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# Cambridge IGCSE™

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*5277923975*

**GEOGRAPHY** **0460/43**

Paper 4 Alternative to Coursework **October/November 2021**

**1 hour 30 minutes**

You must answer on the question paper.

You will need: Insert (enclosed) Ruler
Calculator
Protractor

**INSTRUCTIONS**

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- If additional space is needed, you should use the lined pages at the end of this booklet; the question number or numbers must be clearly shown.

**INFORMATION**

- The total mark for this paper is 60.
- The number of marks for each question or part question is shown in brackets [ ].
- The insert contains additional resources referred to in the questions.

This document has **16** pages. Any blank pages are indicated.


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**1** A class of students did fieldwork at five sites along a local river to see how it changed downstream. One group chose to investigate river velocity and the shape of rocks on the river bed (bedload).

The two hypotheses which the students tested were:

**Hypothesis 1**: *There is a relationship between river velocity and the wetted perimeter of the river channel*.

The wetted perimeter is the part of the river channel cross-section which is in contact with the water.

**Hypothesis 2**: *Rocks on the bed of the river become more rounded downstream*.

**(a)** Before beginning their fieldwork, the class of students discussed safety in and around a river. They produced a risk assessment table to identify possible risks and ways to reduce them. This is shown in Fig. 1.1 below.

**Complete the table** by suggesting different ways to reduce the **three** possible risks. [3]

**Risk assessment**

| possible risk | how to reduce the risk |
|---|---|
| slipping on rocks on the river bed | ..... ..... |
| getting a disease or illness from the river water | ..... ..... |
| getting wet whilst making measurements in the river | wear waterproof clothing |
| falling into the river and getting injured | ..... ..... |
| getting hypothermia in cold temperatures | wear warm clothing whilst outside in cold temperatures |

**Fig. 1.1**

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**(b)** To investigate **Hypothesis 1**: *There is a relationship between river velocity and the wetted perimeter of the river channel*, the students measured the velocity once at each fieldwork site.

**(i)** Describe **one** method to measure river velocity.

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..... [4]

**(ii)** The students' measurements of velocity are shown in Table 1.1 (Insert). **Plot the result for site 5** on Fig. 1.2 below. [1]

