AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

# GCSE
# SCIENCE B

**H**

## Higher Tier Unit 1 My World

Tuesday 17 May 2016 Afternoon Time allowed: 1 hour

**Materials**
For this paper you must have:
- a ruler.

You may use a calculator.

**Instructions**
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

**Information**
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.
- Question 4 should be answered in continuous prose.
  In this question you will be marked on your ability to:
  – use good English
  – organise information clearly
  – use specialist vocabulary where appropriate.

**Advice**
- In all calculations, show clearly how you work out your answer.

Answer **all** questions in the spaces provided.

**1** **Figure 1** shows some of the elements in a reactivity series.

**Figure 1**

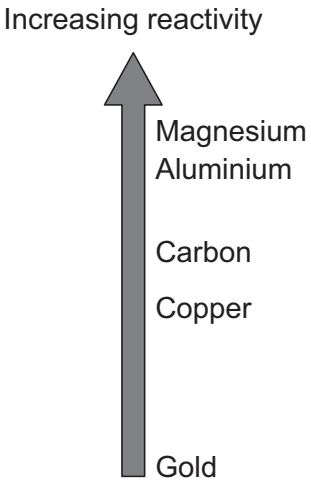



**Table 1** gives some information about metals.

**Table 1**

| Metal | Energy needed to extract the metal in MJ per kg | Percentage (%) of the Earth's crust made of the metal | Value of the metal in £ per kg |
|---|---|---|---|
| Aluminium | 100 | 8.0 | 1.40 |
| Copper | 70 | 0.0068 | 4.15 |
| Gold | 0 | 0.0000007 | 26 500.00 |
| Magnesium | 103 | 2.1 | 1.75 |

**1 (a)** Use **Figure 1** and data from **Table 1** to answer the following questions.

**1 (a) (i)** Explain why no energy is needed to extract gold.

**[2 marks]**

**1 (a) (ii)** Describe the trend for the reactivity of the metals listed in **Table 1** and the amount of energy needed to extract each metal.

**[1 mark]**

**1 (a) (iii)** Describe the trend for the value of the metals listed in **Table 1** and the percentage of the Earth's crust made of the metal.

**[1 mark]**

**1 (b) (i)** Aluminium **cannot** be extracted by heating aluminium ore with carbon.

Give the reason why.

Use **Figure 1** to help you.

**[1 mark]**

**1 (b) (ii)** Name the method used to extract aluminium.

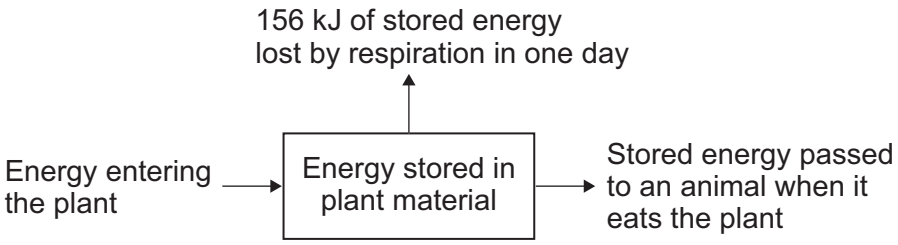
**[1 mark]**

**6**

**Turn over for the next question**

**2** **Figure 2** shows the flow of energy through a plant.

**Figure 2**




80 000 kJ of energy enters the plant in one day.

**2 (a) (i)** 1.3% of the energy entering the plant is stored in plant material in one day.

Calculate the amount of energy stored in plant material in one day.

Give the correct unit in your answer.

**[3 marks]**

Energy stored in plant material in one day = _____

**2 (a) (ii)** What percentage of the energy stored in plant material is lost by respiration in one day?

**[1 mark]**

Percentage of energy lost by respiration in one day = _____%

**2 (b)** Not all of the energy from the plant material eaten by the animal is transferred to the animal.

Give the reason why.

**[1 mark]**

**2 (c) (i)** Millions of years ago some plant material was converted into fossil fuel.

Where did the energy in the fossil fuel **originally** come from?

**[1 mark]**

**2 (c) (ii)** Explain why burning fossil fuel may be increasing the growth rate of plants.

**[2 marks]**

8

**Turn over for the next question**

**3 (a)** **Figure 3** shows a rock pocket mouse that has light brown fur.

**Figure 3**

Most rock pocket mice live on light coloured sandy soil, and have light brown coloured fur as shown in **Figure 3**.

