

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature											

Leave blank
-------------

General Certificate of Education  
 June 2005  
 Advanced Subsidiary Examination



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

**ESC1**

Wednesday 8 June 2005 Afternoon Session

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

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 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 60.
- Mark allocations are shown in brackets.
- 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			
Total (Column 1)			
Total (Column 2)			
TOTAL			
Examiner's Initials			

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

1 (a) The table shows some of the processes involved in the water cycle.

Complete the table by adding appropriate names or descriptions of processes.

Name of process	Description of process
Infiltration	
	Water molecules pass out of the stomata of leaves
Interception	
Evaporation	Hydrogen bonds between water molecules break and individual molecules escape in gaseous form

(3 marks)

(b) Rocks which form aquifers must be both permeable and porous.

Explain the difference between permeability and porosity.

.....

.....

.....

.....

(2 marks)

2 The atmosphere contains a range of naturally occurring gases and some which are added by human activities. Some of these gases have industrial uses.

(a) The table shows the sources and industrial uses of some atmospheric gases.

Complete the table by adding the appropriate gas, source or use.

Gas	Natural source	Human activity causing release	Industrial use
Nitrogen	Denitrification by bacteria	Not released	Manufacture of nitrate fertilisers
Oxygen	Photosynthesis	Not released	
	Respiration	Combustion of fossil fuels	Fire extinguishers, nuclear reactor primary coolant
Methane		Rice paddy farming, organic waste in landfill sites	Fuel
Chlorofluorocarbons	No natural source	Propellant, solvent (now banned)	Propellant, solvent (now banned)

(3 marks)

(b) Outline **two** human activities which significantly increase the amount of water vapour which enters the atmosphere.

1. ....  
.....
2. ....  
.....

(2 marks)

(c) Use the natural processes which control the amount of water vapour in the atmosphere to illustrate the principle of negative feedback.

- .....  
.....  
.....  
.....  
.....  
.....

(3 marks)

Turn over ►

(d) Explain how variations in insolation affect movements of water vapour around the Earth.

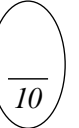
.....

.....

.....

.....

(2 marks)



3 An important factor affecting the future use of energy resources is whether or not they are renewable.

The table shows some renewable and non-renewable energy resources.

Renewable energy resources	Non-renewable energy resources
Solar power Wind power Wave power Tidal power Geothermal power Biofuels	Coal Crude oil or petroleum Natural gas Tar sands Oil shales

(a) Explain what is meant by the term *non-renewable*.

.....

.....

(1 mark)

(b) Outline the physical conditions under which dead marine organisms are converted to crude oil.

.....

.....

.....

.....

(2 marks)

- (c) Explain why particular geological conditions are essential for the formation of exploitable oil deposits.

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

(2 marks)

- (d) Suggest why the physical conditions of deep oil fields often increase the recovery rate of oil.

.....  
.....

(1 mark)

- (e) Energy resources are not always found in the area where the energy is required so transport is necessary.

Outline how the following energy transport methods may damage the environment.

- (i) Oil pipelines

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

(2 marks)

