

Surname	Centre Number	Candidate Number
Other Names		0



New GCSE

4781/01

SCIENCE B
UNIT 1: Space, Energy and Life
FOUNDATION TIER

P.M. THURSDAY, 17 January 2013

1¼ hours

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

ADDITIONAL MATERIALS

In addition to this paper you may require a calculator, pencil and a ruler.
 You will also need a copy of the Resource Folder 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.
Section B is based upon the Pre-Release Article.

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(a)**.

SECTION A

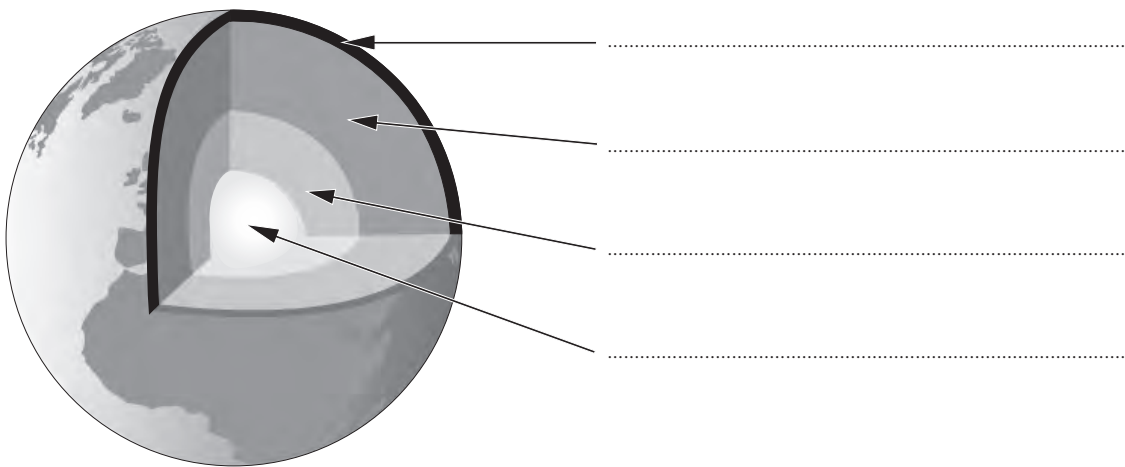
Answer all questions in the spaces provided.

1. (a) The diagram below shows the structure of the Earth.

Use terms from the box to label the diagram.

[4]

solid iron core	molten iron outer core	mantle	crust	plate
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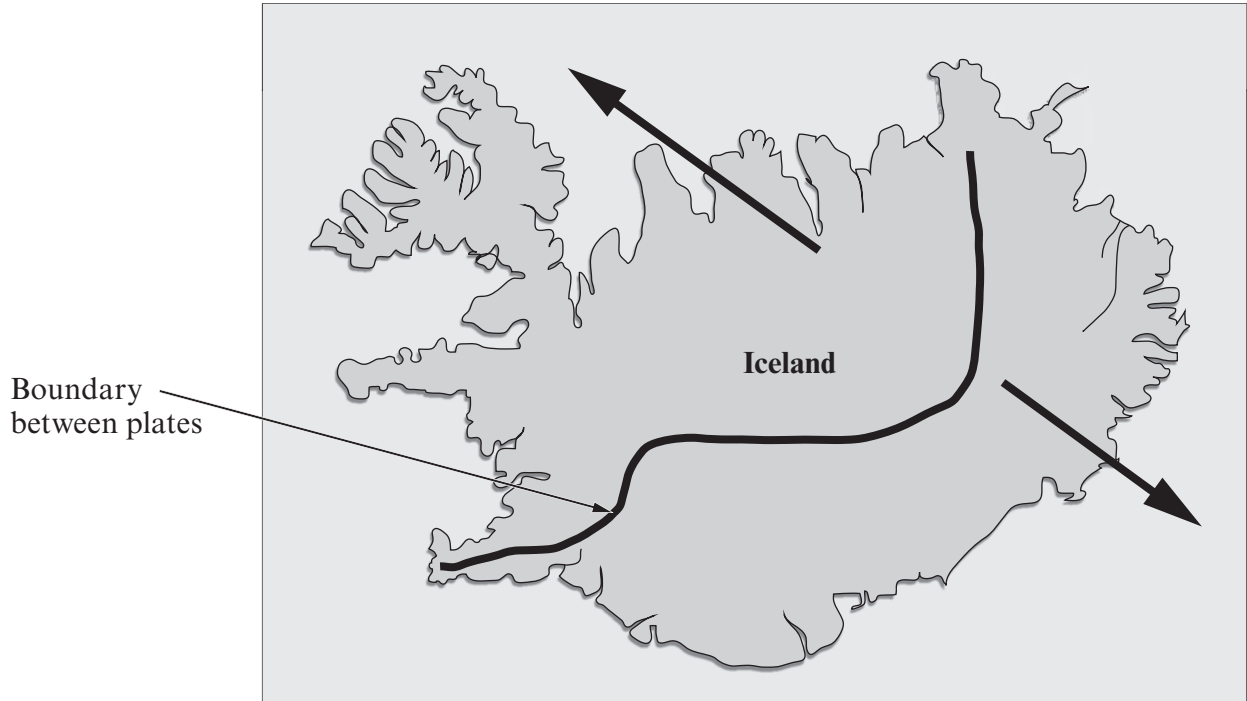
(b) The surface of the Earth changes due to geological processes. For example, Iceland was formed because the Earth is made of plates that move.

