



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER



**ENVIRONMENTAL MANAGEMENT**

**0680/43**

Paper 4

**May/June 2018**

**1 hour 30 minutes**

Candidates answer on the Question Paper.

No Additional Materials are required.

**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 an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, 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.

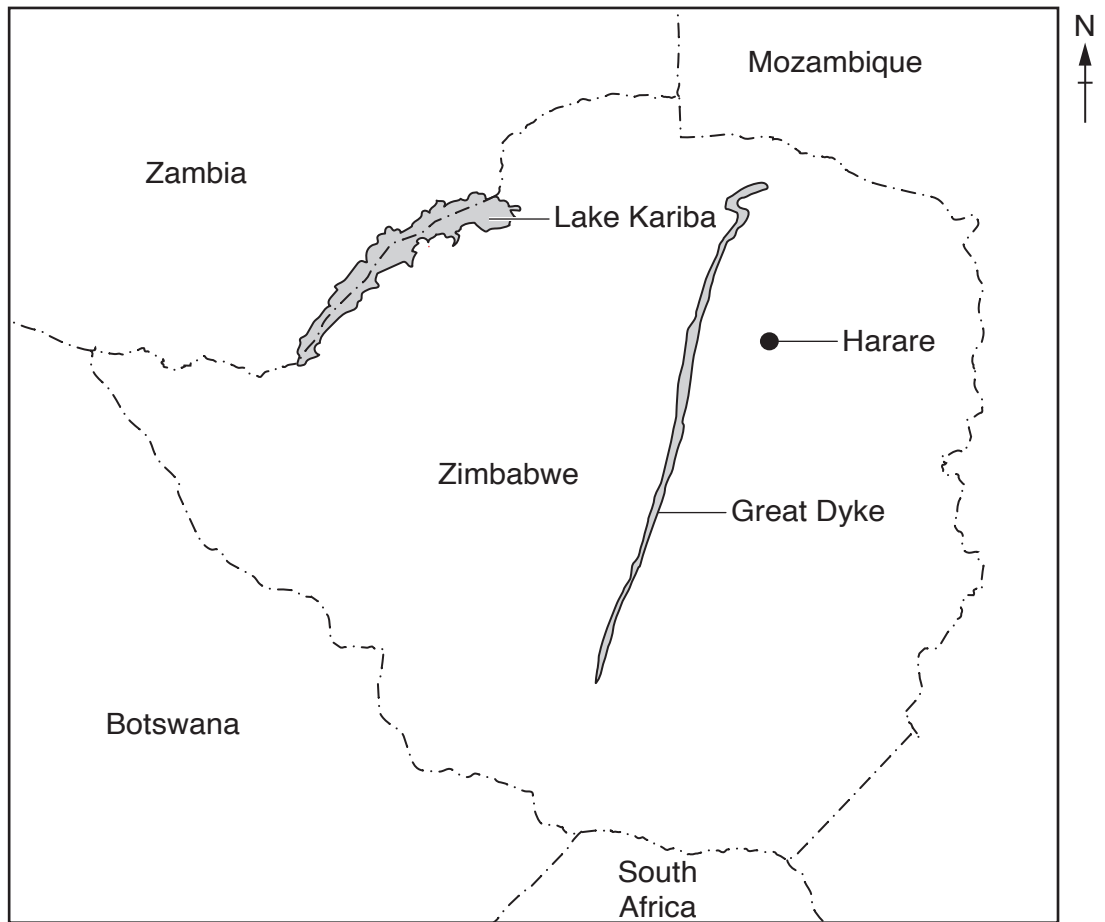
The number of marks is given in brackets [ ] at the end of each question or part question.

