

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature											

For Examiner's Use
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General Certificate of Education  
 January 2007  
 Advanced Subsidiary Examination



**ENVIRONMENTAL SCIENCE**  
**Unit 1 Energy, Atmosphere and Hydrosphere**

**ESC1**

Wednesday 17 January 2007 9.00 am to 10.00 am

<p><b>You will need no other materials.</b>          You may use a calculator.</p>
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Time allowed: 1 hour

**Instructions**

- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Answer the questions in the spaces provided.
- 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.

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

**There are no questions printed on this page**

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

- 1 The table shows features of some processes used to purify water.

Complete the table.

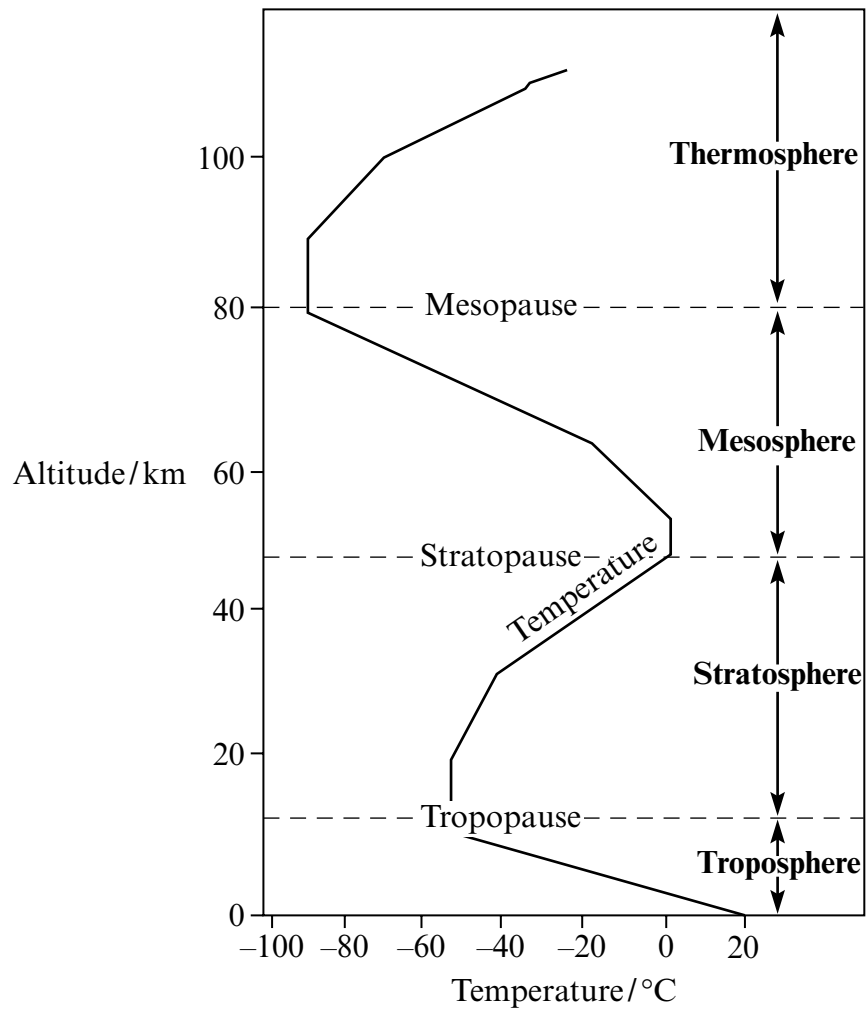
Process	Purpose	Principles of process
Screening	Removal of large objects	Wire mesh traps objects which are scraped off
	Removal of small solid particles carried by water	Solids sink when water is still
Flocculation	Removal of fine suspended solids	
Chlorination		
	Reduced dental health problems	Makes teeth more resistant to acid attack

(5 marks)

5

Turn over for the next question

2 The diagram shows the structure of the atmosphere.



(a) (i) Which layer absorbs ultraviolet light from the sun?

.....  
(1 mark)

(ii) Which gas absorbs ultraviolet light?

.....  
(1 mark)

(b) Describe how human activities have increased the amount of ultraviolet radiation reaching the Earth's surface.

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(3 marks)

(c) In which layer does carbon dioxide absorb the infrared radiation emitted by the Earth?

.....

(1 mark)

(d) By reference to the natural processes which control atmospheric carbon dioxide, explain the term 'dynamic equilibrium'.

