

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature											

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General Certificate of Education
 June 2004
 Advanced Level Examination



ENVIRONMENTAL SCIENCE **ESC5**
Unit 5 Pollution and Physical Resource Management

Monday 28 June 2004 Morning Session

No additional materials are required.
 You may use a calculator.

Time allowed: 1 hour 30 minutes

Instructions

- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided. All working must be shown.
- Do all rough work in this book. Cross through any work you do not want marked.

Information

- The maximum mark for this paper is 70.
- Mark allocations are shown in brackets.
- You are expected to use a calculator where appropriate.
- This unit assesses your understanding of the relationship between the different aspects of Environmental Science.
- You will be assessed on your ability to use an appropriate form and style of writing, to organise relevant information clearly and coherently, and to use specialist vocabulary, where appropriate.
- The degree of legibility of your handwriting and the level of accuracy of your spelling, punctuation and grammar will also be taken into account.

For Examiner's Use			
Number	Mark	Number	Mark
1			
2			
3			
4			
5			
6			
7			
Total (Column 1)	→		
Total (Column 2)	→		
TOTAL			
Examiner's Initials			

Answer **all** questions in the spaces provided.

1 Water conservation in the UK is being encouraged as increasing demand for water creates supply problems.

(a) Outline methods which can be used to reduce domestic water use without reducing our quality of life.

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(2 marks)

(b) Explain why the following are used only if other water supplies are not available.

(i) Desalination of seawater

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(2 marks)

(ii) Freshwater storage in estuary barrages

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(2 marks)



2 The deciBel (dB) which is used to measure the relative loudness of sounds is a logarithmic scale.

(a) Complete the table.

Loudness/dB	Relative loudness 0 dB = 1	Exposure time limit for workers
108 dB		
105 dB	3.2×10^{10}	15 minutes
102 dB	1.6×10^{10}	
99 dB		1 hour
96 dB	4×10^9	2 hours
93 dB	2×10^9	4 hours
90 dB	1×10^9	8 hours
dB	1×10^8	no limit
20 dB	1×10^2	no limit
10 dB	1×10^1	no limit
0 dB	1	no limit

(3 marks)

(b) Explain what is meant by the term acoustic fatigue.

.....

(1 mark)

(c) Outline **two** ways of reducing urban vehicle noise pollution.

1.

2.

(2 marks)



Turn over ►

3 Since the 1960s, the leaders of many countries have met at international summits to discuss the environment.

(a) Outline the general objectives of the Rio Summit of 1992.

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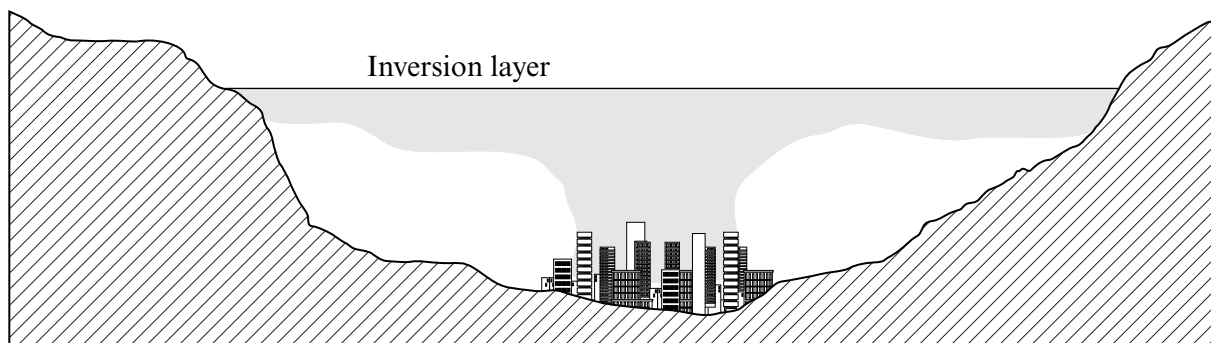
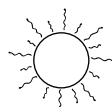
(2 marks)

(b) Outline the changes since the Rio Summit in the UK's policies for the production and disposal of solid waste which are intended to protect the environment.

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(3 marks)

4 Photochemical smogs are urban pollution events which become more common as vehicle exhaust pollution becomes worse in areas where temperature inversions are common.



(a) Describe the topographical and climatic features of an area which make temperature inversions more likely.

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(3 marks)

(b) Explain how the inversion layer prevents atmospheric pollutants from dispersing.

