Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature									

For Examiner's Use

General Certificate of Education
June 2008
Advanced Subsidiary Examination

ASSESSMENT and QUALIFICATIONS ALLIANCE

ENVIRONMENTAL SCIENCE **ESC2**
Unit 2 The Lithosphere

Tuesday 3 June 2008 1.30 pm to 2.30 pm

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

Time allowed: 1 hour

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 60.
- 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.

There are no questions printed on this page

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ANSWER IN THE SPACES PROVIDED

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

1 Non-metal minerals are an essential part of our daily life.

Complete the table.

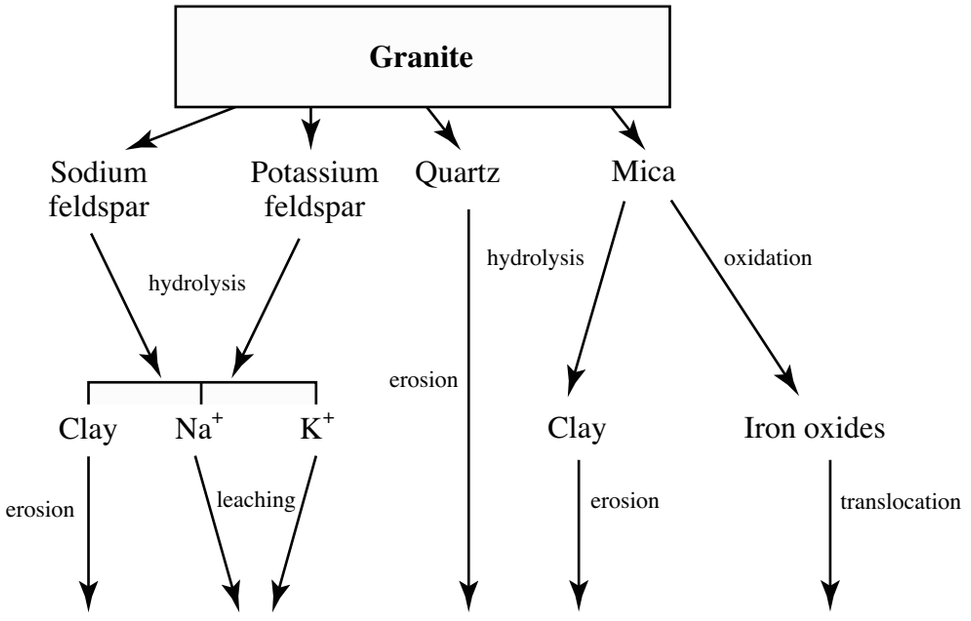
Description	Mineral / Rock
Used as filler in the construction industry and for making concrete	
Used for roadstone as it contains resistant quartz and feldspar	
Added to cement to make mortar	
Relatively soft and easy to convert into powder form for cement manufacture	
Fine-grained and smooth, so ideal for paper making	

(5 marks)

5

Turn over for the next question

2 The diagram shows the weathering of granite.



2 (a) (i) What type of rock is granite?

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(1 mark)

2 (a) (ii) What general term describes substances such as quartz and feldspar?

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(1 mark)

2 (b) Define the terms:

2 (b) (i) weathering

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(2 marks)

2 (b) (ii) leaching.

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(2 marks)

2 (c) Explain why:

2 (c) (i) different rocks in the same location weather at different rates

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(2 marks)

2 (c) (ii) physical weathering may accelerate chemical weathering.

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(2 marks)

10

Turn over for the next question

3 (a) Why do all living organisms need nitrogen?

.....

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(1 mark)

3 (b) Within the nitrogen cycle, nitrogen exists in several forms.

Complete the table by choosing the most appropriate form or equation from the list below. One has been completed as an example.