1000 years ago volcanic eruptions produced isolated areas of black volcanic sand.

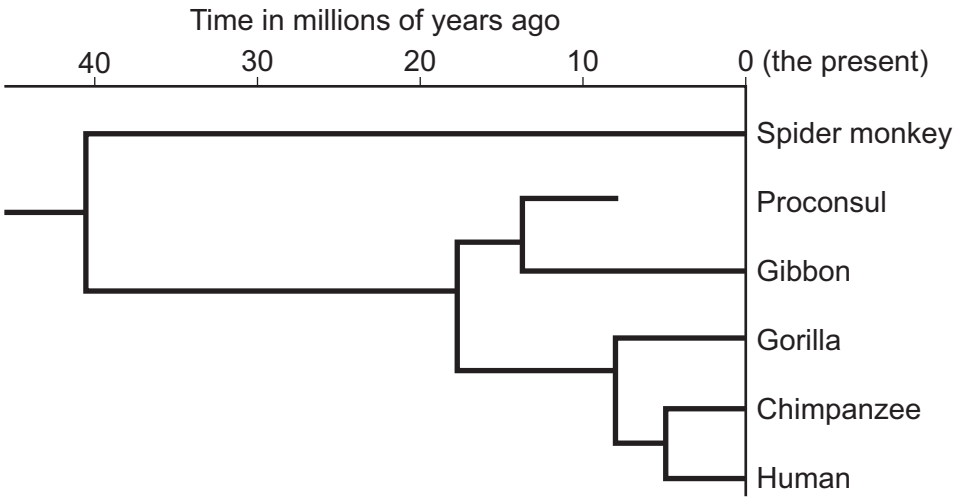
As a result of evolution, rock pocket mice now living on the black volcanic sand have black fur on their back.

Describe how the black fur colour of these rock pocket mice has evolved by natural selection.

**[3 marks]**

**3 (b)** Primates include monkeys and apes. **Figure 4** shows an evolutionary tree for some primates.

**Figure 4**




The evolutionary tree shows that spider monkeys are very different from other primates.

Give **three** other facts about the evolution of primates that are shown in **Figure 4**.

**[3 marks]**

1 _____

_____

_____

2 _____

_____

_____

3 _____

_____

_____

6

**There are no questions printed on this page**

**DO NOT WRITE ON THIS PAGE**
**ANSWER IN THE SPACES PROVIDED**

**4** **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

**Figure 5** gives information from the periodic table about the element beryllium.

**Figure 5**

$^{9}_{4}Be$

Use the information in **Figure 5** to give a **written** description of the structure of a beryllium atom.