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(2 marks)

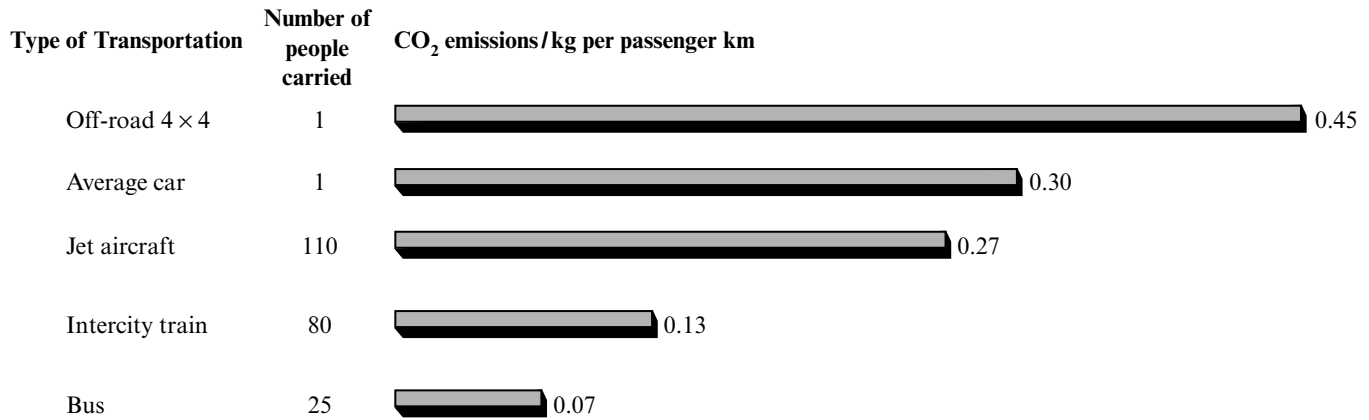
(e) Explain why burning biofuels such as straw may be described as being 'greenhouse neutral', despite the fact that burning them releases carbon dioxide.

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(2 marks)

3 The lifetimes of fossil fuels may be extended by using them more efficiently now.

The graph shows the relative energy efficiencies of different passenger transport systems.



(a) Calculate the amount of carbon dioxide produced when 300 people travel alone by car for 100 kilometres.

Show your working.

..... kg of CO<sub>2</sub>  
(2 marks)

(b) Suggest a circumstance in which using a bus may be less energy efficient than using cars.

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.....  
(1 mark)

(c) Outline **two** features of car design which reduce fuel consumption.

1 .....

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(4 marks)

(d) Explain how the use of **one** named alternative fuel may reduce the environmental impact of vehicle use.

Fuel .....

Explanation .....

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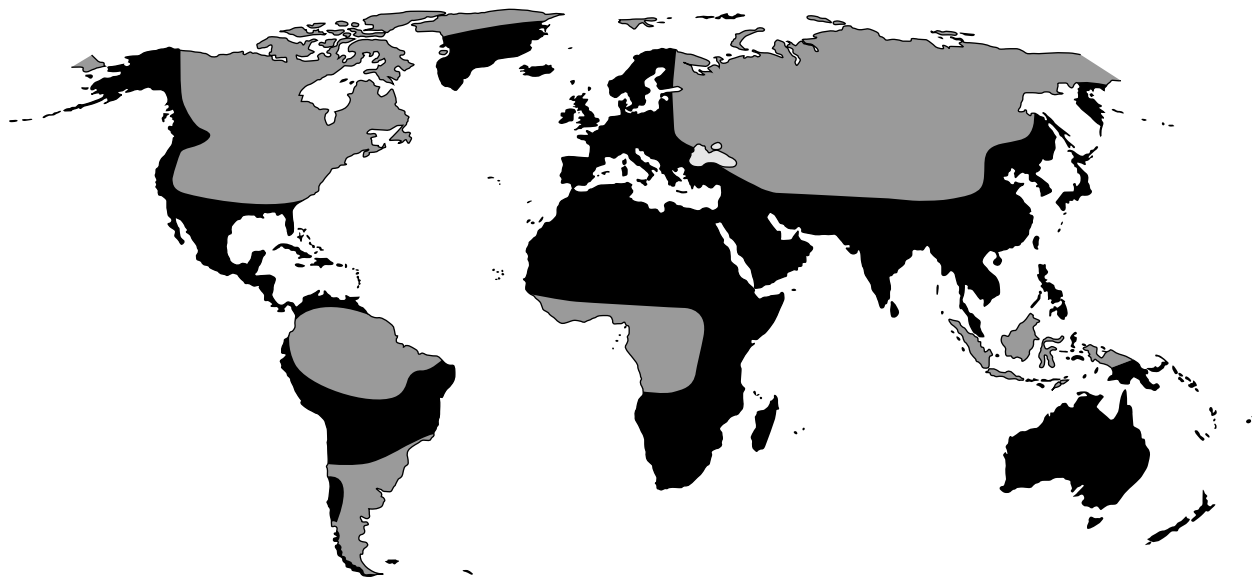
(3 marks)

