Surname		Other Names	
Centre Number			Candidate Number				
Candidate Signature									

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General Certificate of Education
January 2005
Advanced Subsidiary Examination

ASSESSMENT and QUALIFICATIONS ALLIANCE

ENVIRONMENTAL SCIENCE ESC1
Unit 1 Energy, Atmosphere and Hydrosphere

Tuesday 11 January 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 details of some of the processes in the carbon cycle.

Add the names of the missing processes to the table.

Name of process	Description of process
	Fixation of carbon dioxide in plants using energy from sunlight
Carbonate rock formation	Sedimentary rocks formed by the laying down of shells of marine organisms or by chemical precipitation
	Production of carbon dioxide from organic matter at high temperatures
Respiration	Release of carbon dioxide from living organisms to produce energy for metabolic processes
	Production of methane or alcohol from the incomplete decay of organic matter

(3 marks)

(b) Use the carbon cycle to explain the principle of a dynamic equilibrium.

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(2 marks)

5

NO QUESTIONS APPEAR ON THIS PAGE

TURN OVER FOR THE NEXT QUESTION

2 Forest removal and urbanisation can alter the local climate.

Diagrams 1 and **2** show an area where forest has been removed to develop a city. The graph shows the mean air temperature of the area before forest removal.

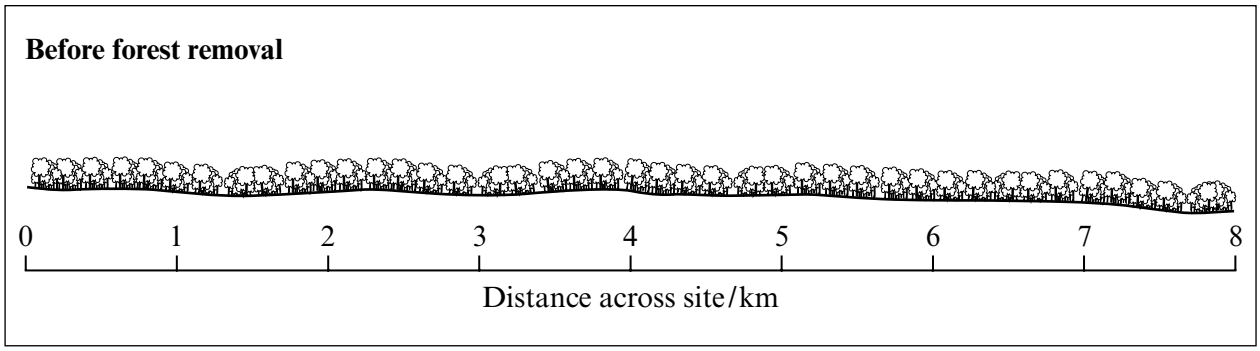


Diagram 1

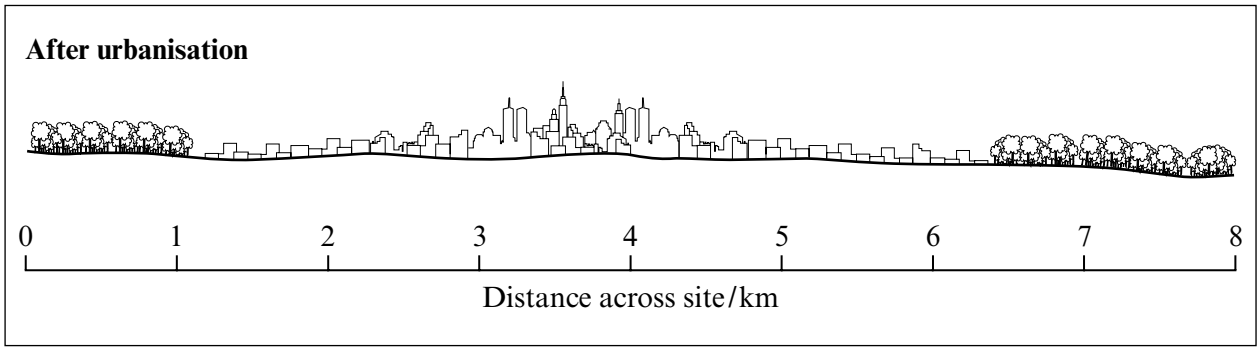
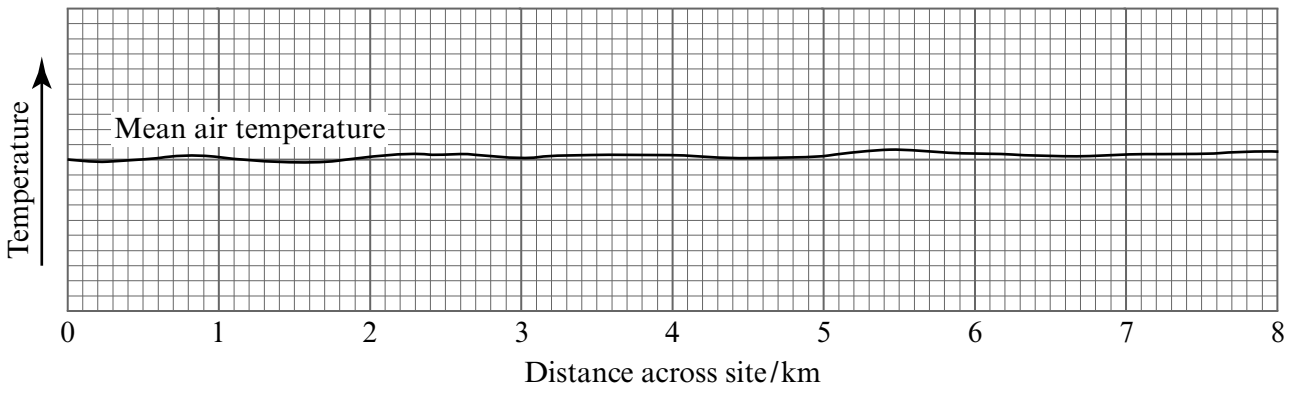


Diagram 2



Mean air temperature before forest removal

(a) (i) Draw a line on the graph to show how the urban development will have changed the air temperature. *(1 mark)*

(ii) Outline why this change in temperature has occurred.

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(1 mark)

(b) Explain why **two** other features of the local climate may change after urbanisation.

1. Feature .....

Explanation .....

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2. Feature .....

Explanation .....

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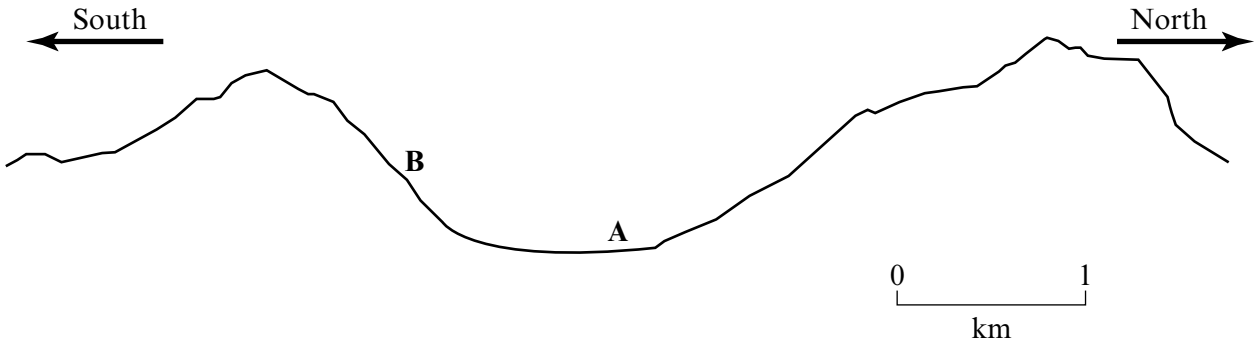
(4 marks)

(c) The local climate of an area can also be affected by its topography. The diagram shows two locations in a mountainous region in Britain.



Describe **two** ways in which the local climate at **A** will be different from that at **B**.

1. Difference .....

Description .....

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2. Difference .....

Description .....

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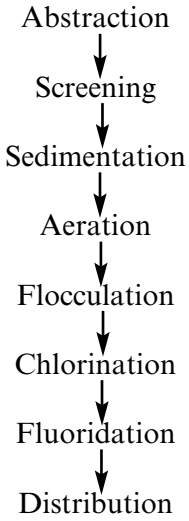
(4 marks)

10

3 The diagram shows some of the processes used to make water suitable for drinking.



(a) State the purposes of the following processes.

