UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER					

ENVIRONMENTAL MANAGEMENT **5014/22**

Alternative to Coursework **October/November 2013**

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 pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.

Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.

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.

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1	
2	
Total	

This document consists of **18** printed pages and **2** blank pages.

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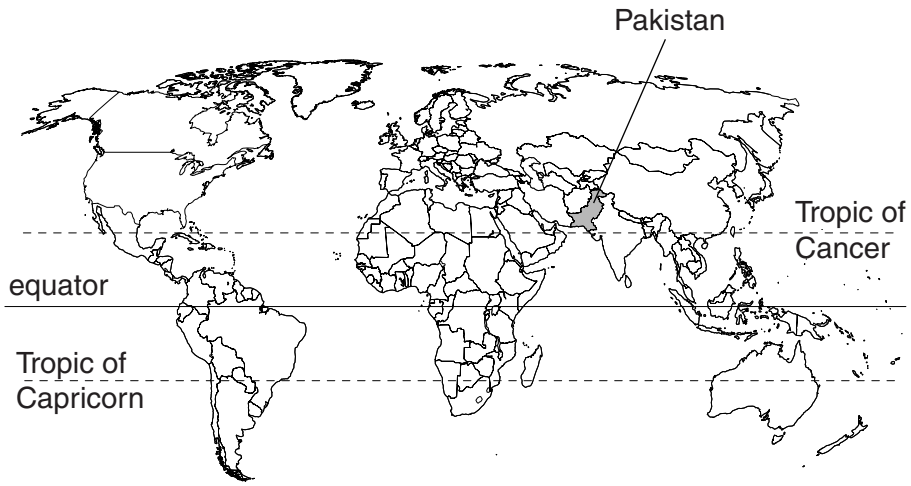
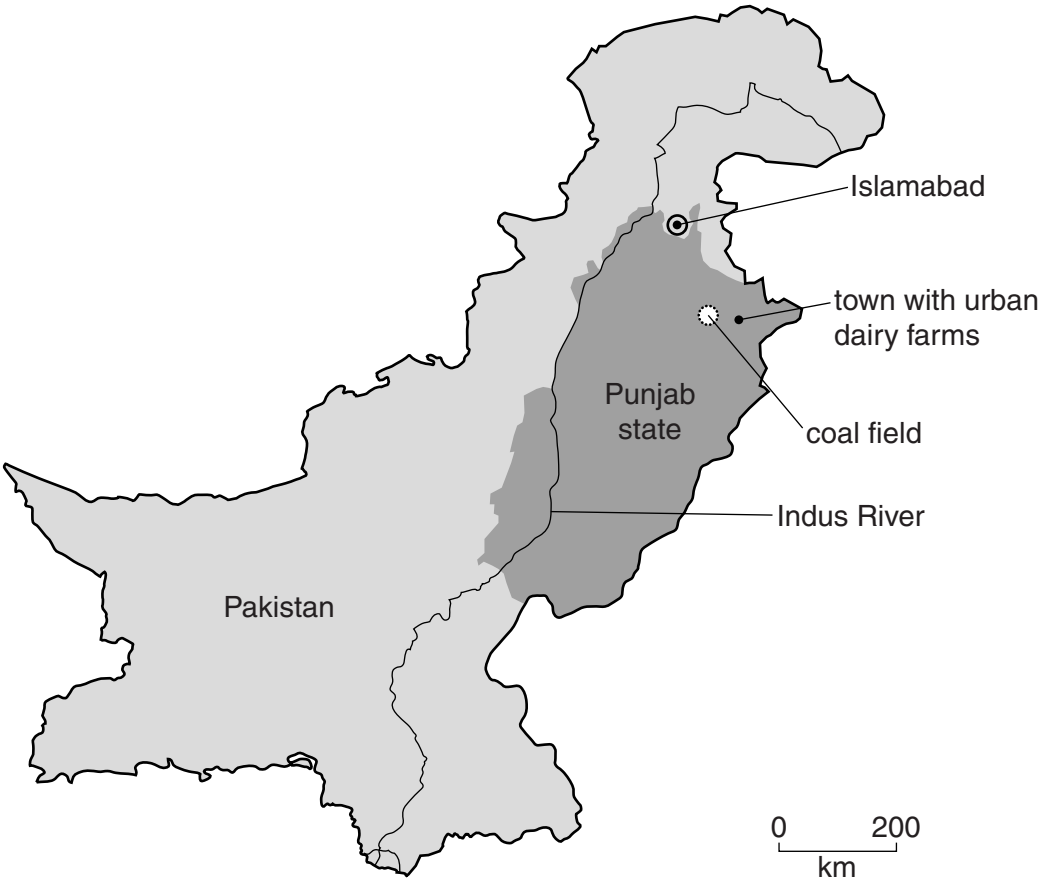
world map, showing the location of Pakistan



