

Surname	Centre Number	Candidate Number
Other Names		0



GCSE

4781/01



W15-4781-01

SCIENCE B

**UNIT 1: Space, Energy and Life
FOUNDATION TIER**

P.M. THURSDAY, 15 January 2015

1 hour 15 minutes

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
Section A	1.	8
	2.	6
	3.	9
	4.	8
	5.	9
	6.	6
Section B	7.	24
	Total	70

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ADDITIONAL MATERIALS

In addition to this paper you may require a calculator and a ruler.

You will also need a copy of the **Resource Folder** (Pre-Release Article) to answer **Section B**.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication used in your answer to question 7(e).

Section B is based upon the **Pre-Release Article**.

SECTION A

Answer all questions in the spaces provided.

1. During the last 100 years, the percentage of land area covered by forest has fallen by 20%. At the same time, there has been a rapid increase in the Earth's human population. There has also been an increase in captive breeding programmes.

(a) Give **two** reasons why more land is needed as the population increases. [2]

- 1.
- 2.

(b) (i) Describe what is meant by the term *captive breeding programmes*. [2]

.....

.....

(ii) State **one** reason why these programmes are important. [1]

.....

.....

(c) Many people believe that intensive farming is better at producing enough food. Other people prefer their food to be produced by organic farming.

In the table below, **tick (✓)** to show whether the statement is linked with intensive farming **or** organic farming. *One row has been completed as an example.* [3]

	Intensive farming	Organic farming
Uses pesticides	✓	
Produces more food		
Produces cheaper food		
Does not use caged animals		

2. (a) Complete the sentences below.

[5]

- (i) The Universe began as the result of an known as the Big Bang.
- (ii) The Universe continues to away from the Big Bang.
- (iii) The evidence for the Big Bang is provided by shift measurements.
- (iv) Cosmic Background radiation is the remains of energy produced by the Big Bang.
- (v) The Universe is estimated to be 13.5 thousand years old.

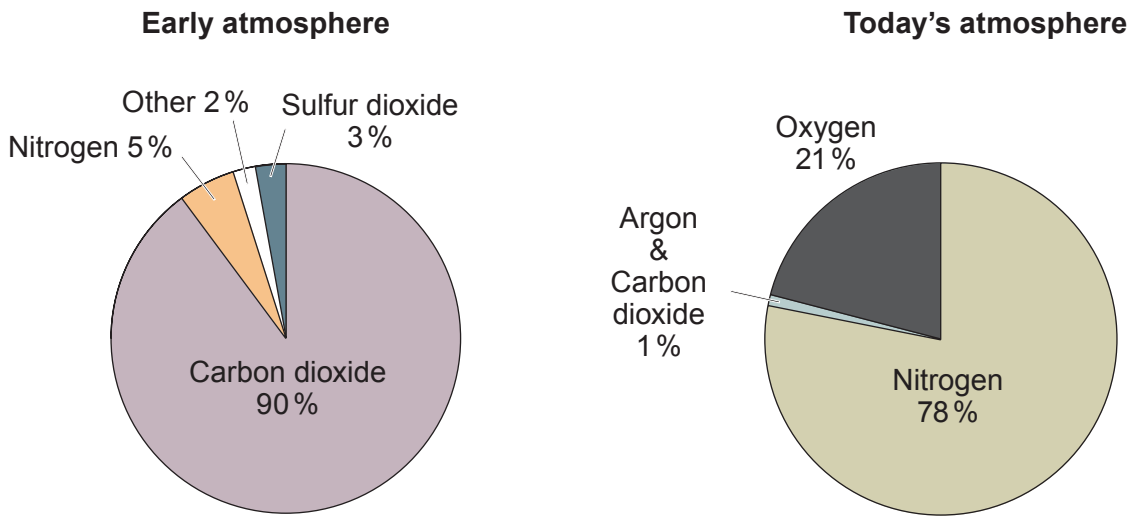
(b) Light years are used when measuring the Universe. What is a light year?

[1]

.....

