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0460/41

October/November 2011

1 hour 30 minutes

Additional Materials: Calculator
 Ruler

READ THESE INSTRUCTIONS FIRST

DO **NOT** WRITE ON ANY BARCODES.

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.

This document consists of **14** printed pages, **2** blank pages and **1** Insert.

- 1 Students in a class in Beijing, China, were learning about the sphere of influence of settlements and services.

- (a) (i) Which **one** of the following is the correct definition of 'sphere of influence'?
Tick your choice in the table below.

| Definition | Tick ✓ |
|--|--------|
| area around a town or shop | |
| area where people have migrated from | |
| area where people go to work in a town | |
| area served by a settlement or service | |
| area next to a particular service | |

[1]

- (ii) Why does the sphere of influence vary between different sized settlements?

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.....[3]

Some of the students decided to investigate the sphere of influence of their school. They agreed to test the following hypotheses:

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Hypothesis 1: *The number of students coming to our school decreases as distance from the school increases.*

Hypothesis 2: *Students travel to school in different ways but most travel by car.*

(b) To collect data to test these hypotheses the students produced a questionnaire which they showed to their teacher. This is shown in Fig. 1 (Insert).

- (i) Their teacher did not give a positive response about the questionnaire. Suggest **one** weakness of **each** question.

Question 1

.....

Question 2

.....

Question 3

.....[3]

- (ii) The students changed the questionnaire on the advice of their teacher. Their amended version is shown in Fig. 2 (Insert). The students decided to ask 10% of all the students in the school to complete their questionnaire. This would result in 125 questionnaires being completed.

Do you think that this is an appropriate sample size? Explain your answer.

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- (iii) Describe a suitable method of selecting the students to complete the questionnaire in order to get a fair, representative sample.

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- (c) Having completed their survey the students tabulated the results of the questionnaire. The results for Question 1 (*In which municipality of Beijing do you live?*) are shown in Table 1 below.

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Table 1

Answers to Question 1: *In which municipality of Beijing do you live?*

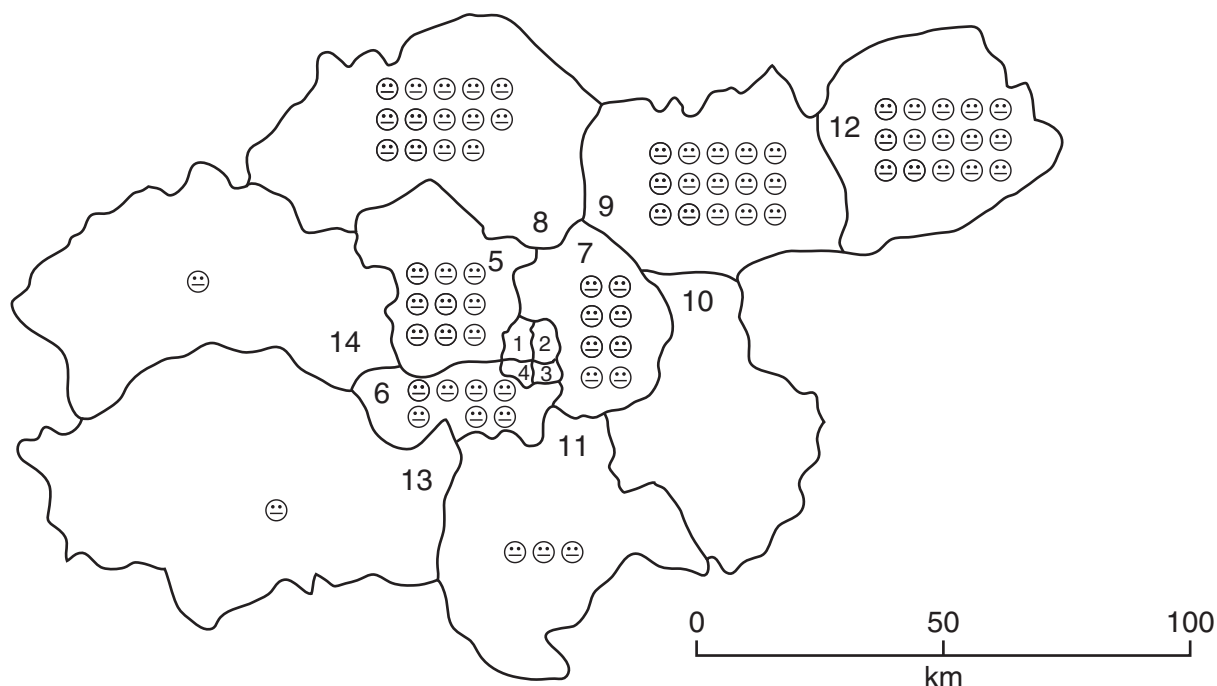
| | Municipality | Tally | Number |
|----|--------------|-------|--------|
| 1 | Xi Cheng | | 18 |
| 2 | Dong Cheng | | 10 |
| 3 | Chong Wen | | 13 |
| 4 | Xuan Wu | | 4 |
| 5 | Hai Dian | | 9 |
| 6 | Feng Tai | | |
| 7 | Chao Yang | | 8 |
| 8 | Chang Ping | | 14 |
| 9 | Shung Yi | | 15 |
| 10 | Tong Zhou | | 7 |
| 11 | Da Xing | | 3 |
| 12 | Ping Gu | | 15 |
| 13 | Fang Shan | | 1 |
| 14 | Men Tou Go | | 1 |
| | Total | | 125 |

