Cambridge Assessment
International Education

Cambridge IGCSE™

CANDIDATE NAME	

CENTRE NUMBER		CANDIDATE NUMBER	

GEOGRAPHY **0460/41**

Paper 4 Alternative to Coursework **October/November 2022**

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.

1 A group of students visited Jwaneng, a large open-pit diamond mine in Botswana, an LEDC in Africa. Most mining is done by blasting at or near the surface.

(a) Before their visit the students did some research about the location and the reserves of the world's largest diamond mines. Their results are shown in Table 1.1 (Insert).

(i) Use the data in Table 1.1 to **complete the pie chart**, Fig. 1.1. [2]

Percentage of diamond reserves

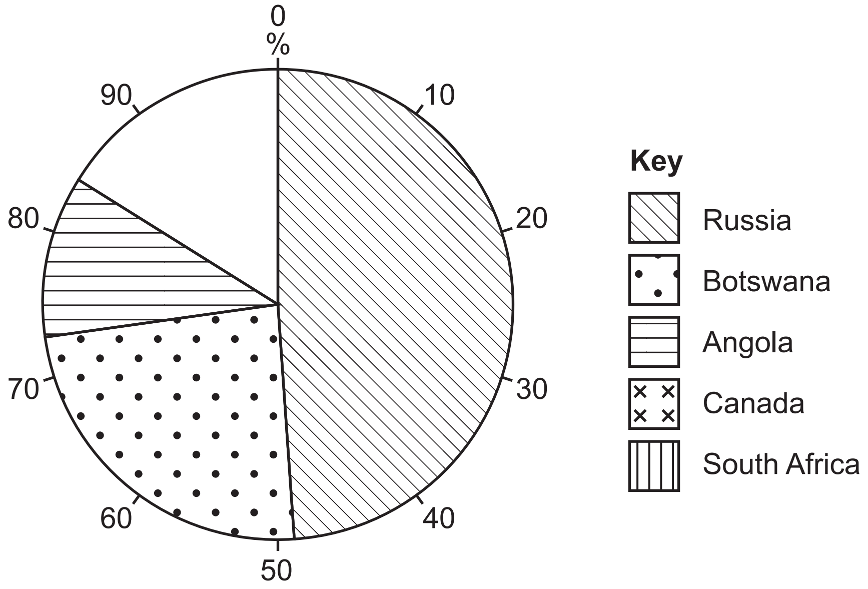

Fig. 1.1

(ii) What percentage of diamond reserves are in Russia?

....% [1]

(b) Fig. 1.2 (Insert) is a photograph of Jwaneng mine.

(i) Which sector of employment is shown in Fig. 1.2? Tick (✓) your answer.

sector of employment	tick (✓)
primary	
secondary	
tertiary	
quaternary	

[1]

(ii) Describe **two** features of the mine shown in Fig. 1.2.

1 ....

....

2 ....

.... [2]

The students tested the following hypotheses:

Hypothesis 1: *Employment is the most important benefit of the mine for residents of Jwaneng.*

Hypothesis 2: *The level of pollution increases towards the mine.*

(c) To investigate **Hypothesis 1** the students used a questionnaire with 100 local residents to study the impacts of Jwaneng mine. This questionnaire is shown in Fig. 1.3 (Insert).

(i) The population of Jwaneng is 13 500. Do you think 100 people is an appropriate sample size? Circle your choice below and explain your answer.

YES NO

....

....

....

.... [2]

(ii) Name a suitable sampling method for the students to select 100 people. Describe the method and explain why it is a suitable method.

Name of sampling method ....

....

....

....