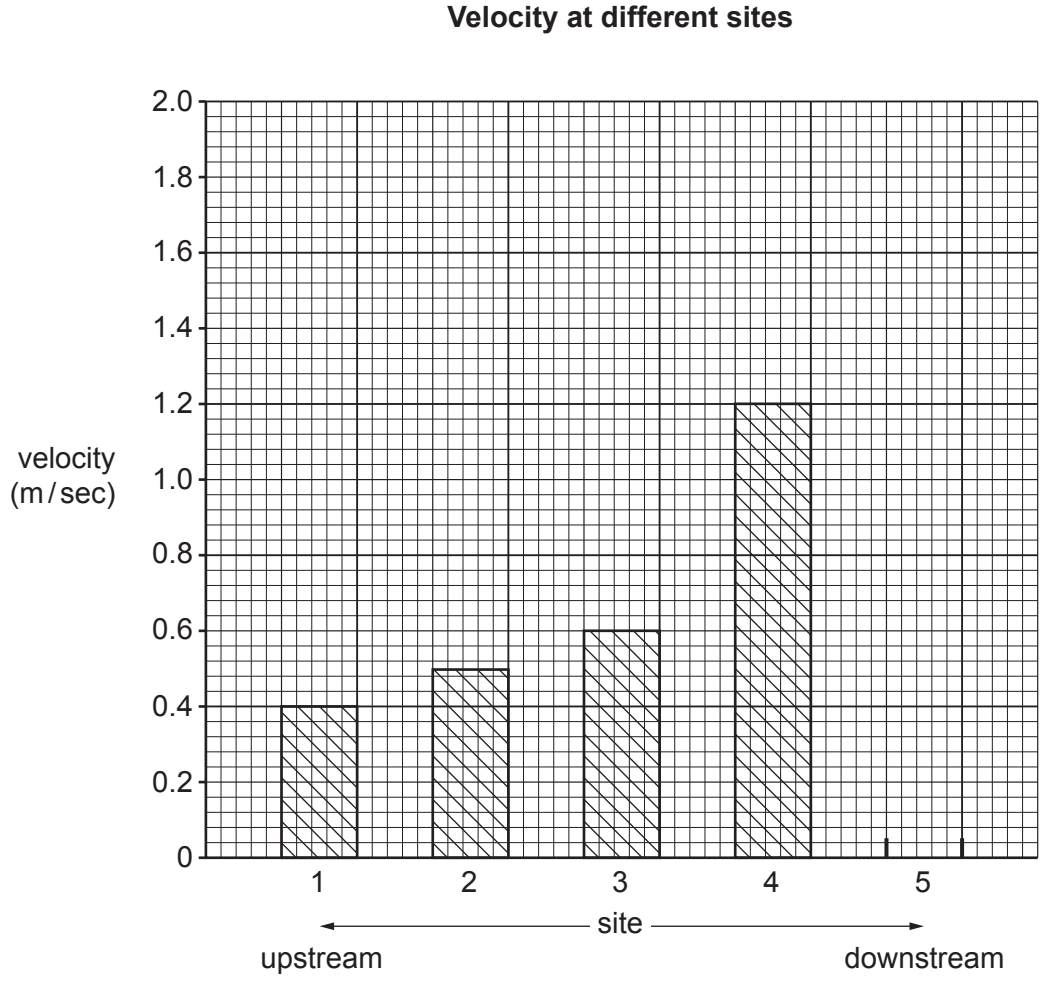



**Fig. 1.2**

**(c)** The technique which the students used to measure the wetted perimeter of the river channel is shown in Fig. 1.3 (Insert) which is from a student's notebook.

**(i)** Suggest **two** difficulties of this method of measuring the wetted perimeter of the river channel.

1 .....

.....

2 .....

..... [2]

**(ii)** The students' results are shown in Table 1.1 (Insert). Complete Fig. 1.4 below by **plotting the result for site 4**. [1]

