Surname		Other Names	
Centre Number			Candidate Number	
Candidate Signature			

For Examiner's Use

General Certificate of Education
January 2008
Advanced Subsidiary Examination

AQA
ASSESSMENT and QUALIFICATIONS ALLIANCE

ENVIRONMENTAL SCIENCE **ESC1**
Unit 1 Energy, Atmosphere and Hydrosphere

Wednesday 16 January 2008 9.00 am to 10.00 am

You will need no other materials.
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.
- 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

LEAVE MARGIN BLANK

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

1 Tick **one** box in each row to show which water source best fits the feature described. One has been completed as an example.

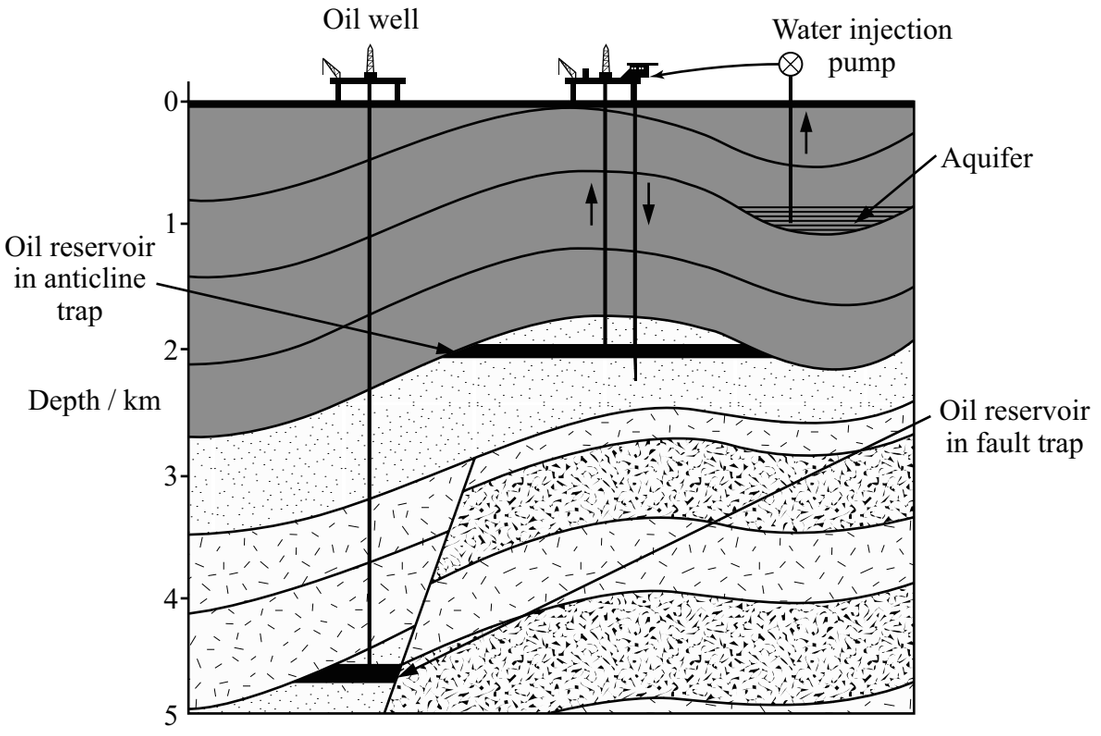
Feature	Source of water for public supply		
	Upland reservoir water	**Groundwater**	**Lowland river water**
Most likely to be saline			
Least likely to be turbid			
Most likely to be contaminated with pesticides			✓
Least likely to have a high calcium content			
Most likely to contain *E. coli*			
Least likely to have a low dissolved oxygen level			

(5 marks)

5

Turn over for the next question

2 The diagram shows the geological structures associated with two crude oil fields.



(a) Explain how the following conditions aid the exploitation of oil.

(i) High reservoir rock porosity

.....

.....

(1 mark)

(ii) Low cap rock permeability

.....

.....

(1 mark)

(iii) High oil temperature

.....

.....

(1 mark)

(b) Using crude oil and solar power as examples, explain the difference between renewable and non-renewable resources.

.....

.....

.....

.....

(2 marks)

(c) Suggest why the use of oil may decline in the future even if abundant reserves still remain.

.....

.....

.....

.....

.....

.....