(i) Complete the sentences below.

The Earth's crust is made up of huge slabs of rock called
plates. [1]

The movement of these plates is known as drift. [1]

- (ii) Iceland sits on the boundary between two of these plates, which are moving in the direction shown by the arrows.



State **two** natural disasters that could be caused by these moving plates. [2]

- 1.
- 2.

- 2. Homeowners who generate electricity using solar panels on their houses get paid for the energy they produce. Their energy bills also fall slightly.

The cost of installing a 2.5kW solar panel is £9 000.

The homeowner saves £1 200 a year.

- (a) State **one** reason why the use of solar power benefits the **environment**. [1]

.....

- (b) (i) Use the information above to calculate the payback time of the cost of installing the solar panel. [2]

Payback time = years

- (ii) What is the effect on payback time if the weather becomes sunnier over longer periods of time during a year? [1]

.....

- (iii) What is the effect on payback time if the cost of buying electricity from the National Grid increases? [1]

.....

- (c) (i) Calculate the number of units produced by the 2.5kW solar panel in 300 hours of sunlight using the equation: [2]

$$\text{Units used} = \text{power (kW)} \times \text{time (h)}$$

Units used = kWh

- (ii) Calculate the cost of buying this number of units from the National Grid using the equation: [2]

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

One unit of electricity costs 12p

Cost =

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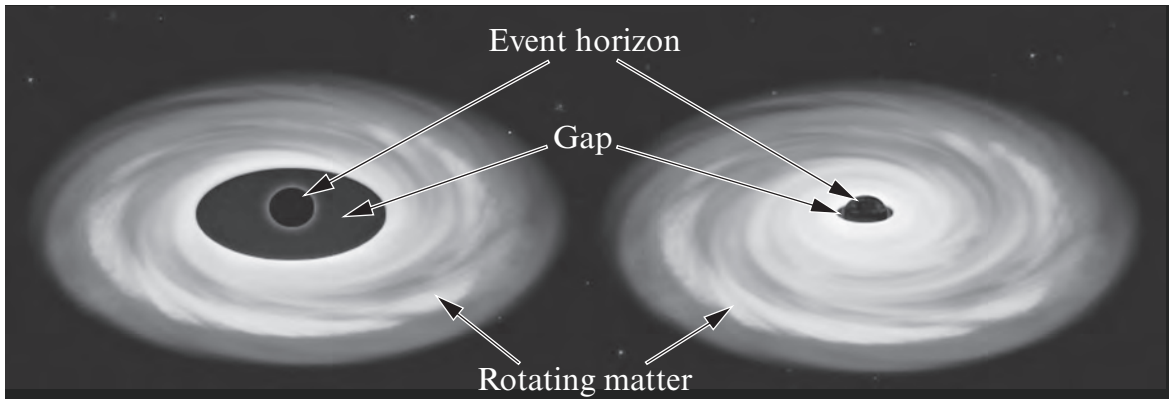
3. Images of objects in space are collected using different parts of the Electromagnetic Spectrum.

(a) State **one** advantage and **one** disadvantage of space-based telescopes compared to Earth-based telescopes when producing these images. [2]

Advantage:

Disadvantage:

(b) The diagram below shows images of **two** black hole systems taken by a space based telescope.