A CH_4

B $N_2(g)$

C NO_2^- (aq)

D $N_2(g) \rightarrow NO_2^-$

E Lightning

F $N_2(g) \rightarrow NH_3(g)$

G $NH_4^+ \rightarrow NO_2^-$

H Amino acids $\rightarrow$ ammonia

I NO_3^- (aq)

J $NO_3^- \rightarrow N_2(g)$

K $NH_3(g)$

Reservoir or process	Form or equation
Main form in atmosphere	**B**
Nitrification	
Possible contamination of underground water stores	
Ammonification	
Fixation	
Denitrification	

(5 marks)

3 (c) Outline the environmental significance of each of the following.

3 (c) (i) Plants and animals are unable to break the bond which holds nitrogen atoms together in a nitrogen molecule.

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(2 marks)

3 (c) (ii) Some nitrogen compounds are very soluble.

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(2 marks)

10

Turn over for the next question

4 Soils around derelict mines are often low in nutrients and organic matter. Scientists investigated the ability of two plant species, Black Bent (*Agrostis gigantea*) and Wavy Hair Grass (*Deschampsia flexuosa*), to increase levels of organic matter in soils around derelict mines.

4 (a) Describe, giving practical details, how the scientists would undertake the investigation.

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(6 marks)

4 (b) An investigation was carried out to analyse the effect of planting the legume Common Bird's-foot Trefoil (*Lotus corniculatus*) on land around a derelict tin mine in Cornwall. The table summarises the effect on soil properties after five years.

	Original soil	**Soil after five years' growth of Common Bird's-foot Trefoil**
pH	5.0	6.5
Organic matter content / %	8.0	22.0

Explain how each of the following changes shows improved soil fertility.

4 (b) (i) The pH increase from 5.0 to 6.5

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(2 marks)

4 (b) (ii) Increased organic matter content

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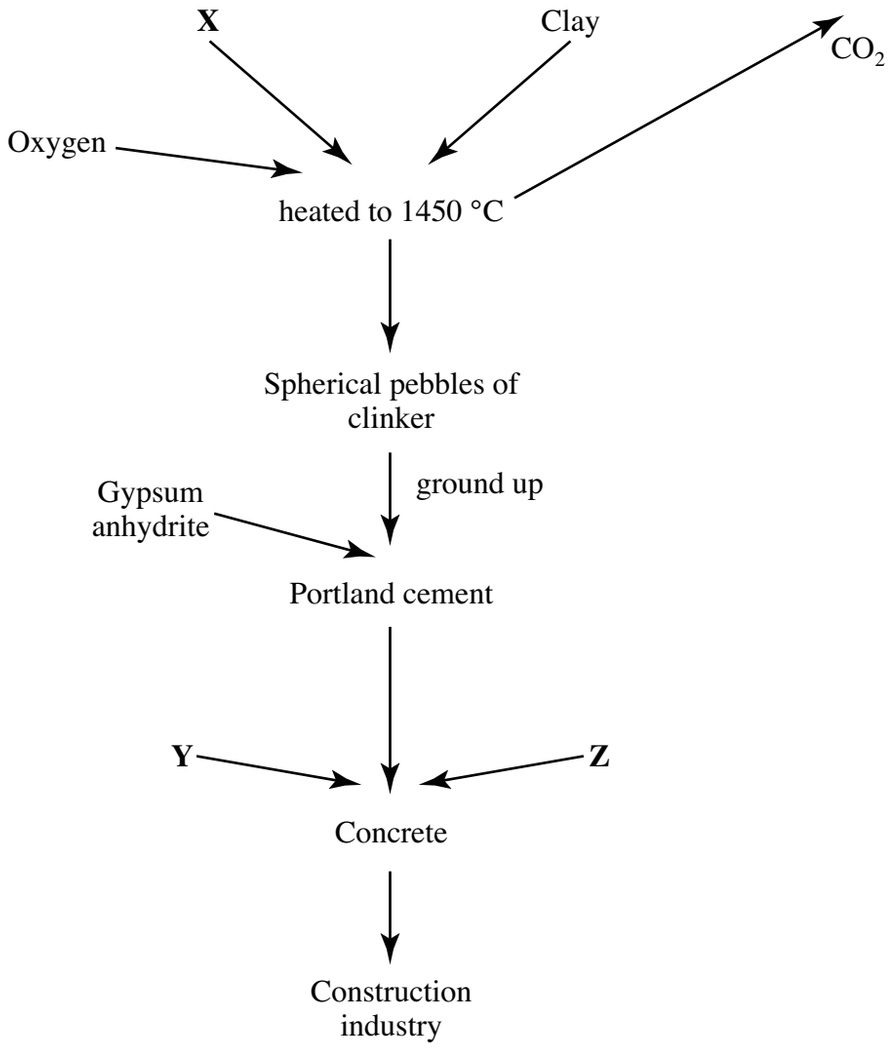
(2 marks)

