



Rewarding Learning

ADVANCED

General Certificate of Education

2023

Centre Number

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Candidate Number

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# Environmental Technology

Unit A2 1

Building and Managing a Sustainable Future



AET11

[AET11]

FRIDAY 2 JUNE, MORNING

### TIME

2 hours.

### INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

Write your answers in the spaces provided in this question paper.

Complete in black ink only. **Do not write with a gel pen.**

Answer **all** questions.

### INFORMATION FOR CANDIDATES

The total mark for this paper is **100**.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Quality of written communication will be assessed in Questions **5(b)**, **7(a)** and **9**.

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	

<b>Total Marks</b>	
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Examiner Only	
Marks	Remark

1 (a) (i) Name the process which uses bacteria to extract metals from low grade ore which is an alternative to traditional metal smelting.

\_\_\_\_\_ [1]

(ii) Give **two** reasons why traditional metal smelting technology is detrimental to the environment.

1. \_\_\_\_\_ [1]

2. \_\_\_\_\_ [1]

(b) Another extraction technique uses plants to extract metal from metal ore mine tailings. **Table 1** shows the names of metals which can be extracted by plants.

(i) Give the names of the plants which can extract the metals shown in **Table 1**.

**Table 1**

Name of Plant	Metal extracted
	Copper
	Gold

[2]

(ii) Describe, using **four** stages, the process of how metal ore is extracted by plants.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_ [4]

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**(Questions continue overleaf)**



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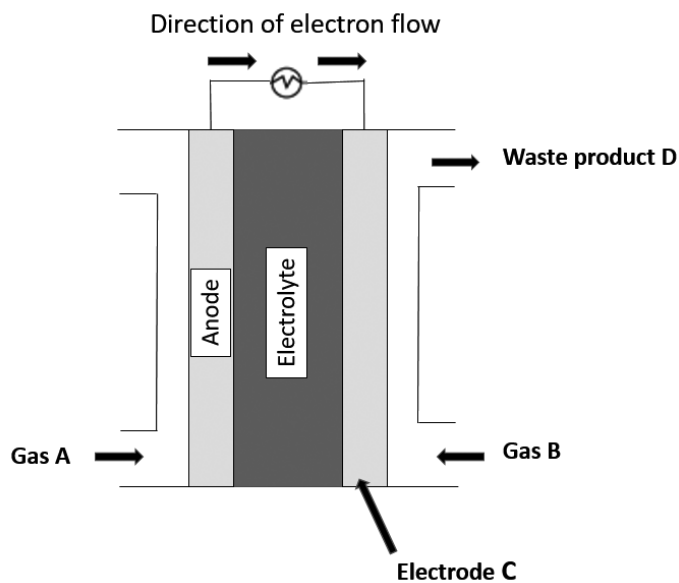
**(Questions continue overleaf)**







(c) Fig. 2 shows a diagram of a PEM fuel cell.



Source: © Principal Examiner

Fig. 2

Name each of the following in Fig. 2:

Gas A: \_\_\_\_\_ [1]

Gas B: \_\_\_\_\_ [1]

Electrode C: \_\_\_\_\_ [1]

Waste product D: \_\_\_\_\_ [1]

(d) Describe **two** different applications of hydrogen fuel cells.

1. \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_ [2]

2. \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_ [2]

Examiner Only	
Marks	Remark

5 Reducing reliance on landfill is one of the main objectives of the Northern Ireland Waste Management Strategy.

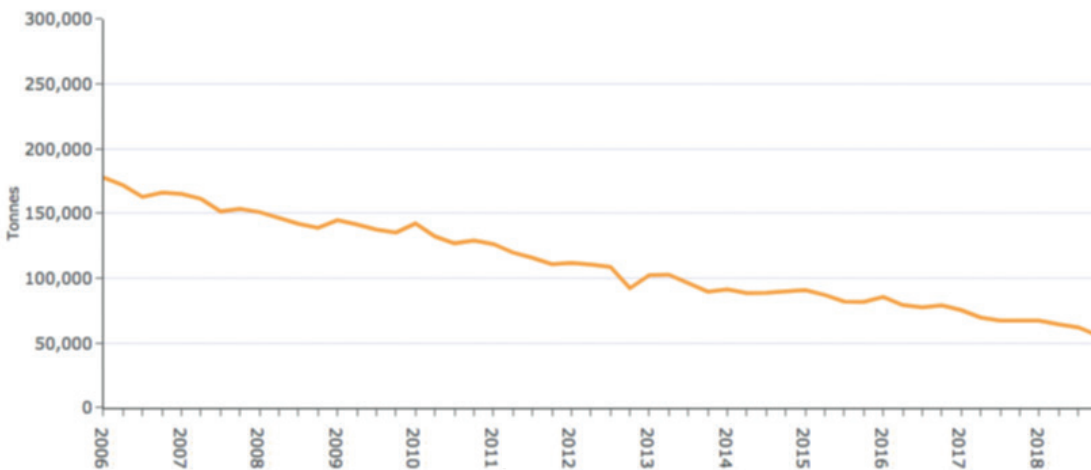
Examiner Only	
Marks	Remark

(a) Name **two** priority waste streams identified in the Northern Ireland Waste Management Strategy.

