UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

ENVIRONMENTAL MANAGEMENT **5014/21**

Alternative to Coursework **October/November 2010**

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.
DO **NOT** WRITE IN ANY BARCODES.

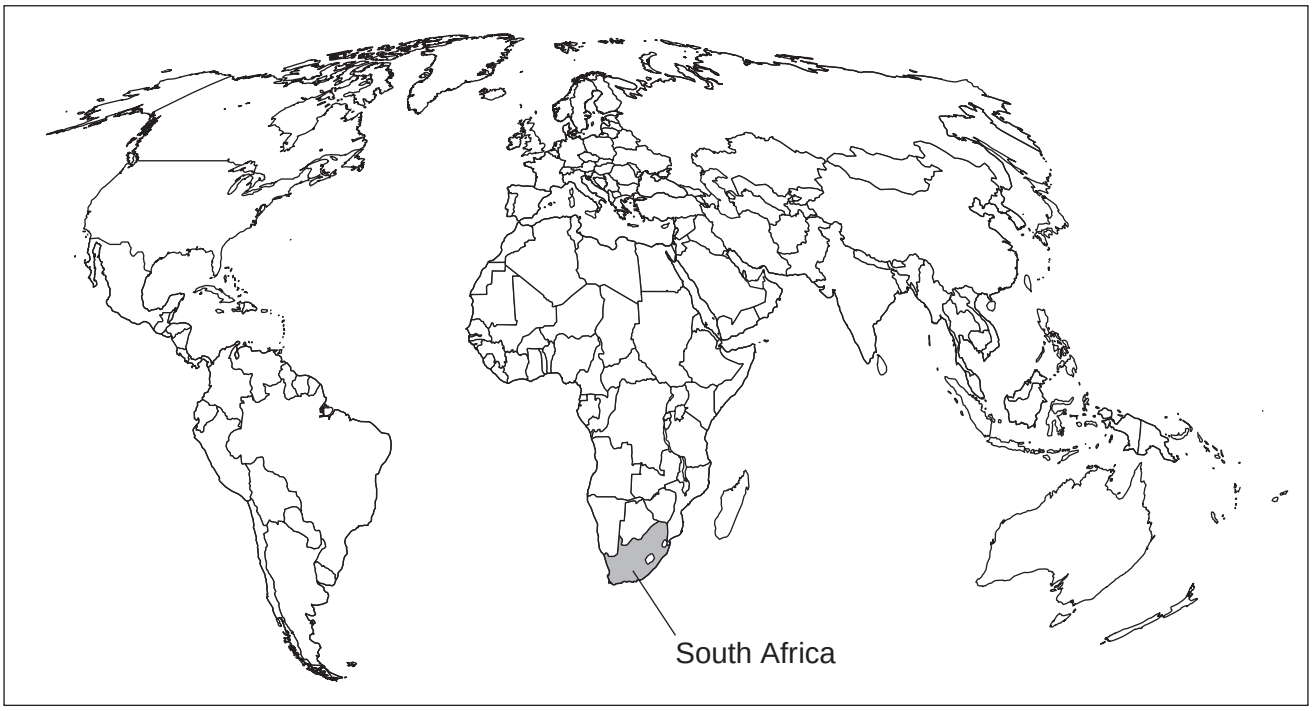
Answer **all** questions.
Study the appropriate Source materials before you start to write your answers.
Credit will be given for appropriate selection and use of data in your answers and for relevant interpretation of these data. Suggestions for data sources are given in some questions.
You may use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