6

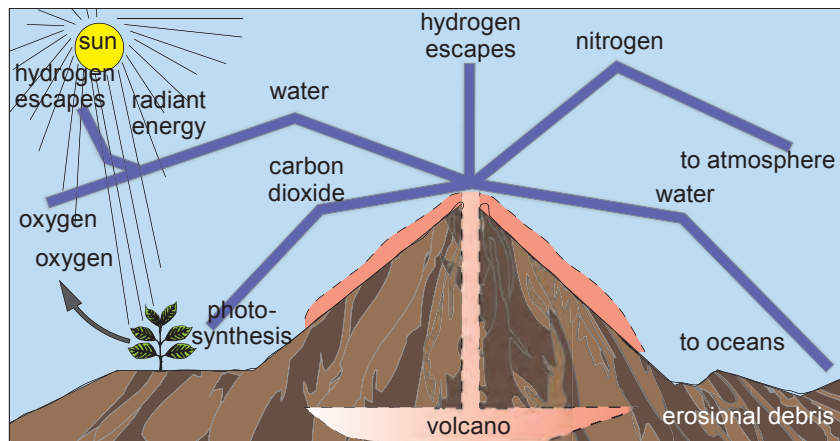
3. (a) The pie charts below show how the present day atmosphere on Earth compares with the early atmosphere millions of years ago.



- (i) State **three** ways today's atmosphere is different from the early atmosphere. [3]

1.
2.
3.

- (ii) Use the information in the diagram below to give **two** ways volcanoes helped the atmosphere of the Earth to change. [2]



1.
2.

- (b) The table below shows information about gases found in the atmosphere on Venus, Earth and Mars.

Atmospheric gas	Venus	Earth	Mars
CO ₂	98 %	0.03 %	90 %
N ₂	1 %	78 %	2.5 %
O ₂	0.0 %	21 %	2.5 %

- (i) Name the planet that has the biggest greenhouse effect and give **one** reason for your answer. [2]

Planet

Reason

- (ii) Scientists claim that the global warming on Earth is increasing. State **two** effects of global warming. [2]

1.

2.

4. (a) (i) Complete the table of the electromagnetic (em) spectrum to show the positions of **visible, ultra-violet** and **infra-red** radiation. [2]

Gamma rays	X rays	Microwaves	Radio waves
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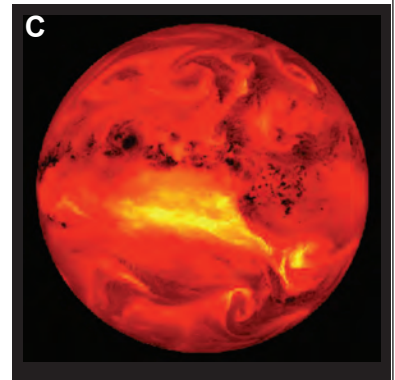
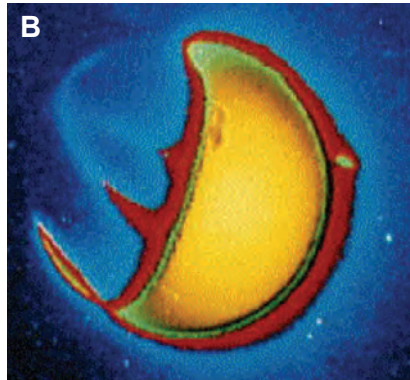
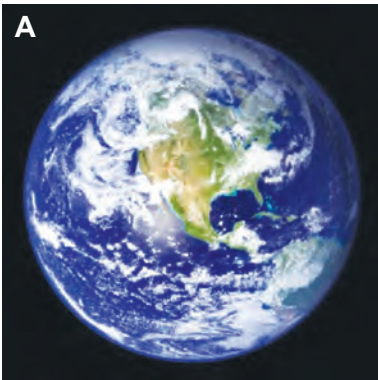
- (ii) Complete the sentences below by **underlining** the correct word in the brackets. [3]

The wavelength (*decreases / stays the same / increases*) from gamma rays to radio waves.

The frequency (*decreases / stays the same / increases*) from gamma rays to radio waves.

