Surname		Other Names	
Centre Number		Candidate Number	
Candidate Signature			

For Examiner's Use

General Certificate of Education
June 2008
Advanced Level Examination

ASSESSMENT and QUALIFICATIONS ALLIANCE

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

Friday 20 June 2008 1.30 pm to 3.00 pm

You will need no other materials.
You may use a calculator.

Time allowed: 1 hour 30 minutes

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

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Answers written in margins or on blank pages will not be marked.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The maximum mark for this paper is 70.
- The marks for questions are shown in brackets.
- You are reminded of the need for good English, clear presentation and appropriate use of specialist vocabulary. Question 6 should be answered in continuous prose. Quality of Written Communication will be assessed in this answer.
- This unit assesses your understanding of the relationship between the different aspects of Environmental Science.

There are no questions printed on this page

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ANSWER IN THE SPACES PROVIDED

Areas outside the box will not be scanned for marking

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

1 The table includes descriptions of some pollutant properties.

Complete the table by selecting the appropriate properties from the list below.

Acute
Chronic
Bioaccumulation
Biomagnification
Synergism
Mutagenic
Teratogenic
Mobility
Persistence
Toxicity
Neurotoxin

Description of pollutant property	Property
Effects which occur over long time periods	
Alters the structure of DNA	
Causes birth abnormalities without causing mutations	
Concentration increases as it is stored in the body	
Concentration increases as it passes along the food chain	

(5 marks)

5

Turn over for the next question

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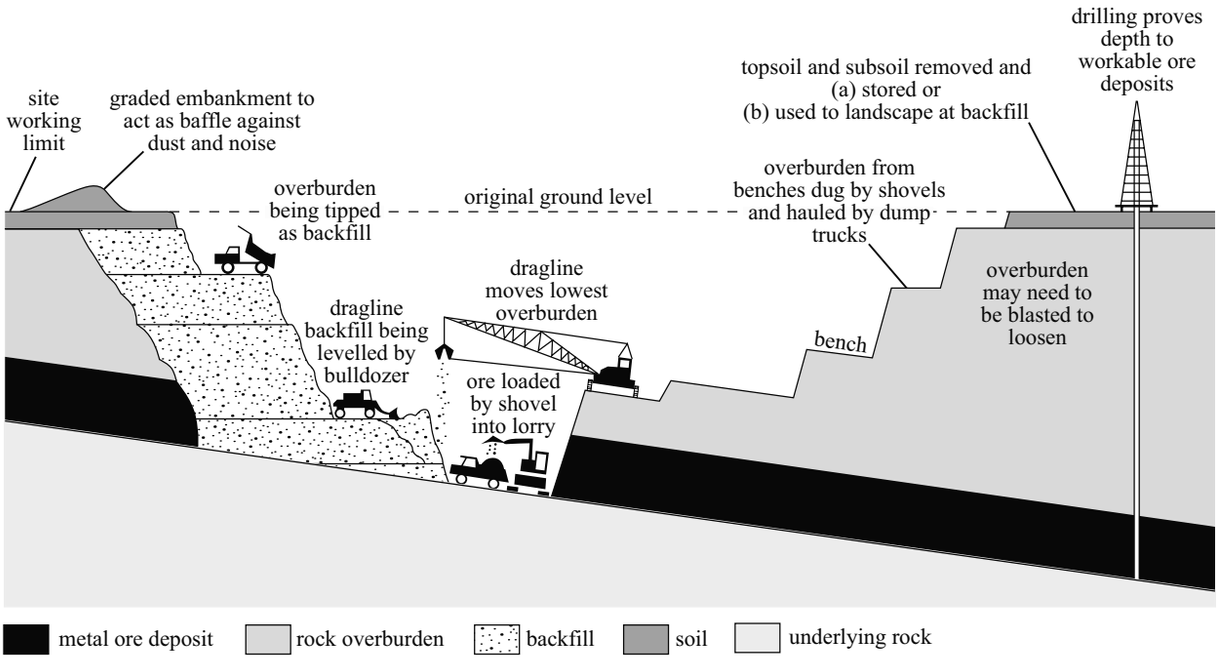
2 The diagram shows a working open-cast metal ore mine.



Source: adapted from The Open University

2 (a) Suggest methods that may be used to reduce the following problems caused by mining.

2 (a) (i) Turbid drainage water

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(2 marks)

2 (a) (ii) The high heavy metal content of drainage water

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(2 marks)

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2 (b) Outline **two** other methods that can be used to reclaim derelict mine sites.

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2 .....

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(4 marks)

2 (c) Suggest how the following may reduce the environmental impact of mining.

2 (c) (i) Recycling

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(1 mark)

2 (c) (ii) Landfill Tax

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(1 mark)

10

Turn over for the next question

Areas outside the box will not be scanned for marking

3 The table shows how the concentration of the heavy metal mercury increased along a food chain following a pollution incident in which 5 kg of mercury spilled into a lake.