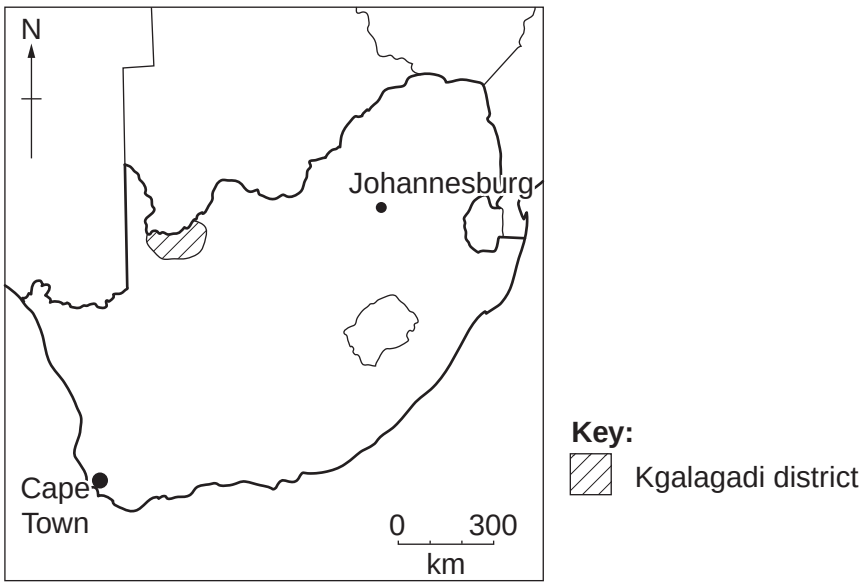
For Examiner's Use

This document consists of **15** printed pages and **1** blank page.

World map showing the location of South Africa



Map of South Africa



Area of South Africa: 1 219 912 sq km
Population: 50 000 000
Children per woman: 2.43
Life expectancy at birth: 48 years
Currency: rand (8 rand = 1 US dollar)
Languages: Isizulu, Isixhosa, Afrikaans, Sepedi, English, others
Climate: mostly semi-arid; subtropical along the east coast; sunny days, cool nights on the plateau
Terrain: vast interior plateau surrounded by hills, narrow coastal plains
Main exports: gold, diamonds, platinum, other metals, machinery

South Africa is rich in natural resources with well developed financial, legal, communications, energy and transport sectors. A good infrastructure supports the efficient distribution of goods to urban centres. However there is still high unemployment and poverty. Recently immigration of mostly unskilled labour has placed heavy demands on the social welfare system. Agricultural products that are not exported include rice, beans, potatoes, beef and timber. Industry includes food processing, construction materials, fertilisers and plastic products.

[Turn over

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1 **(a)** In Kgalagadi district up to fifty percent of the people are unemployed. The district is semi-arid but has one reliable water supply, the Kuruman Eye. This delivers 20 million litres every day and the water is piped for many kilometres to irrigate crops and supply homes.

Some unemployed people in a small village wanted to start a project breeding chickens for their food and to sell in the local market. They asked an animal scientist to help them make a plan they could carry out themselves.

(i) Suggest why the people wanted to carry out the plan themselves.

.....

.....

.....[2]

(ii) The animal scientist said there were two chicken breeds often kept on farms in South Africa, the Ovambo and the Koekoek. A small scale trial was carried out on both breeds.