**Relationship between velocity and wetted perimeter**

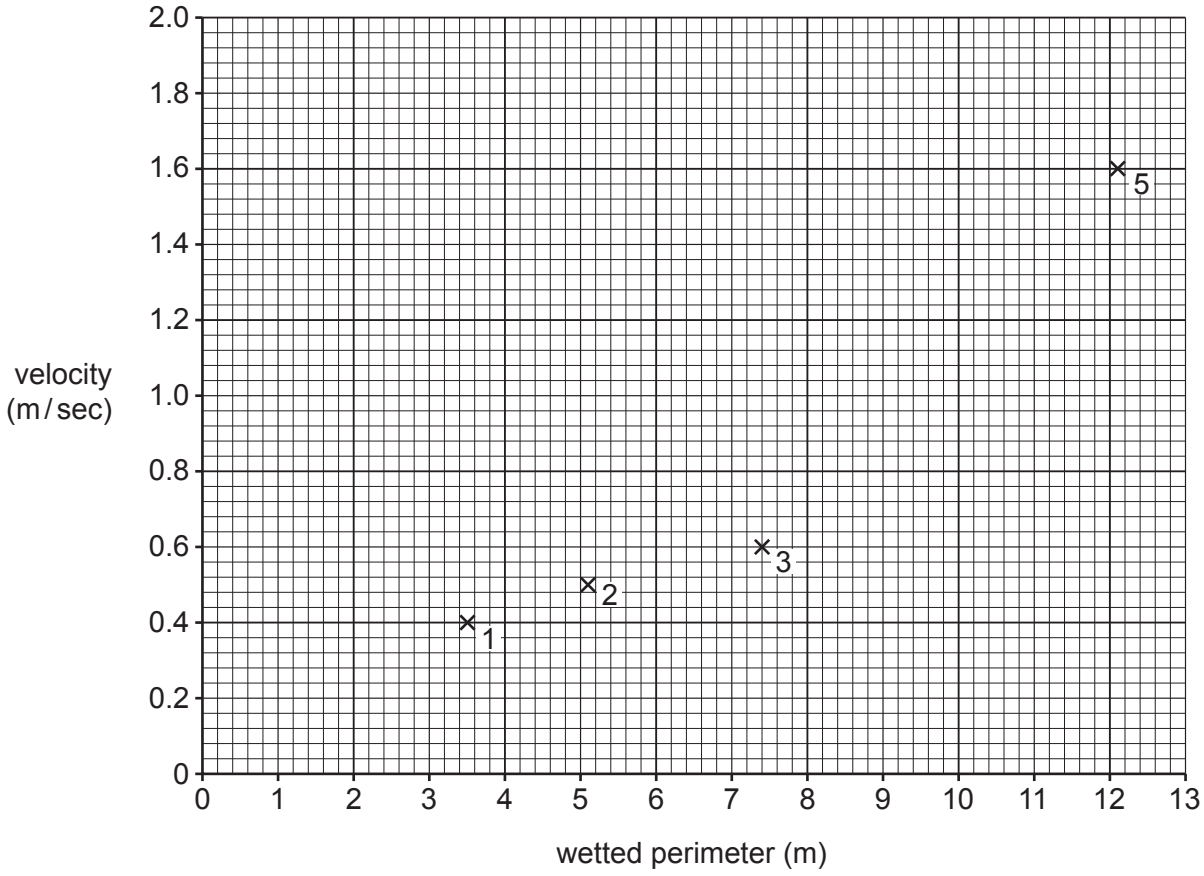



**Fig. 1.4**

**(iii)** What conclusion would the students make about **Hypothesis 1**: *There is a relationship between river velocity and the wetted perimeter of the river channel*? Support your decision with evidence from Fig. 1.4 and Table 1.1.

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..... [3]

**(d)** To investigate **Hypothesis 2**: *Rocks on the bed of the river become more rounded downstream*, the students picked up 20 pebbles at random from the bed of the river at each site. They then measured the roundness of the pebbles by comparing them with the Powers' Scale of Roundness which is shown in Fig. 1.5 (Insert).

**(i)** Suggest **one** problem of using the Powers' Scale to measure roundness.

.....

..... [1]

**(ii)** The students simplified their investigation by combining descriptions on the Powers' Scale. Their results are shown in Table 1.2 (Insert). Use these results to **complete the pie graph for site 2** in Fig. 1.6 opposite. [3]

**(iii)** The students decided that **Hypothesis 2**: *Rocks on the bed of the river become more rounded downstream* was **partly true with some exceptions**. Use evidence from Fig. 1.6 and Table 1.2 to explain why they reached this conclusion.

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..... [3]

**(iv)** Explain why rocks on the river bed generally become more rounded downstream.

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.....

..... [2]

**(v)** Suggest ways in which the students could have improved the reliability of their method for testing Hypothesis 2.

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..... [2]

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**Roundness of rocks at different sites**