- (i) Seven students live in Feng Tai municipality. Insert this information to complete Table 1. [1]

The students displayed the results for Question 1 in two different types of map. These are shown in Fig. 3 (below) and Fig. 4 (on page 6).

For
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Use

Pictogram to show where students travel from



**Large-scale map
of central municipalities**

Key to municipalities

| | Municipality |
|----|--------------|
| 1 | Xi Cheng |
| 2 | Dong Cheng |
| 3 | Chong Wen |
| 4 | Xuan Wu |
| 5 | Hai Dian |
| 6 | Feng Tai |
| 7 | Chao Yang |
| 8 | Chang Ping |
| 9 | Shung Yi |
| 10 | Tong Zhou |
| 11 | Da Xing |
| 12 | Ping Gu |
| 13 | Fang Shan |
| 14 | Men Tou Go |

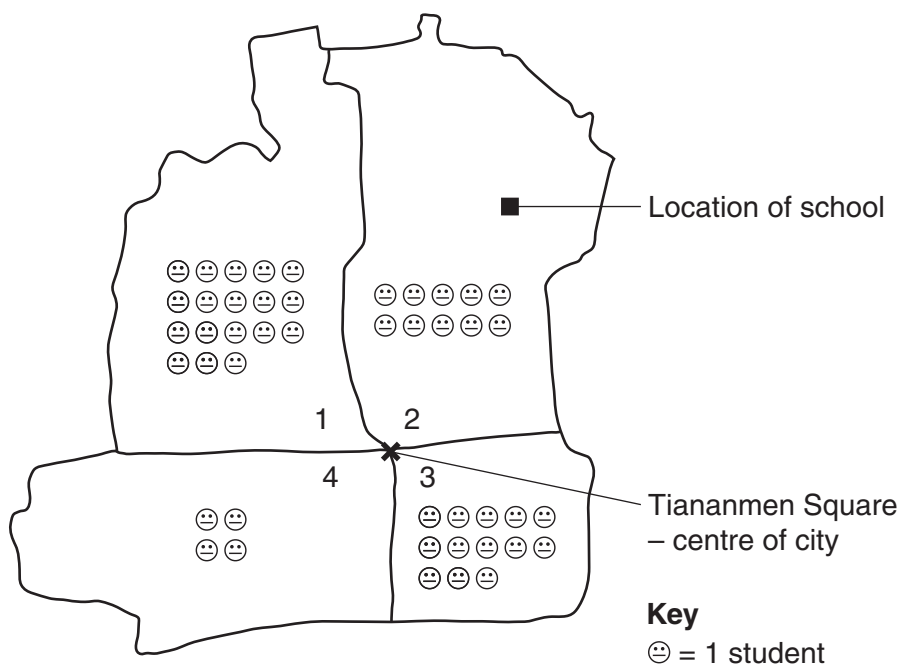
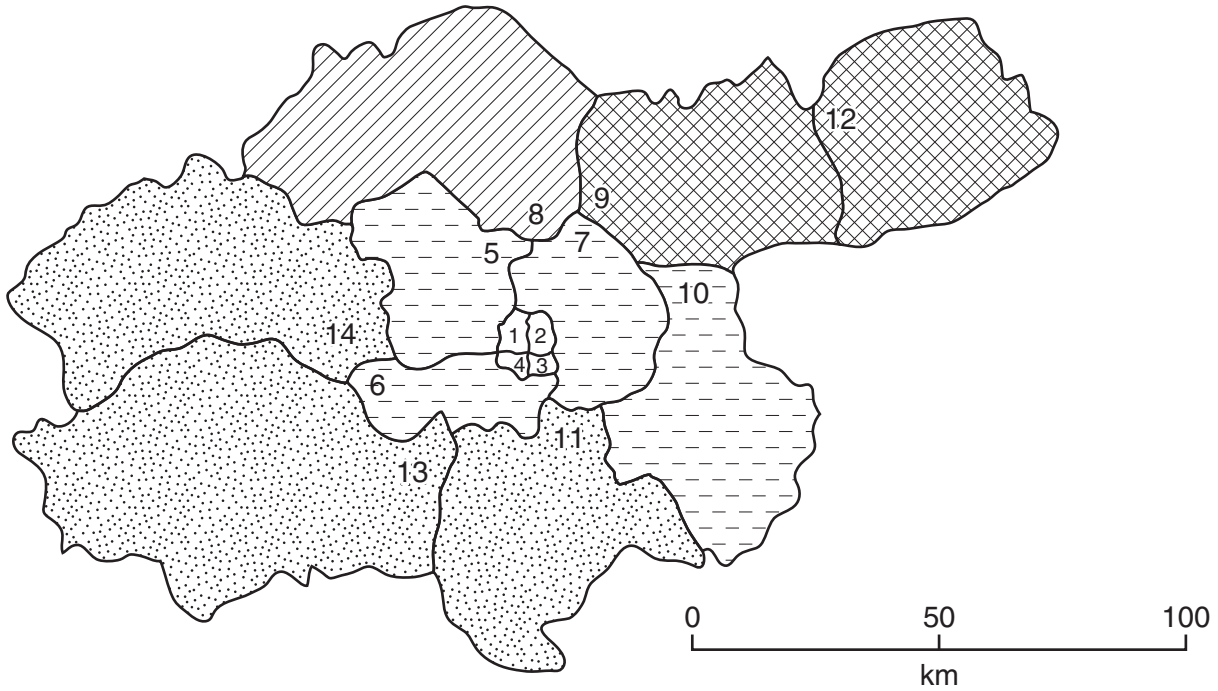


Fig. 3

- (ii) Complete Fig. 3 by inserting the number of students who live in Tong Zhou municipality. [1]

Choropleth map to show where students travel from

For
Examiner's
Use



**Large-scale map
of central municipalities**

Key

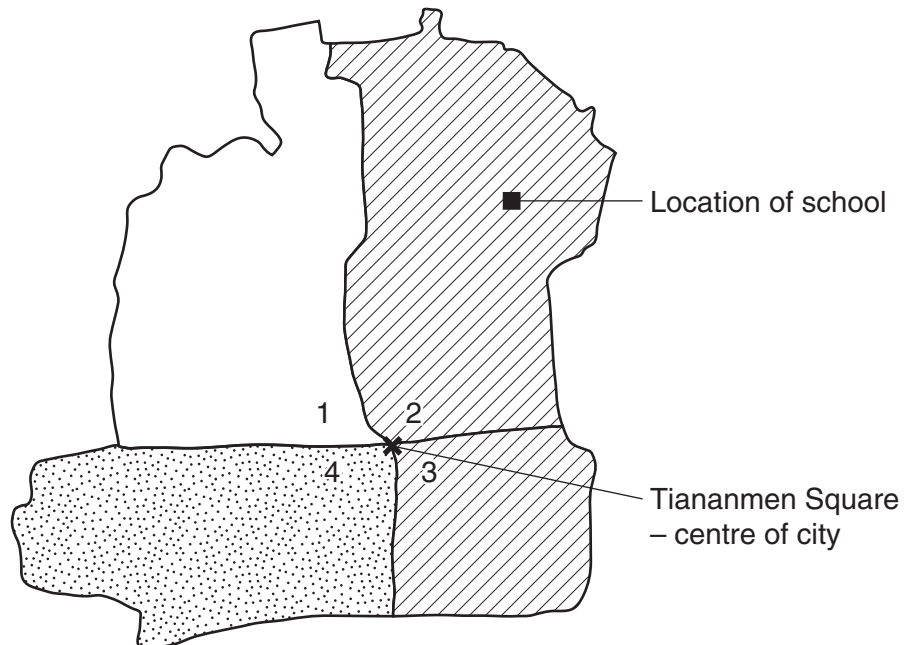
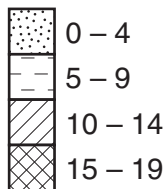