.... [3]

(iii) The results of question 1 (*What do you think are the benefits of Jwaneng mine?*) are shown in Table 1.2 (Insert). Use this data to **complete Fig. 1.4**. [2]

Benefits of the mine

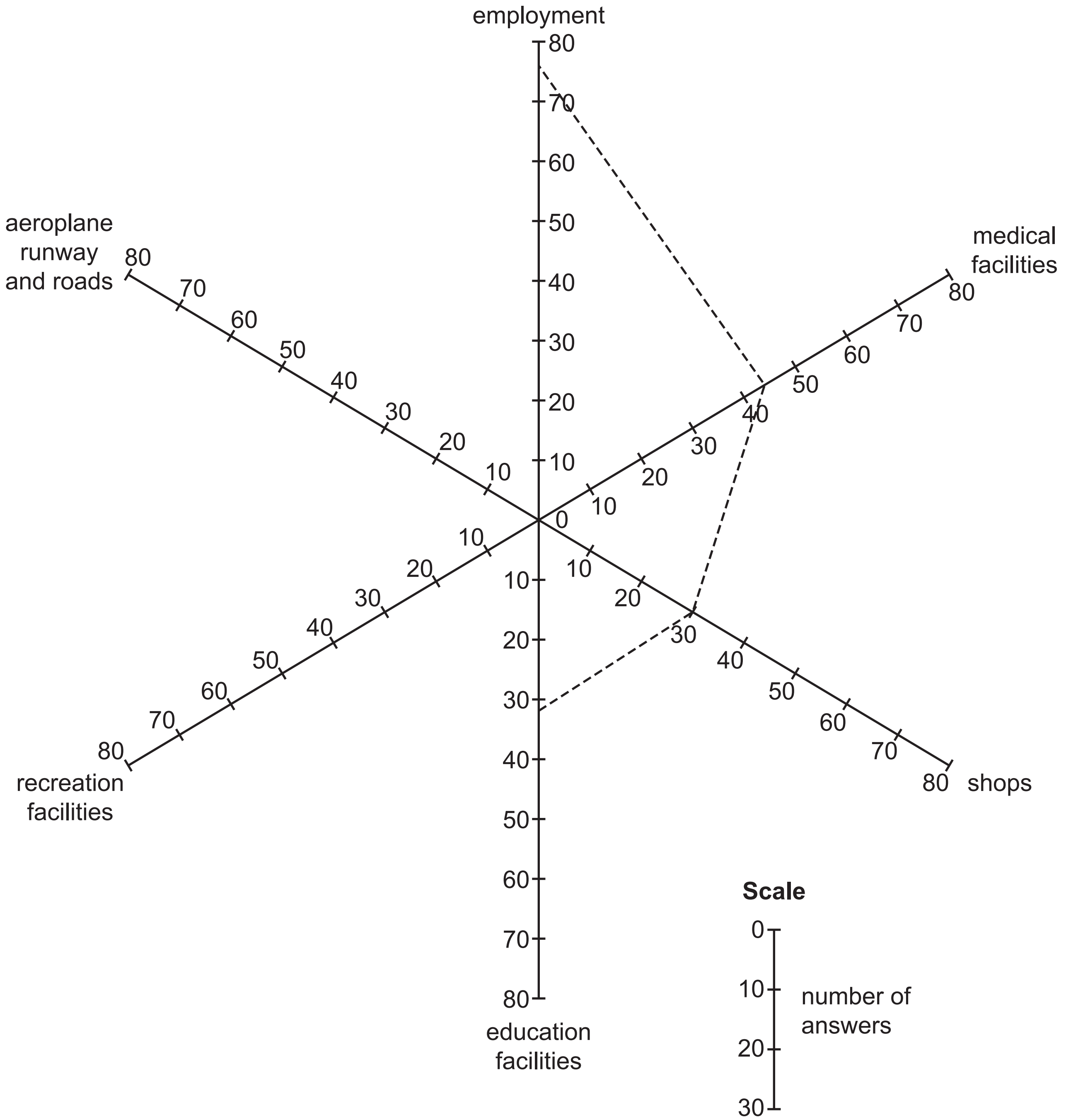

Fig. 1.4

(iv) What conclusion did the students make to **Hypothesis 1**: *Employment is the most important benefit of the mine for residents of Jwaneng*? Support your answer with data from Fig. 1.4 and Table 1.2.

....

....

....

....

....

