![CEA Rewarding Learning logo]

**General Certificate of Secondary Education
2010–2011**

Science: Single Award (Modular)

Chemical Patterns and our Environment Module 3

Higher Tier

GSC32

[GSC32]

THURSDAY 19 MAY 2011, MORNING

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.
Answer **all six** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 45.
Figures in brackets printed down the right-hand side of pages
indicate the marks awarded to each question or part question.
A Data Leaflet is provided for use with this paper.

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

7167

1   John investigated how the amount of sodium hydrogencarbonate affects
    the height of honeycomb toffee. His results are shown below.
    One of his results is **not** correct.

Amount of sodium hydrogencarbonate/g	4	8	12	16	20	24	28	32	36
Height of honeycomb/ cm	2.0	3.0	4.0	4.2	6.0	6.4	6.6	6.6	6.6

(a) (i) Plot the points and draw a line graph on the grid below.

NB: When drawing the line take into account that **one** result is
    not correct.
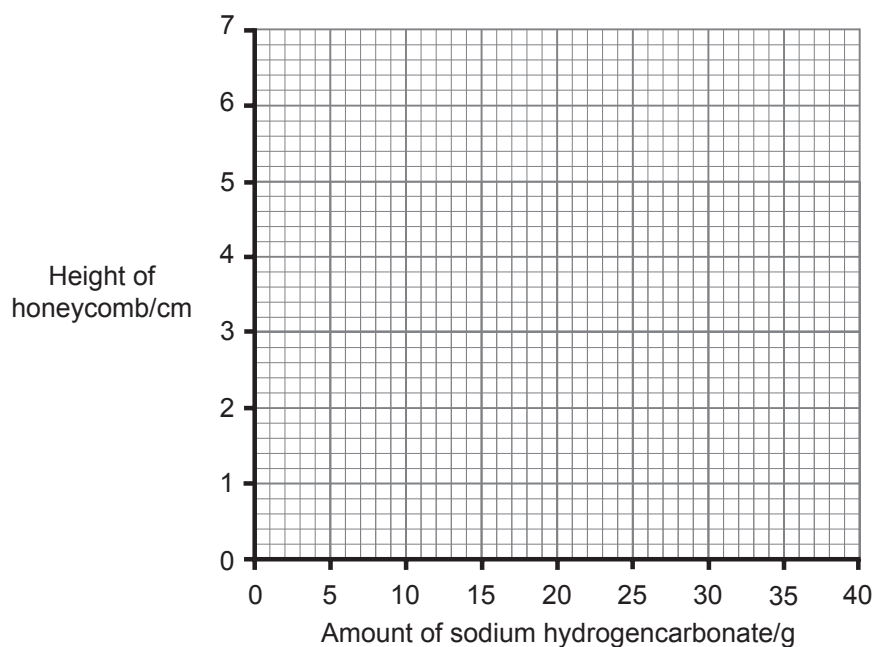
[3]

(ii) From the graph, predict what is the correct height for the
    anomalous result.

_____ cm [1]

(b) From the results describe how the amount of sodium hydrogencarbonate affects the height of the honeycomb.

_____

_____ [2]

(c) The teacher decided to make more honeycomb. What is the least amount of sodium hydrogencarbonate she should use to get the maximum height?

_____ g [1]

(d) John asked if he could add a few drops of vinegar to the mixture to try and get an even greater height. Explain fully why adding vinegar could make a difference.

_____

_____ [2]

(e) Complete the word equation for the reaction of vinegar with sodium hydrogencarbonate.

sodium
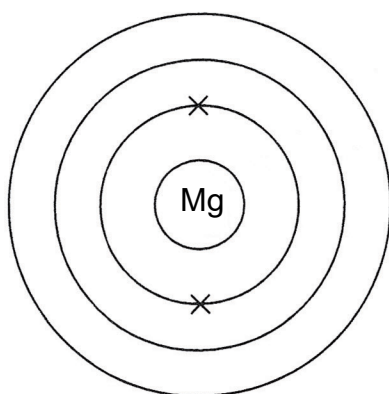hydrogencarbonate + _____ ⟶ sodium
ethanoate + carbon
dioxide +

[2]

2 Magnesium is a chemical element with an atomic number of 12 and a mass number of 24.

(a) What is meant by the term mass number?

_____

_____ [1]

(b) Complete the diagram to show how all the electrons are arranged in an atom of magnesium.

