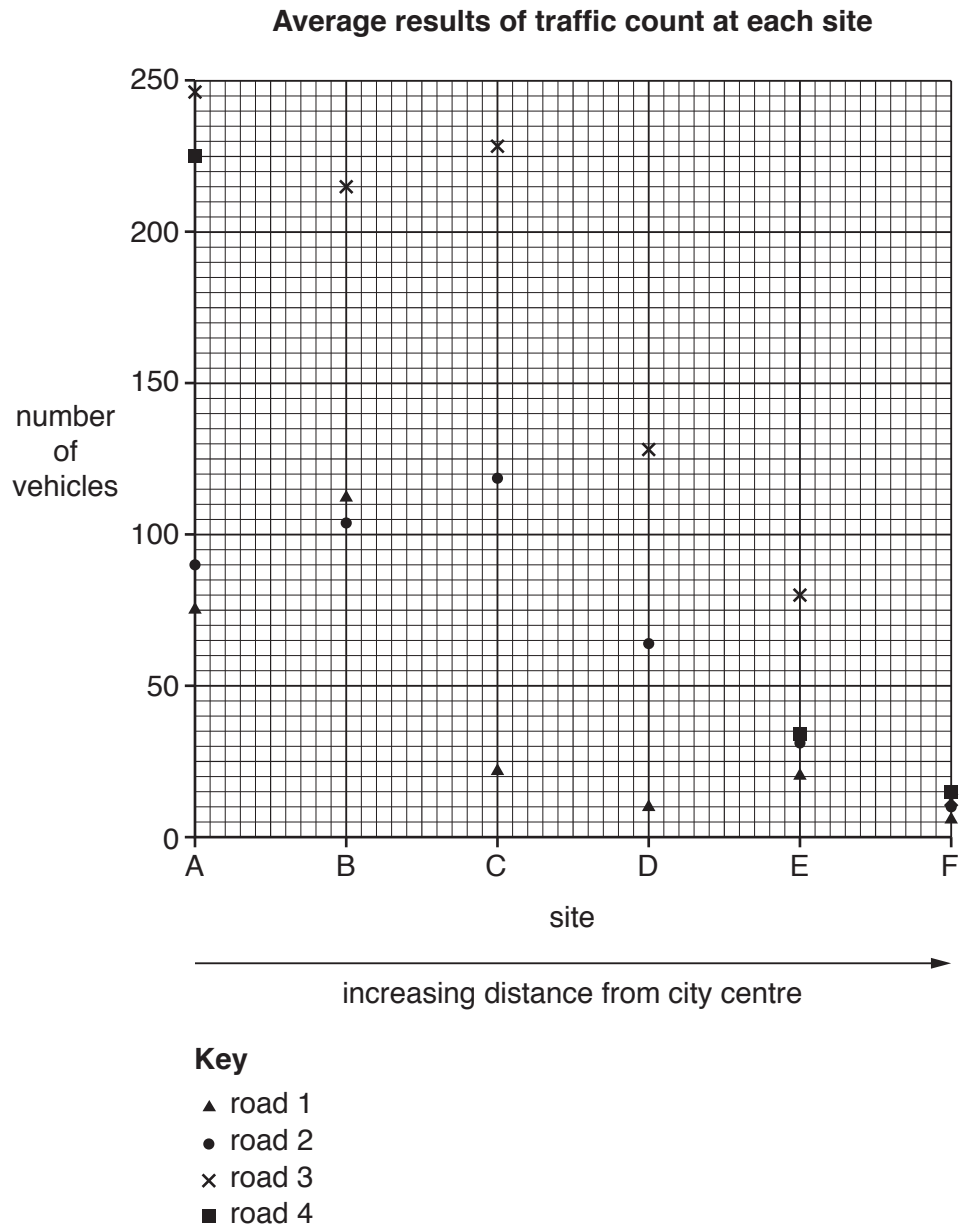


Fig. 7

- (iii) The students made the conclusion that **Hypothesis 1: *The amount of traffic decreases as distance from the city centre increases*** was partly correct. Support their decision with data from Table 3 (Insert) and Fig. 7. Include reference to any anomalies in the results.

.....[4]

- (iv) Use evidence from Fig. 7 and Table 3 to compare the amount of traffic on road 1 and the amount of traffic on road 3.

.....[2]

- (c) When they had completed their traffic counts the students did pedestrian counts at the same sites. Their results are shown in Table 4 (Insert).

- (i) **Plot the result** for site C on road 4 on Fig. 8 (opposite). [1]

- (ii) Do the students' results support **Hypothesis 2**: *Pedestrian numbers decrease as distance from the city centre increases*? Support your decision with evidence from Table 4 and Fig. 8.