1. \_\_\_\_\_ [1]

2. \_\_\_\_\_ [1]

The graph, **Fig. 3**, shows the amount of household waste which has been sent to landfill between 2006 and the end of 2018.



Source: [https://www.daera-ni.gov.uk/sites/default/files/publications/daera/northern-ireland-local-authority-collected-municipal-waste-management-statistics\\_2.html](https://www.daera-ni.gov.uk/sites/default/files/publications/daera/northern-ireland-local-authority-collected-municipal-waste-management-statistics_2.html)

**Fig. 3**

(b) Using the graph in **Fig. 3**, comment on the trend in landfill use in Northern Ireland and outline **two** key EU strategies and directives identified in the Northern Ireland Waste Management Strategy that have driven this change.

**The quality of written communication will be assessed in your answer.**

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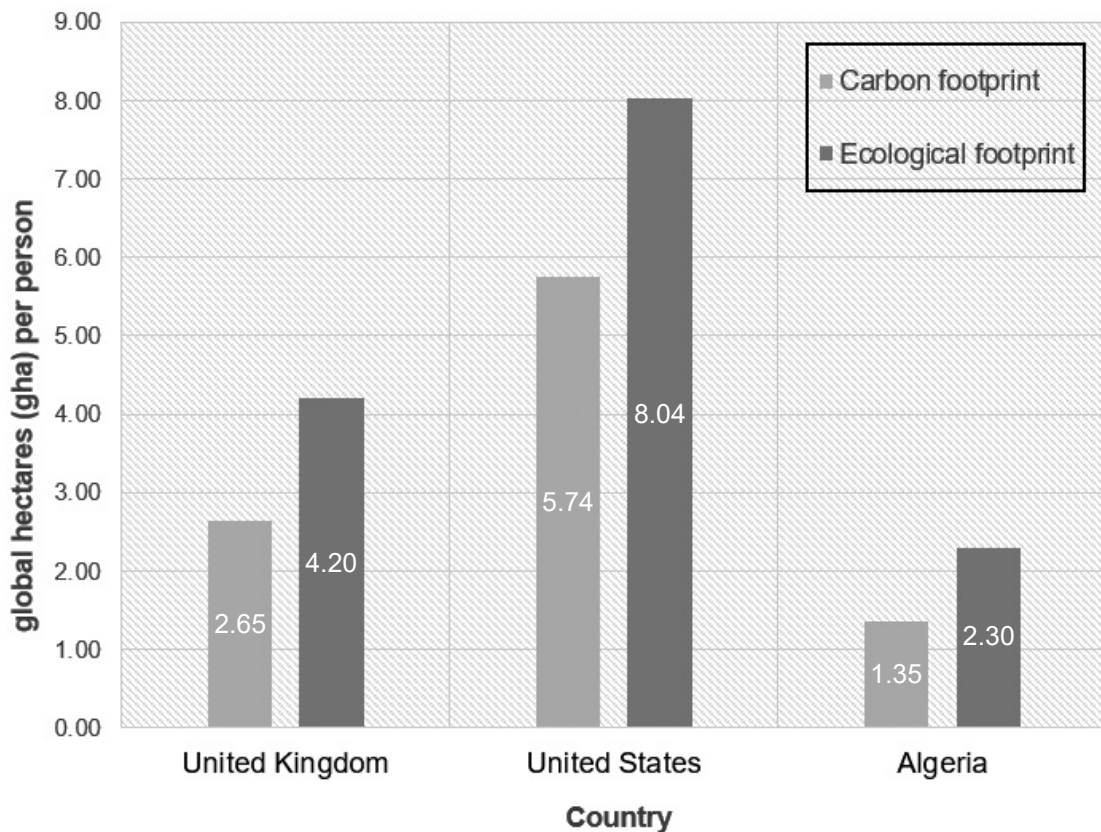








(b) The graph in **Fig. 5** shows the ecological and carbon footprint for people in three different countries.



Source: © Principal Examiner

**Fig. 5**

Discuss the concept and measurement of an ecological footprint and the link between an ecological footprint and a carbon footprint making reference to **Fig. 5** where appropriate.

Concept of an ecological footprint:

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[2]

Examiner Only	
Marks	Remark



8 Linking isolated rural dwellings to waste water treatment, energy supply and communication networks causes problems in terms of cost and environmental impact.

(a) Discuss these problems. Include **one** discussion point for each problem.

Cost:

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[2]

Environmental Impact:

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[2]

Examiner Only	
Marks	Remark

**(b)** Describe **one** solution for each of the three named issues **(i)**, **(ii)** and **(iii)** that would improve sustainability for rural communities.

**(i)** Energy supply:

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[2]

**(ii)** Communication networks:

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[2]

**(iii)** Waste water treatment:

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[2]

Examiner Only	
Marks	Remark









## Sources

Fig.3.....© Crown Copyright. <https://www.daera-ni.gov.uk/articles/northern-ireland-local-authority-collected-municipal-waste-management-statistics>  
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fig.4.....© Getty Images

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