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| Centre Number | Candidate Number | Name |
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UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
 International General Certificate of Secondary Education  
 General Certificate of Education Ordinary Level

**ENVIRONMENTAL MANAGEMENT**
0680/04  
5014/02

Alternative to Coursework
 October/November 2006

1 hour 30 minutes

Candidates answer on the Question Paper.  
 Additional Materials: Ruler

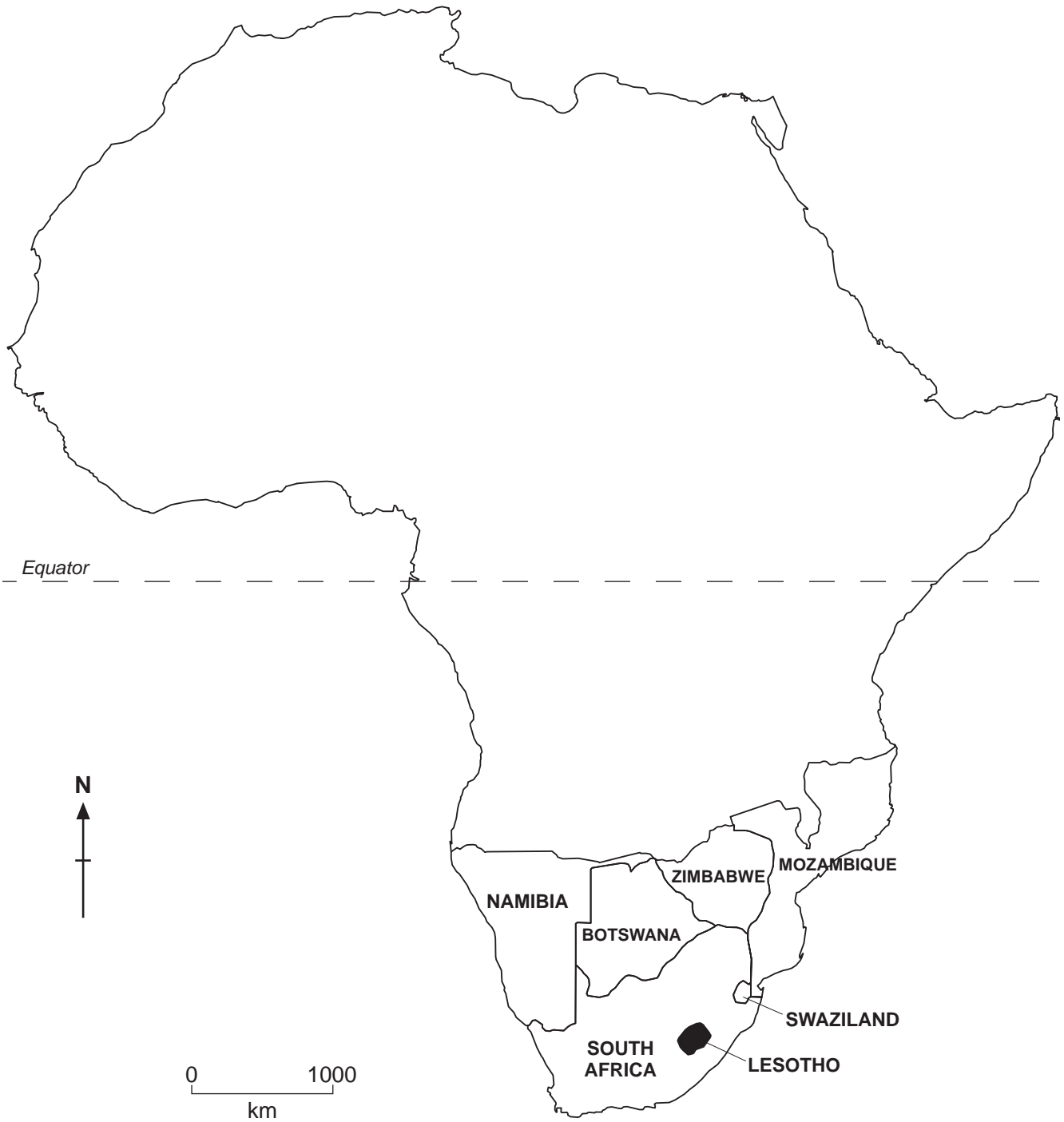
**READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name on all the work you hand in.  
 Write in dark blue or black pen.  
 You may use a soft pencil for any diagrams, graphs or rough working.  
 Do not use staples, paper clips, highlighters, glue or correction fluid.

