Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

GEOGRAPHY **0460/41**

Paper 4 Alternative to Coursework **May/June 2016**

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 Fig. 1, Table 1 and Photograph A for Question 1, and Fig. 5, Tables 2, 3 and 4 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 **16** printed pages and **1** Insert.

1 Students at a school in Scotland did fieldwork on a river in the Lammermuir Hills. The students chose ten sites, approximately 1 kilometre apart downstream, along the river.

The students agreed to investigate the following hypotheses:

Hypothesis 1: *The gradient of the river bed becomes steeper as distance downstream increases.*

Hypothesis 2: *River velocity becomes faster as distance downstream increases.*

(a) Before they went on their fieldtrip the students did a pilot study at three sites on a local stream. Suggest **two** advantages of doing a pilot study.

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2 .....

.....[2]

(b) (i) To test **Hypothesis 1** the students measured the gradient of the river bed. Describe how they would use the equipment shown in Fig. 1 (Insert) to measure the gradient.

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(ii) The students made four measurements of gradient at each site. Suggest **two** reasons why they did this.

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(iii) The results of the students' measurements are shown in Table 1 (Insert).
What conclusion would the students make about **Hypothesis 1:** *The gradient of the river bed becomes steeper as distance downstream increases*? Support your answer with data from Table 1.

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(c) (i) To investigate **Hypothesis 2:** *River velocity becomes faster as distance downstream increases*, the students measured the velocity at the ten survey sites. They used an orange as a float, ranging poles, a tape measure and a stopwatch. Describe how they measured the velocity of the river.

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(ii) Another way to measure the velocity of a river is to use a digital flowmeter (velocity meter) like the one shown in Photograph A (Insert).
Give **one** advantage and **one** disadvantage of using a digital flowmeter to measure velocity.

Advantage .....

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Disadvantage .....

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(iii) At each survey site the students measured the velocity twice on the left side of the channel, twice in the centre and twice on the right side. An example of their results from a site in their pilot study is shown in Fig. 2, below.

Pilot study recording sheet

Pilot study site: 1

Time in seconds for the float (orange) to travel 10 metres:

	Measurement 1	Measurement 2
Left side of channel	14	16
Centre of channel	19	17
Right side of channel	21	20

Fig. 2

Suggest why speed of flow varied across the river channel.

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(iv) Calculate the average velocity at pilot study site 1 using all six measurements shown in Fig. 2.
Show your working and answer in the box below. [3]

Pilot site 1:

Average time to float 10 metres = seconds

$$\text{Average velocity} = \frac{\text{distance}}{\text{average time}}$$

Average velocity = metres per second (m/s)

(v) The average velocity of the river at each of the ten fieldwork sites is shown in Table 1 (Insert). Plot the results for site 9 on Fig. 3, below. [1]

