



Rewarding Learning

General Certificate of Secondary Education
2016–2017

Centre Number

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Candidate Number

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Science: Single Award

Unit 2 (Chemistry)
Foundation Tier



[GSS21]

THURSDAY 10 NOVEMBER 2016, MORNING

TIME

1 hour.

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 nine** questions.

INFORMATION FOR CANDIDATES

The total mark for this paper is 60.

Quality of written communication will be assessed in Question 8.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

A Data Leaflet, which includes a Periodic Table of the Elements, is included for your use.

For Examiner's use only

Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	

Total Marks	
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1 (a) Given below is information about some household substances.

Complete the table.

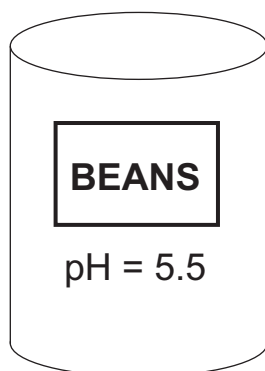
Choose from:

red 1 10 orange 14 blue

Substance	Universal Indicator colour	pH number
toothpaste	blue	
lemon juice		4
oven cleaner	purple	

[3]

Many foods contain either an acid or an alkali.



Source: Chief Examiner

(b) Describe the pH of the can of beans shown above.

Circle the correct answer.

strong acid : weak alkali : weak acid : strong alkali

[1]

(c) Complete the following sentence.

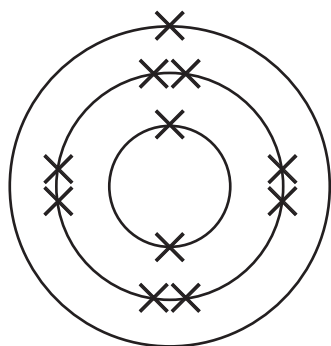
Pure water is a neutral substance and has a pH value of _____.

[1]

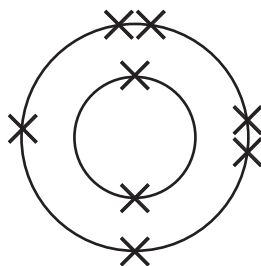
Examiner Only

Marks Remark

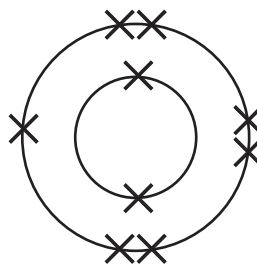
Shown below are the electronic structures of three atoms.



A



B



C

Source: Chief Examiner

(c) Which diagram (**A**, **B** or **C**) shows the electronic structure for a sodium atom?

_____ [1]

Shown below is a label found on a bottle of water.

Ions present	%
calcium	35
magnesium	20
phosphate	5
potassium	12
sodium	
sulfate	4

Source: Chief Examiner

(d) Calculate the percentage (%) of sodium ions in this water.

(Show your working out.)

_____ % [2]

Examiner Only	
Marks	Remark

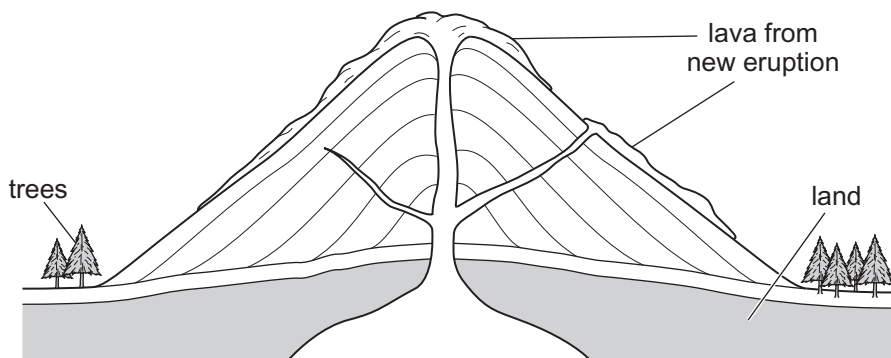
4 Below are two types of rock and some named examples.

(a) Using lines match each type of rock with one example.

Type of rock	Example
metamorphic	limestone
sedimentary	marble
	granite

[2]

(b) Volcanoes are often found at tectonic plate boundaries.
The diagram below shows a cross section through a volcano.