Location of mercury in food chain	**Mercury concentration**		**Mass of material which contains 1 g of mercury / kg**
	ppb (parts per billion)	**mercury concentration in tissue or water / g kg^{-1}**	
Heron egg	4800	0.0048	208
Heron adult	3000	0.0030	333
Large fish		0.0006	1 667
Small fish	98	0.000098	10 200
Zooplankton	14	0.000014	71 430
Phytoplankton	2	0.000002	
Water	0.01	0.00000001	100 000 000

3 (a) Use the information in the table to fill in the blank spaces.
Show your working.

(2 marks)

3 (b) What mass of large fish will lead to 1 g of mercury being stored in the tissues of adult herons? Assume 50 % of the mercury ingested by the herons is absorbed and stored.
Show your working.

(2 marks)

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3 (c) Describe the likely effects of the mercury on the herons.

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(2 marks)

3 (d) Outline the properties of pollutants which make concentration along food chains likely.

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(2 marks)

3 (e) Explain how the severity of the pollution caused by pollutant discharges may be affected by the features of the water body.

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(2 marks)

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Turn over for the next question

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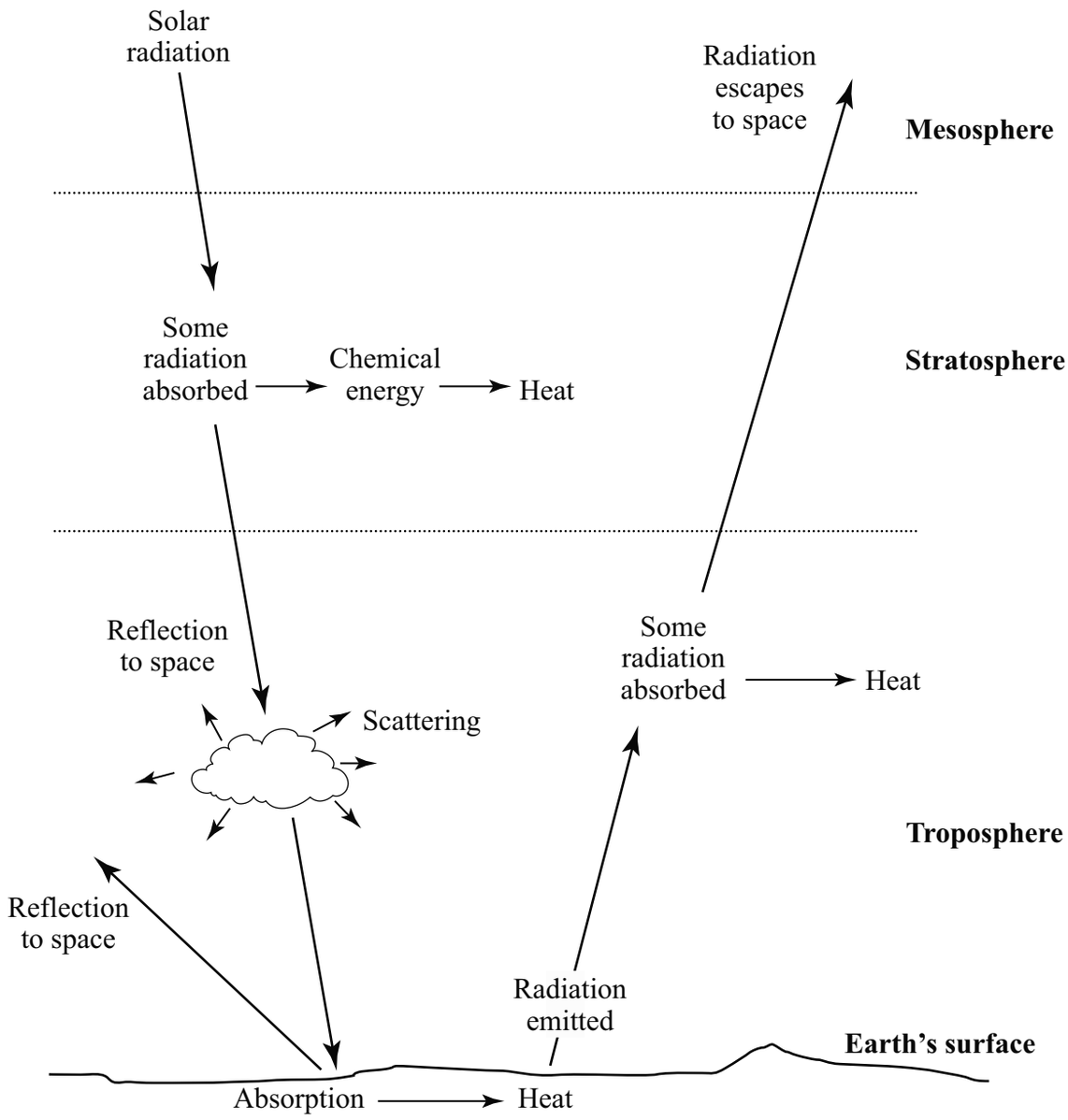
4 The diagram shows some of the processes in the Earth's atmosphere which involve energy that comes from the sun.