Trial chicken enclosures

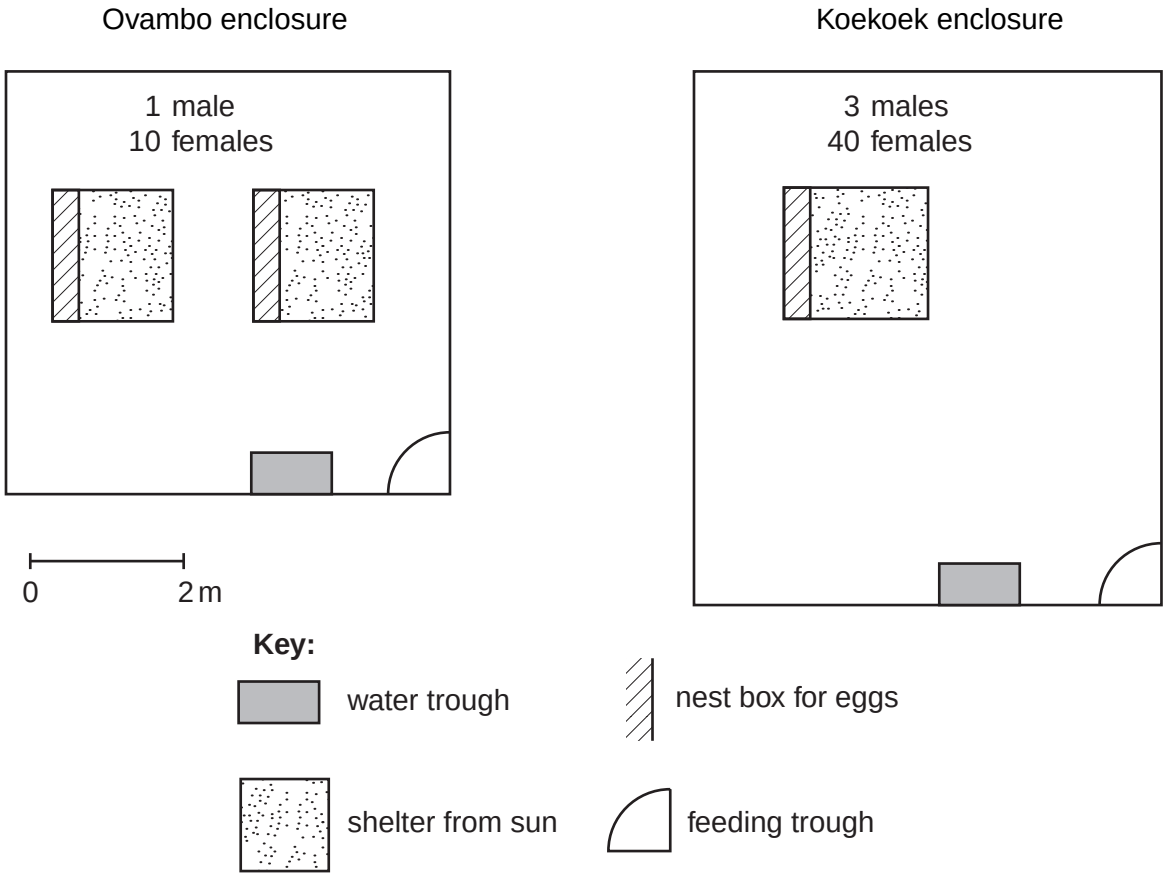

Fig. 1.1

Suggest **three** ways the trial shown in Fig. 1.1 could be improved to make a fair comparison of the two breeds.

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.....

.....

.....

.....[3]

(iii) Why did the people want to leave a gap between the two enclosures?

.....[1]

(iv) After one year they had a record of both enclosures as shown in Table 1.1.

Table 1.1

	Ovambo	Koekoek
number of eggs per chicken	130	198
average weight of chicken after sixteen weeks (kg)	2.25	2.62
average live weight of chicken eaten in the village (kg)	2.55	2.97
average live weight of chicken sold at market (kg)	2.95	3.20

Calculate the average growth rate of each breed in the first sixteen weeks.

Ovambo .....

Koekoek .....[2]

(v) Give **three** reasons why the people decided to farm the Koekoek breed, rather than the Ovambo breed, the following year.

.....

.....

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.....[3]

[Turn over

(b) The people built one large enclosure, 20 m × 20 m, for eighty females and six males.

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(i) In the space below draw a diagram to show the new Koekoek enclosure.

[4]

(ii) The Koekoek breed produces meat with a low fat content. Suggest why the people's health improved when they could eat eggs as well as chicken meat.

.....

.....[1]

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(iii) The people decided that one person would have to manage the village chicken breeding enclosure so the profits could be shared out fairly.

The manager recorded the following:

- the hours each person worked
- the cost of chicken feed
- the cost of water pipes
- the cost of building materials

Why were these items recorded?

.....

.....

.....[2]

(iv) The manager recorded the following working hours:

Manager	200
Person A	150
Person B	100
Person C	75
Person D	75
.....	
Total hours	600

What percentage of the profit should person A receive?

.....

.....[2]

(c) The manager thought that the larger enclosure would create a larger quantity of manure. The manager decided to build a small manure digester to release enough methane gas to cook all the workers' meals.