.... [3]

(v) The residents' answers to question 2 (*What do you think are the disadvantages of Jwaneng mine?*) are shown in Table 1.3 (Insert). Use the results to **complete Fig. 1.5**. [2]

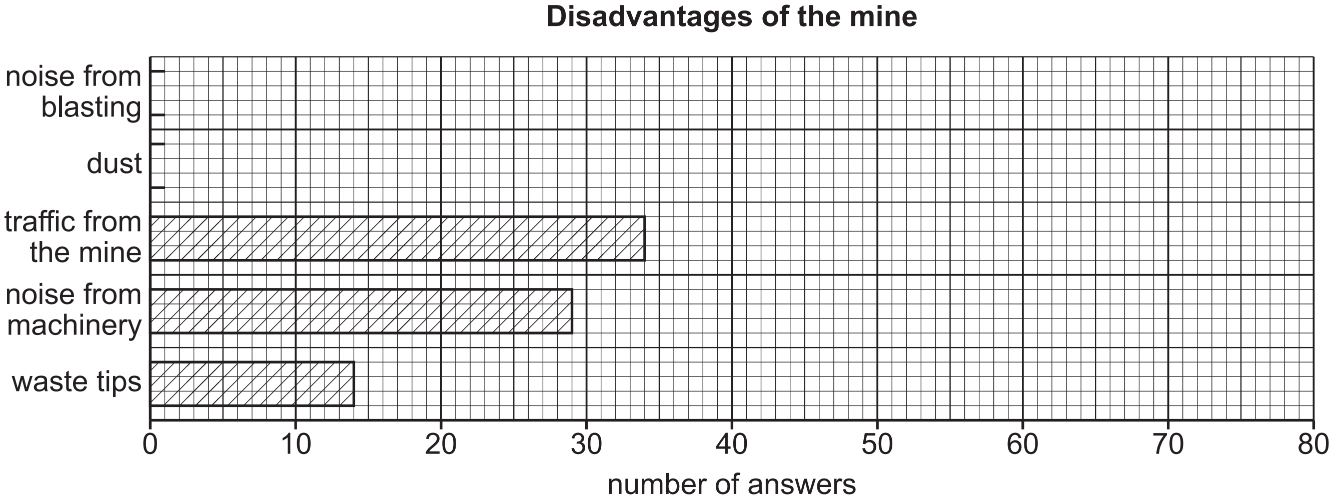

Fig. 1.5

(d) From the answers to question 2 in the questionnaire the students realised that the mine caused pollution. They did some fieldwork to investigate different types of pollution so that they could answer **Hypothesis 2**: *The level of pollution increases towards the mine*.

The students did a bi-polar analysis at five sites around the mine and town of Jwaneng. These are shown in Fig. 1.6 (Insert).

(i) The students assessed the level of pollution at each site using the guidance sheet shown in Fig. 1.7 (Insert).
Suggest **two** reasons why a bi-polar analysis may **not** produce reliable results.

1 ....

....

2 ....

.... [2]

(ii) The students' bi-polar analysis scores are shown in Table 1.4 (Insert). **Draw the bars for site 3** at the bend in the road on Fig. 1.8. [1]

