Cambridge Assessment International Education

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GEOGRAPHY **0460/41**

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

INSERT **1 hour 30 minutes**

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INFORMATION

- This insert contains additional resources referred to in the questions.
- You may annotate this insert and use the blank spaces for planning. **Do not write your answers** on the insert.

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Table 1.1 for Question 1

World's largest diamond mines

mine location	country	percentage (%) of reserves
Aikhal	Russia	14
Jwaneng	Botswana	13
Udachny	Russia	13
Nyurba	Russia	11
Orapa	Botswana	11
Catoca	Angola	11
Ekati	**Canada**	**9**
Venetia	**South Africa**	**7**
Lomonosov	Russia	6
Mir	Russia	5

Fig. 1.2 for Question 1

Jwaneng mine, Botswana



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Fig. 1.3 for Question 1

Resident questionnaire

We are doing a survey about the local mine as part of our Geography fieldwork. Please will you answer the following questions?

1. What do you think are the benefits of Jwaneng mine?

.....

.....

.....

.....

2. What do you think are the disadvantages of Jwaneng mine?

.....

.....

.....

.....

Thank you for your time.

Table 1.2 for Question 1

Answers to question 1

What do you think are the benefits of Jwaneng mine?

benefits of the mine	number of answers
employment	76
medical facilities	44
shops	30
education facilities	32
recreation facilities	**20**
aeroplane runway and roads	**15**

Table 1.3 for Question 1

Answers to question 2

What do you think are the disadvantages of Jwaneng mine?

disadvantages of the mine	number of answers
noise from blasting	**70**
dust	**55**
traffic from the mine	34
noise from machinery	29
waste tips	14

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Fig. 1.6 for Question 1

Sites of bi-polar analysis

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Fig. 1.7 for Question 1

Students' guidance sheet

	bi-polar score			
type of pollution	**4**	**3**	**2**	**1**
noise from blasting	too loud to have a conversation	loud noise	faint noise	no noise
dust	too dusty to see	very dusty	little dust visible	no dust
fumes from machinery and vehicles	unpleasant to breathe in	strong fumes	some fumes	no fumes
noise from machinery	too loud to have a conversation	loud noise	faint noise	no noise
visual eyesore	waste tips dominate the landscape	waste tips cover much land	some waste tips	unspoilt landscape

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Table 1.4 for Question 1

Students' bi-polar analysis scores

type of pollution	fieldwork site 1 in Jwaneng town	fieldwork site 2 at the main roundabout	fieldwork site 3 at the bend in the road	fieldwork site 4 at the mine entrance	fieldwork site 5 at the pit
noise from blasting	2	2	**3**	3	4
dust	2	3	**3**	4	4
fumes from machinery and vehicles	2	3	**3**	3	3
noise from machinery	1	2	**2**	3	4
visual eyesore	2	2	**3**	3	4
total	9	12	14	16	19

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Table 1.5 for Question 1

Where 20 workers lived before coming to work at the mine

worker number	place where they lived
1	Orapa
2	Francistown
3	Gaborone
4	Werda
5	Hukuntsi
6	Tshabong
7	Gaborone
8	Orapa
9	Ghanzi
10	Mafikeng
11	Lobatse
12	Lichtenburg
13	Zeerust
14	Gaborone
15	Kanye
16	Kanye
17	Johannesburg
18	Gaborone
19	Molepolole
20	Tshabong

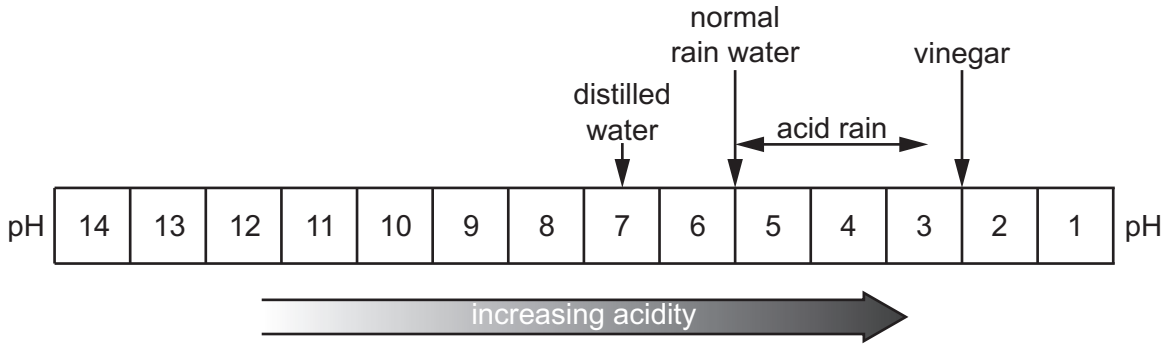
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Fig. 2.1 for Question 2