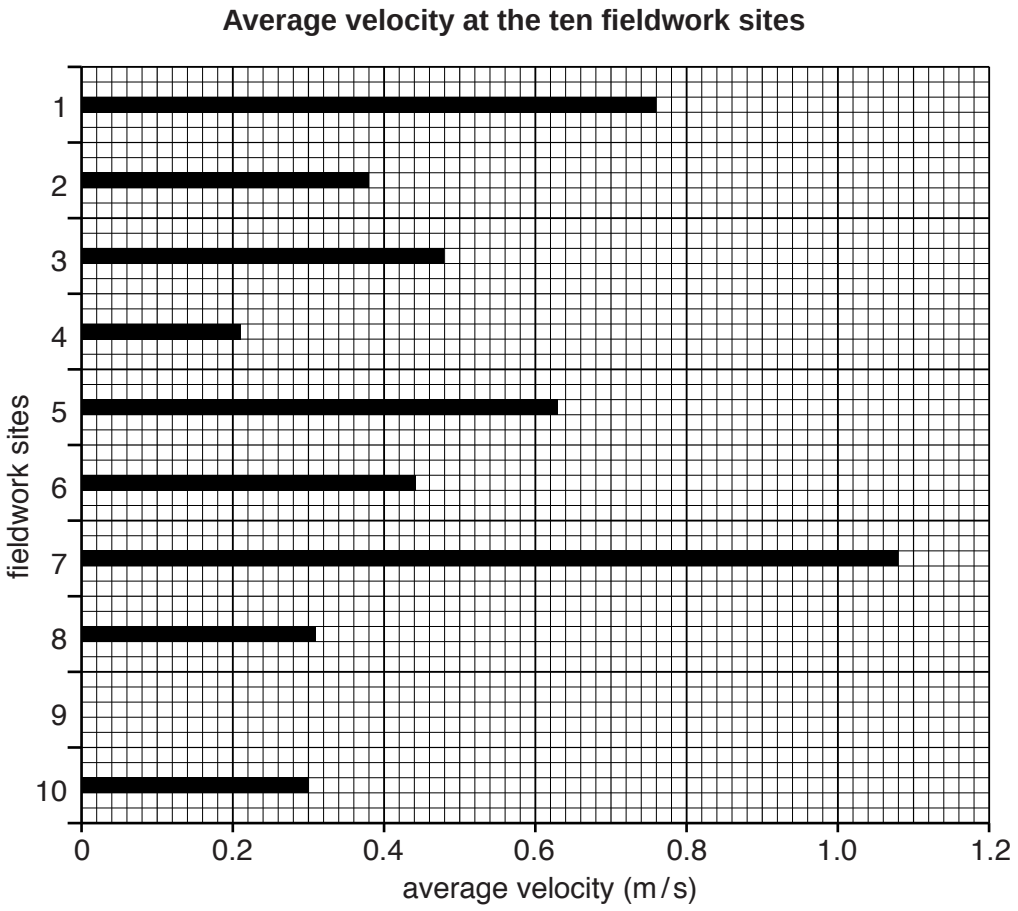

Fig. 3

(vi) Do the results shown in Table 1 and Fig. 3 agree with **Hypothesis 2:** *River velocity becomes faster as distance downstream increases*? Use data to support your answer.

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(d) (i) One student decided to compare the two sets of measurements made at the ten sites. He plotted both sets of results on a scatter graph, Fig 4. below. Use the data in Table 1 (Insert) to plot the results of site 5 on Fig. 4. [1]

(ii) Draw a best-fit line on Fig. 4 to show the relationship between gradient and average velocity. [1]