This document consists of **13** printed pages and **3** blank pages.

map of the world



map of Zimbabwe



0 100  
km

**Key**

- capital city
- - - international boundary

**area:** 390 760 km<sup>2</sup>

**population:** 15.6 million (in 2015)

**children per woman:** 3.53

**life expectancy:** 57 years

**currency:** US Dollar (USD) in use in 2015

**languages:** Shona, English, Ndebele

**climate:** tropical with wet and dry seasons

**terrain:** central plateau, mountains in the east

**main exports:** clothing, cotton, gold, metal alloys, platinum, textiles, tobacco

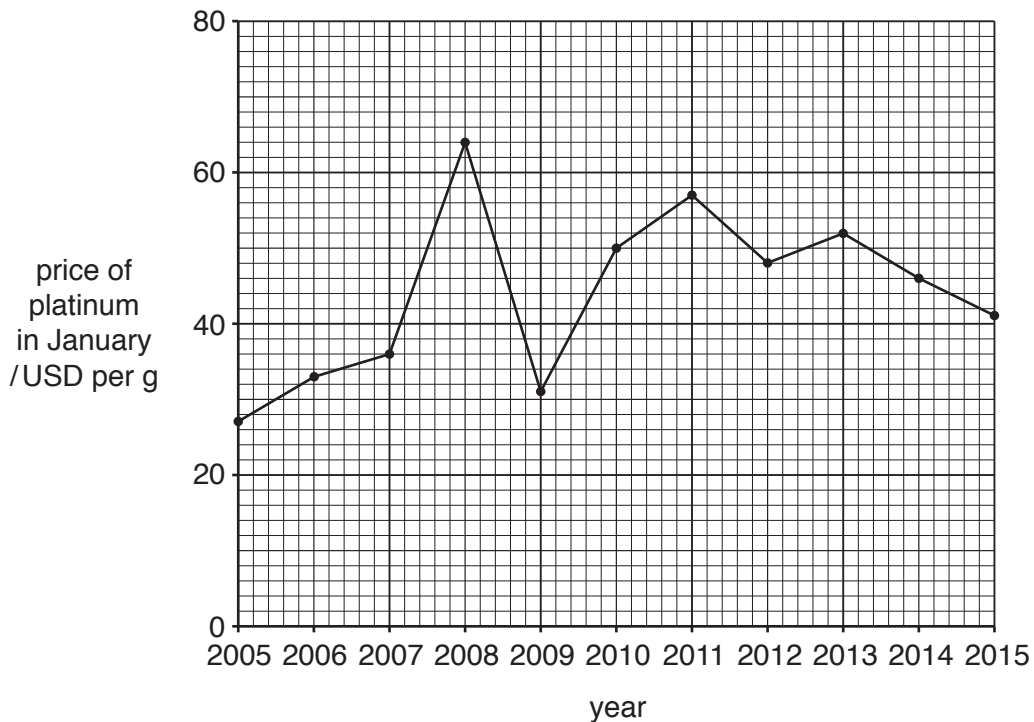
1 The economy of Zimbabwe depends on mining and agriculture. Most people live in rural settlements and have a low standard of living because of unemployment. In Harare, the capital city, there are frequent shortages of electricity that affect about 1.5 million people. The largest industry is mining, which employs up to 350 000 people.

(a) (i) Calculate the percentage of the population in Zimbabwe that is employed in mining.

Show your working.

.....% [2]

The graph shows the price per gram of platinum between January 2005 and January 2015.



(ii) State how many years the platinum price in January was less than 40 USD per gram.  
 .....[1]

(iii) Complete the sentence.  
 The lowest price of platinum was ..... USD in January 20.....  
 and the highest price of platinum was ..... USD in January 20..... . [2]

(iv) Suggest why companies invest in platinum mining.  
 .....  
 .....  
 .....  
 ..... [2]

(b) The Great Dyke, shown on the map on page 2, was formed from magma 2.5 billion years ago. It is 550 km long and between 3 and 12 km wide. The dyke is rich in minerals.

(i) Suggest the type of rock that formed the Great Dyke.

.....[1]

(ii) Suggest how the Great Dyke intrusion formed 2.5 billion years ago.

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

(c) As a result of mining activity in Zimbabwe water pollution is a problem.