map of Pakistan, showing locations of coal field and town with urban dairy farms in Punjab state



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Area of Pakistan: 800 000 sq km

Population: 190 million

Children per woman: 4.0

Life expectancy: 67 years

Currency: Rupee (90 = 1US$)

Languages: Punjabi, Sindhi, Urdu, English (official)

Climate: hot desert in west and south, hot summers with monsoon rain in east

Terrain: Indus plain in centre and east, mountains in north and west

Main exports: cotton, rice, leather goods, textiles, chemicals and manufactured goods, such as surgical instruments and carpets.

Pakistan is a developing country. Its industrial and service sectors have grown recently, but are held back by shortages of electricity and frequent power cuts. Inflation is a major worry for ordinary people. Large scale flooding in 2010 reduced agricultural output and increased inflation. Key priorities for investment include electricity production and improving the health and education of ordinary people.

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1 (a) (i) Describe the problems likely to be caused by the frequent power cuts in Pakistan.

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..... [2]

(ii) More than 40% of the workforce are employed in agriculture. The contribution from agriculture and some other primary activities to the Gross Domestic Product (GDP) of Pakistan are shown in the table below.

percentage contribution to GDP

	year			
sector	2000	2003	2006	2009
forestry	0.7	0.7	0.4	0.2
fishing	0.4	0.3	0.3	0.3
livestock	11.8	11.7	11.6	10.9
crops	13.1	11.2	10.2	9.5
total percentage of GDP for these sectors	26.0	23.9	22.5	20.9

From the table, state the sector which showed the largest decrease in contribution to GDP between 2000 and 2009.

Suggest a reason for this decline.

sector .....

reason .....

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..... [2]

(iii) From the table, state the sector which showed the smallest decrease in contribution to GDP between 2000 and 2009.

Suggest a reason for this decline.

sector .....

reason .....

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..... [2]

For Examiner's Use

(b) About 35 million people in Pakistan are involved in livestock production. A typical rural family owns 2 or 3 cows or buffaloes, 5 or 6 sheep or goats and between 10 and 12 chickens. These contribute up to 40% of the family income.

(i) Recently, milk prices have increased by 25% even though milk production has increased. Suggest possible reasons for such a price increase.

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(ii) Government agricultural advisors have proposed that many farmers can make a good living by following the '50 animals project', as shown in the table below.

	buffaloes	cows
percentage of each type of animal	75	25
number of years of milking	8–9	7–8
food consumption per day / kg	40–55	30–40
milk yield per day / litres	10	14
number of days producing milk in the year	280	305
annual milk production / litres	.....	.....

Complete the table for annual milk production.

Space for working.

Write your answers in the spaces in the table. [2]

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(iii) The advantages of the '50 animals project' are that 2 hectares of land are needed to house the animals and only a further 6 hectares must be rented to provide enough green fodder to feed the animals. The animals also need a daily water supply and a protein food concentrate. Many farmers want to start this project because it:

- is more profitable than growing other crops
- is easier and cheaper than growing other crops
- needs little weeding or insecticides
- uses little fertiliser

More farmers would like to take up the project than can actually do it. Explain why some farmers will not be able to start this project.

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(iv) The table shows the milk output from buffaloes and cows in Pakistan over a 12 year period.

milk output/millions of tonnes

year	0	3	6	9	12
buffaloes	10	13	15	17	18
cows	3	4	9	8	8

Plot the data as a line graph on the grid below.