(3 marks)

(d) How do the origins of wave power and tidal power differ?

.....

.....

.....

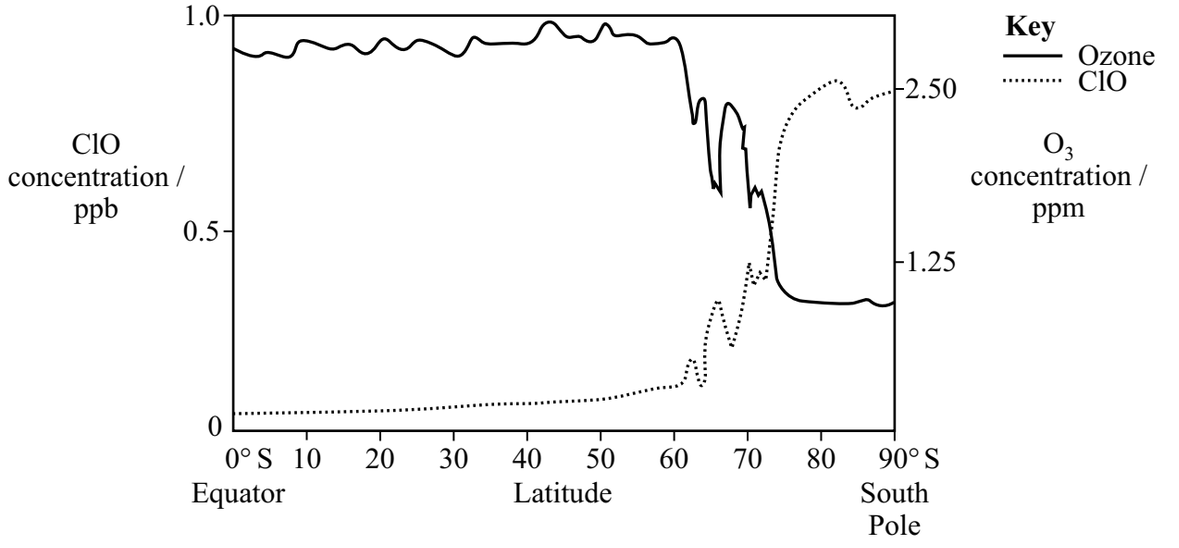
.....

(2 marks)

10

Turn over for the next question

3 The graph shows how the concentrations of ozone and chlorine monoxide in the stratosphere vary between the equator and the South Pole.



(a) Suggest how the concentrations of the two gases may be linked.

.....

.....

.....

.....

(2 marks)

(b) Outline the most likely explanation for the presence of chlorine monoxide.

.....

.....

.....

.....

(2 marks)

LEAVE MARGIN BLANK

(c) Outline the possible consequences of reduced stratospheric ozone levels for life on the Earth's surface.

.....

.....

.....

.....

(2 marks)

(d) Describe the strategies that have been used to prevent ozone depletion.

.....

.....

.....

.....

.....

.....

.....

.....

(4 marks)

10

Turn over for the next question

4 The table shows how the climate in a typical British city differs from that of the surrounding countryside.

Sunshine duration	5–15 % less
Annual mean temperature	0.5–1.0 °C higher
Winter maximum temperatures	1–2 °C higher
Occurrence of frost	2–3 weeks fewer
Relative humidity in winter	2 % lower
Relative humidity in summer	8–10 % lower
Total precipitation	5–10 % more
Number of rain days	10 % more
Number of days with snow	14 % fewer
Cloud cover	5–10 % more
Occurrence of fog in winter	100 % more
Amount of condensation nuclei	10 times more
Albedo	10 % lower

Source: Crown copyright, 2001, data supplied by the Met Office

(a) Use the information in the table to suggest reasons for:

(i) increased total precipitation

.....

.....

.....

.....

(2 marks)

(ii) increased temperatures.

.....

.....

.....

.....

(2 marks)

LEAVE MARGIN BLANK

(b) Explain how an improvement in energy efficiency in a city may change the climatic differences shown in the table.

.....

.....

.....

.....

.....

.....

.....

.....

(4 marks)

(c) Explain how climatic conditions are affected by a temperature inversion.

.....

.....

.....

.....