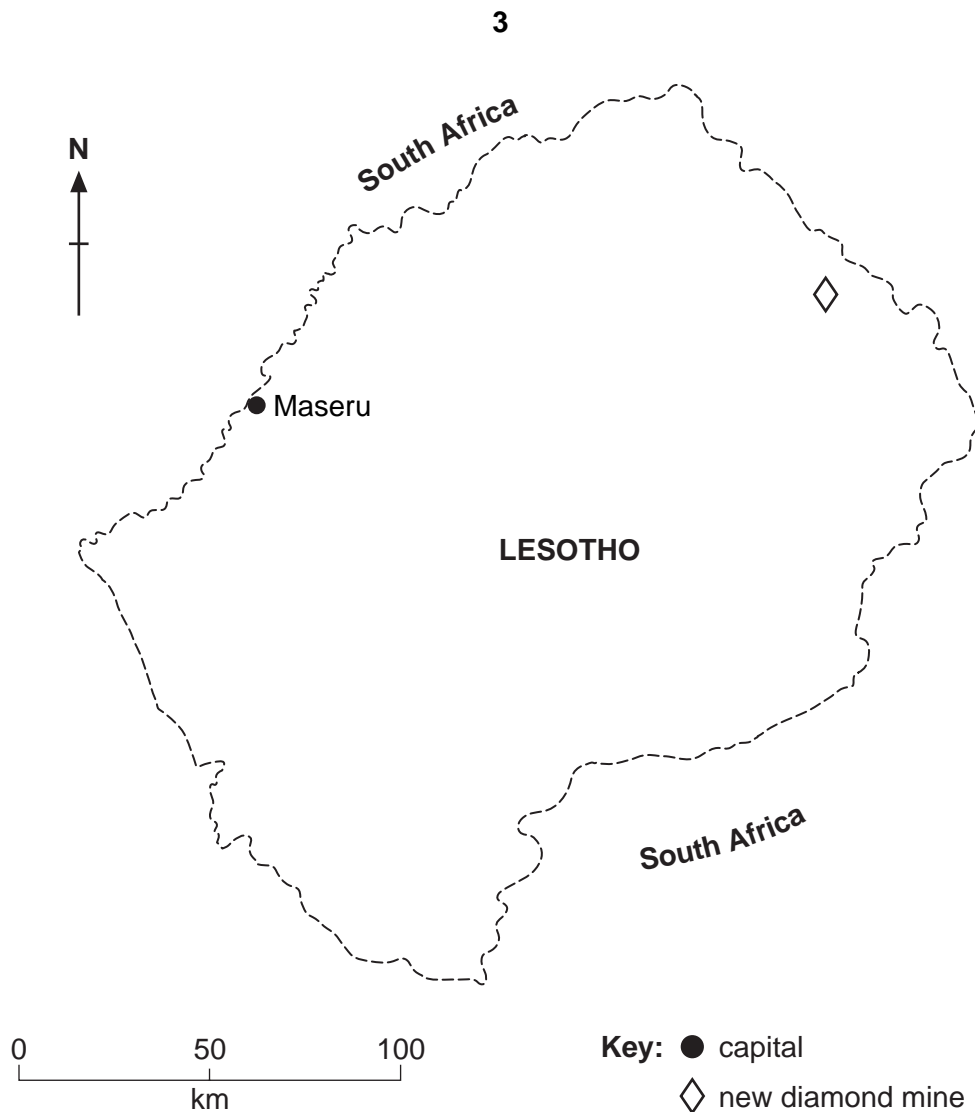
Answer **all** questions.  
 Study the appropriate Source materials before you start to write your answers.  
 Credit will be given for appropriate selection and use of data in your answers and for relevant interpretation of these data. Suggestions for data sources are given in some questions.  
 You may use the source data to draw diagrams and graphs or to do calculations to illustrate your answers.