Scatter graph

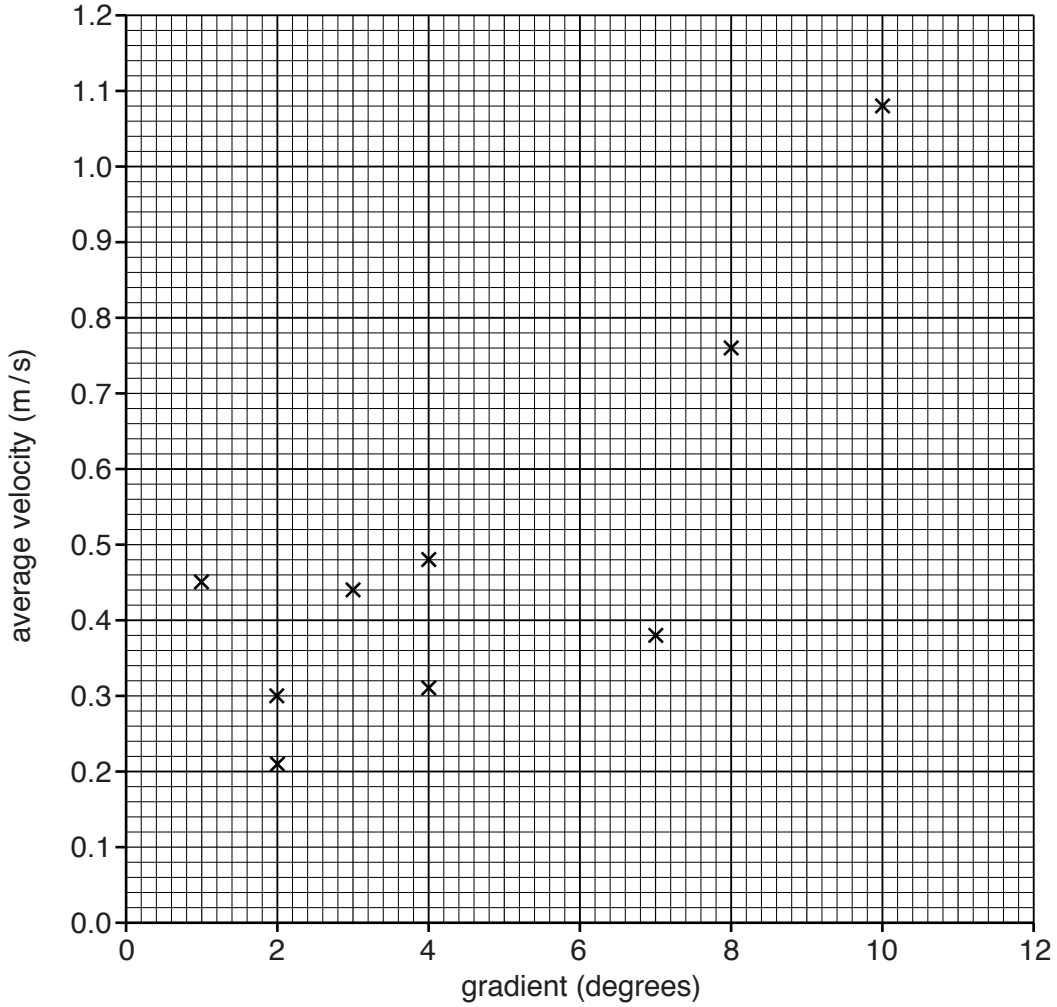

Fig. 4

(iii) What conclusion can be made about the relationship between gradient and average velocity? Support your answer with data from Table 1 and Fig. 4.

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[Total: 30 marks]

2 A class of students in Tianjin, China were studying land use in the local area. They identified three main roads which went through their local area towards the city centre on which to do their fieldwork. The three roads shown on Fig. 5 (Insert) are Weijin Nan Lu, Zijinshan Lu and Youyi Lu. On each road the students worked along a section approximately 4 kilometres long.

Their aim was to test the following hypotheses:

Hypothesis 1: *There is the same pattern of land use along all three roads.*

Hypothesis 2: *Most of the residential and business buildings on the three roads are old.*

(a) In order to test their hypotheses the class of 18 students was divided into six groups of three. Two groups worked separately on each road.

(i) Suggest **two** reasons why their teacher split the class into groups.

1 .....

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2 .....

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(ii) Street lights were positioned every 10 metres along each road. The teacher told the students to record the main land use in each 10 metre section. They also labelled the residential and business buildings as old, recent or new.

After they completed their fieldwork task the students classified the different types of land use into six categories.
Part of one group's fieldwork notes and their classification of land use are shown in Fig. 6 below.

Complete the missing land use categories in Fig. 6. [2]

Example of students' fieldwork notes on Zijinshan Lu

metres	Age	Category	Land use	Zijinshan Lu	Land use	Category	Age	metres
0	O	residential	apartment		market	business	O	0
10	O	residential	apartment		market	business	O	10
20	O	residential	apartment		restaurant	tourism		20
30	O	residential	apartment		hotel	tourism		30
40		unoccupied	under construction		hotel	tourism		40
50		unoccupied	under construction		jewellery shop	business	N	50
60	R	business	gas (petrol) station		bank	business	N	60
70		public	hospital		bank	business	N	70
80		public	hospital		police station			80
90		public	hospital		garden with benches			90
100								100

Key

age of buildings	residential and business
O	old
R	recent
N	new

Examples of land use in each category

residential	apartment, house
business	shops, bank
tourism	hotel, restaurant
public	post office, hospital, earthquake administration centre
unoccupied	under construction
open land	parkland, land cleared for building

Fig. 6

(iii) The results of the land use classification of the two groups working on Zijinshan Lu are shown in Table 2 (Insert). Both groups surveyed all the land use on both sides of the road.

Suggest **two** reasons why their results are different.