[1]

(c) What is the meaning of the term compound?

_____

_____ [2]

(d) Complete the sentences about magnesium and oxygen.

Magnesium is in Group _____ of the Periodic Table. Oxygen is

in Period _____ of the Periodic Table.

When magnesium is burned in oxygen a new substance is formed.

This substance is called _____.   [3]

3 The diagram below shows a cross section through a volcano.

trees   land

(a) With reference to the diagram describe what happens when a volcano erupts.

_____

_____

_____ [3]

(b) In May 2010 an active volcano in Iceland erupted. The volcano was covered in snow and ice.

Suggest one effect the snow and ice had on the lava.

_____

_____ [1]

(c) Explain fully what causes earthquakes.

_____

_____ [2]

4 The Periodic Table was developed over a period of time. Three scientists in particular are noted for their contribution: Mendeleev, Aristotle (a Greek scientist) and Newlands.

(a) List these scientists in the order that they made their contribution starting with the earliest.

_____ _____ _____ [1]

(b) Use the information below and your knowledge to describe the contribution made by each scientist.

Gaps were left for undiscovered elements.

There were four elements, earth, fire, air and water.

Elements were found to have a repeating pattern every 8th element.

Atomic mass was used to put elements in order.

John Newlands: _____

_____

Aristotle: _____

_____

Dmitri Mendeleev: _____

_____
[4]

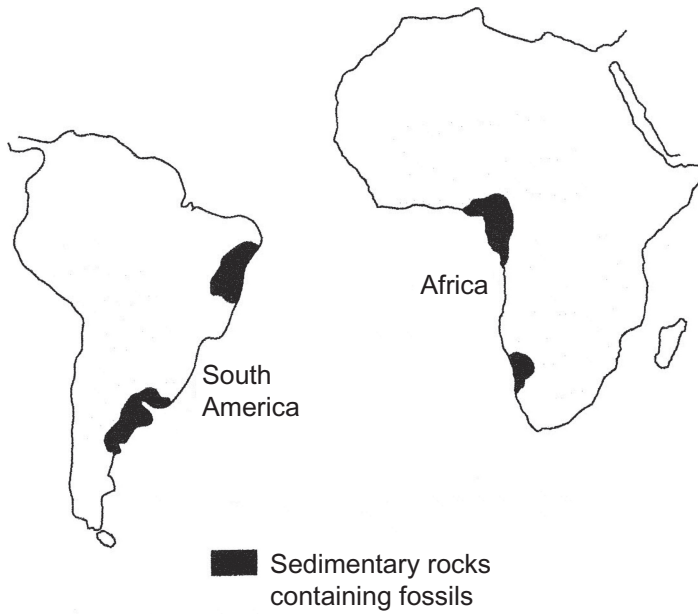**(c)** Describe how the modern Periodic Table differs from earlier versions.

_____

_____

_____ [2]

5 In 1915 a German scientist called Alfred Wegener put forward a theory that the continents were once joined together.

South
America

Africa

■ Sedimentary rocks
containing fossils

(a) Use the diagram and your knowledge to suggest **two** reasons why he thought the continents had once been joined together.

_____

_____

_____ [2]

(b) What was the name of Wegener's theory?

_____ [1]

(c) Why was Wegener's theory originally rejected in 1915?

_____

_____ [1]

6 The table below lists some physical properties of the alkali metals.

Element	Melting point/°C	Boiling point/°C	Density/g/cm^3
Lithium	180	1347	0.53
Sodium	98	883	0.97
Potassium	64	774	0.86
Rubidium	39	688	1.53
Caesium	28	678	1.88

(a) (i) Name the alkali metal that is a liquid at 34 °C.

_____ [1]

(ii) Suggest the name of an alkali metal which would sink when placed in water.

_____ [1]

(iii) Give a trend in the boiling points of the alkali metals.

_____

_____ [1]

(b) (i) Using your knowledge of the Group 1 metals, describe in detail how you would expect rubidium to react with water.

_____

_____

_____

_____ [3]

(ii) How many electrons would you expect rubidium to have in its outer shell?

_____ [1]

(c) Complete and **balance** the equation for the reaction of sodium with water.

$$Na \ + \ H_2O \ \longrightarrow \ \underline{\hspace{3cm}} \ + \ \underline{\hspace{3cm}}$$ [3]

___

THIS IS THE END OF THE QUESTION PAPER
___

9