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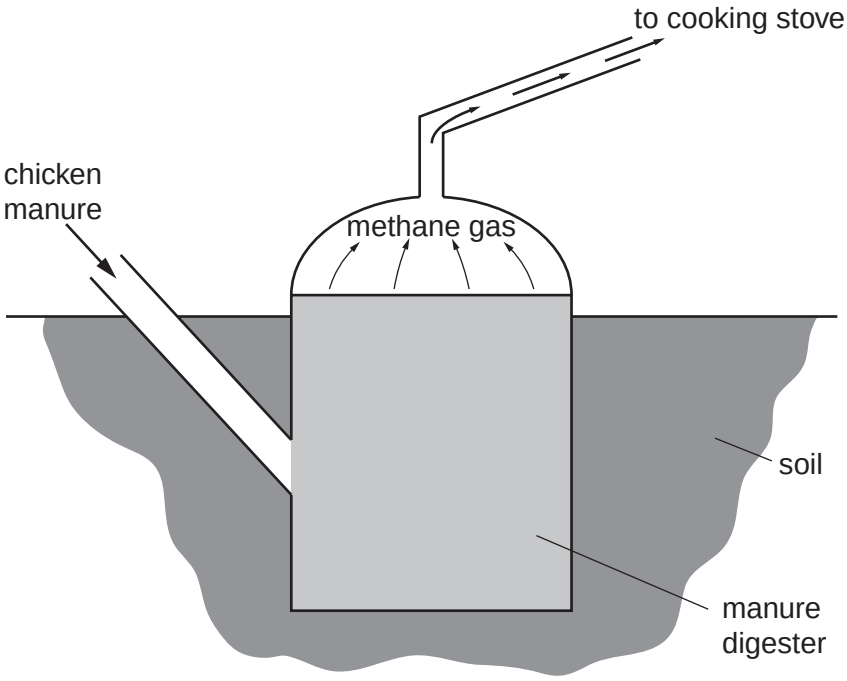

Fig. 1.2

(i) Suggest why the digester is mainly underground.

.....[1]

(ii) Give **two** advantages of using the methane burning stove.

.....

.....

.....[2]

(iii) Developing a large chicken enclosure and building a digester needs an investment of 4000 rand (500 USD).
Suggest a possible source of money for this development.

.....[1]

(iv) Explain why the chicken enclosure and the manure digester are good examples of sustainable development.

.....

.....

.....[2]

2 Many people in the district grow vegetables for sale in the towns. Each year about 20 million seedlings are planted.
Some women in the village decided to set up a plant nursery after they noticed that plant seedlings sold very quickly in local markets.
When setting up the nursery they needed to take water from the local water source and build a simple gravel track. The available land contained a disused asbestos mine.

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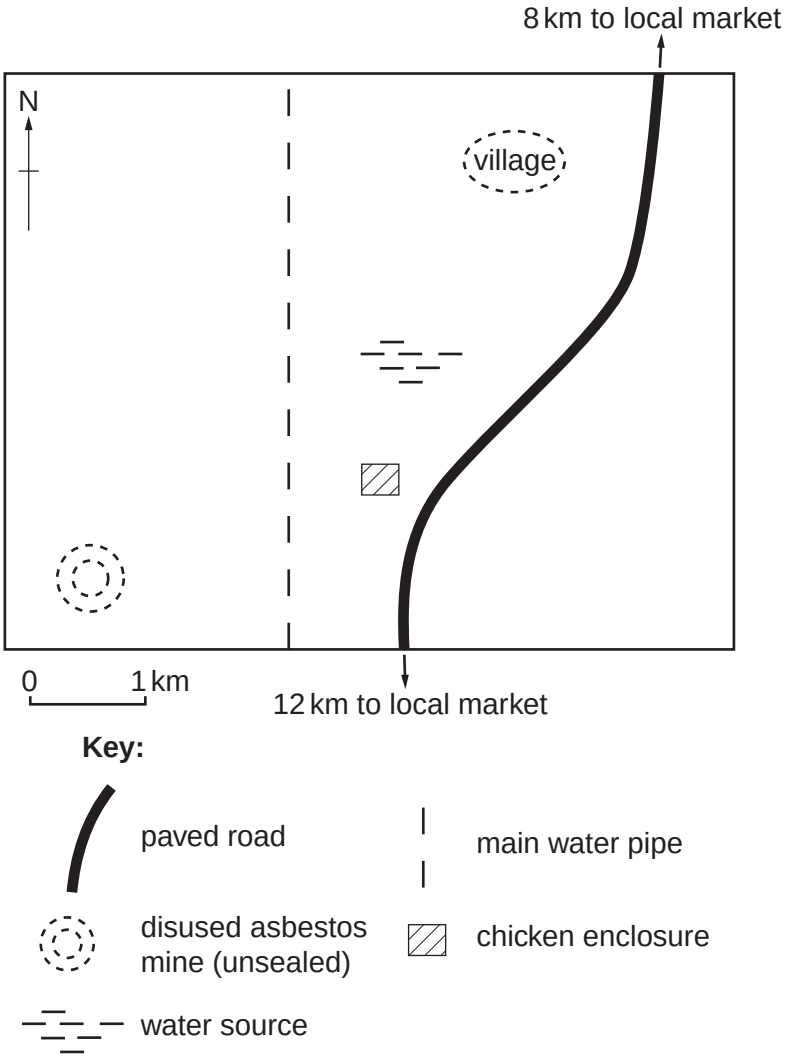