Students' sketch map of Jwaneng mine and town

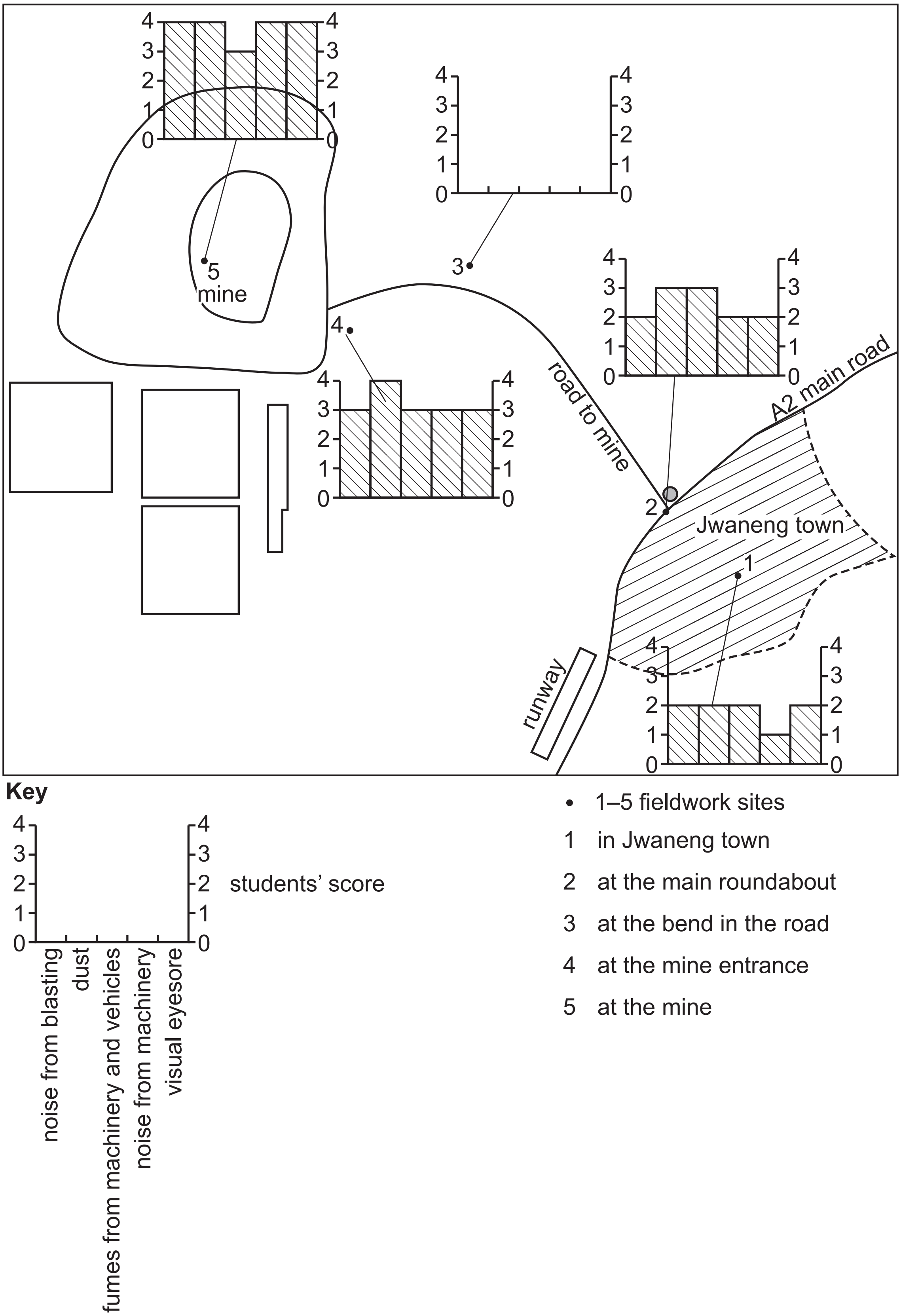

Fig. 1.8

(iii) What conclusion would the students make to **Hypothesis 2**: *The level of pollution increases towards the mine*? Support your answer with evidence from Fig. 1.8 and Table 1.4.

....

....

....

....

....

.... [3]

(iv) Explain how the following could improve the students' bi-polar analysis fieldwork.

do a pilot study

....

....

repeat the fieldwork on different days

....

....

use equipment such as a noise level meter

....

.... [3]

(e) To extend their fieldwork the students asked workers at the mine where they lived before coming to work at the mine. Some of their results are shown in Table 1.5 (Insert). Describe a suitable method to show this data on a map.

....

....

....

....

....

.... [3]

[Total: 30]

2 Students in China did fieldwork on the acidity of rainfall in their urban area. First, they researched acid rain and made a fact file. This is shown in Fig. 2.1 (Insert).

(a) What is the acidity of normal rain water on the pH scale?

.... [1]

The students tested the following hypotheses:

Hypothesis 1: *Rainfall is more acidic (pH value is lower) when the wind blows from the north and north-east directions.*

Hypothesis 2: *Rainfall is more acidic (pH value is lower) as the number of dry days before rainfall increases.*

(b) Fig. 2.2 (Insert) is a sketch map of the urban area where the students live. Which direction is the prevailing wind blowing from?

.... [1]

(c) Each day the students recorded:

- the direction the wind came from
- the amount of rain that had fallen in the previous 24 hours
- the pH value of any rain water collected.