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10

Pie graphs showing land use

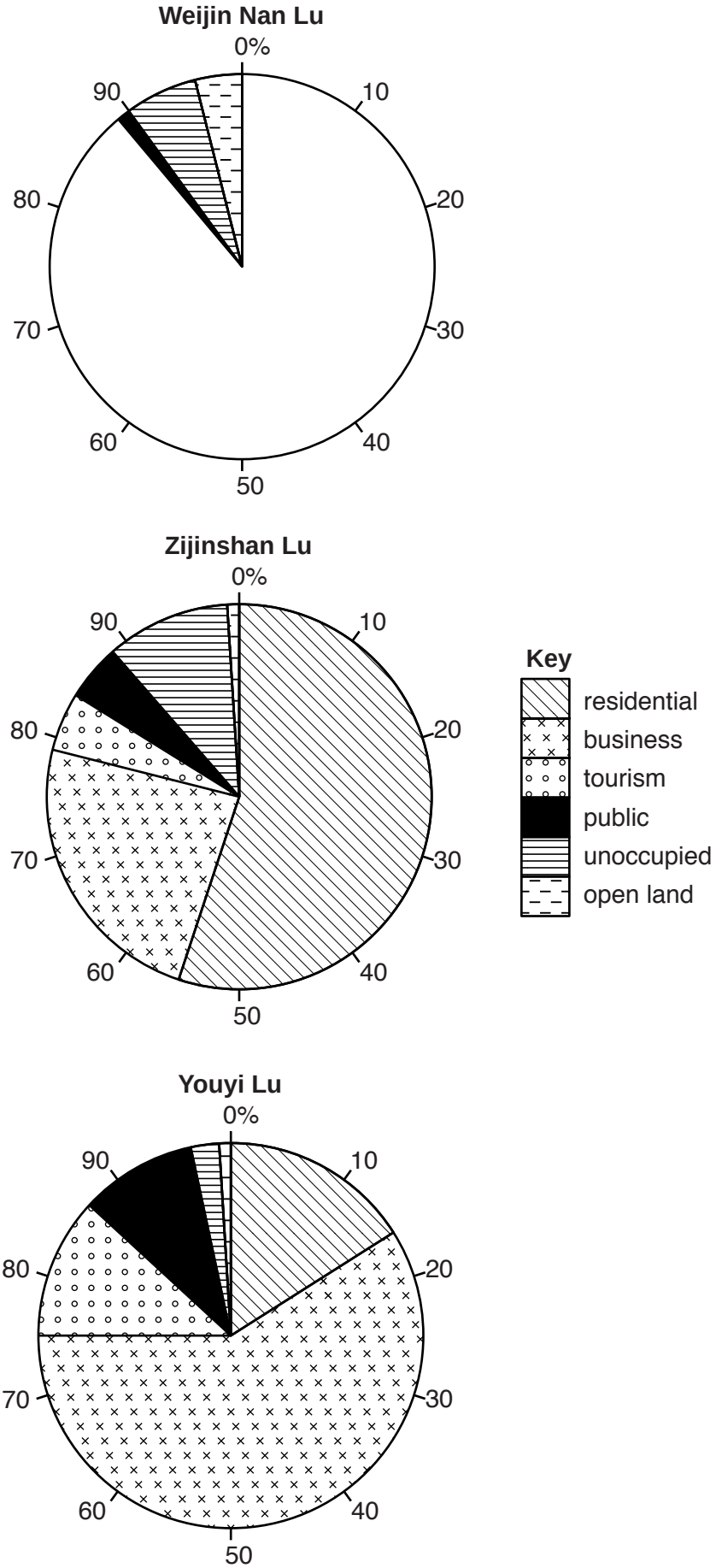

Fig. 7

(iv) When the students had checked their results and agreed figures they converted them into percentages in order to draw graphs. These percentages are shown in Table 3 (Insert).