(2 marks)

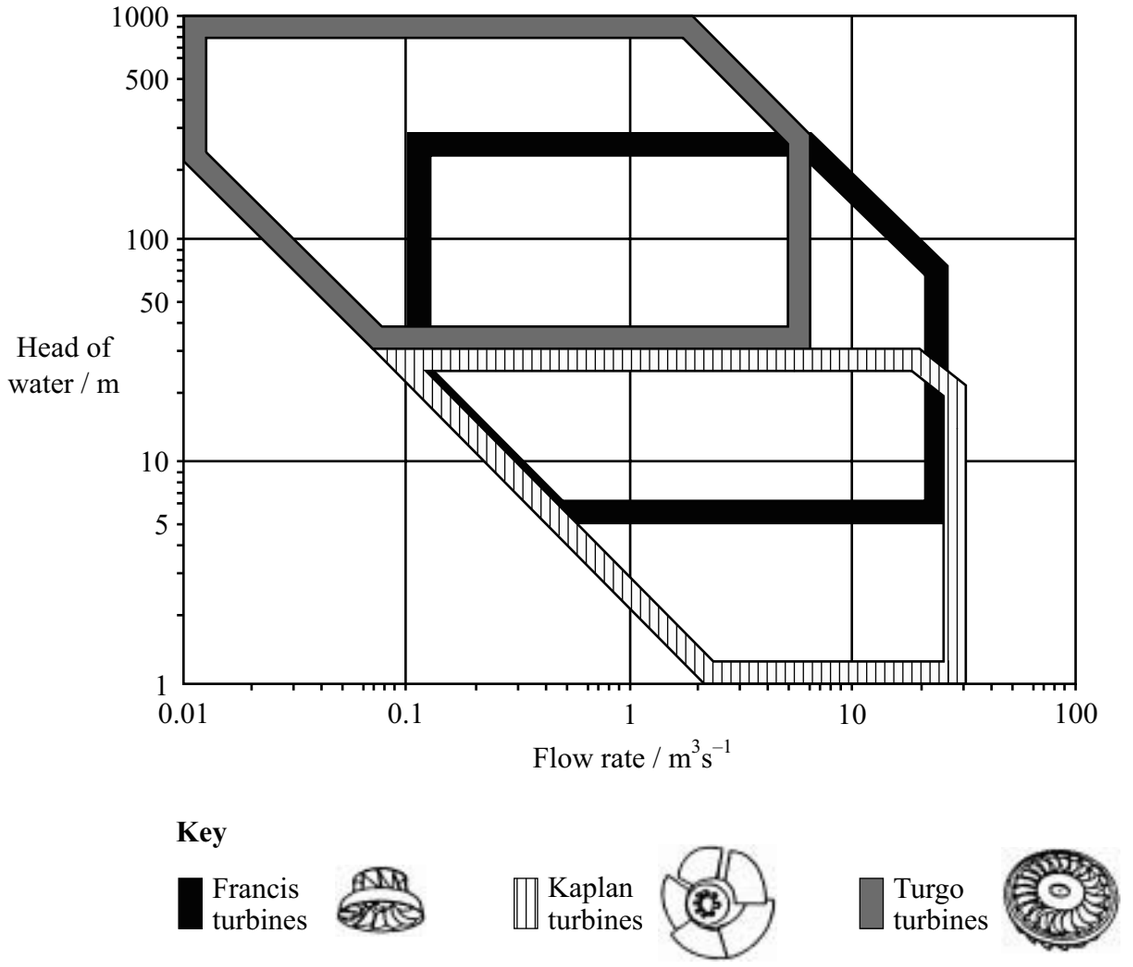
10

Turn over for the next question

LEAVE MARGIN BLANK

5 Hydroelectric power is a well established renewable energy resource. The type of turbine used depends on the flow rate and height drop of the water.

The graph shows the types of turbine which can be used under different conditions of flow rate and height drop (head of water).



(a) (i) Shade the area on the graph where the flow rate and height drop are suitable for Turgo turbines **only**. *(1 mark)*

(ii) What type of turbine should be used if the flow rate is 10 m^3s^{-1} and the height drop is 100 m?

.....

(1 mark)

(iii) Which **two** types of turbine could **never** be used under the same conditions?

..... and .....

(1 mark)

LEAVE MARGIN BLANK

(b) Explain why hydroelectric power can be described as indirect solar power.

.....

.....

.....

.....

(2 marks)

(c) Describe how pumped storage hydroelectric power stations can be used to match electricity supplies to demand.