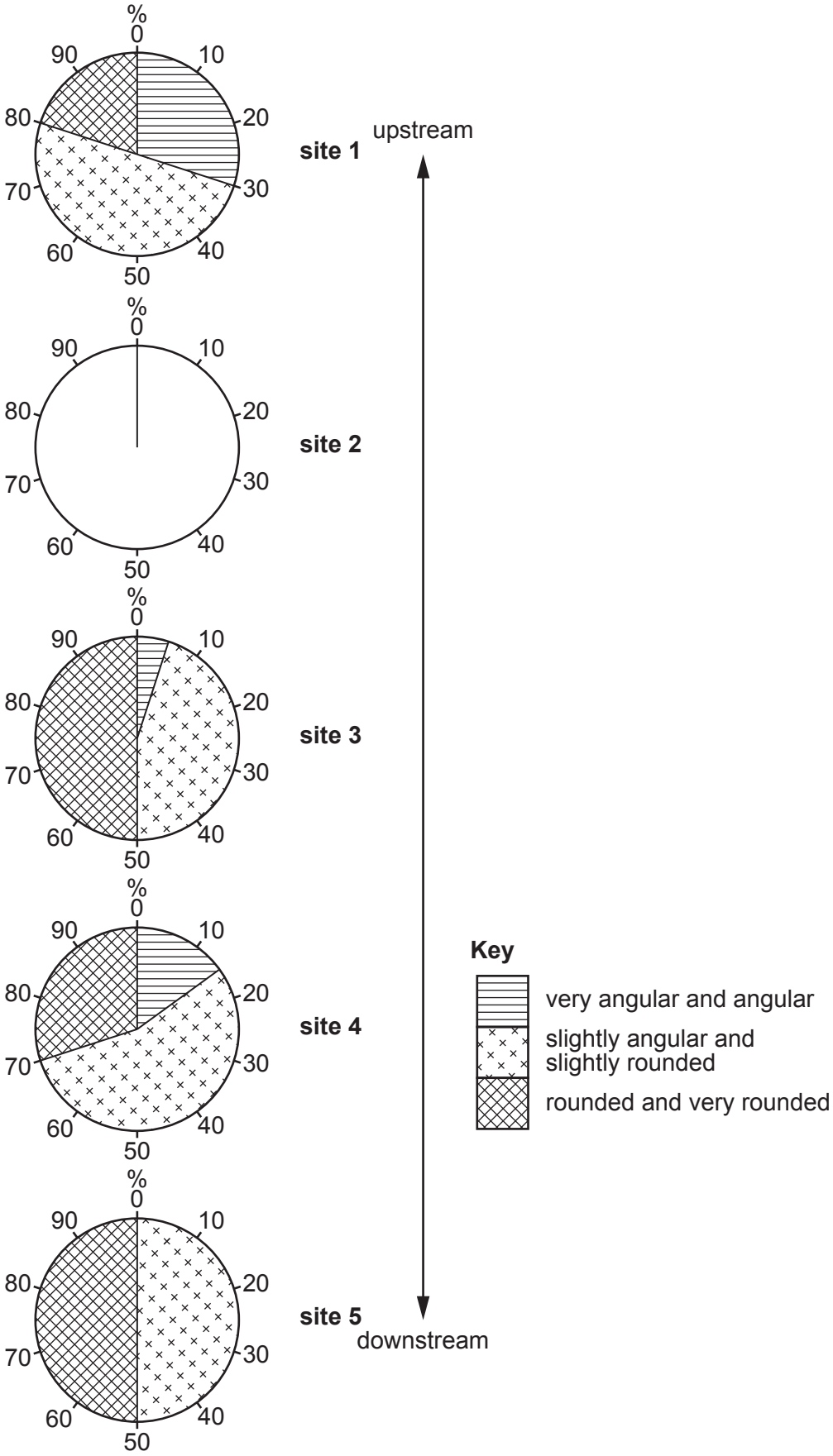



**Fig. 1.6**

**(e)** Other students in the class measured the **size** of the rocks on the river bed at each site to test another hypothesis.

Which **two** pieces of equipment below could the students use to measure the size of each rock? Tick (✓) your choices. [2]

| equipment | tick (✓) |
|---|---|
| callipers | |
| clinometer | |
| quadrat | |
| ranging pole | |
| ruler | |

**(f)** While doing fieldwork one observant student noticed that the river valley was different at each of the five sites. Describe possible changes in the features of the river and its valley downstream.

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..... [3]

[Total: 30]

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**2** Students lived in a village where a by-pass road had recently been completed. This is a road which goes around the village to provide an alternative route for traffic going past it.

They decided to investigate the following hypotheses by doing a traffic survey:

**Hypothesis 1**: *The **total** amount of traffic in the village has changed since the by-pass was constructed*.

**Hypothesis 2**: *The amount of traffic on the by-pass is the same throughout the day*.

**(a)** The route of the by-pass is shown in Fig. 2.1 (Insert).

Estimate the distance along the by-pass road between points **A** and **B**.
Tick (✓) your choice in the table below. [1]

| distance | tick (✓) |
|---|---|
| 3.2 km | |
| 3.8 km | |
| 4.2 km | |
| 4.6 km | |

**(b)** Before they began their fieldwork, the students looked at the results of a traffic survey done in the village in 2016, before the by-pass was constructed. These results are shown in Table 2.1 (Insert).
Why are these results 'secondary' data?

.....

..... [1]

**(c)** The sites chosen for the traffic survey are shown in Fig. 2.1 (Insert).
The students agreed to do five separate counts at the same times as the survey was done in 2016. The recording sheet used by the students is shown in Fig. 2.2 (Insert).

**(i)** Which **one** of the following methods would the students use to complete their recording sheet? Tick (✓) your choice in the table below. [1]

| method | tick (✓) |
|---|---|
| estimate | |
| interview | |
| measure | |
| sample | |
| tally | |

**(ii)** Describe how the students would carry out the traffic survey.

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..... [4]

**(iii)** Suggest **three** difficulties which the students had when doing their traffic survey.

1 .....

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2 .....

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3 .....

..... [3]

**(d)** The results of the students' traffic survey done in the village in 2018 after the by-pass was constructed are shown in Table 2.2 (Insert).