- (ii) Overhead electricity cables

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

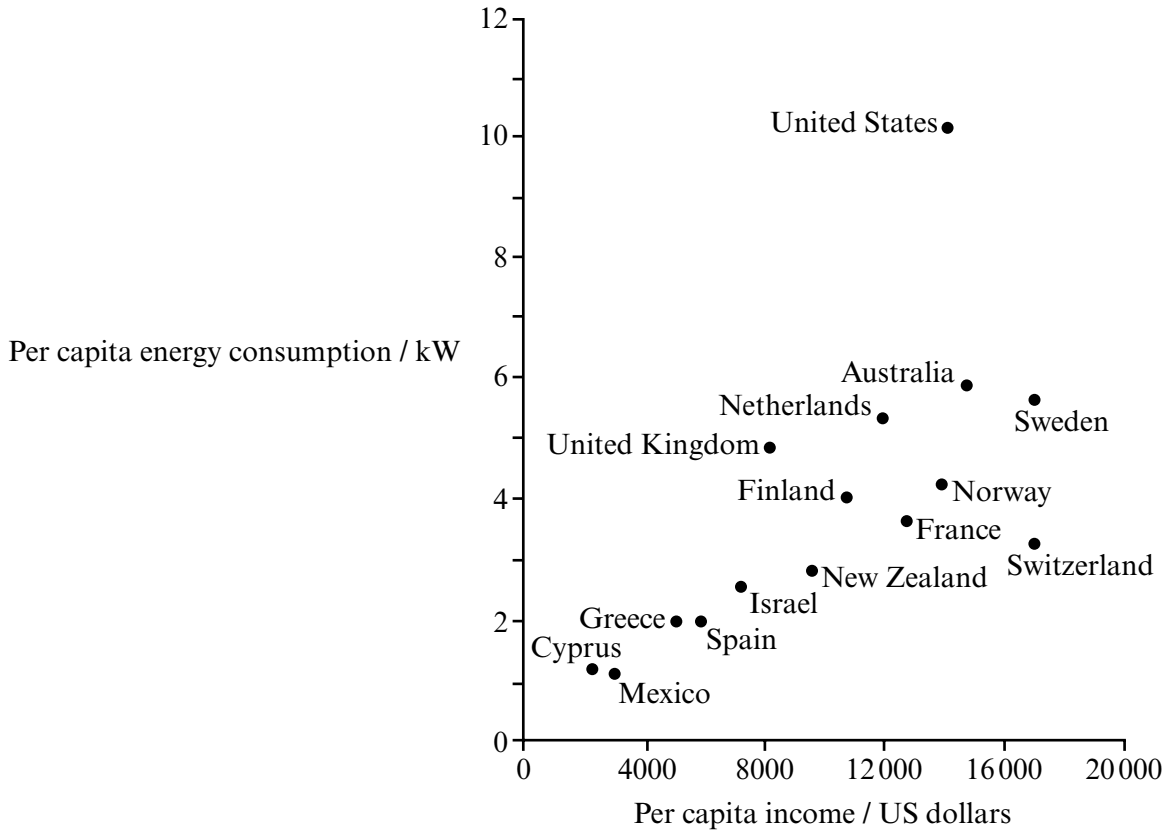
(2 marks)

**TURN OVER FOR THE NEXT QUESTION**

Turn over ►

4 The per capita energy consumption in a country is affected by its level of affluence.

(a) The graph shows the relationship between income and energy consumption in a range of countries.



(i) Describe the trend shown in the graph.

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

(ii) Explain the relationship between income and energy consumption shown in the graph.

.....  
 .....  
 .....  
 .....  
 (2 marks)

(iii) Suggest why some countries have a position on the graph which is well away from the general trend.

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

*(3 marks)*

(b) Suggest how the wealth of a country may affect the choice of energy resource which is used.

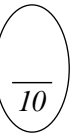
.....  
.....

*(1 mark)*

(c) Explain how the level of energy use in more wealthy countries can have an impact on the development and environment of less wealthy countries.