(i) Sedimentation

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(1 mark)

(ii) Flocculation

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(1 mark)

(b) Chlorine is often added to water to kill pathogenic bacteria.

Name another method that is used to sterilise water for public supply.

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(1 mark)

(c) The level of chemical contamination is an important factor in the selection of water sources for agriculture.

Outline a problem which would be caused by the use of irrigation water containing dissolved salts.

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(2 marks)

(d) Describe a technique which can be used to produce fresh water from salt water.

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(2 marks)

(e) Describe how the quality of water may affect its use in industry.

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(3 marks)

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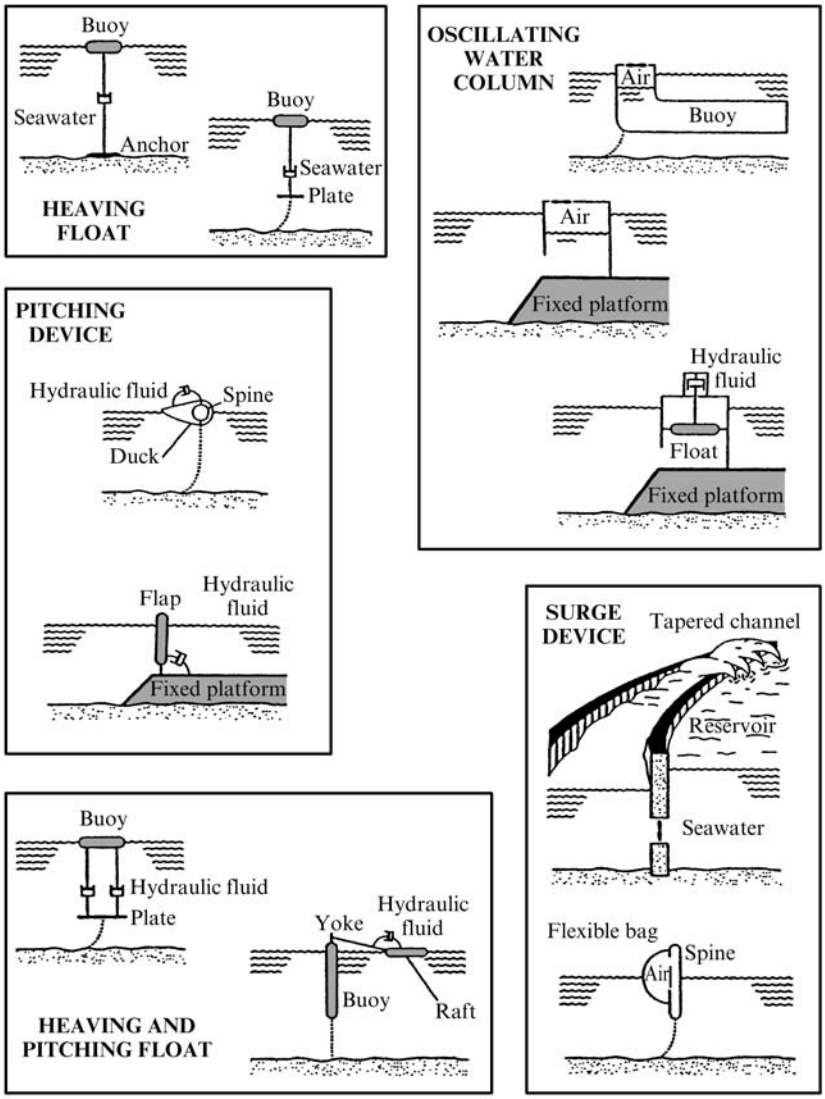
TURN OVER FOR THE NEXT QUESTION

4 Many different designs of equipment have been proposed to harness the energy of waves in the sea.

The diagram shows some of these designs.



Source: adapted from *An Assessment of Renewable Energy for the UK* (HMSO) 1994 (Crown copyright materials reproduced with the permission of the Controller of HMSO and the Queen's Printer for Scotland.)

(a) Describe how **one** type of wave power equipment could be used to produce electricity.

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(2 marks)

(b) Explain why wave power can be considered to be indirect solar power.

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(2 marks)

(c) Name **two** other methods by which the kinetic energy of naturally moving water is harnessed.

1. .....

2. .....

(2 marks)

(d) Wind power is another important renewable energy technology.