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(2 marks)

(c) Outline the pollutants and chemical reactions which occur during a photochemical smog.

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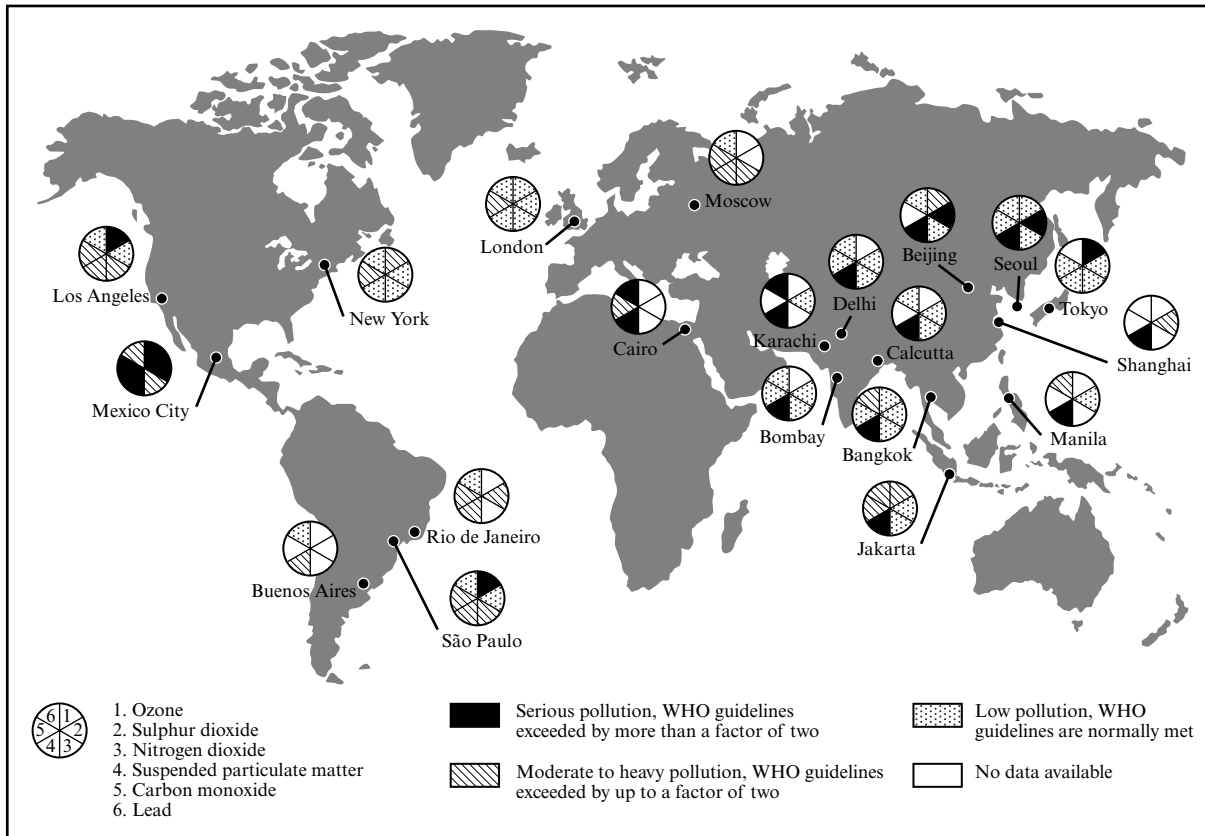
(4 marks)



Turn over ►

- 5 The concentrations of pollutants are often controlled by three factors:
- the level of the polluting activity;
 - the effectiveness of pollution control equipment;
 - natural processes which degrade or disperse pollutants.

The map shows air quality in 20 large cities.



Source: N. MIDDLETON, *The Global Casino* (Arnold) 1999

(a) Suggest likely reasons for the following.

- (i) Low lead levels in the UK

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(1 mark)

- (ii) High carbon monoxide levels in Mexico City

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(1 mark)

- (iii) High suspended particulate matter in Bombay

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(1 mark)

(b) Outline the methods which can be used to control the emissions of:

(i) oxides of nitrogen;

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(2 marks)

(ii) suspended particulate matter (PM10).

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(2 marks)

(c) Explain the increased forest damage caused by the interaction of ozone and sulphur dioxide.