**[6 marks]**

Extra space

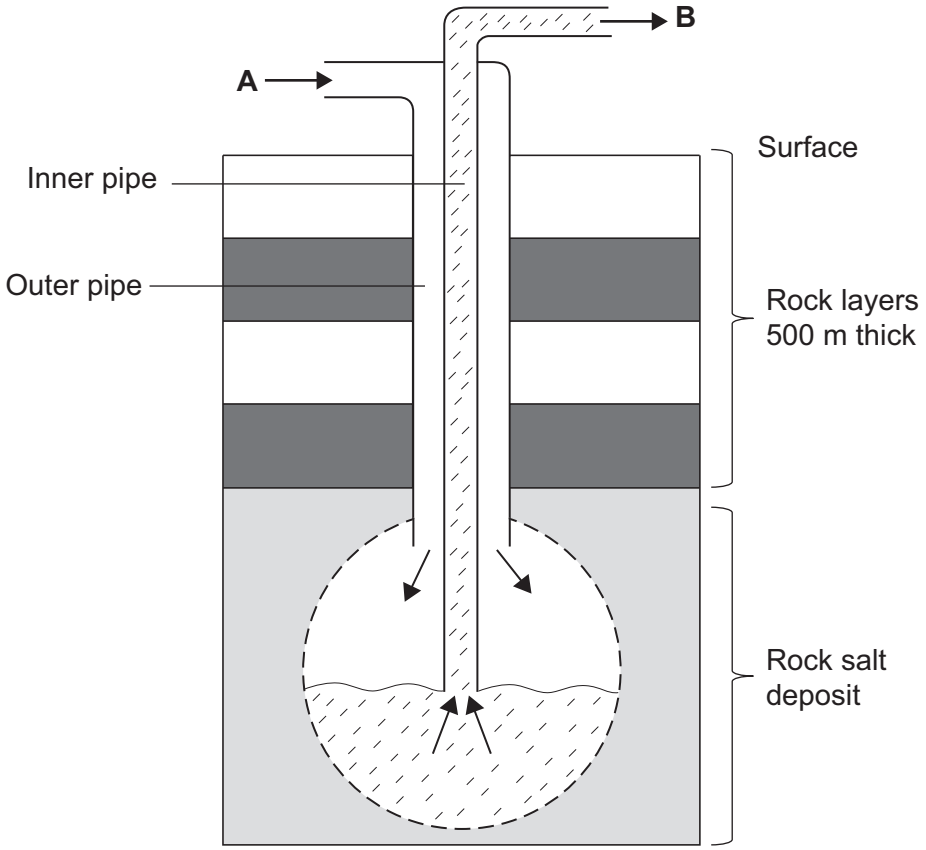
6

**Turn over ▶**

**5** Salt is a useful material which can be removed from the Earth's crust.

**5 (a) (i)** **Figure 6** shows the equipment that could be used to get salt from a rock salt deposit.

**Figure 6**




Suggest how the equipment shown in **Figure 6** is used to get salt from the rock salt deposit.

**[3 marks]**

**5 (a) (ii)** Describe how pure salt crystals could be obtained from the materials coming out at point **B** in **Figure 6**.

**[1 mark]**

_____

_____

**5 (b)** The Earth's crust also provides us with metal ores.

**5 (b) (i)** Lead is obtained from lead ore. The lead ore is first converted to lead oxide (PbO).

Lead is extracted from the lead oxide (PbO) by removing oxygen from it.

Give the name of the reaction that removes oxygen from a compound.

**[1 mark]**

_____

**5 (b) (ii)** Complete and balance the symbol equation for the reaction which produces lead from lead oxide.

**[3 marks]**

2PbO + _____ ⟶ _____ + _____

**5 (b) (iii)** When 446 g of lead oxide is used in the reaction shown in part **(b)(ii)**, one of the substances produced has a mass of 414 g and the other substance produced has a mass of 44 g.

Calculate the mass of the substance that is reacted with the lead oxide.

**[1 mark]**

_____

_____

_____

_____ g

**9**

**6 (a) (i)** When a wave source is moving relative to an observer there will be a change in the observed wavelength and observed frequency.

What is the name given to these observed changes?

**[1 mark]**

_____

**6 (a) (ii)** State the changes in the observed frequency and the observed wavelength of a wave from an object **approaching** an observer.

**[2 marks]**

_____

_____

**6 (b)** Which statement **A**, **B** or **C**, is correct?

**[1 mark]**

Tick (✓) **one** box.

| | | **Tick** (✓) |
|---|---|---|
| **A** | The further away a star is from us, the faster the star travels away from us and the smaller the red-shift seen in the light from the star will be. | |
| **B** | The further away a star is from us, the slower the star travels away from us and the greater the red-shift seen in the light from the star will be. | |
| **C** | The further away a star is from us, the faster the star travels away from us and the greater the red-shift seen in the light from the star will be. | |

**4**

**7 (a)** Carbon is found in different types of organic compounds in plants and animals.

Name **two** different **types** of organic carbon compounds found in plants and animals.

**[2 marks]**

1 _____

2 _____

**7 (b)** Plants and animals need a supply of water, energy and raw materials to survive.

Describe the ways that plants and animals obtain the energy and raw materials they need to survive.

**[4 marks]**

_____

_____

_____

_____

_____

_____

_____

_____

**7 (c) (i)** Plants that live in hot dry conditions often have waxy stems and leaves, or small needle shaped leaves, to help them to survive.

Give **two other** adaptations that plants have to help them to survive in hot dry conditions.