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

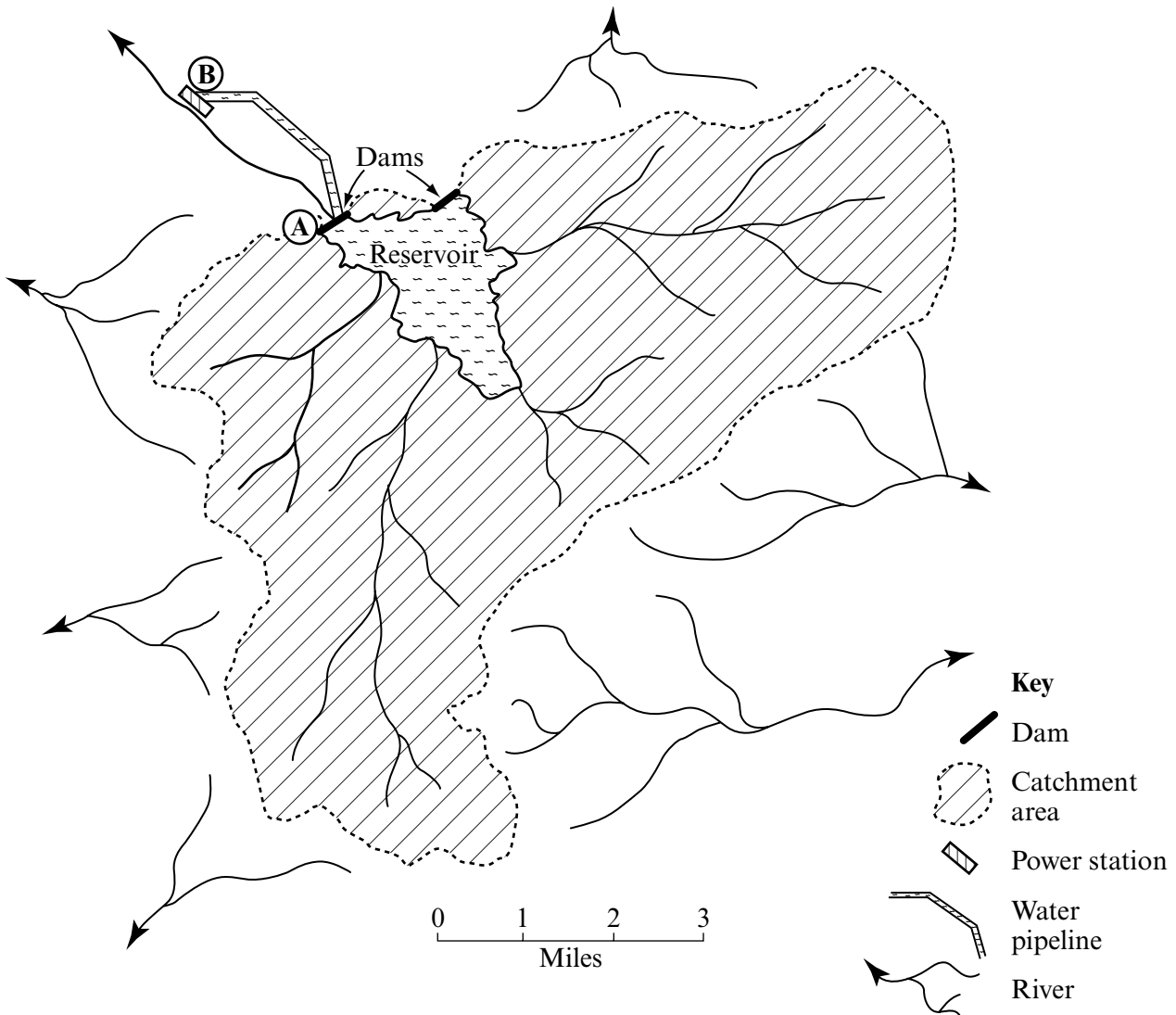
*(3 marks)*



**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

5 (a) The map shows a hydroelectric power (HEP) scheme in Wales.



(i) Explain what is meant by the term *catchment area*.

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

(ii) Name a factor other than the size of the catchment area which affects the amount of water collected by the reservoir.

.....  
(1 mark)

(iii) Explain why the drop in height between points A and B should be as large as possible.

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



(b) Outline how **two** land uses within a catchment area may cause problems for a reservoir which is to be used for public water supply.

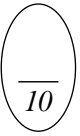
- 1. ....  
.....  
.....  
.....
- 2. ....  
.....  
.....  
.....

*(4 marks)*

(c) Compare the usefulness of HEP and solar power in meeting the daily demand for domestic electricity.

- .....
- .....
- .....
- .....
- .....
- .....