Fact file

Acid Rain

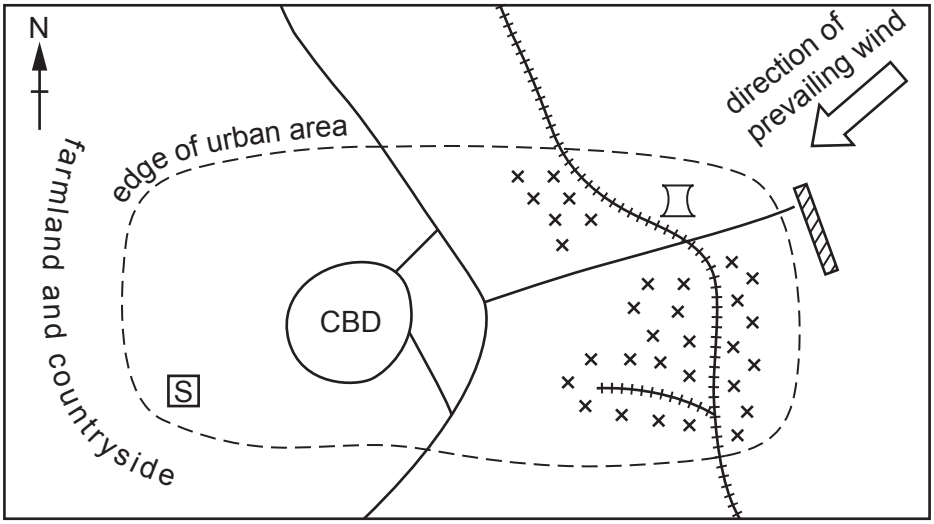
- Sulfur dioxide and nitrogen oxide are produced by human activity.
- The biggest sources of acid rain are coal-fired power stations, factories and vehicles.
- These polluting gases rise into the atmosphere and react with water molecules in the atmosphere.
- This makes the water molecules become weak acid that later falls as acid rain.
- The acidic water droplets are blown by the prevailing wind so the effects of acid rain occur in different areas from where the gases are created.
- The strength of acid rain is measured on the pH scale.



pH scale measuring acidity

Fig. 2.2 for Question 2

Sketch map of the urban area where the students live



Not to scale

Key

S	students' school		coal-fired power station
CBD	central business district		airport
	motorway	× ×	industrial area
	railway		

Fig. 2.3 for Question 2

Instrument for measuring rainfall



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Fig. 2.4 for Question 2

Equipment for measuring pH of water



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Fig. 2.5 for Question 2

Data log of ten days during the recording period

date	direction wind is blowing from	rainfall (mm)	pH value of rainfall
2 April 2019	east	0	not recorded
3 April 2019	south-east	12	5.0
22 April 2019	north	0	not recorded
23 April 2019	north-east	5	4.4
15 May 2019	west	0	not recorded
16 May 2019	west	4	5.6
6 June 2019	north	18	4.6
7 June 2019	north-east	15	4.7
26 July 2019	east	6	4.9
27 July 2019	north-east	9	4.6

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Table 2.1 for Question 2

Results of students' measurements for Hypothesis 1

direction from which wind is blowing	number of days wind comes from this direction	average pH reading of rainfall
north	18	4.5
north-east	23	4.4
east	**17**	4.6
south-east	16	4.9
south	8	5.2
south-west	3	5.5
west	2	5.6
north-west	7	5.2

Table 2.2 for Question 2

Results of students' measurements for Hypothesis 2

number of dry days before rainfall	average pH reading of rainfall on the day after the days with no rainfall
0	5.5
1	**5.1**
2	5.4
3	5.7
4	5.0
5	5.1
6	4.3
7	5.0
8	4.8
9	4.4

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