(i) Describe how the students would measure wind direction.

....

....

....

.... [2]

(ii) Describe how the students used the instrument shown in Fig. 2.3 (Insert) to measure daily rainfall.

....

....

....

....

....

....

....

.... [4]

(iii) To measure the pH value of rain water they used the equipment shown in Fig. 2.4 (Insert). Describe their method by putting the three statements below into the correct order in the table.

- read the digital display
- collect a sample of rain water in a clean container
- put the pH meter into the water

1	
2	
3	

[1]

(iv) Describe **two** ways the students could make sure that their pH measurements were reliable.

1 ....

....

2 ....

.... [2]

(d) The students recorded their results as a data log. Part of this data log is shown in Fig. 2.5 (Insert).

(i) On which date was the wind blowing from the north-east and 15 mm of rainfall was measured with a pH value of 4.7?

.... [1]

(ii) On which date was the rainfall most acidic?

.... [1]

(e) Using the entries from their data log, the students produced the results table shown in Table 2.1 (Insert).

(i) Use the data in Table 2.1 to **complete the wind rose diagram**, Fig. 2.6. [1]

Wind rose diagram

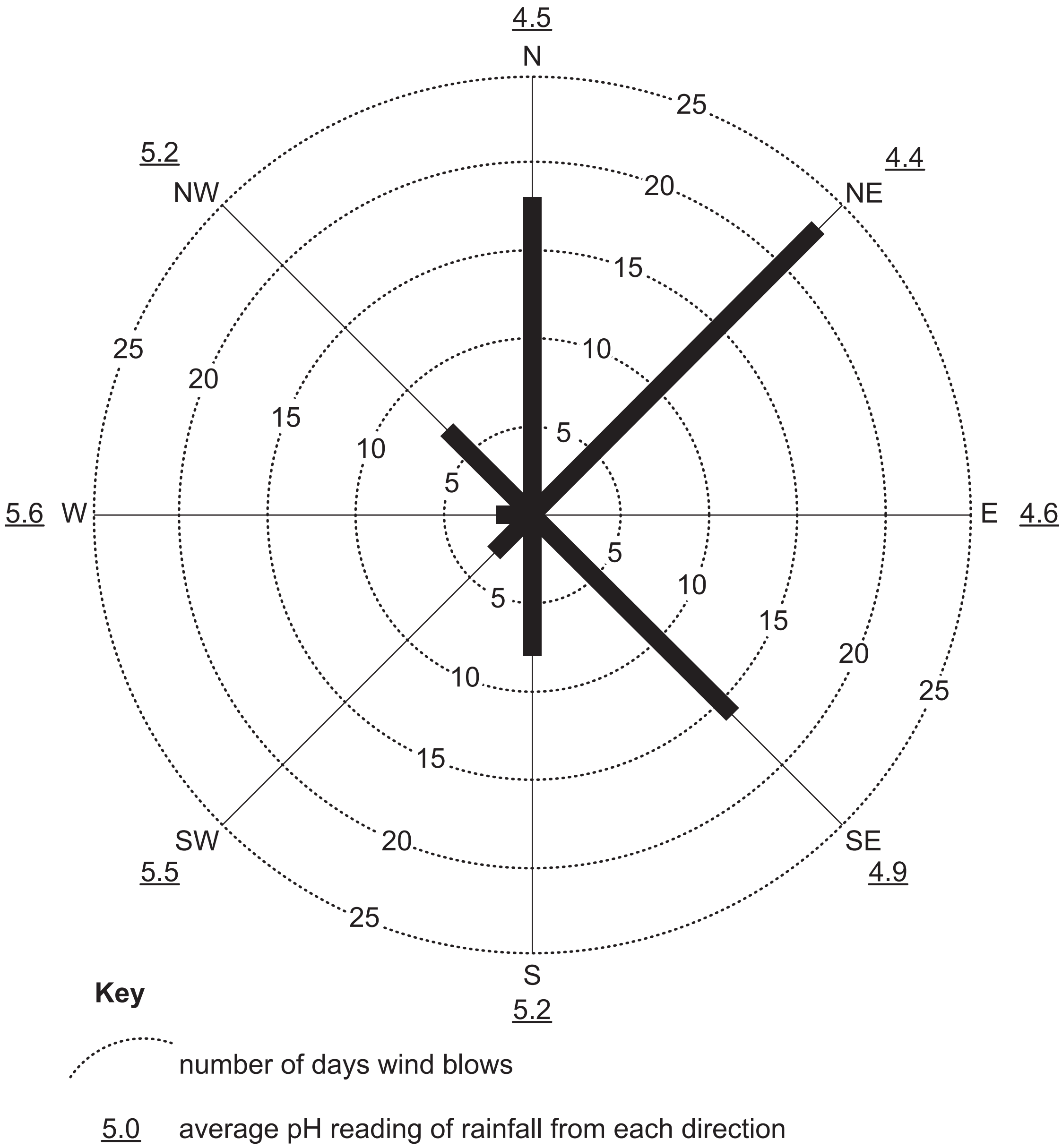

Fig. 2.6

(ii) What conclusion could the students make about **Hypothesis 1**: *Rainfall is more acidic (pH value is lower) when the wind blows from the north and north-east directions*? Support your decision with evidence from Fig. 2.6 and Table 2.1.