Outline **two** factors which must be considered when choosing a suitable site for a wind farm.

1. .....

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2. .....

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(4 marks)

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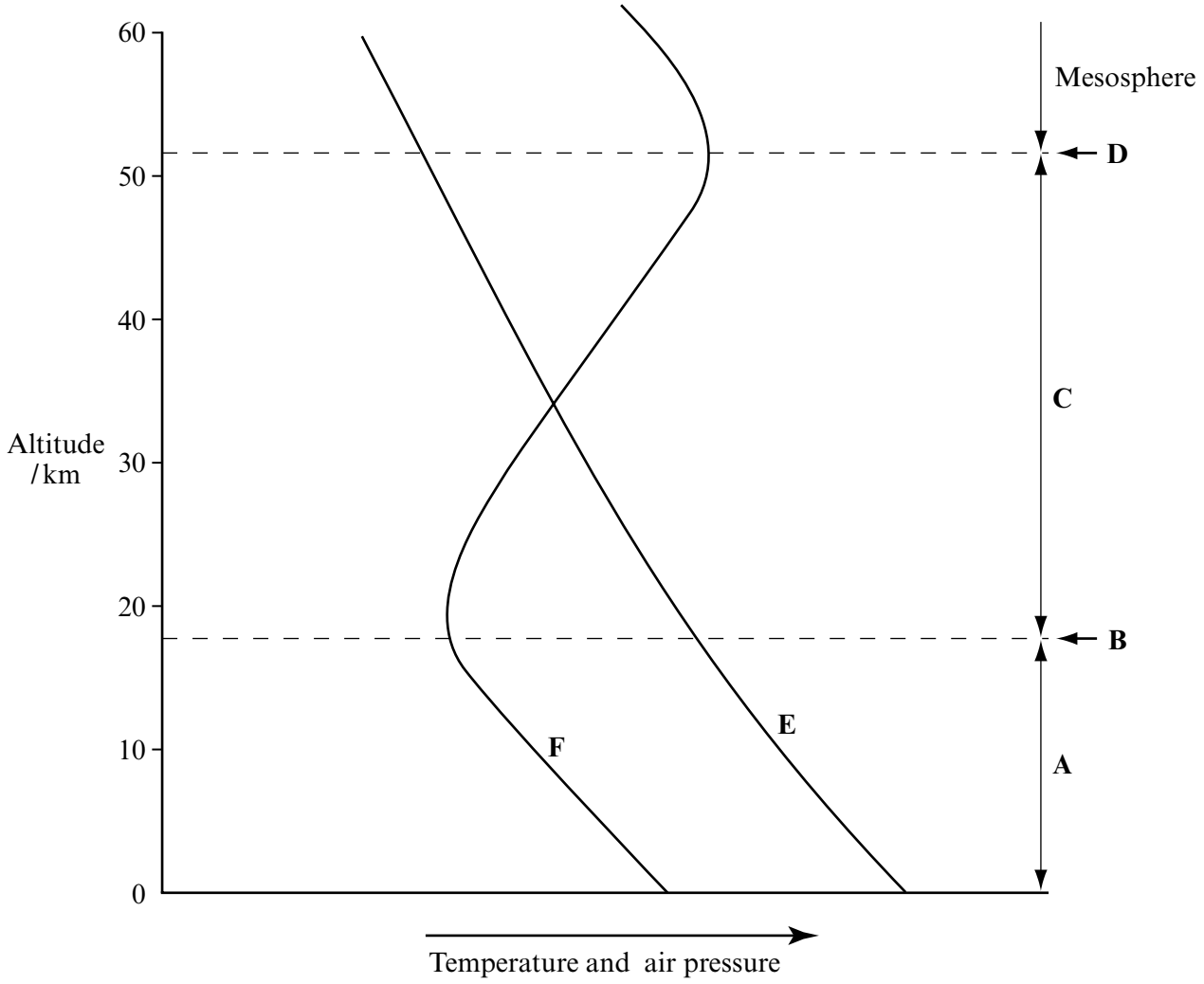
TURN OVER FOR THE NEXT QUESTION

5 (a) The diagram shows some features of the structure of the atmosphere.



Use letters from the diagram to identify the following features of the atmosphere.

Air temperature .....

Troposphere .....

(2 marks)

(b) Explain why the ozone layer is so important to life on Earth.