**10**

**Turn over for the next question**

4 The map shows one possible scenario for the effect of global climate change on weather.

Projected changes in precipitation patterns in this century as a result of global warming



**Key**

■	Wetter than now
■	Drier than now

(a) Explain how global climate change may:

(i) **increase** the rainfall which an area receives

.....  
.....  
.....  
.....

*(2 marks)*

(ii) **reduce** the rainfall which an area receives.

.....  
.....  
.....  
.....

*(2 marks)*



(b) Explain why global climate change may cause:

(i) species extinction

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

(ii) changes in species distribution

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

(iii) sea level rise.

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

(c) Suggest how a change in albedo, caused by a reduction in the area covered by ice, may upset the temperature balance of the Earth.

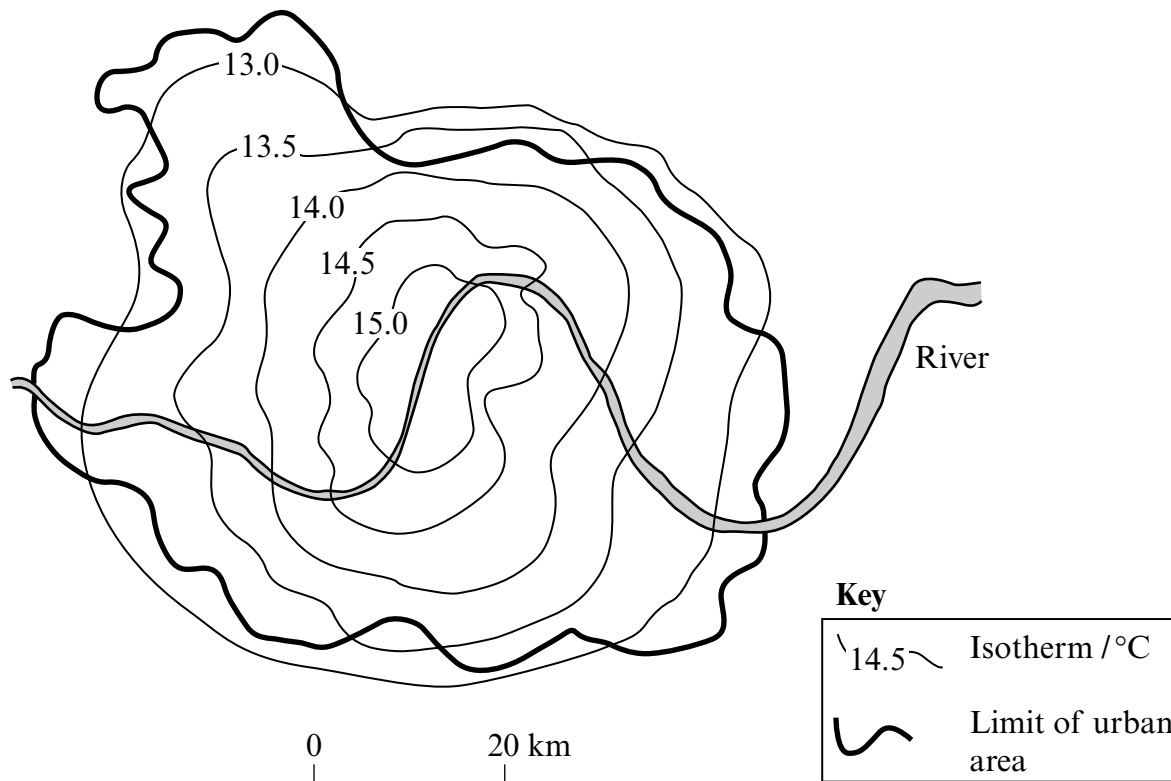
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*(3 marks)*