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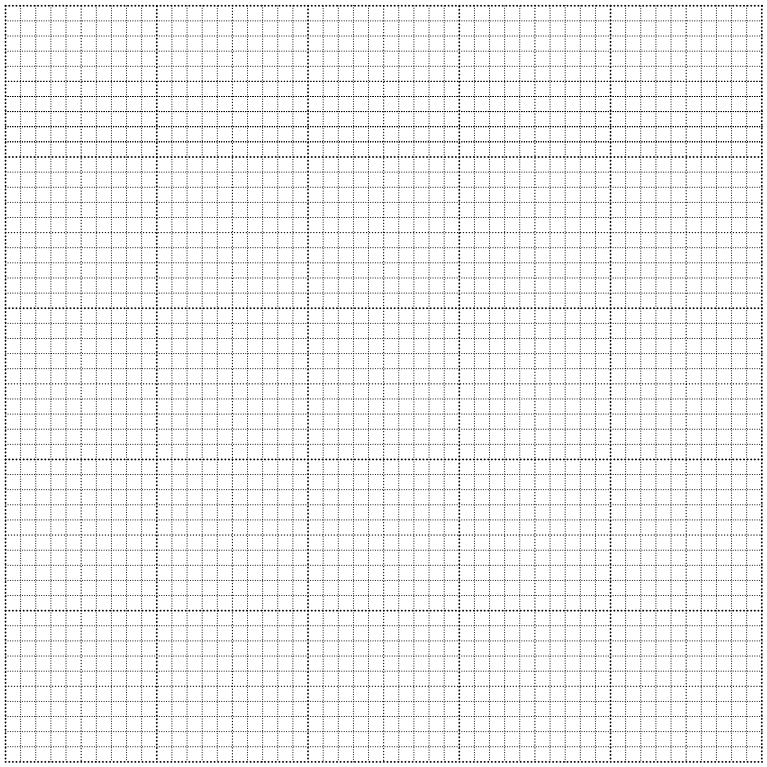

[4]

(v) Describe the changes in milk output for:

buffaloes .....

cows .....
[2]

(vi) Suggest a reason for the increase in milk output from cows between years 3 and 6.

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..... [1]

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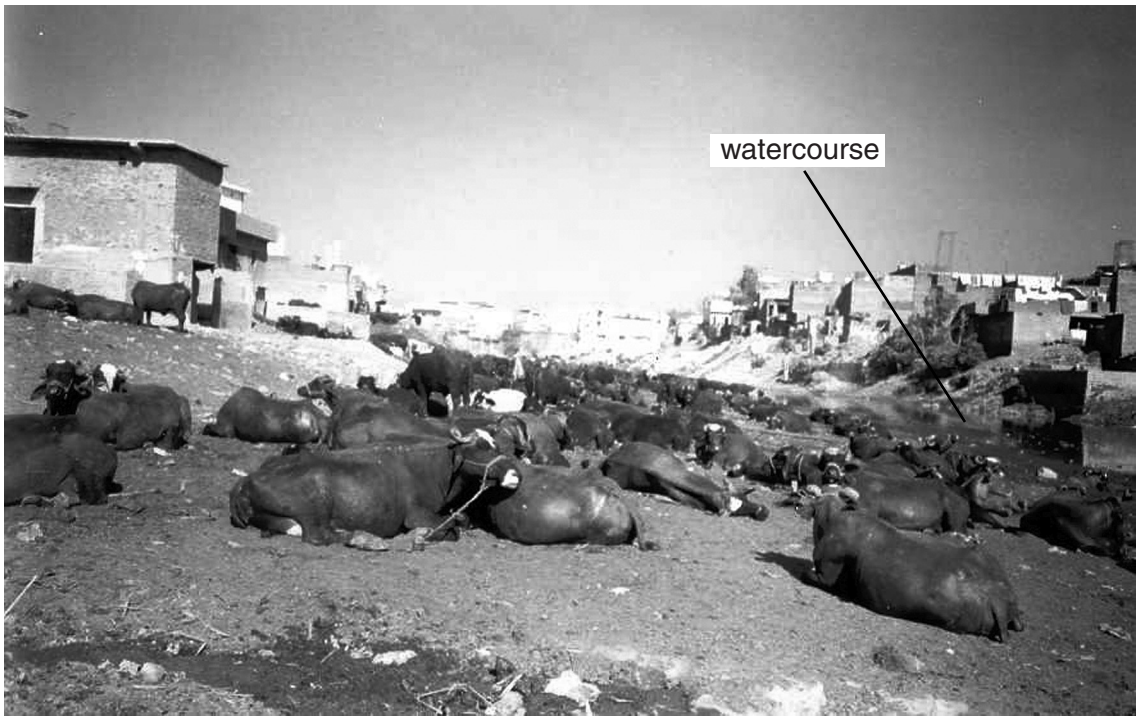
(c) Look at the photograph below showing an urban dairy farm next to a water course.