The wave energy (*decreases / stays the same / increases*) from gamma rays to radio waves.

- (b) These pictures of the Earth were taken using different parts of the em spectrum.



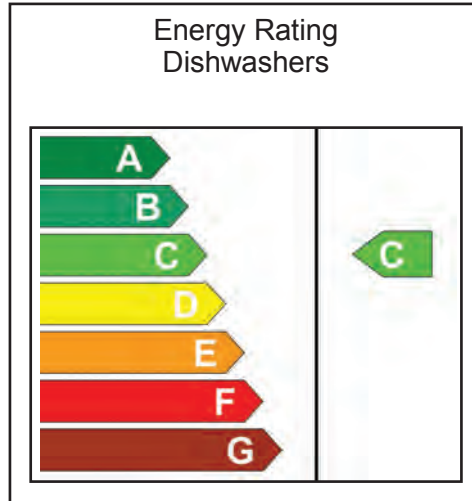
Complete the table below.

[3]

Picture	Features	Type of em wave used to take the picture
A	Land, clouds and sea clearly seen.
B	One side appears than the other.	ultra-violet
C	Shows patterns of water vapour in the atmosphere that has trapped heat.

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5. Dishwashers are rated by the amount of energy they use. Dishwashers rated **A** use less energy and are cheaper to run than those rated **G**.



The following table gives information about dishwashers rated **A**, **B** and **D**.

Dishwasher energy rating	Voltage (V)	Current (A)	Units of energy used per year (kWh)
A	230	4	210
B	230	6	315
D	230	8	420

- (a) Calculate the power of dishwashers rated **D** using the equation: [2]

$$\text{power} = \text{voltage} \times \text{current}$$

Power = kW

- (b) Circle, from the list below, the energy used per year by a dishwasher rated **C**. [1]

200 310 350 430

(c) A homeowner buys a dishwasher rated **D**.

(i) Find the cost of using this dishwasher for a year using the equation: [2]

$$\text{cost} = \text{units used} \times \text{cost per unit}$$

One unit of electricity costs 20p.

Cost = £

(ii) Complete the following sentence by **underlining** the correct words in the brackets. [1]

The dishwasher rated **A** costs (*half as much as / the same as / more than*) the dishwasher rated **D** to run.

(iii) The homeowner could have bought a dishwasher rated **A** that cost £35 more than the one rated **D**. State **one** reason why the dishwasher rated **A** would have been more cost effective. [1]

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.....

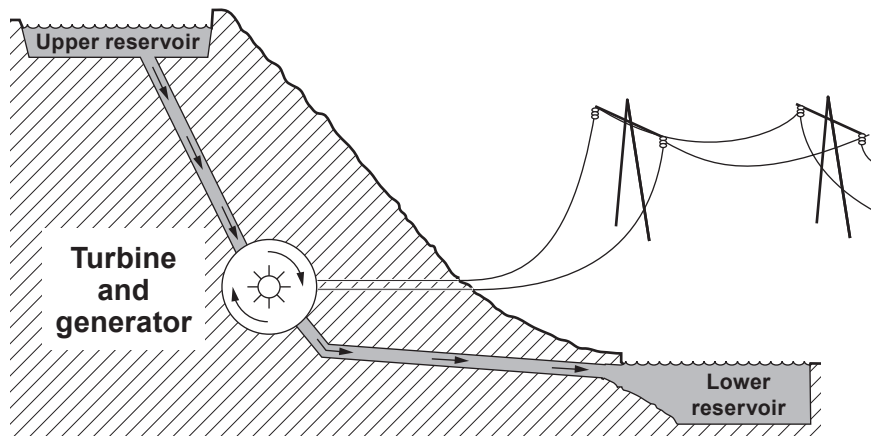
(d) Use the information in the table opposite, and your answer to part (a), to calculate the time that the dishwasher rated **D** was used during a year. [2]

Use the equation:

$$\text{time (h)} = \frac{\text{units used}}{\text{power (kW)}}$$

Time = h

6. The diagram shows how electricity is generated in a hydroelectric power station.



The hydroelectric power station is only used when we need more electricity than the rest of the power stations around the country can supply.