**(i)** Fig. 2.3 below shows the results of both traffic surveys done in the village (2016 and 2018). **Plot the results of total traffic numbers** for 16:30–17:00 and 19:30–20:00 in 2018 on Fig. 2.3. [2]

**Results of the traffic surveys done in the village**

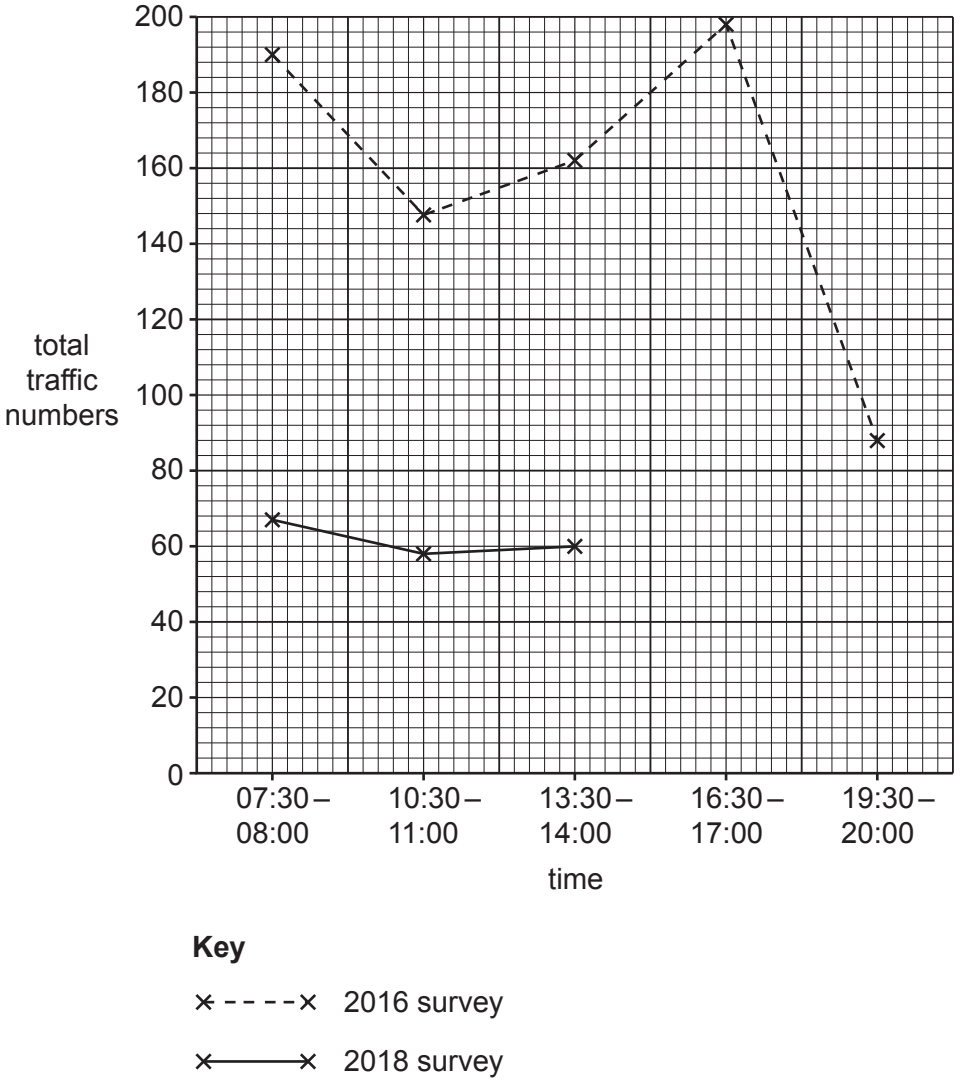



**Fig. 2.3**

**(ii)** Which **one** of the following would be another suitable method to show the results of total traffic numbers?
Circle your answer below.

choropleth shading  flow lines on a map  scatter graph [1]

**(iii)** What conclusion would the students make about **Hypothesis 1**: *The **total** amount of traffic in the village has changed since the by-pass was constructed*? Support your decision with evidence from Fig. 2.3 and Tables 2.1 and 2.2 (Insert).

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..... [3]

**(e)** The students then considered **Hypothesis 2**: *The amount of traffic on the by-pass is the same throughout the day*. First, they used their recording sheet to count the number of vehicles in each category at the different times. Their results are shown in Table 2.3 (Insert).