(i) Describe the uses of land shown in the photograph.

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(ii) Urban dairy farmers must buy green fodder transported from the edges of the town each day.

Suggest one advantage and one disadvantage of such urban dairies to urban dairy farmers.

advantage .....

.....

disadvantage .....

..... [2]

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(iii) Buffalo dung is a good fertiliser. Some is sold back to the green fodder farmers by the urban dairy farmers.

Much of the dung enters watercourses, such as the one in the photograph on page 8. The watercourses become narrow and shallow during the dry winter and spring seasons.

Describe the risks to humans and animals living near urban dairy farms during the heavy summer rains.

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(iv) Some of the manure is made into dung cake to be used as fuel.

Suggest why this form of fuel is used by many households in Pakistan.

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(v) Explain why using dung as a fuel reduces agricultural output.

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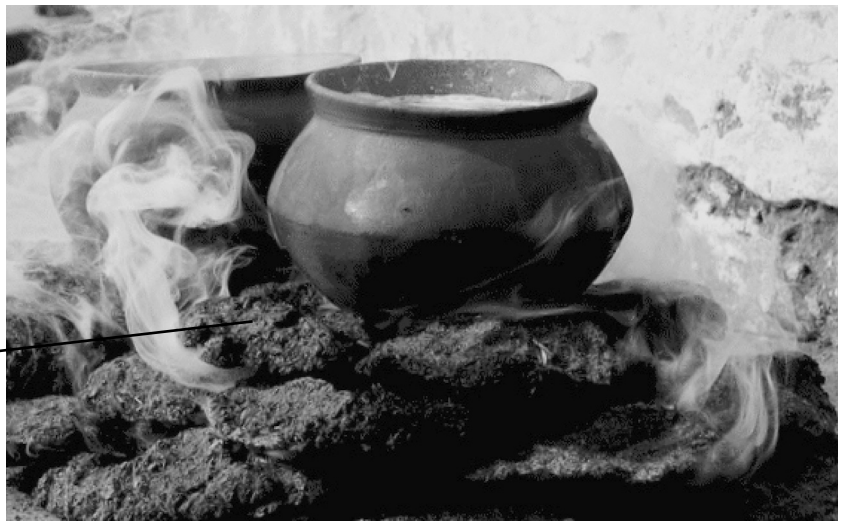
For Examiner's Use

(d) **(i)** Look at the photograph below showing traditional cooking inside buildings in the housing area shown in the photograph on page 8.



Suggest the problems this cooking method can cause.

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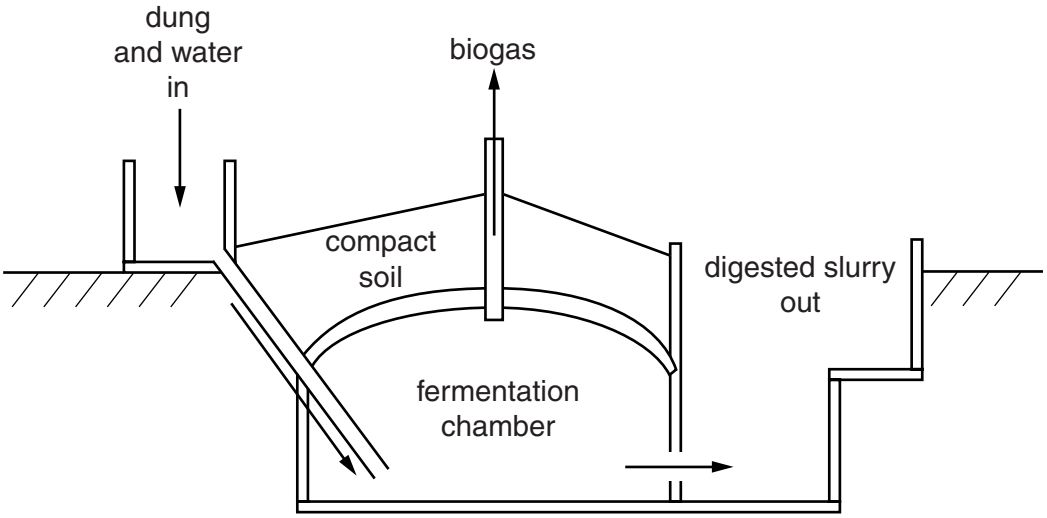
..... [2]