Fig. 4

(iii) Complete Fig. 4 by shading the municipality of Xi Cheng.

[1]

- (iv) Give **two** advantages of each type of map for showing data.

Pictogram:

Advantage 1:

.....

Advantage 2:

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Choropleth map:

Advantage 1:

.....

Advantage 2:

.....[4]

- (v) Do you agree with **Hypothesis 1**: *The number of students coming to our school decreases as distance from the school increases?*

Explain your conclusion and support your answer with data from Figs 3 and 4.

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.....[4]

- (d) Table 2, below, shows the results of Question 2 (*How do you usually travel to school?*) in the questionnaire.

For
Examiner's
Use

Table 2

Answers to Question 2: *How do you usually travel to school?*

| Method of travel | Number of students | Percentage |
|------------------|--------------------|------------|
| Bus | 45 | 36 |
| Car | 39 | 31 |
| Train | 37 | |
| Bike | 3 | 2 |
| Walk | 1 | 1 |
| Total | 125 | 100 |

- (i) Complete the table by calculating the percentage of students who travel to school by train. [1]
- (ii) Use the results from Table 2 to complete the pie graph, Fig. 5 below. [2]

Answers to Question 2: *How do you usually travel to school?*

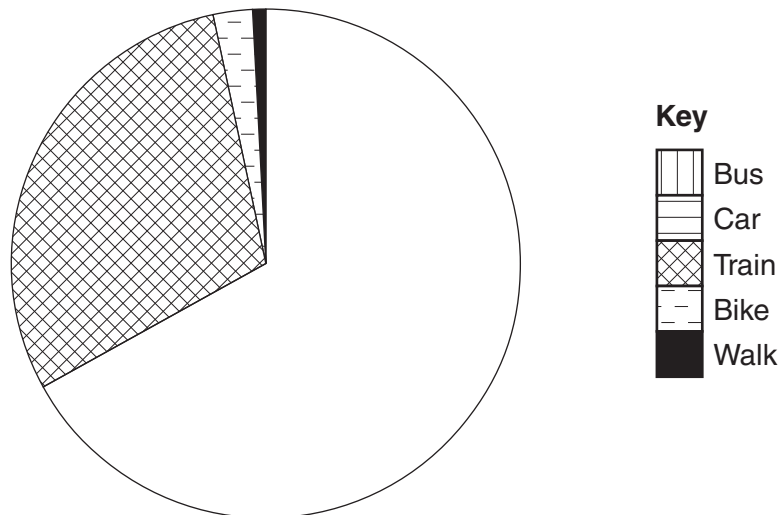


Fig. 5

- (iii) The students decided that **Hypothesis 2: *Students travel to school in different ways but most travel by car*** was incorrect.

Give **three** pieces of evidence to support this conclusion.

For
Examiner's
Use

1

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.....[3]

- (iv) Suggest **two** ways that the fieldwork investigation could have been extended to find out more about the students' journeys to school.

1

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2

.....[2]

[Total: 30 marks]

2 A class of students were studying how to use weather recording instruments.

(a) What instrument would they use to measure the following?