**10**

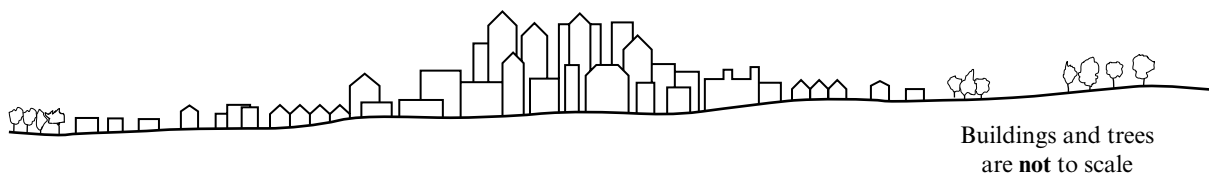
**Turn over for the next question**

5 The diagrams show an urban heat island associated with a large city.

**Diagram A**



**Diagram B**



- (a) (i) Add arrows to **Diagram B** to show the wind flow caused by the heat island. (1 mark)

(ii) Suggest how the heat island can prevent air pollution dispersing from the city.

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*(1 mark)*

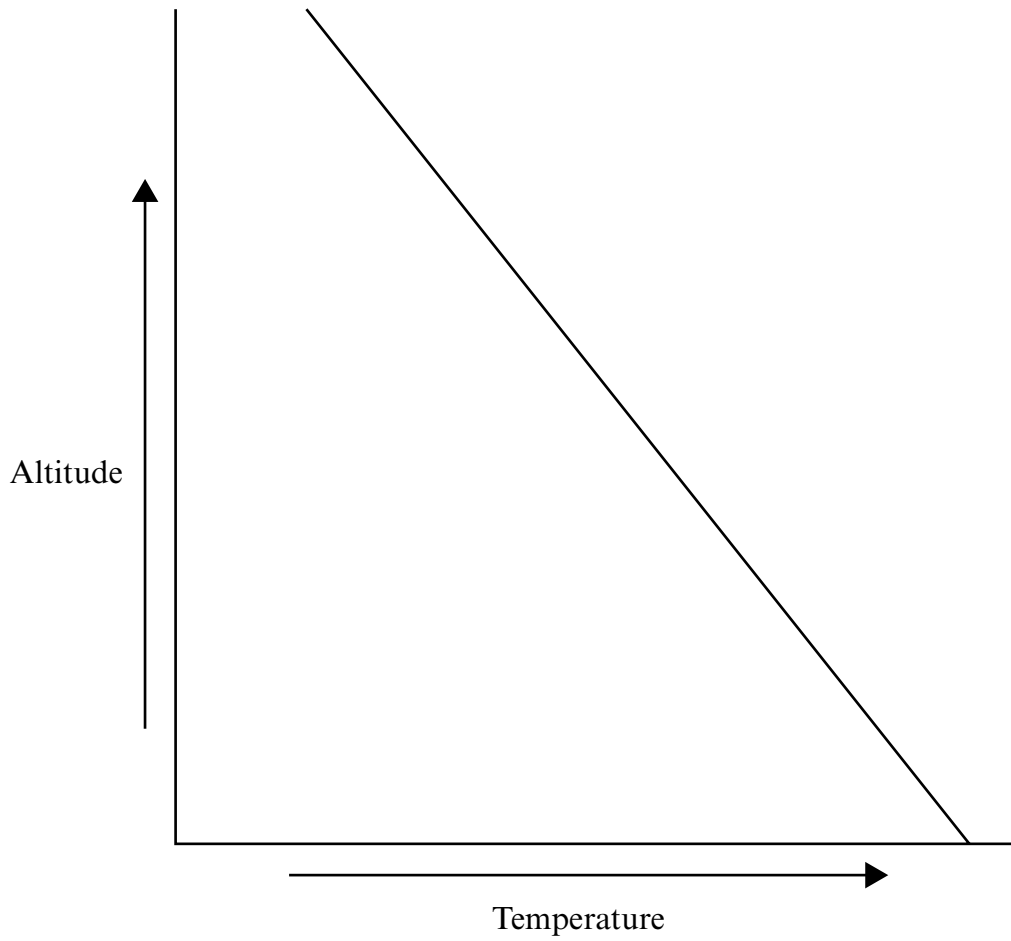
(iii) Suggest reasons why the city is warmer than the surrounding area.

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*(3 marks)*

**Question 5 continues on the next page**

(b) The graph shows the normal change in air temperature with increasing altitude.



(i) Draw a line on the graph to show how temperature changes with increasing altitude when there is a temperature inversion. (1 mark)

(ii) How does the local topography increase the chances of a temperature inversion forming?

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(2 marks)

(c) Describe how the city may affect the river channel discharge downstream of the city.