(i) State **one** similarity and **one** difference between the two images. [2]

Similarity:

Difference:

(ii) Name **two** parts of the Electromagnetic Spectrum that can be used to take images of objects in space. [2]

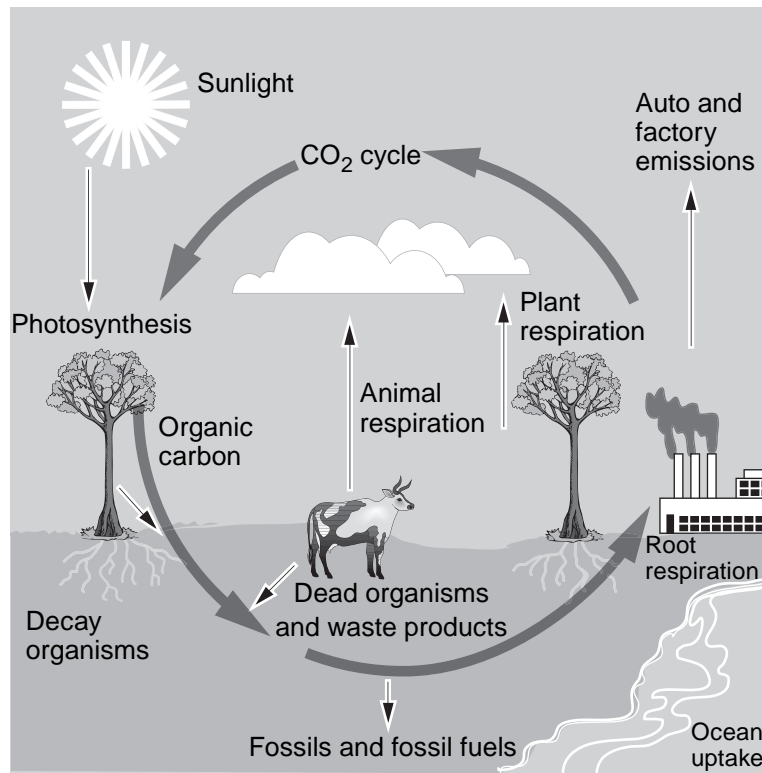
1.

2.

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4. (a) This diagram represents the carbon cycle.



Use the information in the diagram to answer the following questions.

(i) Name **two** processes that add carbon dioxide (CO₂) to the atmosphere. [2]

1.
2.

(ii) Name **one** process that removes carbon dioxide away from the atmosphere. [1]

.....

(b) During the past 200 years, the amount of carbon dioxide in the atmosphere has been steadily rising. One factor that contributes to this increase is people travelling to work.

(i) Give **two** other reasons for the rise in carbon dioxide levels. [2]

-
-

(ii) How will rising carbon dioxide levels affect the Earth's climate? [1]

.....

(c) 100 people travelling 40 km produce:

- 1.60 tonnes of carbon dioxide travelling by car
- 0.20 tonnes of carbon dioxide travelling by coach
- 0.36 tonnes of carbon dioxide travelling by train.

Use this information to answer the following questions.

(i) What is the amount of carbon dioxide produced when 100 people travel 40 km from home to work by car?

..... tonnes [1]

(ii) How much carbon dioxide would be saved if they made this journey by coach instead?

..... tonnes [1]

(iii) Would it be better for the environment if they made their journey by train rather than by coach? Give **one** reason for your answer. [1]

.....

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5. The peppered moth exists as a light form and a dark form.