Temperature

Relative humidity [2]

One student noticed that the weather was forecast to change considerably the next day, so he decided to take some measurements to investigate the extent of these changes.

He decided to test the following hypotheses:

Hypothesis 1: *There is a relationship between changes in atmospheric pressure and change in rainfall.*

Hypothesis 2: *There is a relationship between changes in atmospheric pressure and change in wind speed and wind direction.*

He decided to take measurements of rainfall, wind speed, wind direction, cloud type and amount of cloud cover. He would take these measurements every four hours at 07.00, 11.00, 15.00 and 19.00. He also decided to take readings of atmospheric pressure every hour.

(b) The student also decided to take one set of measurements at 12.00 hours on the day before his investigation (Day 1) and another set at 12.00 on the day after his investigation (Day 3).

Suggest why the student decided to take measurements over three days.

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..... [2]

- (c) He used the following measuring equipment: rain gauge, anemometer, wind vane, barometer and a diagram of cloud types.

For
Examiner's
Use

- (i) In the space below, draw a labelled diagram of a rain gauge. Explain how the student made his measurements.

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.....[4]

- (ii) Fig. 6 (Insert) and Fig. 7 (Insert) show an anemometer and wind vane. Explain how they measure wind speed and wind direction.

Anemometer:

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Wind vane:

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.....[4]

- (iii) The barometer in Fig. 8 (Insert), measures atmospheric pressure. Explain how and why the index pointer on the barometer is used.

For
Examiner's
Use

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- (iv) What unit is used to measure cloud cover?

..... [1]

- (d) The recording sheet of the student's fieldwork is shown in Table 3, below.

Table 3

Student's recording sheet

| | Day 1 | Day 2 | | | | | | | | | | | | | | | | Day 3 |
|----------------------------------|------------|-------|------------|------|------|-------|--------------|-------|-------|-------|---------------|-------|-------|-------|---------|-------|-------|------------|
| Time | 12.00 | 6.00 | 7.00 | 8.00 | 9.00 | 10.00 | 11.00 | 12.00 | 13.00 | 14.00 | 15.00 | 16.00 | 17.00 | 18.00 | 19.00 | 20.00 | 21.00 | 12.00 |
| Atmospheric pressure (millibars) | | 1015 | 1012 | 1009 | 1005 | 1000 | 998 | 997 | 996 | 994 | 992 | 994 | 1000 | 1005 | 1012 | 1015 | 1018 | 1022 |
| Rainfall (mm) | 0 | | 0 | | | | 3 | | | | 5 | | | | 1 | | | 0 |
| Wind speed (km per hr) | 3 | | 8 | | | | 26 | | | | 43 | | | | 20 | | | 5 |
| Wind direction | South East | | South East | | | | South | | | | South West | | | | South | | | South East |
| Cloud type | Cumulus | | Cirrus | | | | Alto-stratus | | | | Nimbo stratus | | | | Stratus | | | Cirrus |
| Cloud cover | 2 | | 4 | | | | 6 | | | | 7 | | | | 6 | | | 3 |

- (i) Look at the barometer in Fig. 8 and use this to fill in the atmospheric pressure at 12.00 hours on Day 1. [1]

Fig. 9, below, is a summary of the student's fieldwork.