(a) (i) State **one** reason why a hydroelectric power station is quicker to start up than a coal or gas power station. [1]

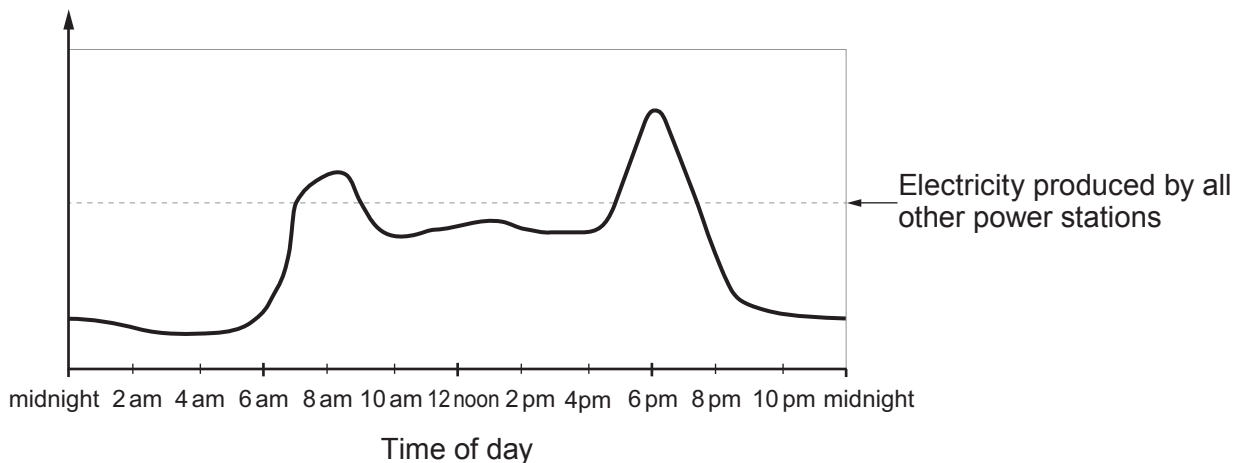
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(ii) State **one** disadvantage to wildlife of using hydroelectric power. [1]

.....

(b) The need for electricity changes in the way shown below.

Demand for electricity



- (i) Demand for electricity is greater than supply from 'all other power stations' between 7.00 a.m. and 9.00 a.m. State **one other** part of day where demand for electricity is greater than supply. [2]

Between p.m. andp.m.

- (ii) **Underline** the best time to use electricity to pump water from the lower reservoir to the upper reservoir. [1]

Midnight – 6 a.m.

6 a.m. – 10 a.m.

10 a.m. – 4 p.m.

4 p.m. – 8 p.m.

- (iii) Give **one** reason for your answer. [1]

.....

SECTION B

Answer all questions in the spaces provided.

Use the information in the separate Resource Folder to answer the following questions.

7. (a) (i) Give **one** reason why phytoplankton and plants **only** increase the oxygen concentration during sunlight hours. [1]

.....

.....

- (ii) Give **one** reason why living phytoplankton and other plants are **only** found in the epilimnion layer of water. [1]

.....