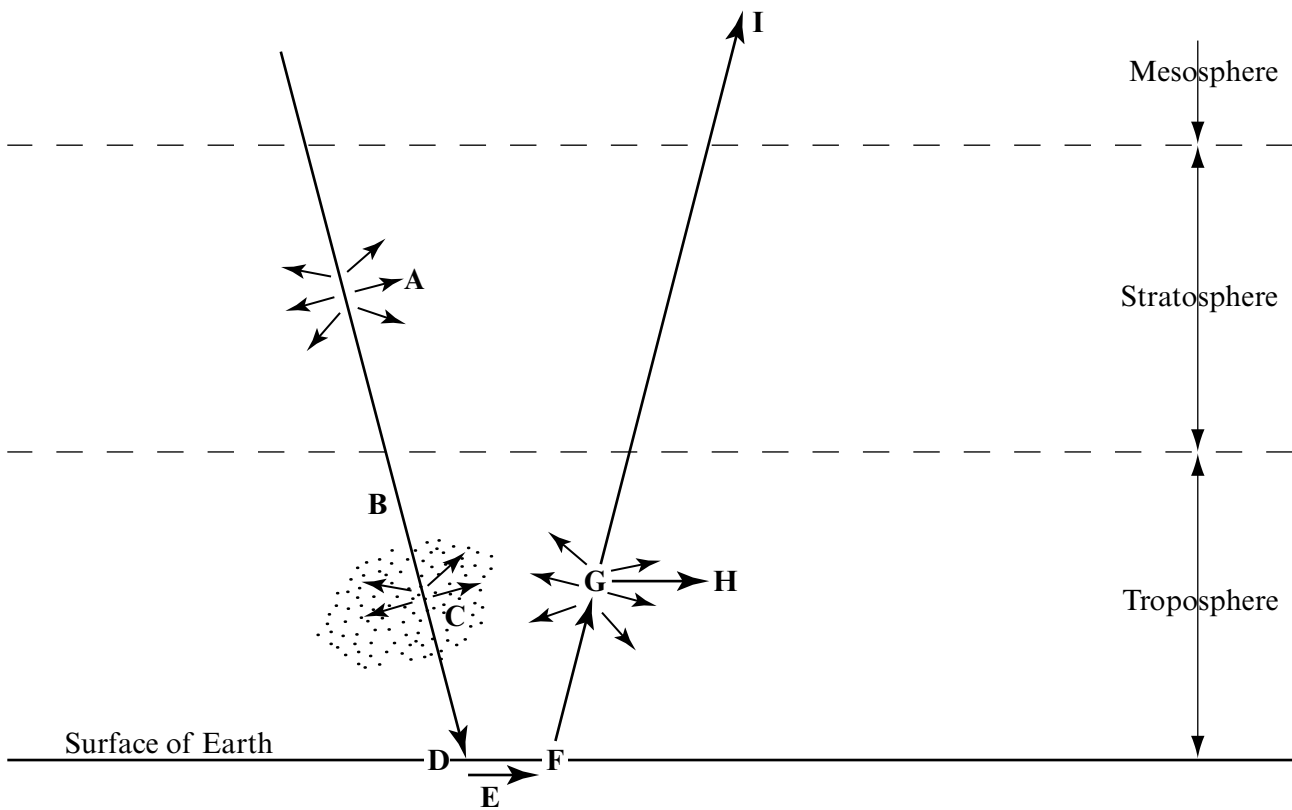
*(3 marks)*



**TURN OVER FOR THE NEXT QUESTION**

**Turn over ►**

- 6 (a) The diagram represents some of the processes occurring in the atmosphere which involve energy conversions.



Complete each box with an appropriate letter from the diagram.

Process	Letter from diagram
Visible light passing through the atmosphere	
Light scattered by particulate matter	<b>C</b>
Warm Earth radiates infra red light	
Infra red light absorbed by atmosphere	<b>G</b>
Visible light absorbed and converted to heat	
Ultraviolet light absorbed in the ozone layer	
Infra red light radiated into space	<b>I</b>

(2 marks)