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.

|  |                    |
|--|--------------------|
|  | For Examiner's Use |
|  |                    |



**Fig. 1 Map of southern Africa**



**Fig. 2 Map of Lesotho**

Lesotho is one of the world's poorest countries. 70% of the population live in small rural communities. Crops are grown in the valleys where soil erosion is a major problem. Large herds of cattle and sheep are grazed on the extensive highlands.

- Area: 30 350 km
- Population: 2 076 000
- Children per woman: 4.7
- Life expectancy at birth: 40 years
- Currency: maloti (parity with South African Rand)
- Official languages: Sesotho, English
- Climate: cool to cold, dry winters, hot, wet summers
- Altitude: lowest point 1 400m, highest point 3 482m
- Terrain: mostly highlands with plateaux
- Main exports: water, textiles, animal hides

- 1 In Lesotho, boys are less likely to be able to read and write than girls. Many boys, between 7-15 years old, herd livestock in the highlands. They leave home for many months. One boy had to look after 700 sheep and 72 cattle and was paid 700 maloti (US\$140) for a year's work.

When the boys finish herding it is difficult for them to find other work because they have few skills and up to 60% are illiterate. The country also has high unemployment.

The Lesotho Distance Learning Centre encourages young boys to take basic teaching materials into the highlands to share with other herders. About 700 boys graduated from the programme in 2003.

- (a) (i) Suggest why the herds of livestock need to be looked after.

.....

.....

.....

.....

.....[3]

- (ii) Calculate how many maloti are equal to one US dollar.

.....

.....[2]

- (b) You have been asked to find out if the boys who graduated in 2003 have benefited from the Learning Programme by 2006.

A questionnaire will be used to record the responses of the boys you interview.

- (i) Suggest how many boys should be interviewed as a fair sample of the 700 graduates.

.....[1]

(ii) Complete the questionnaire that has been started for you.

**QUESTIONNAIRE**

1 Has the Distance Learning helped you since you graduated three years ago?

Yes  No  Not sure

2 What type of work do you do now?

farming  mining  manufacturing  other (please state) .....  
unemployed

3 .....  
.....  
.....

4 .....  
.....  
.....

5 .....  
.....  
.....[4]

(iii) Describe, in detail, how you could use this questionnaire to find out if the Distance Learning Project had really improved the boys' standard of living.

.....  
.....  
.....  
.....[3]

(iv) Until recently up to 45% of Lesotho's labour force worked in the gold mines of South Africa. There are now fewer jobs in these gold mines.

Explain why the Government of Lesotho has made the education of boys a priority.

.....  
.....  
.....[2]

- 2 Climate is a very important factor for the success of crops in the valleys.  
Look at the table below.

| Month     | Average minimum temperature (°C) | Average maximum temperature (°C) | Rainfall (mm) |
|-----------|----------------------------------|----------------------------------|---------------|
| January   | 14                               | 26                               | 114           |
| February  | 14                               | 25                               | 109           |
| March     | 13                               | 24                               | 89            |
| April     | 10                               | 22                               | 48            |
| May       | 6                                | 19                               | 22            |
| June      | 0                                | 17                               | 8             |
| July      | 0                                | 17                               | 8             |
| August    | 6                                | 20                               | 8             |
| September | 9                                | 23                               | 20            |
| October   | 12                               | 25                               | 56            |
| November  | 13                               | 25                               | 107           |
| December  | 14                               | 26                               | 125           |

- (a) (i) In which months are ground frosts **most** likely?

.....[1]

- (ii) Between which months is the rainy season?

.....[1]

- (b) Only 10% of the land area can be used for crops and soil erosion is a major problem. Drought has caused poor harvests in the last three years and many villagers now suffer from lack of food.

A Food for Work Programme pays local people with food rations for building a dam for livestock farming and to enable crop rotation.

The ration is 50 kg maize, 5 kg beans, 2 litres oil per person per month.

A building supervisor said "At the start of the dam building many people were weak and slow but now they are very active. I can hardly believe they are the same people".