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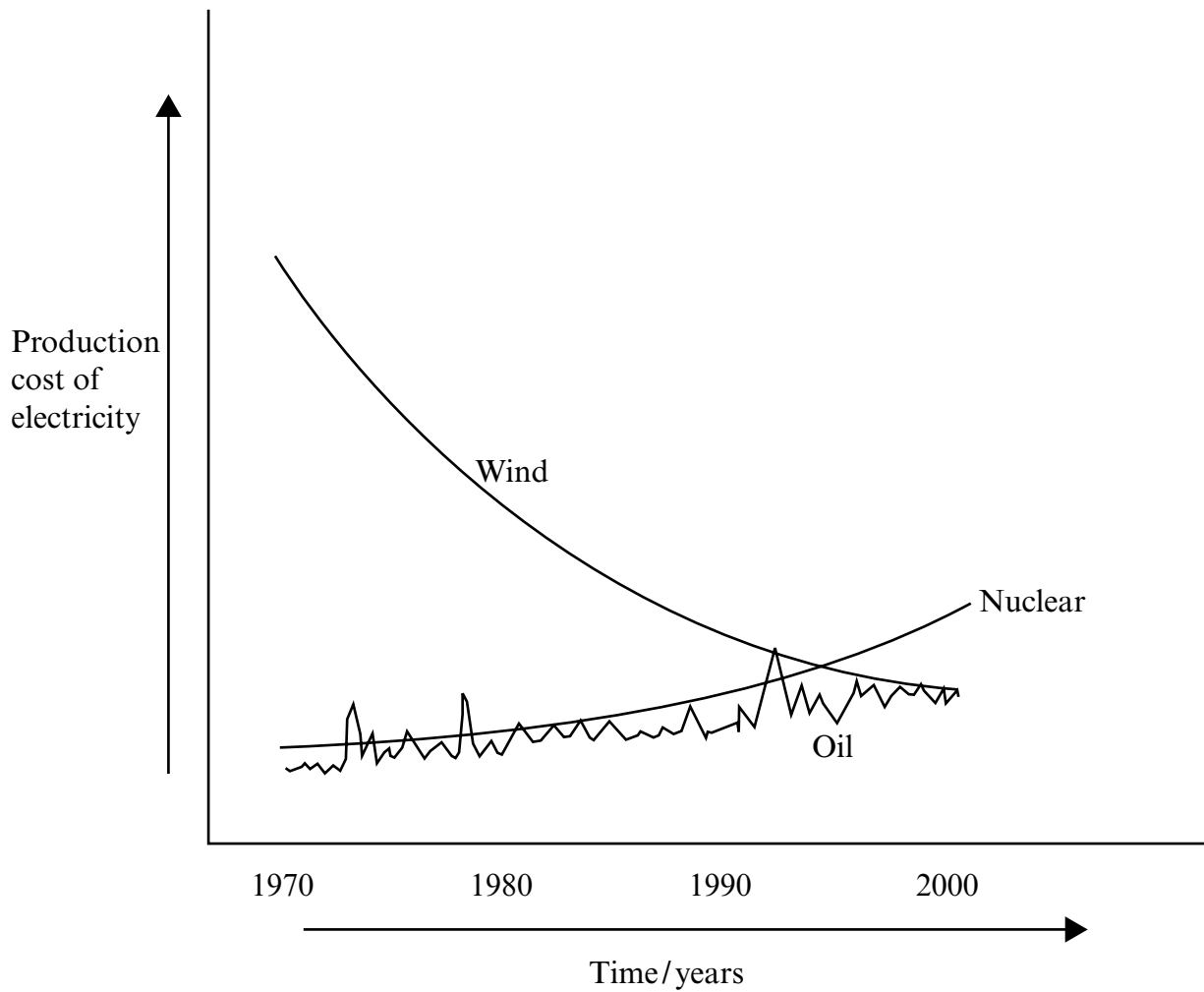
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*(2 marks)*

**10**

**Turn over for the next question**

6 The graph shows the changing costs of producing electricity from three energy resources.



(a) Describe the trend in the production cost of electricity generated by oil.

.....  
.....

(1 mark)

(b) Explain:

(i) the increasing cost of electricity generated by nuclear power

.....  
.....

(1 mark)

(ii) the declining cost of electricity generated by windpower.

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.....

(1 mark)

(c) Outline **one** method that can be used to increase the total amount of oil recovered from an oilfield.

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(2 marks)

(d) Describe how locational, technological and environmental factors may influence the energy resources which are used in different parts of the world.

*Quality of Written Communication will be assessed in this answer.*

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Dotted lines for writing.

(10 marks)

**END OF QUESTIONS**

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