....

....

....

....

....

.... [3]

(iii) Use information in Figs. 2.1 and 2.2 (Insert) to explain why the level of acidity of rainfall varies with wind direction.

....

....

....

....

....

.... [3]

[Turn over

(f) To investigate **Hypothesis 2**: *Rainfall is more acidic (pH value is lower) as the number of dry days before rainfall increases*, the students used entries in their data log to produce the results table shown in Table 2.2 (Insert).

(i) Use the data in Table 2.2 to **complete the graph**, Fig. 2.7. [1]

(ii) **Draw a best-fit line** on Fig. 2.7. [1]

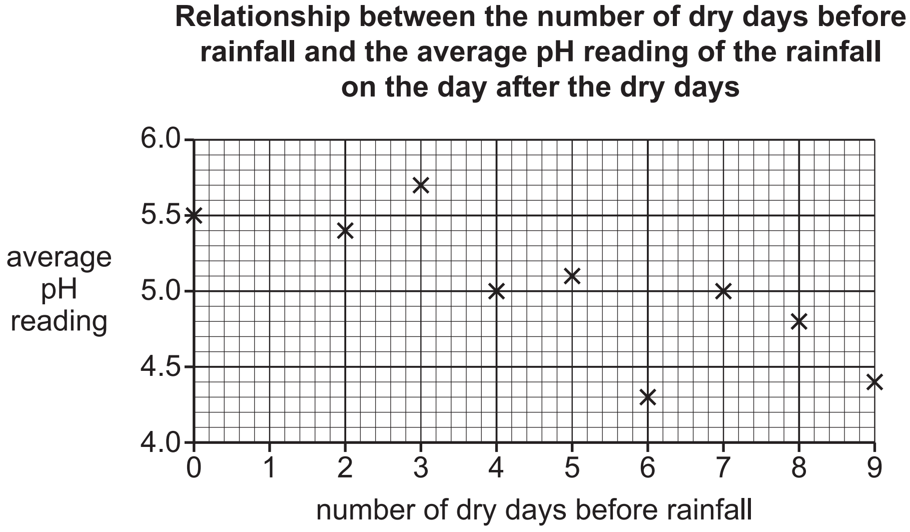

Fig. 2.7

(iii) Which **one** of the following conclusions about **Hypothesis 2**: *Rainfall is more acidic (pH value is lower) as the number of dry days before rainfall increases*, is correct? Tick (✓) your decision in the table below. Support your decision with evidence from Fig. 2.7 and Table 2.2.

	tick (✓)
The hypothesis is completely true.	
The hypothesis is partially true.	
The hypothesis is false.	

....

....

....

....

....

.... [4]

(g) Describe a fieldwork method the students could use to measure **temperature variations** within the urban area where they live shown in Fig. 2.2 (Insert).

....

....

....

....

....

....

....

.... [4]

[Total: 30]

Additional pages

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

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