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4 (a) Describe the processes involved in the natural Greenhouse Effect.

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(3 marks)

4 (b) Outline how positive feedback mechanisms may increase the extent of global climate change that is caused by human activities.

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(4 marks)

4 (c) Outline **one** other pollution problem which includes chemical reactions involving sunlight.

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(3 marks)

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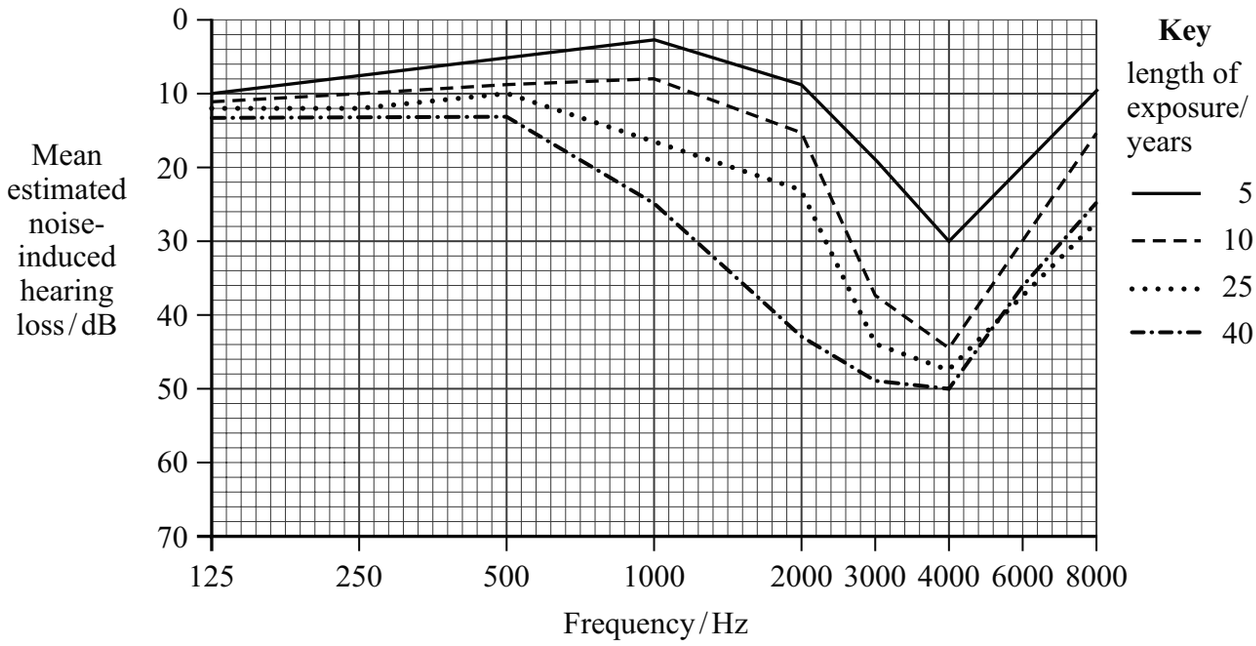
5 The graph shows the noise-induced hearing loss suffered in the past by workers after they had worked for different lengths of time in the weaving industry.



5 (a) Estimate the noise-induced hearing loss at 4000 Hz after five years working as a weaver.

Noise-induced loss ..... dB *(1 mark)*

5 (b) Suggest why the noise-induced hearing loss is greatest at 4000 Hz.

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(2 marks)

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5 (c) The table shows how workers in the weaving industry can be categorised according to the severity of hearing loss at 4000 Hz.

Category	**Degree of hearing loss**	**Increase in sound volume needed to compensate for hearing loss / dB**	**Ability to understand ordinary speech**
A	Not significant	<25	No difficulty
B	Slight	25–39	Difficulty with faint speech
C	Mild	40–54	Difficulty with normal speech
D	Marked	55–69	Difficulty with loud speech
E	Severe	70–89	Only shouted speech understood
F	Extreme	>90	Even shouted speech not understood

Use the graph and table to identify the category that weavers would be in after 25 years of work.

Category ..... *(1 mark)*

5 (d) Outline other possible effects of excessive noise on people.

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(2 marks)

Question 5 continues on the next page

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5 (e) Suggest why it may be difficult to prove that a particular health problem was caused by exposure to noise.

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(2 marks)

5 (f) Explain how sound may cause damage to objects.

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(2 marks)

5 (g) Suggest ways in which working practices have been improved to reduce the exposure of industrial workers to excessive noise.

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(5 marks)

15

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6 Write an essay on **one** of the following topics. Credit will be given for your understanding of the relationship between different areas of the subject, also for the organisation and presentation of the essay and use of grammar, punctuation and spelling.

EITHER

6 (a) Describe the methods which are used to control the pollution caused by transport systems. *(20 marks)*

OR

6 (b) Describe how monitoring of the environment, the public, workers and the workplace can be used to control the pollution caused by ionising radiation. *(20 marks)*

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(20 marks)

END OF QUESTIONS

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