- (i) Explain why the people on this programme changed so much.

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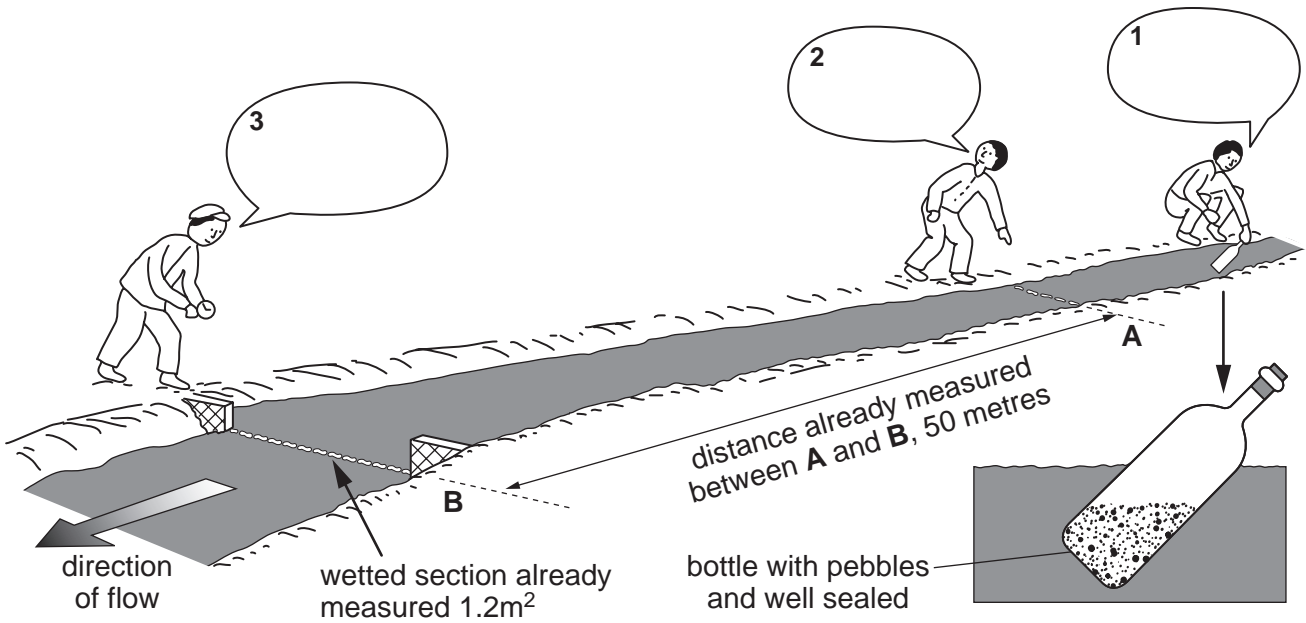
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.....[3]

- (ii) The local people wanted to know how quickly their new reservoir behind the dam would fill with water. They carried out the procedure shown in Fig. 3.

**Measuring speed of flow with the help of a float**



**Fig. 3**

Complete the captions 1, 2 and 3 for each of the farmers to show how they measured the speed of flow. [3]

- (iii) Calculate the volume of water using the formula

wetted section  $\times$  distance = volume of water.

.....  $\times$  ..... = .....m<sup>3</sup>

The farmers found that the float took 60 seconds.

Calculate the discharge.