Fig. 2.1

(a) Draw an X on the plan to show where you would locate the nursery.

Give **three** reasons for your chosen location.

first reason .....

.....

second reason .....

.....

third reason .....

.....[4]

(b) The village men built a small nursery as shown in Fig. 2.2.

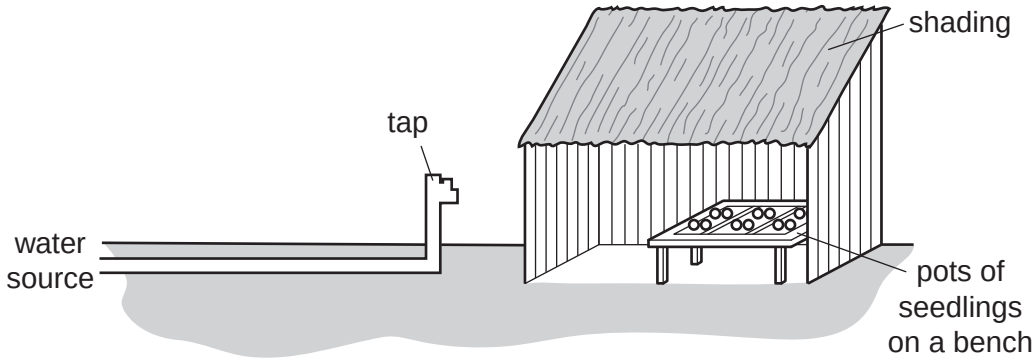

Fig. 2.2

Some temperature and humidity readings were taken from different places inside the nursery. The readings were taken at the edge and the centre of the shading.

Table 2.1

time of day	edge of shading		centre of shading	
	temp °C	relative humidity %	temp °C	relative humidity %
08:00	20	60	24	73
12:00	33	31	30	48
16:00	27	45	32	52

(i) How should the temperature and humidity be measured accurately?

.....

..... [1]

(ii) Explain, using information from Table 2.1, why the women were able to grow seedlings very successfully.

.....

.....

.....

.....

..... [3]

For Examiner's Use

(c) (i) The women quickly made 800 rand profit selling 500 seedlings.
How much profit was made on each seedling?

.....[1]

(ii) The women wanted to invest the profit in different ways:

A First woman

we should start by making more pots and extra seed benches

B Second woman

we should start by making the shaded area bigger

C Third woman

we should buy a donkey and cart first so we do not need to carry seedlings to market

The women need to decide which of these investments to make first.
Using the letters **A**, **B** and **C** write down the order you would choose starting with your first investment.

first ..... second ..... third .....

Give reasons for your choice.

.....

.....

.....

.....[4]

(iii) Suggest why some women did not want to buy a donkey and cart even though they would avoid having to carry the seedlings to market.

.....

.....

.....[2]

(d) Some of the women measured the growth of some seedlings on four seed benches.