A scientist took water samples from a river flowing through a mining area. The table shows the chemical analysis of the water samples at different distances into the mining area.

distance into the mining area/m	pH	sulfate/ppm	nickel/ppm	cobalt/ppm	copper/ppm
0	7.1	55	0.30	0.10	0.10
200	6.4	100	1.00	0.10	0.30
400	6.3	100	1.50	0.10	0.52
600	6.1	160	2.20	0.10	0.78
800	4.3	250	2.89	0.10	0.88
1000	3.4	310	3.15	0.10	0.98

ppm = parts per million

(i) Describe the pattern of results in the mining area, between 0 and 1000m, for pH and cobalt.

pH .....  
 .....  
 cobalt .....  
 .....

[2]

(ii) Calculate the range of copper concentration between 0 and 1000m.

..... ppm [1]

(iii) There were no living organisms in the river at 1000 m into the mining area.

Explain why.

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

(iv) The table shows climate data from a weather station located near the mining area.

month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
average temperature/°C	22	22	21	20	16	14	14	16	19	21	22	22
rainfall/mm	142	109	84	18	10	3	0	0	5	20	81	122

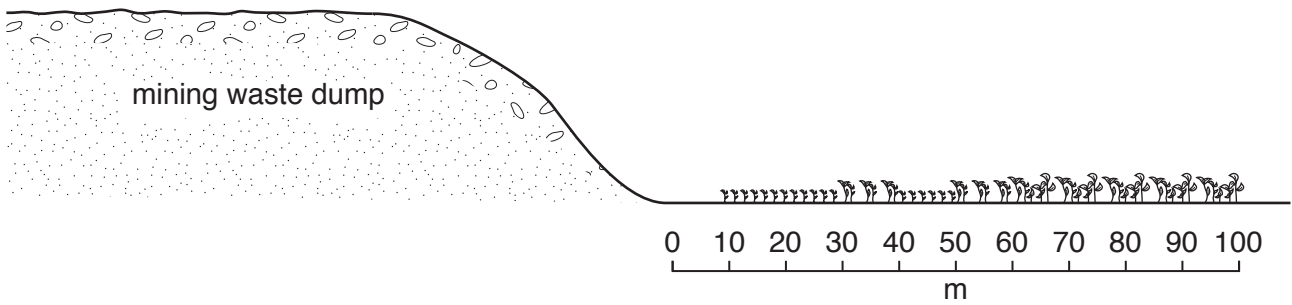
The scientist predicted that the concentrations of sulfate, nickel and copper in the river would be different in September and January.

Suggest reasons why.

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

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- (d) The scientist noticed that there were only a few plants growing near the mining waste dumps. The scientist carried out a survey of plants along a transect line near a mining waste dump.



The table shows the results.

<b>distance from mining waste dump /m</b>	0	10	20	30	40	50	60	70	80	90	100
<b>total number of plants</b>	0	1	2	3	4	6	8	10	13	13	13
<b>number of plant species</b>	0	1	1	2	1	2	2	4	4	4	4

- (i) Describe the patterns of results for the total number of plants and the number of plant species between 0–60 m and 70–100 m.

total number of plants

0–60 m .....

.....

70–100 m .....

.....

number of plant species

0–60 m .....

.....

70–100 m .....

.....

[4]





- (iv) The scientist could not draw a conclusion about the biodiversity near the mining waste dumps.

Describe more surveys the scientist should carry out before deciding how much plant biodiversity is being damaged by the mining waste dumps.

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

- (v) Explain how growing plants on top of a mining waste dump reduces the spread of chemical pollutants.

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

- (e) Most of the mineral ores mined in Zimbabwe are exported to South Africa to be refined before being sold on the world market.

The government of Zimbabwe plans to encourage companies to build refining plants in Zimbabwe.

- (i) Suggest how the government of Zimbabwe could encourage companies to build refining plants.

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

- (ii) Describe **three** advantages to Zimbabwe of these plans.

1 .....

.....

2 .....

.....

3 .....

.....