.....

.....

.....

.....

(2 marks)

(d) Explain how the following features make it difficult to replace fossil fuels with renewable energy resources.

(i) The amount of energy per kg of fuel (energy density)

.....

.....

(1 mark)

(ii) Intermittency of supplies

.....

.....

(1 mark)

(iii) Type of energy available for use

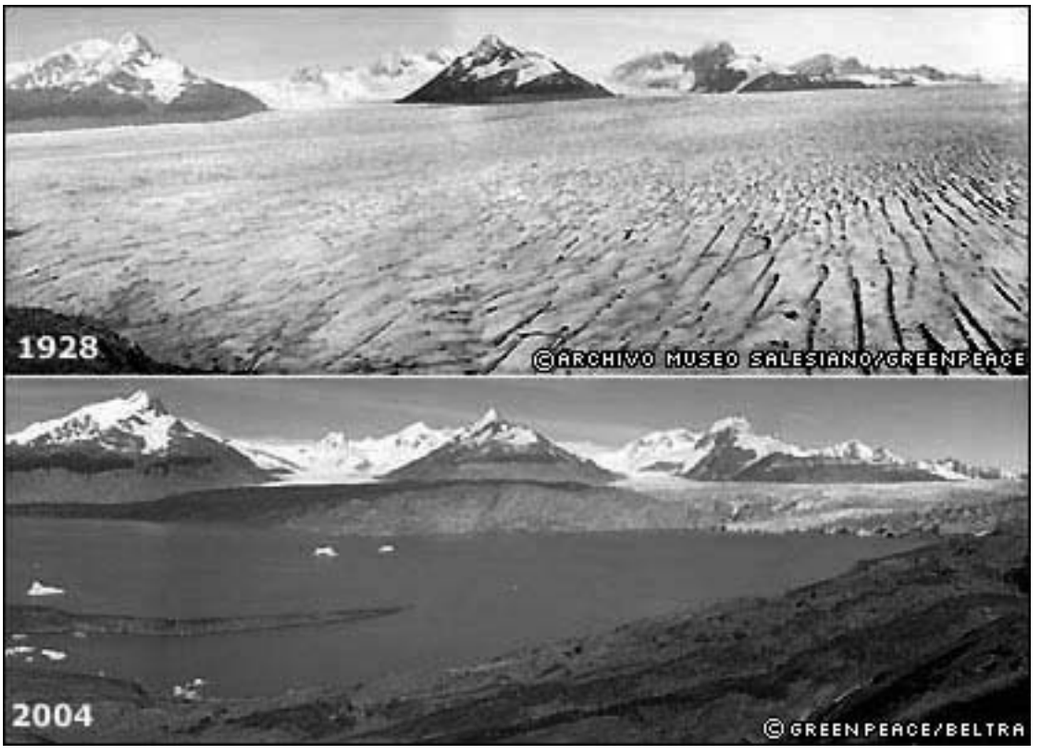
.....

.....

(1 mark)

10

6 The pictures show the Upsala glacier in Argentina which may have been affected by global climate change. The first was taken in 1928 and the second in 2004.



Source: Greenpeace/Beltra/Archivo Museo Salesiano

(a) Complete the table which links the gases involved in global climate change to the human activity causing their release.

Name of gas	Molecular formula	Human activity causing release
Carbon dioxide	CO_2	Burning fossil fuels
	Various, eg CCl_3F	Scrapping old refrigerators
Oxides of nitrogen	NO, N_2O, NO_2 (NO_x)	
Methane	CH_4	

(3 marks)

(b) Suggest why snowfall in some areas may be increased by global climate change.

.....

.....

(1 mark)

(c) Explain why the melting of ice which is floating in the sea does not cause an immediate rise in sea level.

.....

.....

(1 mark)

(d) Describe how plants and animals are likely to be affected by global climate change.

Quality of Written Communication will be assessed in this answer.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

LEAVE MARGIN BLANK

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(10 marks)

15

END OF QUESTIONS

There are no questions printed on this page

There are no questions printed on this page

ACKNOWLEDGEMENT OF COPYRIGHT-HOLDERS AND PUBLISHERS
Permission to reproduce all copyright material has been applied for. In some cases, efforts to contact copyright-holders have been unsuccessful and AQA will be happy to rectify any omissions of acknowledgements in future papers if notified.