Summary of the student's fieldwork

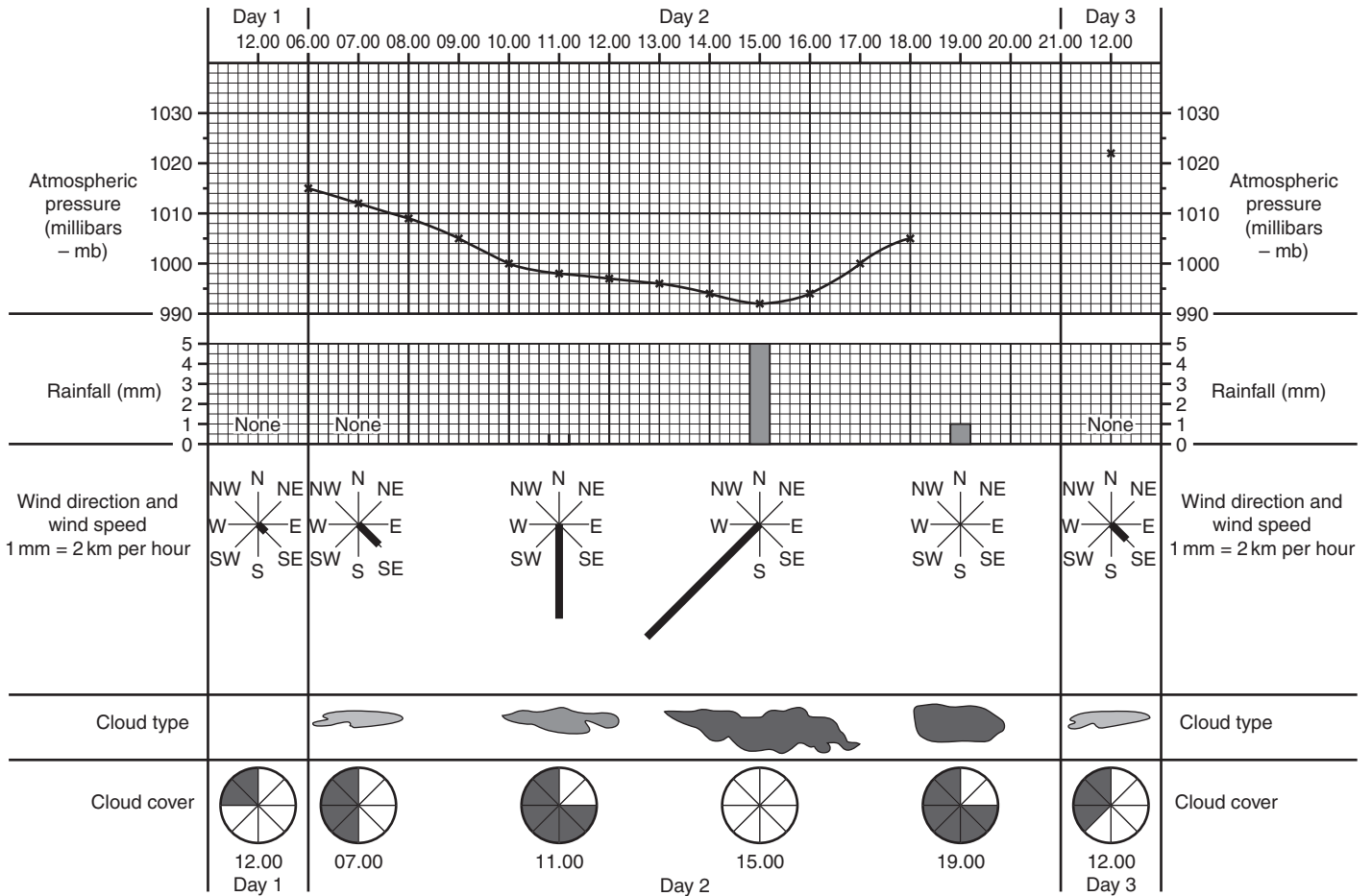


Fig. 9

Use information from Table 3 to complete the following tasks on Fig. 9.

- (ii) Draw the rainfall bar at 11.00 hours on Day 2. [1]
- (iii) Complete the atmospheric pressure line graph at 19.00, 20.00 and 21.00 hours on Day 2. [2]
- (iv) Draw in the wind direction and speed on the rose diagram at 19.00 hours on Day 2. [2]
- (v) Draw in the cloud type at 12.00 on Day 1. [1]
- (vi) Plot the cloud cover at 15.00 hours on Day 2. [1]

(e) Having completed his comparison table the student looked again at his hypotheses.

- (i) He decided that **Hypothesis 1:** *There is a relationship between changes in atmospheric pressure and change in rainfall* was true.

Describe the relationship between atmospheric pressure and rainfall. Support your description with data from Fig. 9.

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.....[3]

- (ii) He also decided that **Hypothesis 2:** *There is a relationship between changes in atmospheric pressure and change in wind speed and wind direction* was true.

How did wind speed and wind direction change as atmospheric pressure changed? Support your answer with data from Fig. 9.

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[Total: 30 marks]

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