Use these results to complete the pie graph for the road, Weijin Nan Lu, opposite. [3]

(v) Whilst some students chose to plot their results on pie graphs, other students showed them on divided bar graphs. Use the results in Table 3 to complete the graph for Youyi Lu below. [2]

Divided bar graphs

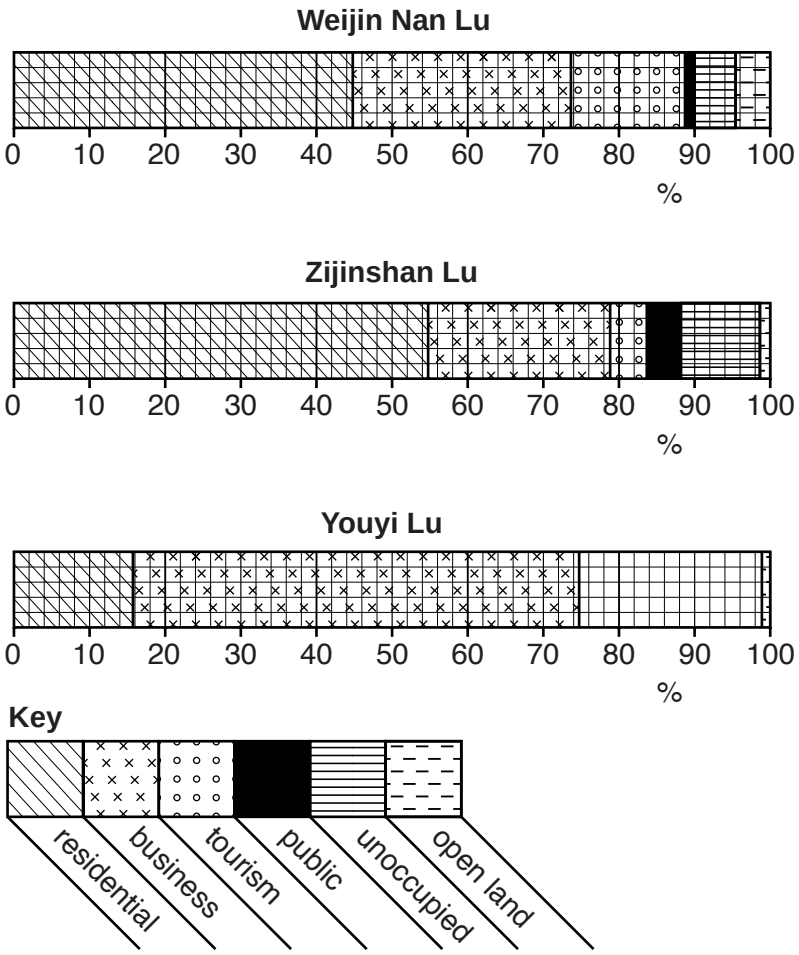

Fig. 8

(vi) What conclusion would the students make about **Hypothesis 1:** *There is the same pattern of land use along all three roads*? Support your answer with evidence from Table 3 and Figs. 7 or 8.

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(b) To investigate **Hypothesis 2:** *Most of the residential and business buildings on the three roads are old*, the students looked again at their fieldwork results about the age of residential and business buildings. They had classified the sections as old, recent or new.

(i) Suggest why it would be difficult for the groups of students to classify the age of buildings in this way.

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(ii) The students converted their age results for residential and business buildings into percentages. The percentages for each road are shown in Table 4 (Insert). Plot the percentages for recent and new business buildings on Weijin Nan Lu on Fig. 9 below.

[2]