[3]

- 2 (a) Many people buy a licence from the government of Zimbabwe and start small mines. They dig pits up to 30m deep and extract rocks containing gold. The rocks are transported to crushing mills up to 50km away. All the extracted gold is bought by the government of Zimbabwe. Many women have formed small mining companies.

Two women were talking about mining.

At first we found the work very hard but now we are used to it. We can earn 2500 USD a month before costs and often make more money than the men.

I now earn enough money to feed and buy clothes for my children. I can also afford to pay their school fees. I will carry on mining.

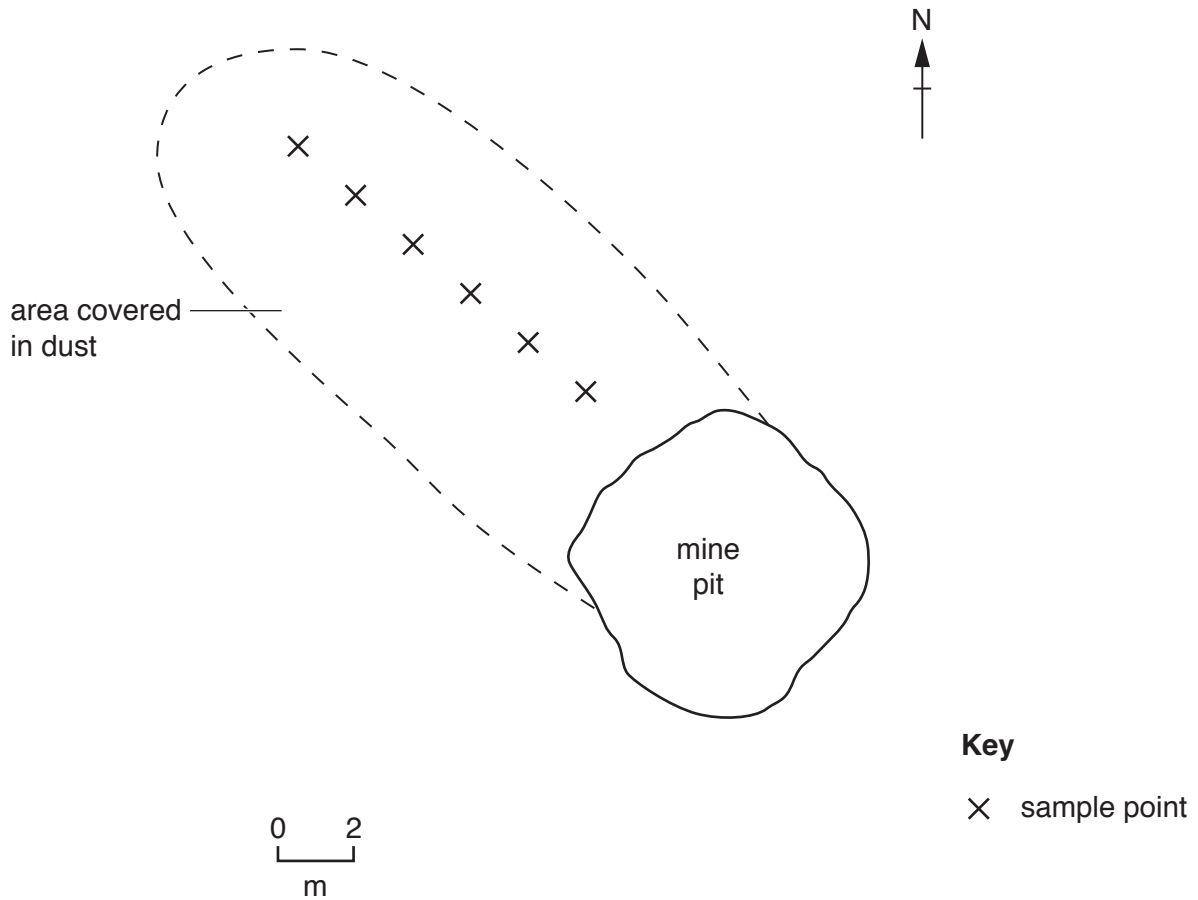
- (i) Suggest **two** expenses of operating a small mine.