For Examiner's Use

(ii) An alternative cooking method, using small biodigesters, has been developed. This produces enough biogas to supply a family all year. Two cows or buffaloes are enough to supply dung for this. The digested slurry goes back on the land. The diagram shows such a biodigester.



advantages	disadvantages
• no moving parts or metal parts to rust	• trained technicians need to supervise construction
• not sensitive to changes in air temperature	• gas leaks are possible
• employs local builders	• the gas is a fire risk
• last for 20 years	• takes up to 3 years to cover the cost of investment

To what extent is this alternative method of cooking an example of sustainable development? Explain your answer as fully as you can.

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[Total: 35]

For Examiner's Use

2 **(a)** **(i)** About 50 coal mines are working in the Punjab state. Due to the shortage of electricity, it is planned to build power stations beside some coal mines. The mines and power stations are expected to last for 30 years.

Suggest the advantages of building these new coal fired power stations.

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(ii) Coal mining can pollute local water supplies. Villagers near a coal mine were worried about water quality from their wells. Water samples were analysed from five villages at different distances from the mine to look for traces of pollutants. The results are shown in the table.

village	bromine / ppb	iron / ppb	strontium / ppb	molybdenum / ppb
A	4432	1140	6165	27
B	1085	691	1210	5
C	1680	720	2428	22
D	3	537	103	1
E	5	677	281	6

Complete the table below to show the likely order of locations of the villages from the mine. The first one has been done for you.

location of mine	**A**	.....	.....	.....	.....

[1]

(iii) Villagers blamed the contaminated well water for a wide range of health problems. They included:

- children with below normal growth
- lung cancer and mouth cancer
- adult mental disorders

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Suggest possible explanations for some children having below normal growth which has nothing to do with village water supplies.

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(iv) Medical researchers wanted to find out if there were more cases of cancer and adult mental disorders in villages near the mine. They carried out a survey. They included village **F**, 50 km from the coal mine with a water source not contaminated by the mine.

number of cases per 100 individuals

village	cancer	adult mental disorders
A	4	1
B	5	2
C	3	1
D	4	0
E	6	1
F	5	2

What conclusions might the medical researchers have come to when they studied these results? Explain your answer.

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(v) Describe how these medical researchers would have carried out their surveys to take fair samples from all the locations.

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(b) A scientist undertaking research in the area observed that plants near the mine were being covered in coal dust and did not look very healthy. She carried out an experiment as outlined below.

- same soil in all pots
- pots planted with seeds of same species
- equal amounts of water added to all pots every other day
- coal dust added to one set of seedlings after 7 days

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On the 7th day she recorded the growth of the seedlings for the first time. The measurements were repeated every 3 days. The results are shown below.

	days after planting	7	10	13	16	19
no coal dust	average length of stem / cm	2	3	4	6	8
	average number of visible leaves	0	2	2	4	6
coal dust added	average length of stem / cm	2	2	3	4	5
	average number of visible leaves	0	0	2	2	4

(i) Suggest exactly what the scientist needed to do when adding coal dust to make the experiment reliable.

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(ii) Describe what she found out about how plant growth was affected by the presence of coal dust.

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(iii) If she had been able to carry out the experiment for longer, what else could have been measured or recorded?

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(iv) Suggest why the coal dust affected plant growth.