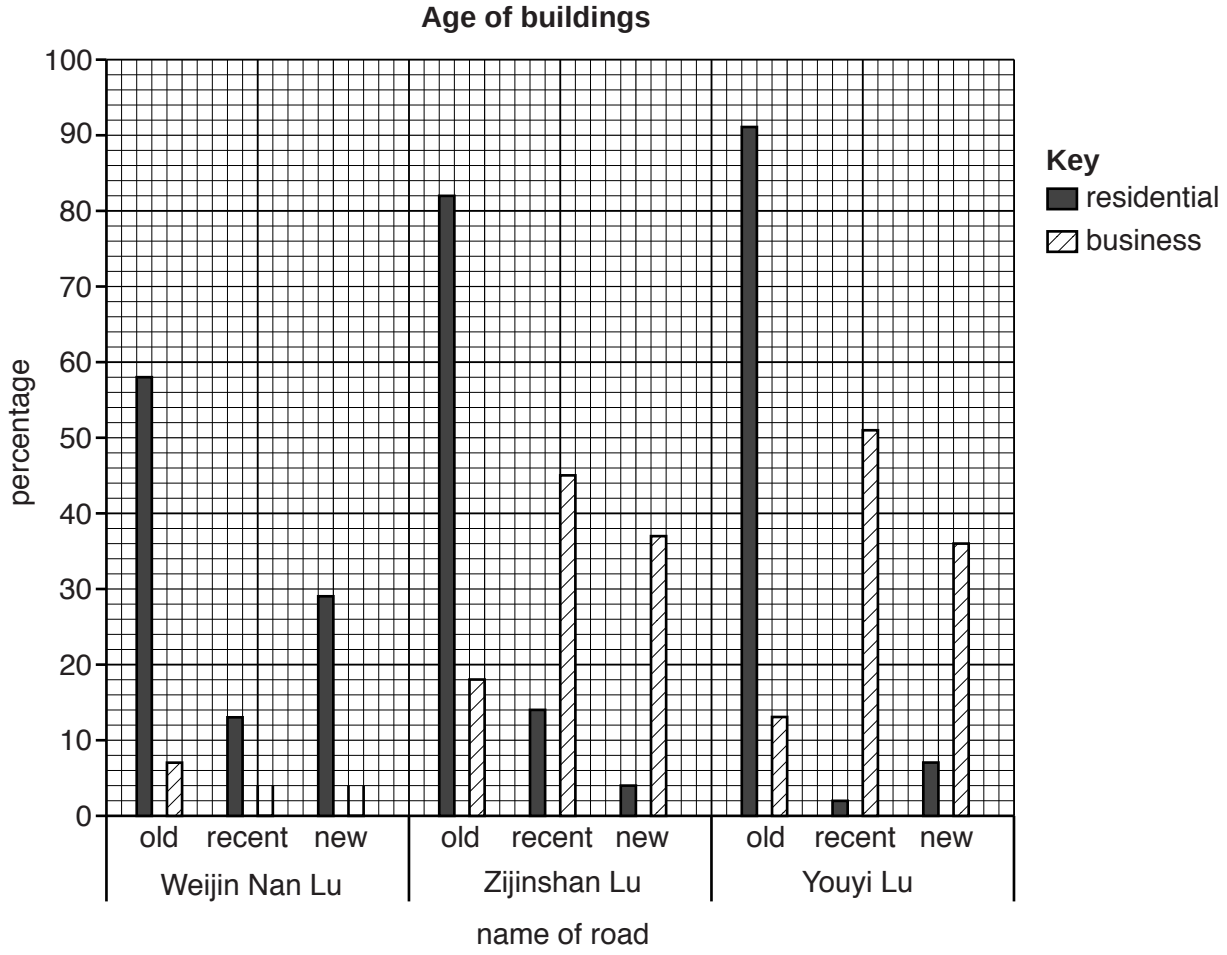

Fig. 9

(iii) Do the results shown in Fig. 9 support **Hypothesis 2:** *Most of the residential and business buildings on the three roads are old*? Support your decision about both types of building with data from Table 4 and Fig. 9.

Residential buildings

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Business buildings

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(c) Whilst they were doing their fieldwork the students found an old map in the school library of the area as it was in 1930. This showed that much of the area in 1930 was countryside. When they compared the old map with their up-to-date map they saw that the area had become more built up. Suggest why this happened.

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(d) One group of students decided that they would test a third hypothesis as an extra piece of fieldwork. Their hypothesis was:

Business buildings are taller than residential buildings.

Describe how the students could test this hypothesis. In your answer refer to how the students would do the following:

- collect data;
- record data;
- display data;
- make a conclusion.

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[Total: 30 marks]

Additional Pages

If you use the following lined pages to complete the answer(s) to any question(s), the question number(s) must be clearly shown.

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