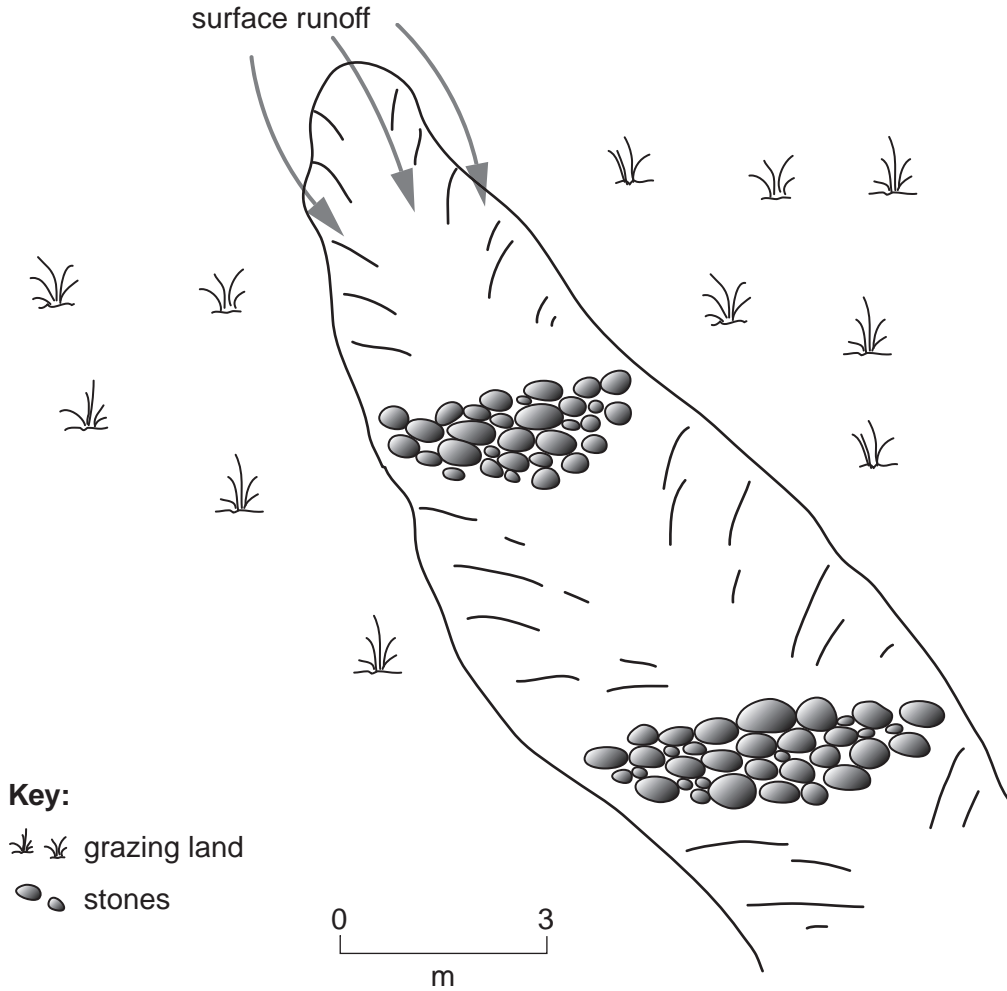
$$\text{Discharge} = \frac{\text{volume}}{\text{seconds}} = \frac{\text{.....m}^3}{\text{.....s}} = \text{.....m}^3/\text{s}$$

[3]

- (iv) The dam was built to hold 52 000m<sup>3</sup>. If the stream flow remained constant at 8 640m per day, approximately how many days would it take to fill?

.....[1]

- (c) Another Food for Work Programme paid local people to build silt traps using stones in a donga (a small steep sided valley) that divided their grazing land. They have also been given 2 000 trees by the government.



**Fig. 4**

(i) On Fig. 4 shade in the areas where silt will be trapped.  
 .....[1]

(ii) Suggest why the local people wanted to fill in the donga on their grazing land.  
 .....  
 .....  
 .....[2]



**(iii)** Explain how trees can prevent the donga from forming again.

.....  
.....  
.....  
.....  
.....[3]

**(iv)** The local people plan to use the trees when they are mature as a renewable source of fuel.

Describe how the local people could do this without the risk of soil erosion.

.....  
.....  
.....  
.....[2]

(d) To help the people recover, some Food for Training Programmes have been started.