.....[3]

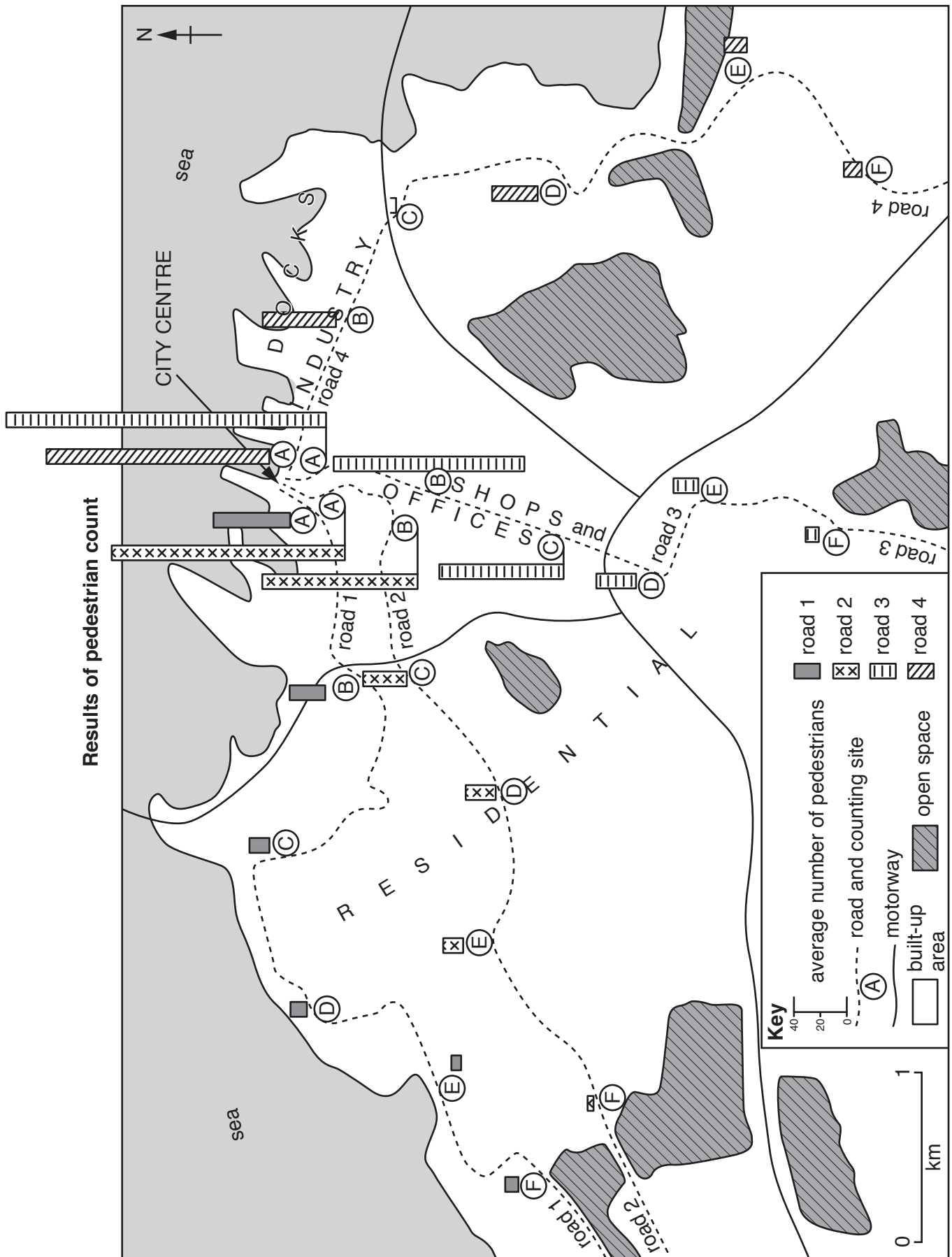


Fig. 8

- (d) One student decided to investigate if pedestrian numbers varied at different times of the day. The results of the sites on road 3 are shown in Fig. 9 (below).