**[2 marks]**

1 _____

2 _____

**7 (c) (ii)** What name describes organisms that live in environments such as volcanic vents?

**[1 mark]**

_____

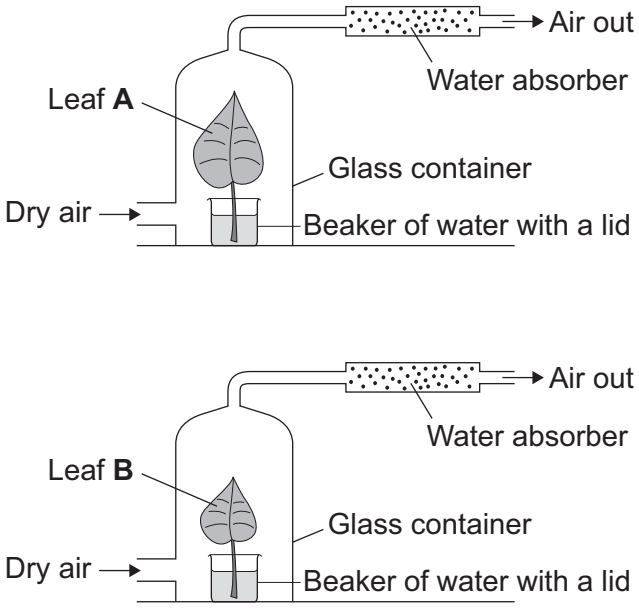
9

**There are no questions printed on this page**

**DO NOT WRITE ON THIS PAGE**
**ANSWER IN THE SPACES PROVIDED**

**8** A student did the experiment shown in **Figure 7** to compare the loss of water from two different types of leaf, leaf **A** and leaf **B**.

**Figure 7**




**8 (a)** Give **two** variables **not** shown in **Figure 7** that the student should control.

**[2 marks]**

1 _____

_____

2 _____

_____

**Question 8 continues on the next page**

**8 (b)** The student measured the mass of the water lost by each leaf.

The student's results are shown in **Table 2**.

**Table 2**

| Leaf | Mass of water lost in grams |
|---|---|
| **A** | 16.5 |
| **B** | 12.1 |

Use data from **Table 2** to suggest a conclusion the student could make about the environmental condition of the plant from which leaf **B** originally came.

Give a reason for your answer.

**[2 marks]**

**8 (c)** The student's teacher said that any conclusion made using the data in **Table 2** is **not** valid because the leaves were different sizes.

The student decided to measure the surface area of each leaf and calculate the mass of water lost by each $cm^2$ of leaf surface.

Some of the student's results are shown in **Table 3**.

**Table 3**

| Leaf | Leaf surface area in $cm^2$ | Mass of water lost in $g/cm^2$ |
|---|---|---|
| **A** | 57.65 | 0.29 |
| **B** | 31.85 | |

**8 (c) (i)** Complete **Table 3**.

**[1 mark]**

**8 (c) (ii)** Why would a conclusion using the data in **Table 2** and **Table 3** be more valid than the conclusion the student made using only the data in **Table 2**?

**[1 mark]**

6

**9 (a)** Air from the Earth's atmosphere can be liquefied and the elements in the liquid air can be separated.

**9 (a) (i)** Give the name of the method used to separate the elements in liquid air.

**[1 mark]**

_____

**9 (a) (ii)** The conditions in the apparatus used to separate two of the elements found in liquid air at –200 °C are shown in **Figure 8**.

**Figure 8**

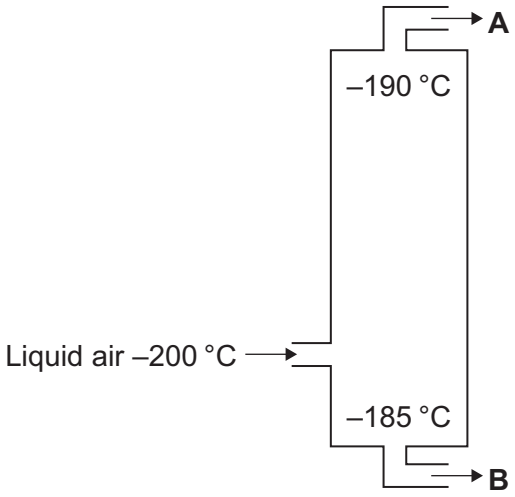



**Table 4** gives some information about elements found in the atmosphere.

**Table 4**

| Element | Boiling point in °C |
|---|---|
| Helium | –269 |
| Neon | –246 |
| Nitrogen | –196 |
| Oxygen | –183 |

Two elements from **Table 4** are found in liquid air at –200 °C and are separated by the apparatus shown in **Figure 8**.

Identify the element that leaves at **A** and the element that leaves at **B**.

Explain your answer.

Use information from **Figure 8** and **Table 4**.

**[4 marks]**

**9 (b)** State the formula of the compound made of nitrogen and hydrogen that is used to make fertiliser.

**[1 mark]**

6

**END OF QUESTIONS**

**There are no questions printed on this page**

**DO NOT WRITE ON THIS PAGE**
**ANSWER IN THE SPACES PROVIDED**