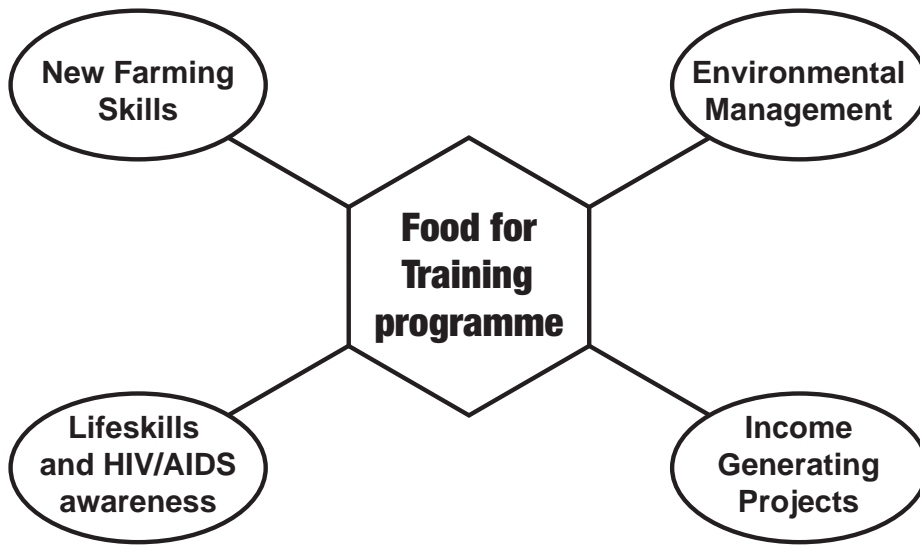


Fig. 5

You have been asked to prepare an outline plan for this programme.  
For each part of the programme state one topic you would teach and explain an advantage to local people.

Programme Part: New Farming Skills

Topic .....

Advantage.....

.....

Programme Part: Environmental Management

Topic .....

Advantage.....

.....

Programme Part: Lifeskills and HIV/AIDS awareness

Topic .....

Advantage.....

.....

Programme Part: Income Generating Projects

Topic .....

Advantage.....

.....[4]

- (e) To help the local people wind turbines were installed by the government. Each family could buy a battery to be charged by the wind turbines and taken home.

The wind turbines are on high poles.

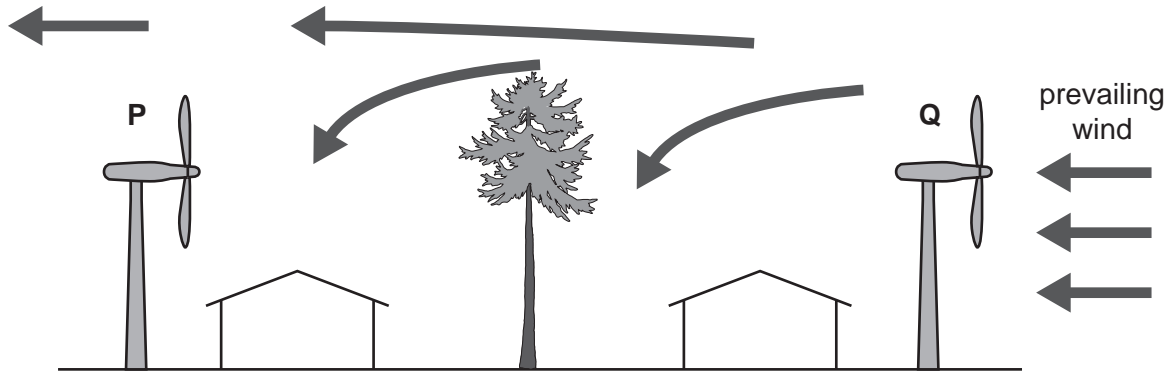


Fig. 6

- (i) Explain why turbine Q is in a better position than P.

.....  
.....[1]

- (ii) Suggest how a family could use the electricity stored in their battery to improve daily life.