Number of pedestrians counted at different times of the day at the six sites on road 3

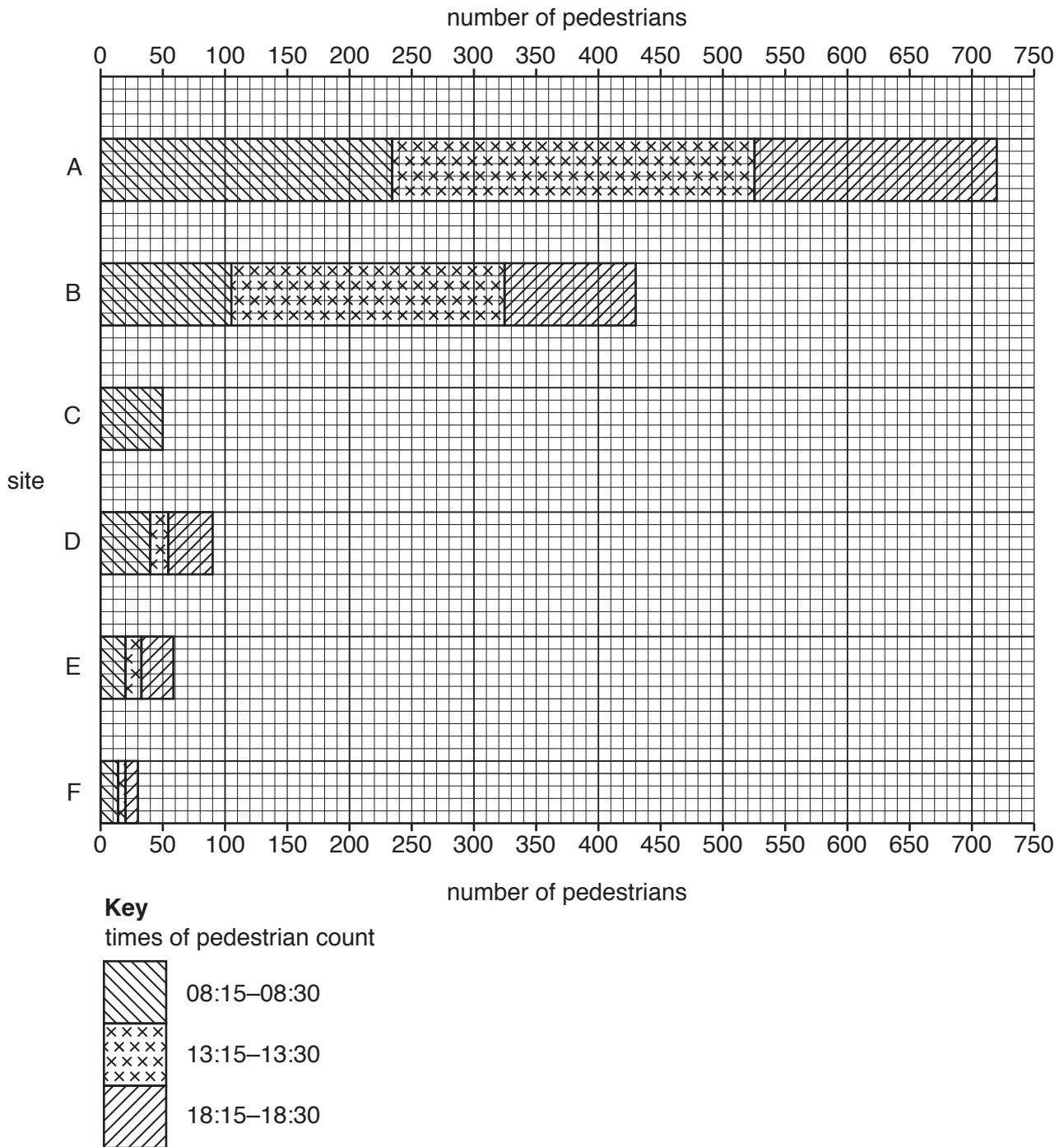


Fig. 9

- (i) Use the figures below to complete the divided bar for site C.

[2]

Time of pedestrian count	Number of pedestrians
13:15–13:30	190
18:15–18:30	45

- (ii) Compare the change in pedestrian numbers between 08:15–08:30, 13:15–13:30 and 18:15–18:30 at sites A and D on road 3.

.....

.....

.....

.....[2]

- (iii) Suggest **two** reasons for the variations in pedestrian numbers on road 3 which are shown in Fig. 9. Look again at Fig. 6 (Insert) to help you to answer.

1

.....

2

.....[2]

- (e) (i) Suggest another hypothesis about how an urban area changes with increasing distance away from the city centre. Do **not** include a hypothesis about traffic or pedestrians.

.....

.....[1]

- (ii) Describe how your chosen hypothesis could be tested. In your answer refer to:

- collecting data;
- recording and displaying the results.

.....

.....

.....

.....

.....

.....

.....

.....

.....[4]

[Total: 30 marks]

This image shows a full page of white paper with horizontal dotted lines. The lines are evenly spaced and run across the width of the page, providing a guide for handwriting practice. There are no margins, text, or other markings on the page.

BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cie.org.uk after the live examination series.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.