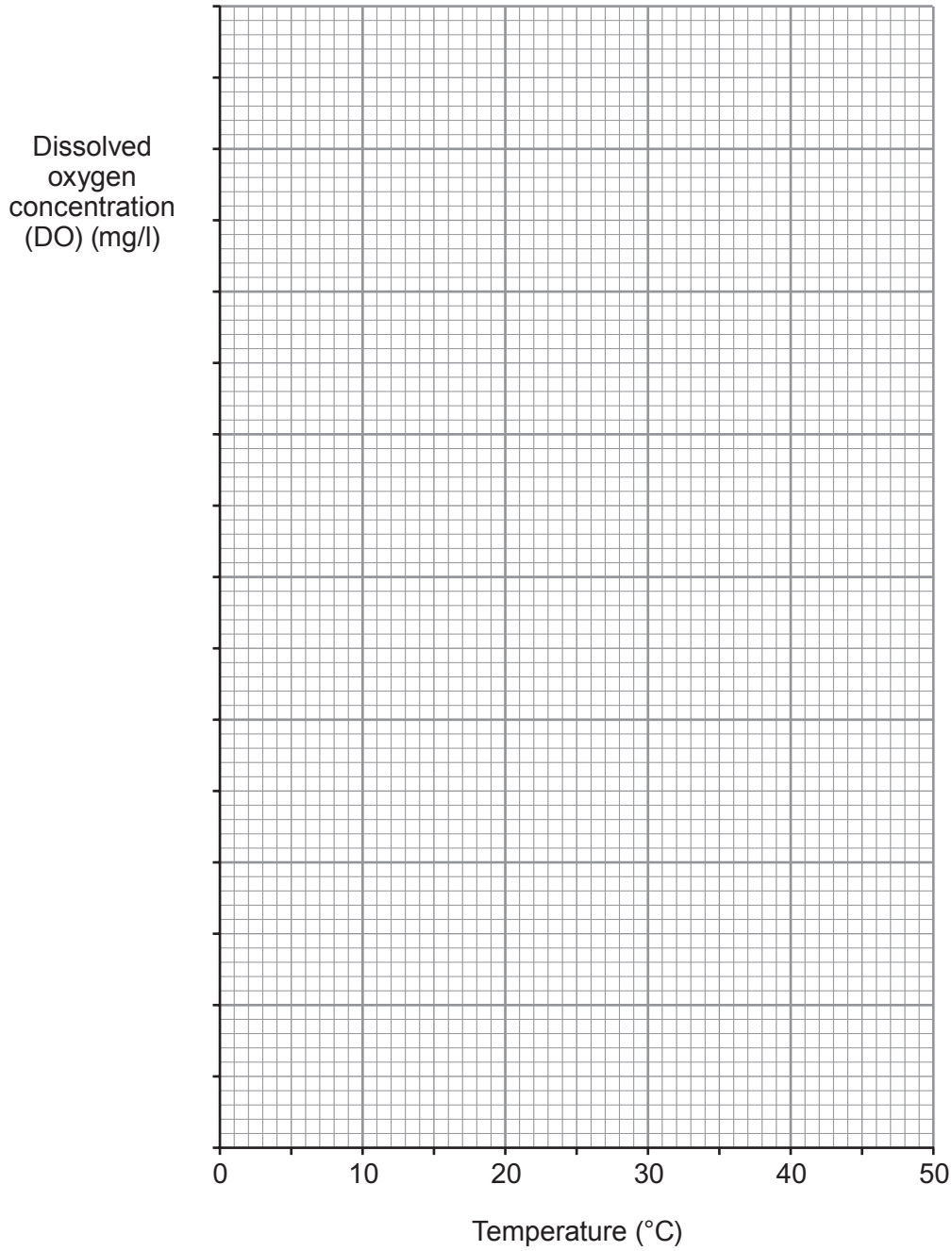
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- (b) Name the process by which phytoplankton and plants will decrease the oxygen concentration at night. [1]

.....

- (c) (i) Use the information in **Table 1** to complete the table below and then plot a graph to show how the dissolved oxygen concentration varies with temperature. [5]

Temperature (°C)	Dissolved oxygen concentration (DO) (mg/l)
0
6
10
14
20
26
30
40



(ii) Describe the pattern shown by your graph. [2]

.....

.....

(iii) Continue your graph to estimate the temperature at which oxygen levels become low enough to cause stress to fish. [1]

.....

- (d) (i) Use **Graph 2** and your answer to (c)(ii) to describe how the dissolved oxygen concentration will vary in the epilimnion between May and November. [3]

.....

.....

.....

.....

- (ii) Use the information in **Diagram 1** and **Graph 1** to complete the table below for the year **2006**. [4]

Month	Dissolved oxygen concentration (DO) (mg/l)	Condition of fish
May	9	OK
June
July
August
September