.....  
.....  
.....[2]

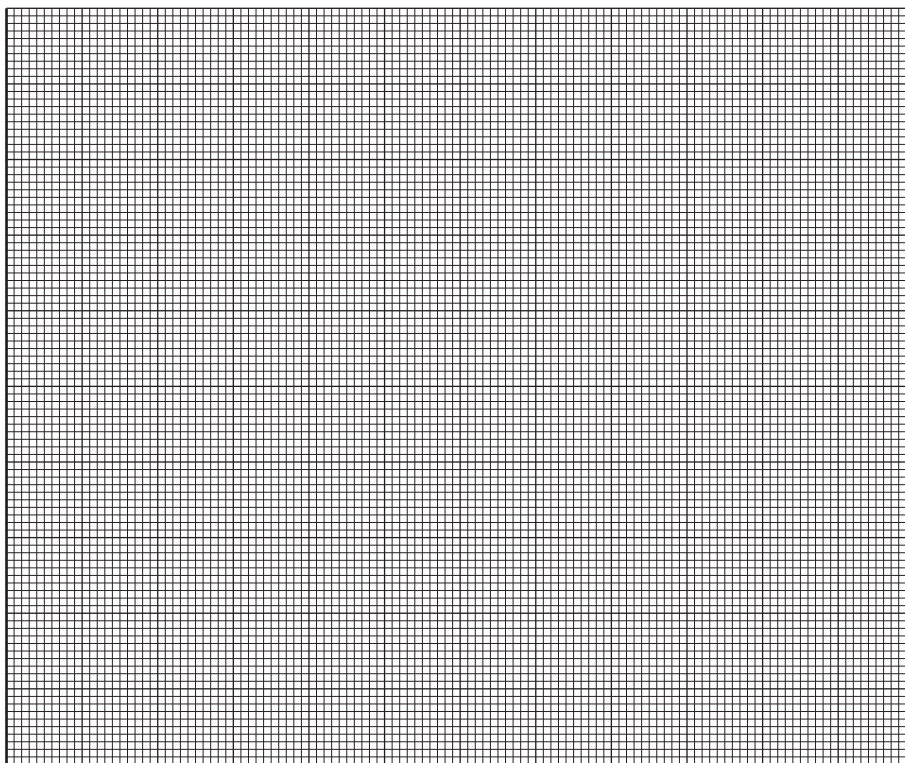
- (f) People from another village came to see the wind turbine and find out how to set up a similar scheme for themselves.

They decided to take measurements of wind speed at sites **A** and **B** for five days. The data are shown below.

wind speed m/s

|               | Monday |       | Tuesday |       | Wednesday |       | Thursday |       | Friday |       |
|---------------|--------|-------|---------|-------|-----------|-------|----------|-------|--------|-------|
| time          | 11:00  | 17:00 | 11:00   | 17:00 | 11:00     | 17:00 | 11:00    | 17:00 | 11:00  | 17:00 |
| site <b>A</b> | 8.2    | 8.8   | 9.1     | 7.2   | 7.4       | 6.5   | 6.5      | 7.5   | 8.0    | 7.5   |
| site <b>B</b> | 8.6    | 9.2   | 7.4     | 7.2   | 8.0       | 7.0   | 7.2      | 8.0   | 8.8    | 8.5   |

- (i) Plot a graph of the data for 11:00 hours for sites **A** and **B** for 5 days.



[4]

- (ii) Describe the pattern shown on the graph for

site **A** .....

.....

site **B** .....

.....[2]

(iii) With reference to the graph, which site should the villagers use? Give **two** reasons for your answer.

Site .....

First reason .....

.....

Second reason .....

.....[3]

- 3** The government has recently reopened Lesotho's largest diamond mine. It is expected to employ less than 1 000 workers but the high quality diamonds will contribute 20% of the annual tax revenue of the government.

The government wants to use some of this money to develop food production so the country is less dependent on food aid in the future.

A new lyamonga bean has been developed by cross-breeding existing varieties. It has been given to farmers in a nearby country with a similar climate, periods of severe storms followed by drought.

One farmer said "When I used the old variety of bean I only got one bag of beans from my land. Now, if there is enough rain I can get 5 bags of beans, if the rains are few I still get 2 bags of beans".

- (a)** A scientist wanted to carry out a field trial of both varieties of beans.

Describe how the scientist could carry out

- 1 the planting
- 2 the harvest
- 3 the measuring and recording of the harvest.

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.....[6]

**(b)** The farmers were also asked to plant a trial crop of a genetically modified (GM) bean. The farmers held a meeting and decided not to use the GM bean. Suggest **two** reasons why the farmers rejected the GM bean.

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.....[3]

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