



*Rewarding Learning*  
**ADVANCED SUBSIDIARY**  
**General Certificate of Education**  
**2023**

Centre Number

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Candidate Number

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# Environmental Technology

Assessment Unit AS 1

*assessing*

The Earth's Capacity to Support  
Human Activity



SET11

**[SET11]**

**THURSDAY 25 MAY, AFTERNOON**

## TIME

1 hour 30 minutes.

## 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 75.

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 Question 7.

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

<b>Total Marks</b>	
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3 (a) Renewable energy sources can be categorised into two groups, direct and indirect.

(i) Identify **two** direct renewable energy sources.

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

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

(ii) Explain what is meant by the term indirect renewable energy source.

\_\_\_\_\_

\_\_\_\_\_

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

(b) A company which owns six small holiday cottages is upgrading the heating system by installing a ground source heat pump which could provide heat for the holiday cottages and a nearby farm house.

(i) Discuss **three** different benefits of community microgeneration with reference to a ground source heat pump.

1. \_\_\_\_\_

\_\_\_\_\_

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

2. \_\_\_\_\_

\_\_\_\_\_

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

3. \_\_\_\_\_

\_\_\_\_\_

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

Examiner Only

Marks

Remark

**Table 1** shows the details of the ground source heat pump to be installed.

**Table 1**

Energy used by heat pump per hour	4.8 MJ
Energy output of heat pump per hour	24 MJ
Operating temperature	20 – 65°C
Type of ground loop	Horizontal

- (ii) State the formula for the Coefficient of Performance of the heat pump and using the information in **Table 1** calculate the coefficient of performance of the ground source heat pump.

Show your working out in the space below.

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

Answer \_\_\_\_\_ [3]

Examiner Only

Marks Remark

4 (a) A wind turbine has a mass of 9 tonnes.

Show that, if the blade length doubles, the new mass of the turbine will be 72 tonnes.

Show your working out in the space below.

[3]

(b) (i) The energy present in 860 kg of air moving at a particular wind speed is 43000 J. Calculate the wind speed of the 860 kg of air.

Show your working out in the space below.

Answer \_\_\_\_\_ m/s [3]

Examiner Only	
Marks	Remark





(b) Compare the operation of the solar thermal collector shown in Fig. 1 with an evacuated tube solar thermal collector shown in Fig. 2.

You are expected to make **three** comparisons.

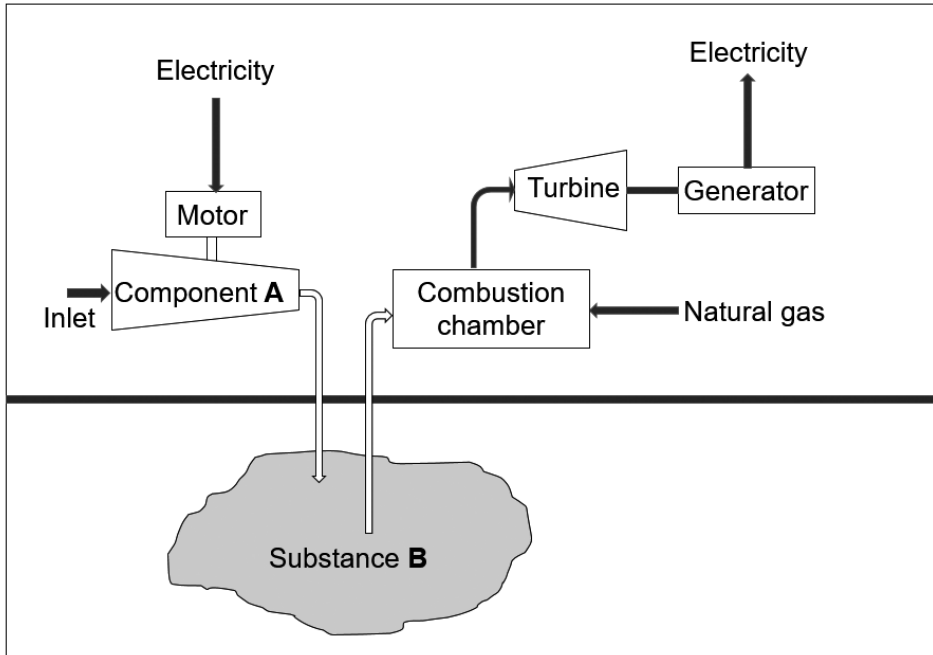
1. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

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

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

Examiner Only	
Marks	Remark

6 (a) Fig. 3 shows a diagram of an energy storage facility.



Source: © Principal Examiner

Fig. 3

(i) Name the energy storage facility shown in Fig. 3.

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

(ii) Name component A shown in Fig. 3.

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

(iii) Name substance B shown in Fig. 3.

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

(iv) Describe how the energy storage facility in Fig. 3 operates.

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[4]

Examiner Only	
Marks	Remark

(b) Pumped hydro energy storage is another type of energy storage facility.

Discuss **two** features of locations for pumped hydro energy storage that are required to make it cost-effective.

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

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

Examiner Only	
Marks	Remark





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**THIS IS THE END OF THE QUESTION PAPER**

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