**(i)** Use the results in Table 2.3 **to complete the divided bar graph** in Fig. 2.4 below to show the results for 16:30 to 17:00. [3]

**Number of vehicles in each category at different times**

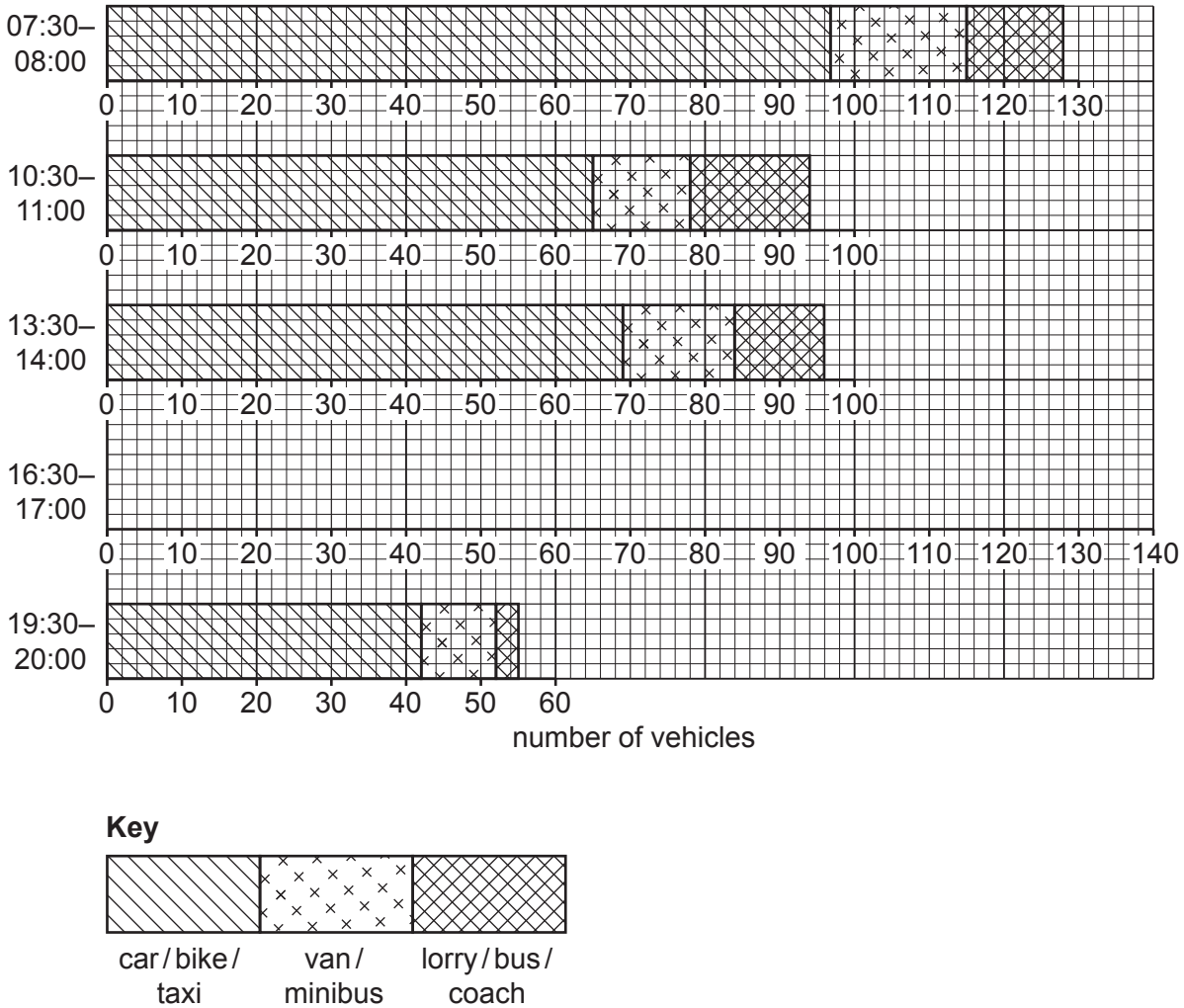



**Fig. 2.4**

**(ii)** At which survey time was the number of lorries, buses and coaches more than the number of vans and minibuses?

..... [1]

**(iii)** The students concluded that **Hypothesis 2**: *The amount of traffic on the by-pass is the same throughout the day* was **false**. Explain why they made this conclusion. Include data from Fig. 2.4 and Table 2.3 (Insert) about total vehicle numbers and number of vehicles in different categories.

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..... [4]

**(iv)** Suggest **two** reasons for the variation in the number of vehicles travelling along the by-pass during the day.

1 .....

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2 .....

..... [2]

**(f)** Suggest likely advantages and disadvantages for people of constructing a by-pass road around the village.

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[Total: 30]

## Additional Pages

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

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