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(2 marks)

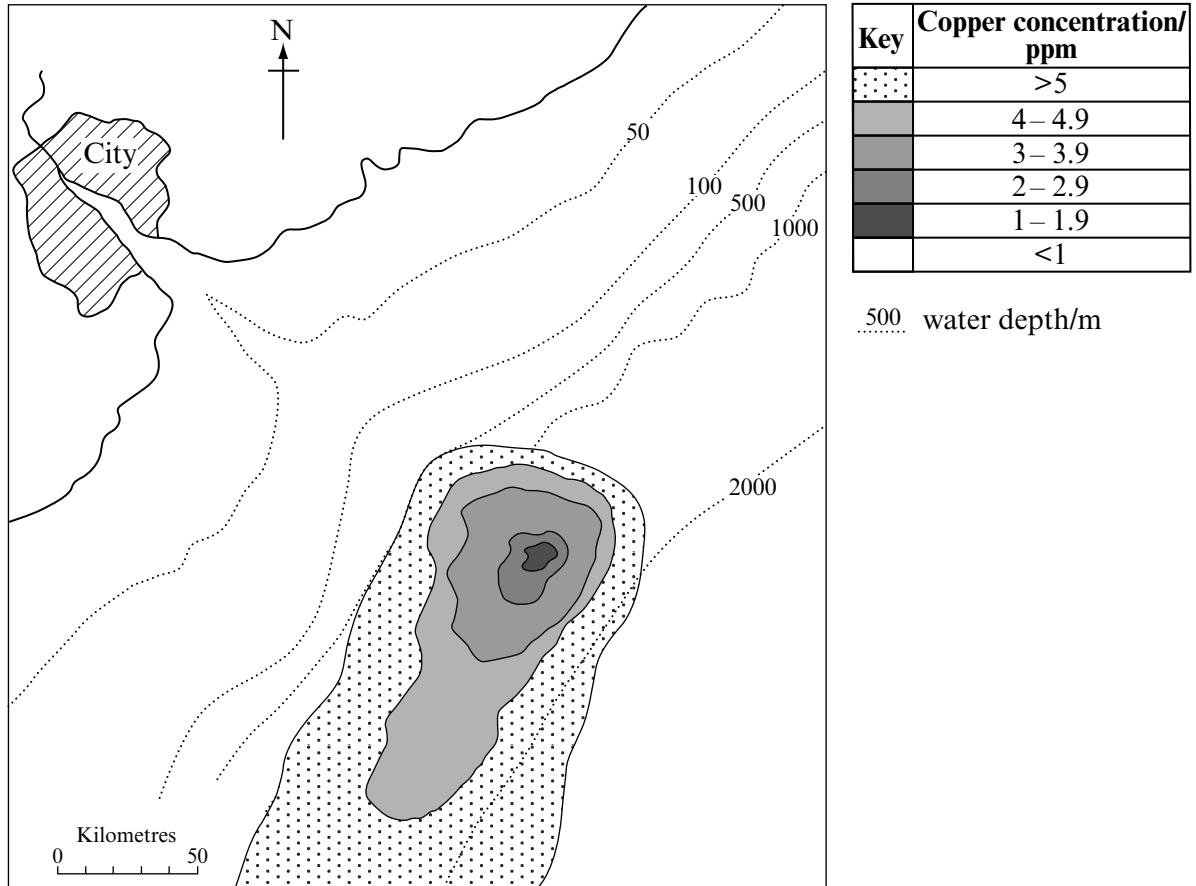
9

TURN OVER FOR THE NEXT QUESTION

Turn over ►

6 In the past it was common to dispose of chemical waste by dumping it from ships at sea.

The map shows the copper content in offshore sediments near a city as a result of the dumping of sewage sludge.



(a) Suggest **three** features which were used to select dumping sites so pollution would be less of a problem.

1.
2.
3.

(3 marks)

(b) Explain why the pollution caused by organic matter is a longer-term problem in colder climates.

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(1 mark)

PCBs (polychlorinated biphenyls) from sewage sludge are found adsorbed onto suspended particles in water or in sediments. PCBs are mutagenic and teratogenic.

- (c) (i) Suggest a pathway by which such PCBs from sewage sludge may reach humans.

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(5 marks)

- (ii) Explain what is meant by the terms *mutagenic* and *teratogenic*.

mutagenic

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teratogenic

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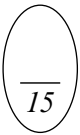
(2 marks)

- (d) Outline the general principles by which indicator species can be used to monitor coastal pollution.

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(4 marks)

Turn over ►



THERE ARE NO QUESTIONS PRINTED ON THIS PAGE