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

- (ii) Describe **one** risk to human health of this type of mining.

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

- (b) A student visited some small mines and noticed that all the plants growing to the north west of the mines were covered in dust.



**Key**

× sample point

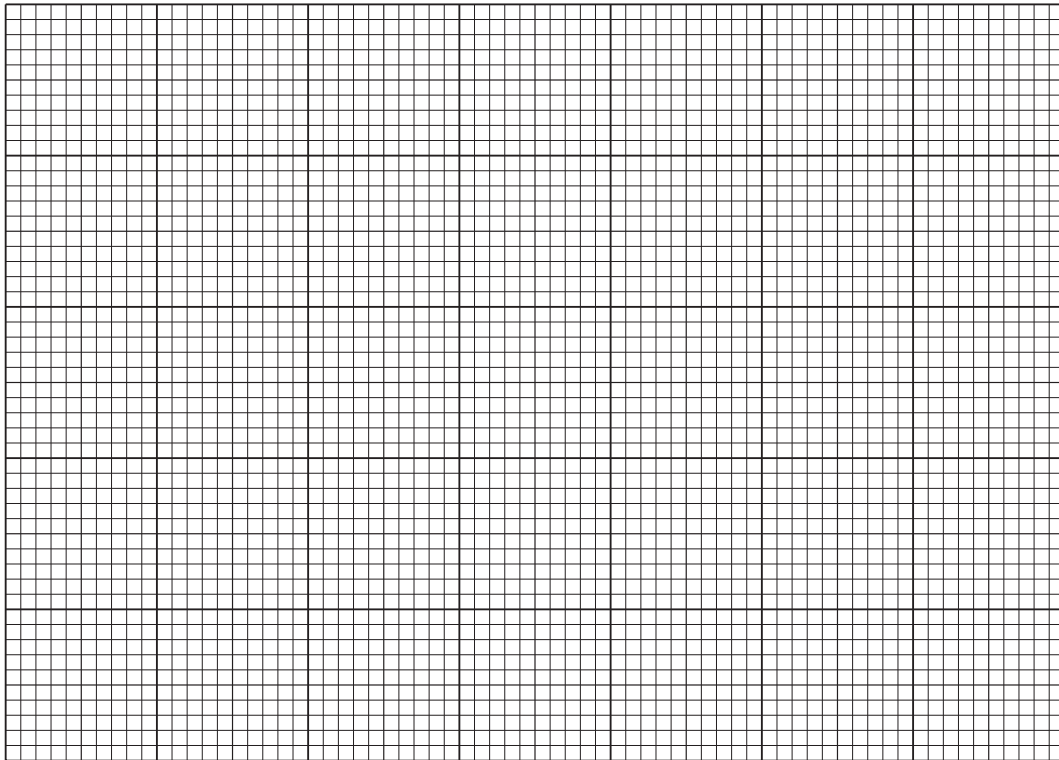
- (i) Name the wind direction responsible for the mining dust shown in the diagram.

.....[1]

The student decided to measure the length of 10 leaves of one species of plant at 2 metre intervals from one of the small mines. The results are shown in the table.

<b>distance from mine /m</b>	2	4	6	8	10	12
<b>average length of 10 leaves/mm</b>	42	46	50	55	64	74

(ii) Plot a graph of the results on the grid.



[4]

(iii) Describe the trend shown by the graph.

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

(iv) Suggest **two** ways the student could have improved this survey.

1 .....  
.....  
2 .....  
.....[2]

(v) Suggest reasons why the dust causes differences in the average length of leaves.

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

(c) Anyone can apply to the government of Zimbabwe for a licence to start a small mine. These licences allow mining to begin immediately. Licences for larger mines take up to a year to be given.

(i) Suggest why farmers might not want small mines to be allowed on their land.

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

(ii) Suggest reasons why giving a licence for a larger mine takes up to a year.

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

(iii) Explain why mining is **not** a sustainable activity.

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

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