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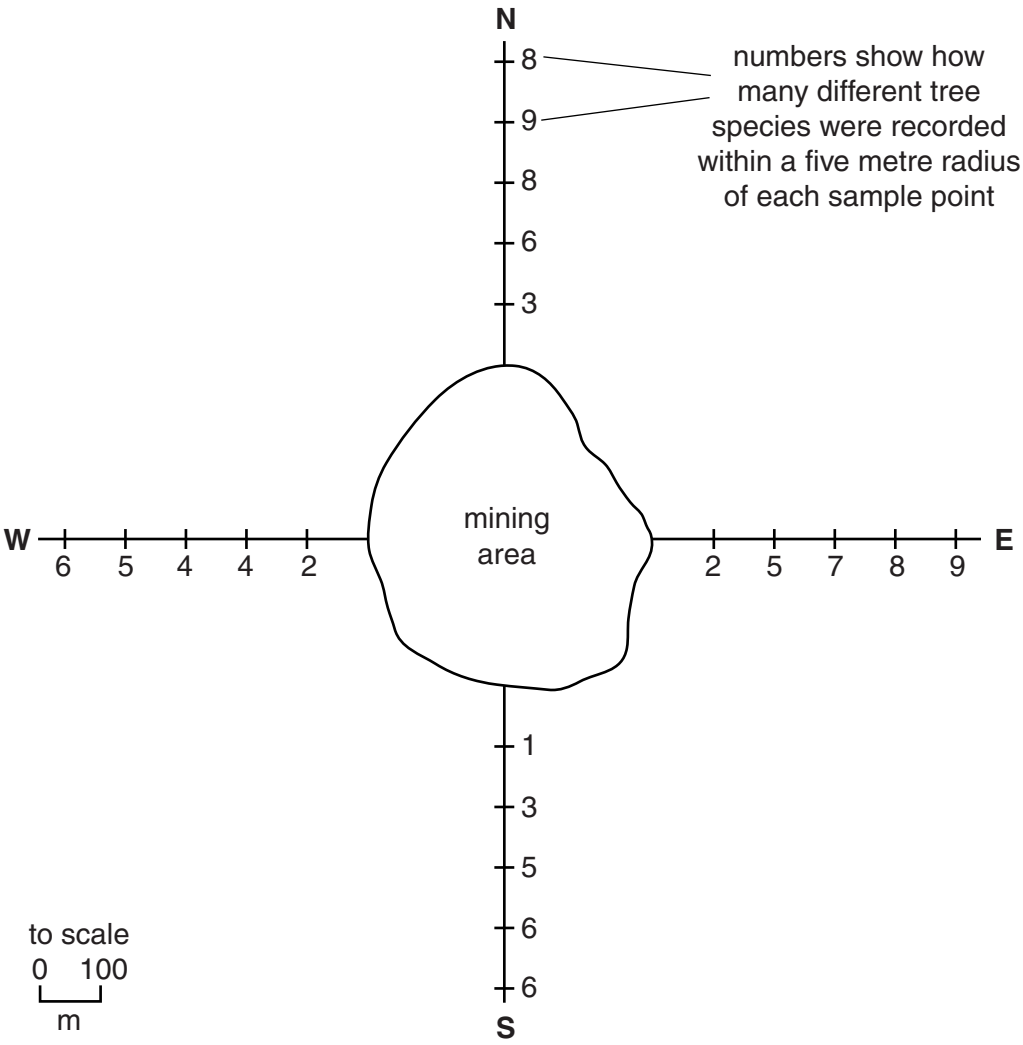
(c) Later the scientist decided to go back to the mining area to investigate the effect of coal dust on the number of tree species. She carried out her investigation in the following way:

- she walked away from the mine for 500 m in four directions
- every 100 m she stopped and recorded the total number of different tree species within a five metre radius
- she plotted the results on the diagram below



(i) Does coal dust also affect tree species? Give a reason for your answer.

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(ii) Which area around the mine is most affected by coal dust? Suggest an explanation for your answer.

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(d) Some people in Pakistan want to continue mining this coal field until all the coal reserves have been mined and others do not. Use the information given and your own knowledge of mining to explain their different points of view.

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[Total: 25]

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