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(2 marks)

(c) Describe how chlorofluorocarbon gases (CFCs) reduce the amount of ozone in the ozone layer.

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(2 marks)

(d) Outline the methods which have been used to reduce the release of CFCs.

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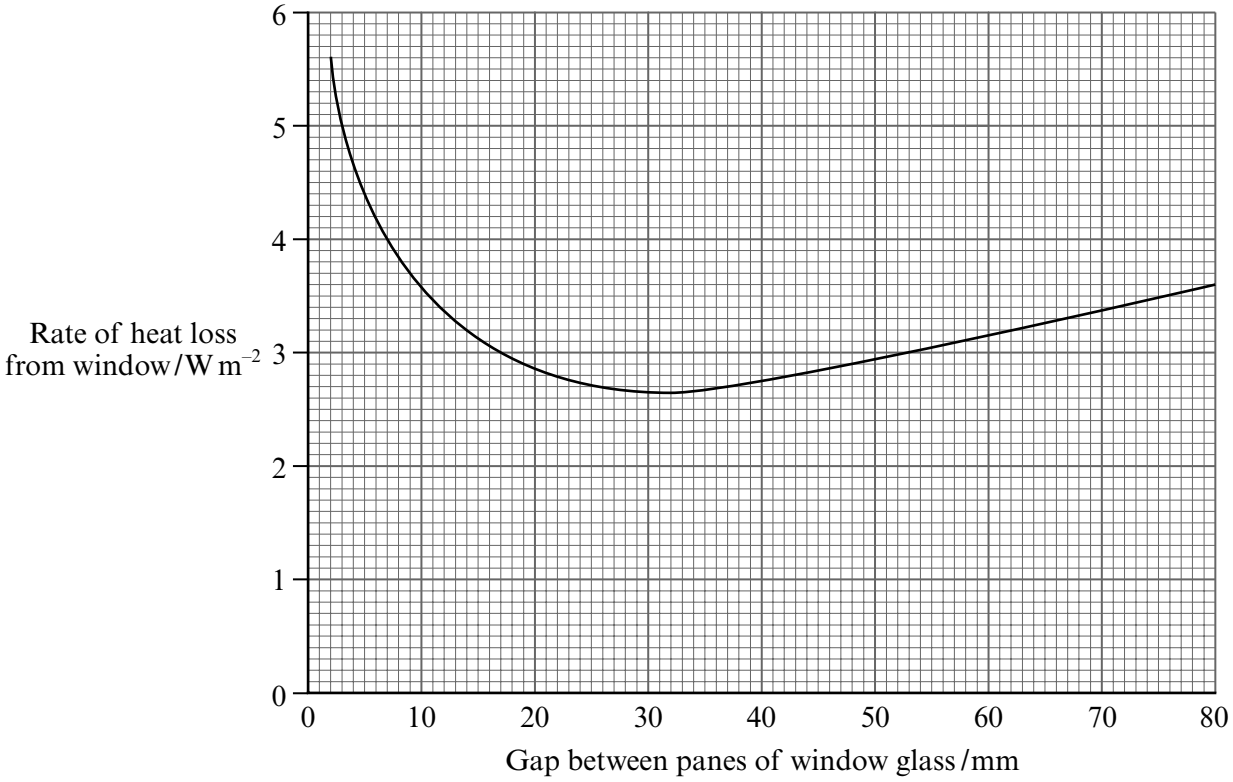
(4 marks)

10

TURN OVER FOR THE NEXT QUESTION

6 The effectiveness of double glazed windows is affected by the size of the gap between the panes of glass.

(a) The graph shows the effect of gap size on the rate of heat loss when the outside temperature is 10 °C lower than that inside the house.



Use the graph to estimate the optimum gap for energy conservation.

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(1 mark)

(b) Explain how double glazing reduces heat loss through a window.

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(2 marks)

(c) The choices made during the design of a house will affect the amount of energy needed to keep it warm.

Explain how the amount of energy needed to heat a house would be affected by:

(i) a large surface area to volume ratio;

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(1 mark)

(ii) a small temperature gradient between the inside and outside;

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(1 mark)

(iii) being in a windy position.

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(1 mark)

(d) Describe the ways in which energy conservation may reduce damage to the environment.

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(9 marks)

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END OF QUESTIONS

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