10

Turn over for the next question

5 (a) The diagram shows some of the processes involved in the production of cement and its use to make concrete.



Identify substances **X**, **Y** and **Z**.

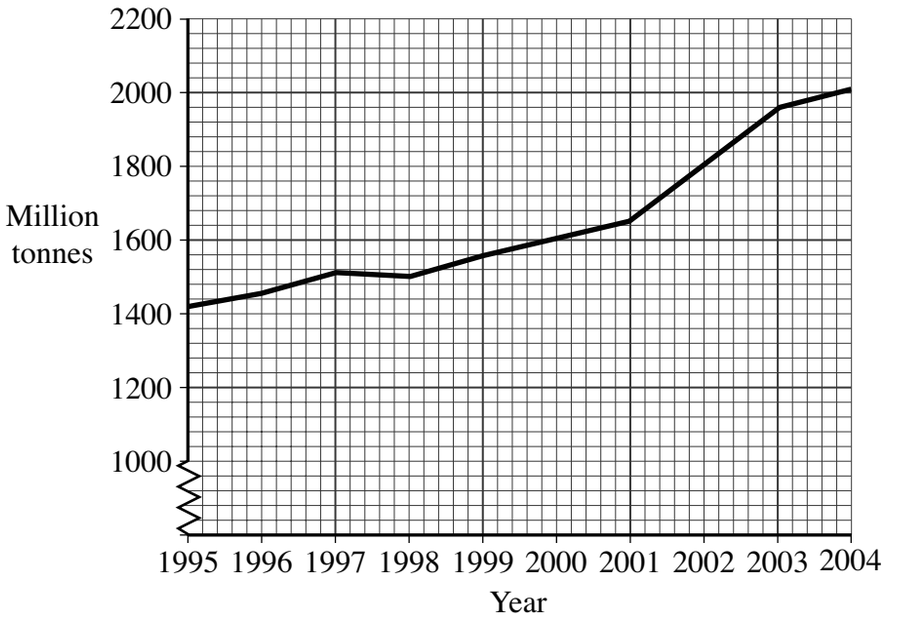
X .....

Y .....

Z .....

(3 marks)

5 (b) The graph shows the world production of cement 1995–2004.



Source: adapted from United States Geological Survey

5 (b) (i) Suggest an explanation for the trend shown.

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(1 mark)

5 (b) (ii) Outline **two** environmental impacts associated with this trend.

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2 .....

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(4 marks)

Turn over ➤

5 (c) The UK cement industry has agreed to reduce energy use by 25 % by 2010, based on its use in 1990. In 1990, 1.6 MkWh of electricity was required to produce each tonne of cement.

Calculate the 2010 target electricity consumption per tonne of cement produced. Show your working.

Answer .....MkWh *(2 marks)*

10

6 (a) Outline the purposes of:

6 (a) (i) Green Belts

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(3 marks)

6 (a) (ii) National Parks.

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(2 marks)

6 (b) Discuss the land use conflicts associated with areas designated as Green Belts or National Parks. How may they be resolved?

Quality of Written Communication will be assessed in this answer.

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(10 marks)

15

END OF QUESTIONS

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