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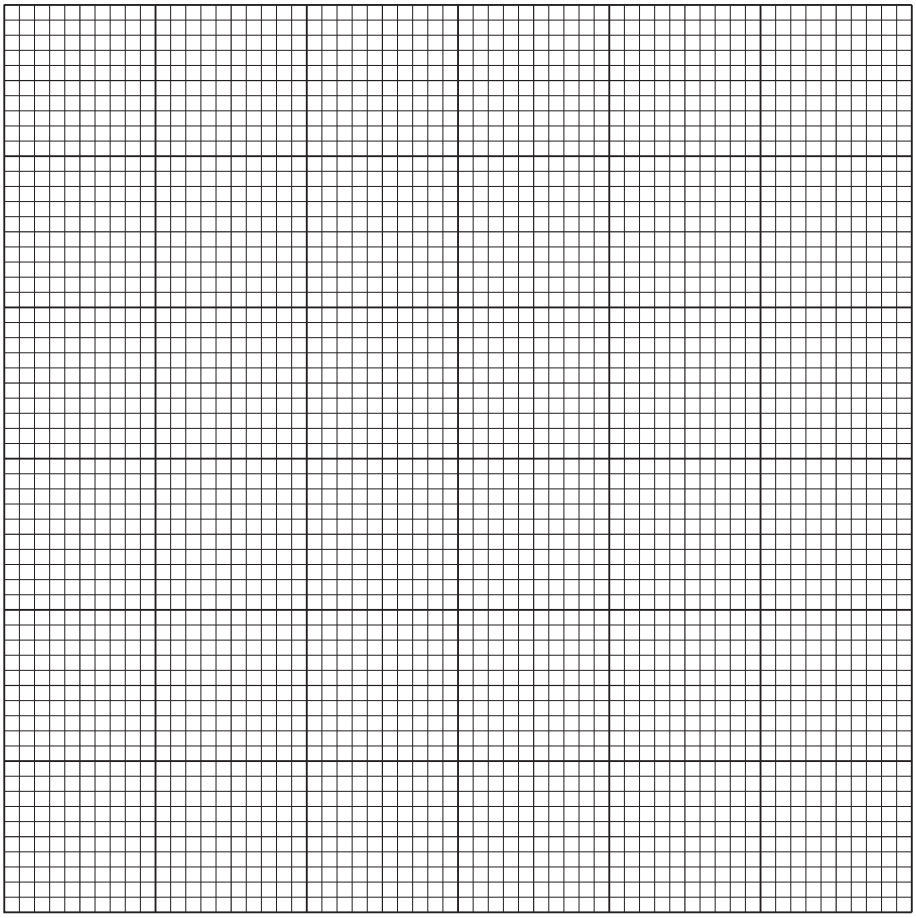
Table 2.2

	height of seedlings (cm)			
days from planting	bench A	bench B	bench C	bench D
3	0.5	1	1	1
6	2	3	2	3
9	5	5	4	6
12	7	10	6	10
15	10	13	9	13
18	13	17	12	17

(i) Plot a suitable graph of the results for benches **C and D only**.



[4]

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(ii) Suggest **two** environmental factors that might explain the differences between the growth of seedlings on benches C and D.

factor one .....

factor two ..... [2]

(iii) One of the women noticed that some seedlings in the middle of a bench had wilted and were dying even though all the plants had equal amounts of water.

What type of disease-causing organism might have infected the seedlings?

..... [1]

(iv) The women decided to clean all the pots and the bench instead of using a pesticide. Give **two** reasons for their decision.

.....

.....

..... [2]

[Turn over

3 **(a)** Many of the men travel south from their villages to work in the gold mines. They work for several months and then return to their village.

Look at Fig. 3.1.