Light form



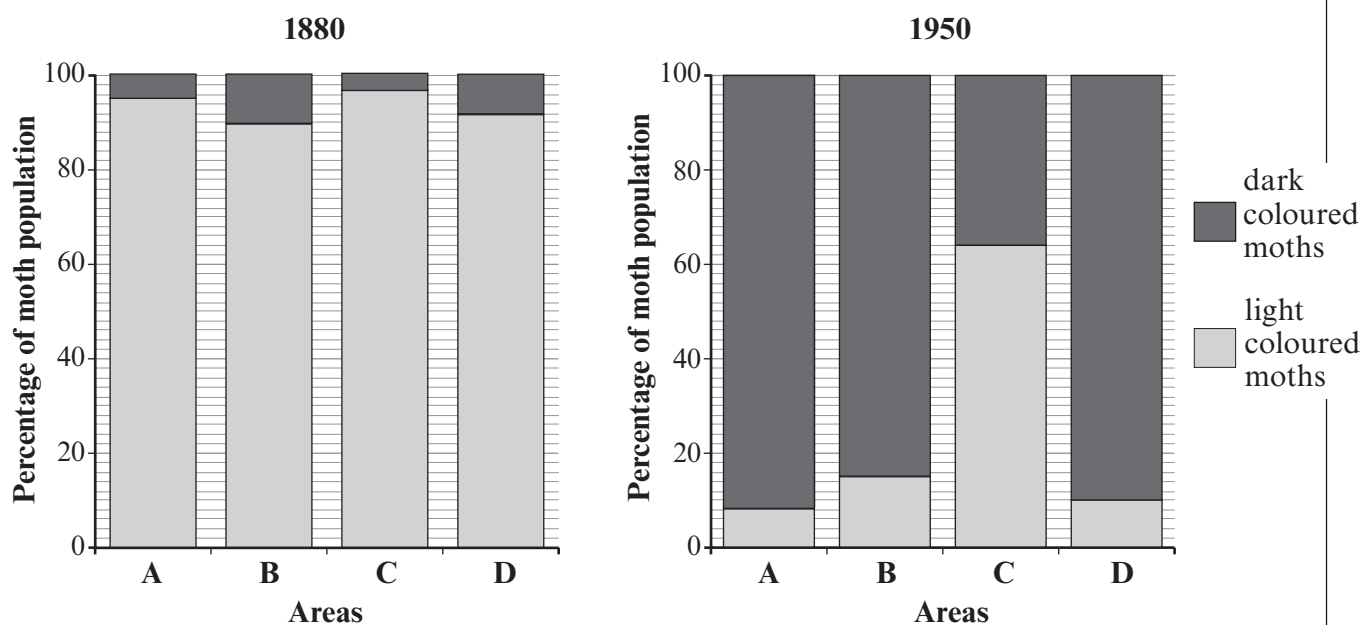
Dark form



Peppered moths are eaten by birds.

In areas affected by air pollution, the trees on which moths land are covered by dark, sooty deposits.

The graphs show the percentages of dark and light forms of moth in the same four areas of Britain A, B, C and D in 1880 and 1950.



(a) (i) Explain how you can tell from the graphs that there was more air pollution in 1950. [2]

.....

.....

.....

(ii) Which area was least affected by air pollution in 1950? [1]

.....

(b) Since the Clean Air Act of 1956, air pollution has reduced. Explain why the number of light coloured moths has increased. [2]

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6. The table shows how lions and tigers are classified by zoologists.

Classification group	Feature of classification group	Lion	Tiger
Kingdom	moves in search of its food	Animalia	Animalia
Phylum	have a vertebral column	Chordata	Chordata
Class	feed young on milk	Mammalia	Mammalia
Order	canine teeth with jaws that move only up and down	Carnivora	Carnivora
Family	can sheath their claws	Felidae	Felidae
Genus	roaring cats over 3 m long	<i>Panthera</i>	<i>Panthera</i>
Species	produce fertile offspring when they breed	<i>leo</i>	<i>tigris</i>

- (a) (i) **Name the Class** to which lions belong. [1]
- (ii) **Name the Order** to which tigers belong. [1]
- (iii) What information shows that lions and tigers both belong to the Kingdom Animalia? [1]
.....
- (iv) Why are lions and tigers both in the Phylum Chordata? [1]
.....
- (v) The scientific name for a tiger is *Panthera tigris*. What is the scientific name for a lion? [1]
.....

- (b) Hyenas are meat-eating vertebrates that feed their young on milk. They have the scientific name *Crocuta crocuta*. Use this information to complete the table below for hyenas. [4]

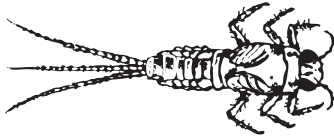
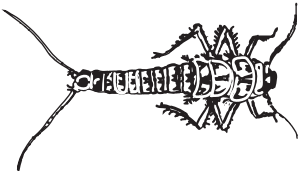

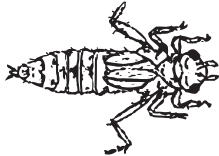
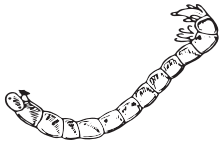

Classification group	Hyenas
Kingdom	Animalia
Phylum
Class
Order
Family	Hyaenida
Genus
Species