World price of gold between 1998 and 2008

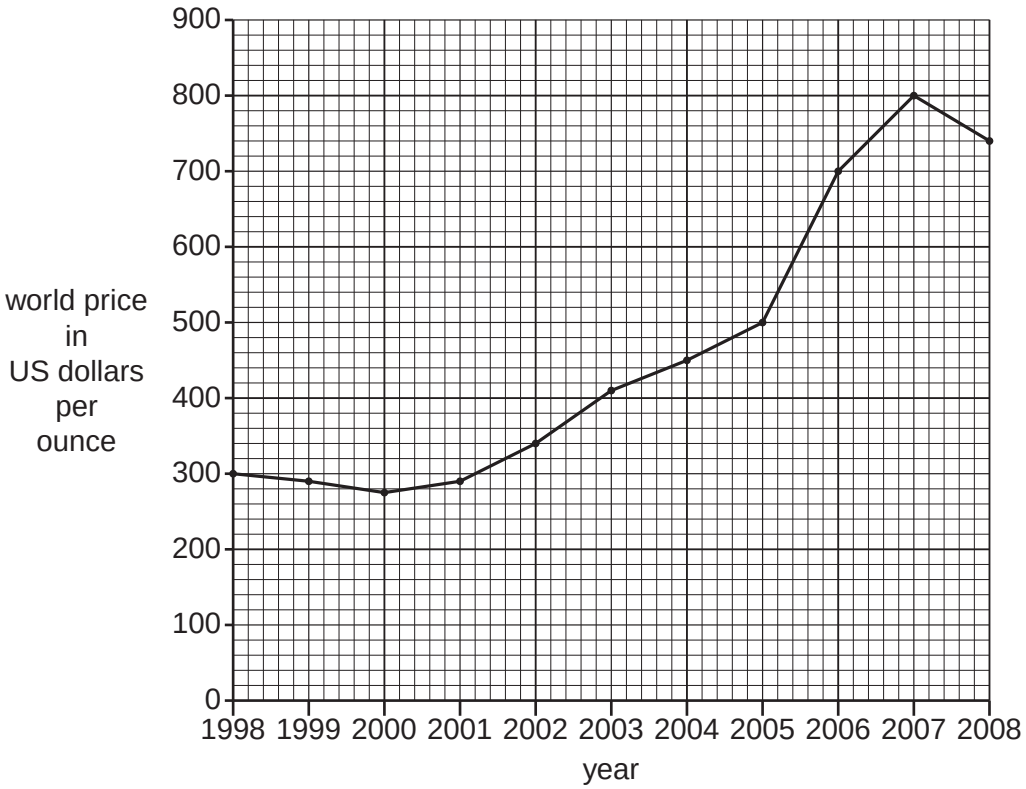

Fig. 3.1

(i) What was the highest and lowest price of gold during this time?

highest .....

lowest .....[1]

(ii) In which years are the miners most likely to have been employed?

.....[1]

(b) How might this make family life in a village

(i) better, ...

.....

.....

(ii) worse? .....

.....

.....[3]

(c) Many mine spoil heaps still contain small quantities of gold. When gold has a high world price the spoil is crushed and poisonous cyanide added. A chemical reaction extracts some extra gold from the spoil. Mining companies claim this process does not harm the environment.

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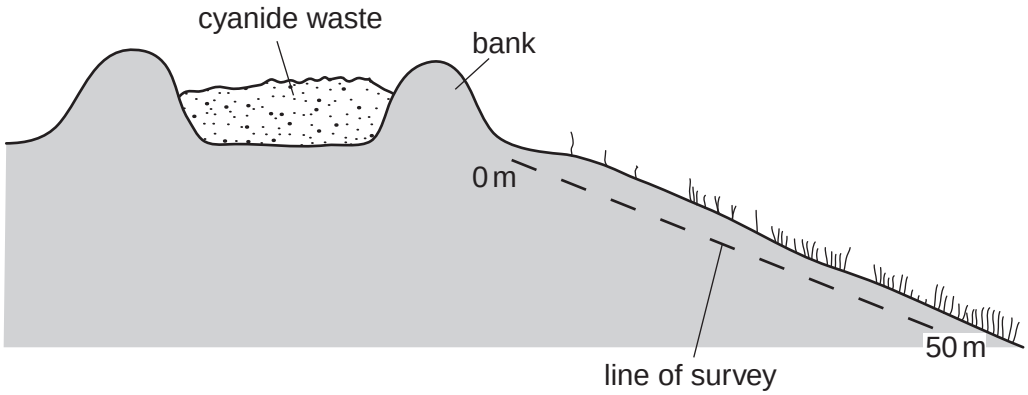
Some students carried out a survey as shown in Fig. 3.2.



	distance from bank (m)					
	0	10	20	30	40	50
number of plant species	2	3	4	6	9	9
number of plants in 1 m^2	10	13	17	21	36	34

Fig. 3.2

To prevent livestock being poisoned the mining company agreed to build a fence around the cyanide waste.

(i) How many metres from the cyanide waste should the fence be built? Give reasons for your answer.

distance (m) .....

reasons .....

.....

..... [3]

(ii) Suggest two ways in which the students could have improved their survey.

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..... [2]

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