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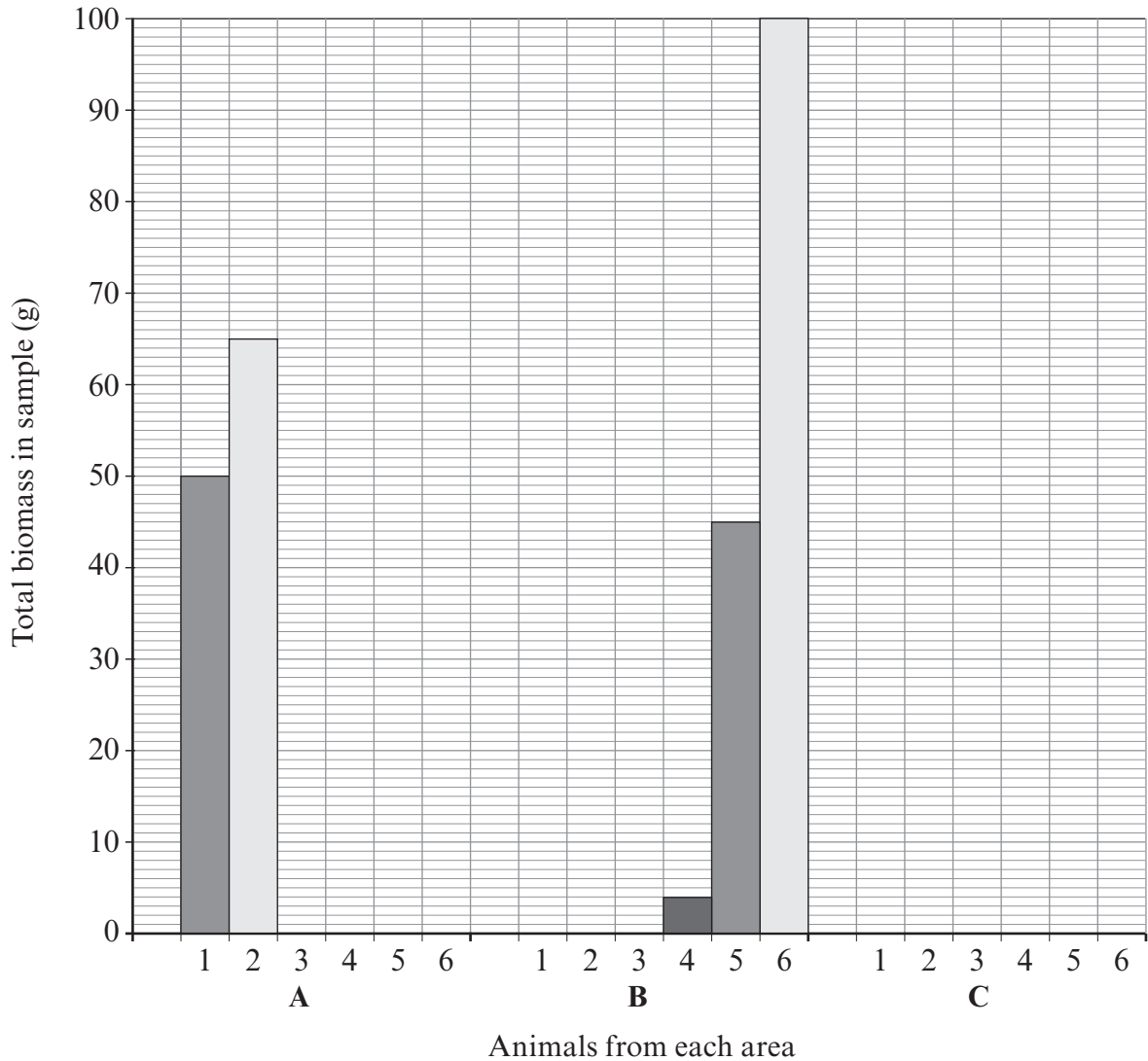
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(b) This table shows the results of invertebrates identified in three parts of a stream A, B and C obtained during an investigation.

	Photograph of invertebrate	Species	Total biomass in sample (g)		
			A	B	C
1		50	0	4
2		65	0	0
3		Caddisfly larva	0	0	30
4		0	4	34
5		0	45	10
6		0	100	2

(i) Use the information in the resource folder to identify each invertebrate and complete the table. One has been completed for you. [5]

- (ii) Plot the results for part **C** of the stream as a bar chart on the grid below. The data for parts **A** and **B** in the stream have already been plotted for you. [3]



- (iii) Use the information in the resource folder and the results of the investigation to describe how the quality of water (pollution level) changes from part **A** of the stream, as it flows to parts **B** and **C**. [3]

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.....

(iv) Explain how the results to the investigation support your answer to (iii). [3]

.....

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(c) During the investigation, any water boatmen collected were not counted. Explain why they were ignored. [2]

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.....

.....

(d) How could the repeatability of the data collected be improved? [2]

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.....

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END OF PAPER