Source: CCEA

(i) On the diagram above use the letter **X** to show the magma chamber. [1]

(ii) Including the new eruption how many times has this volcano erupted?
_____ [1]

(iii) Name the **type** of rock formed from volcanic eruptions.
_____ [1]

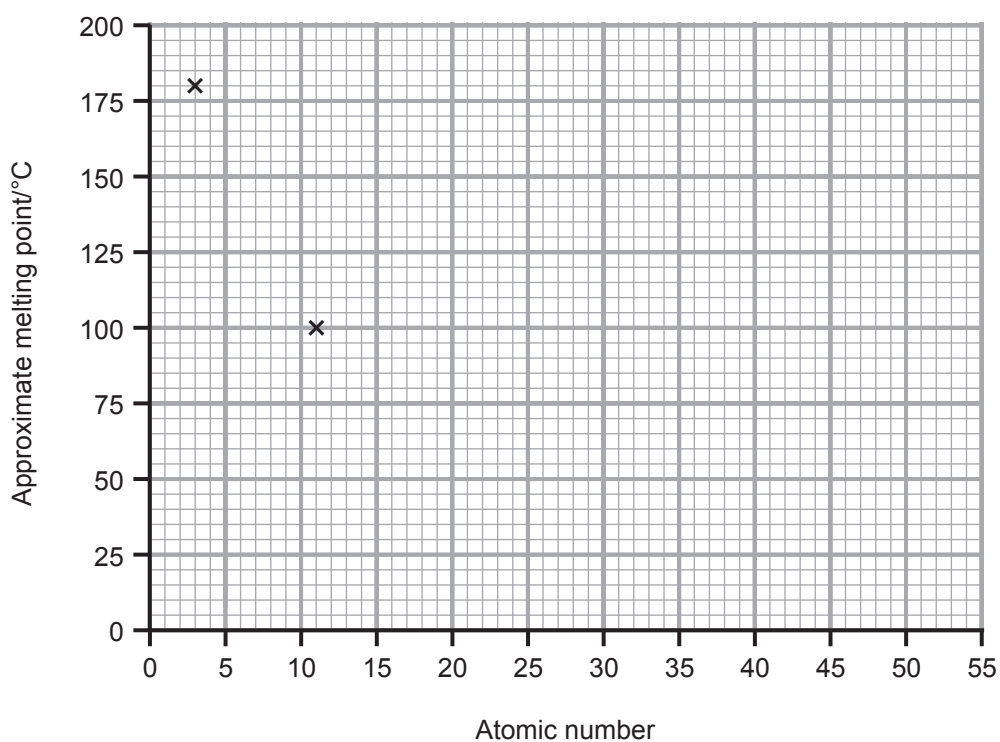
(c) Earthquakes can also happen at tectonic plate boundaries.
Name the scale used to measure the strength of earthquakes.
_____ [1]

Examiner Only	
Marks	Remark

- 5 (a) The table below shows information about the elements in Group 1 of the Periodic Table.

Name	Atomic number	Approximate melting point/°C
lithium	3	180
sodium	11	100
potassium	19	65
rubidium	37	40
caesium	55	30

- (i) On the grid below, complete the line graph for this information.



[3]

- (ii) Describe the trend shown by this information.

_____ [1]

- (b) What name is given to Group 1 of the Periodic Table?

_____ [1]

Examiner Only

Marks Remark

6 The table below shows information about the reactions of some metals with cold water and hot water (or steam).

Examiner Only	
Marks	Remark

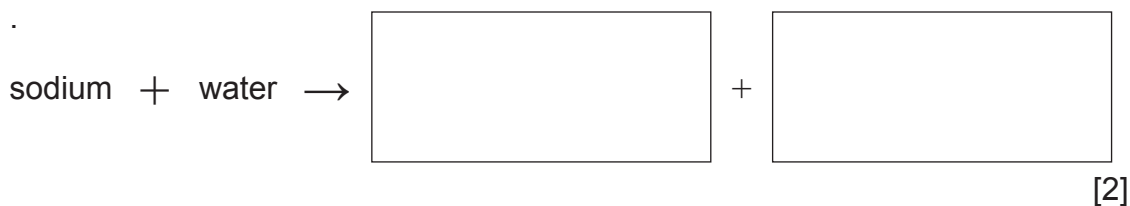
Metal	Reaction with cold water	Reaction with hot water (or steam)
magnesium	very slow reaction	reacts rapidly
zinc	no reaction	reacts slowly
sodium	violent reaction, floats on surface often burning with a coloured flame	very violent reaction, burns with a coloured flame
lead	no reaction	reacts very slowly
copper	no reaction	no reaction

(a) Using information from the table, place the metals in order of **increasing** reactivity. The first one has been done for you.

copper	least reactive	
	↓	
	most reactive	[2]

(b) (i) What colour is the flame produced when sodium burns?
 _____ [1]

(ii) Complete the word equation for the reaction of sodium with water.



(c) Using information from the table, suggest why copper replaced lead for making water pipes in houses.

_____ [1]

(d) The formula of copper carbonate is CuCO_3 .

(i) How many different elements does copper carbonate CuCO_3 contain?

_____ [1]

(ii) What is the total number of atoms represented by the formula CuCO_3 ?

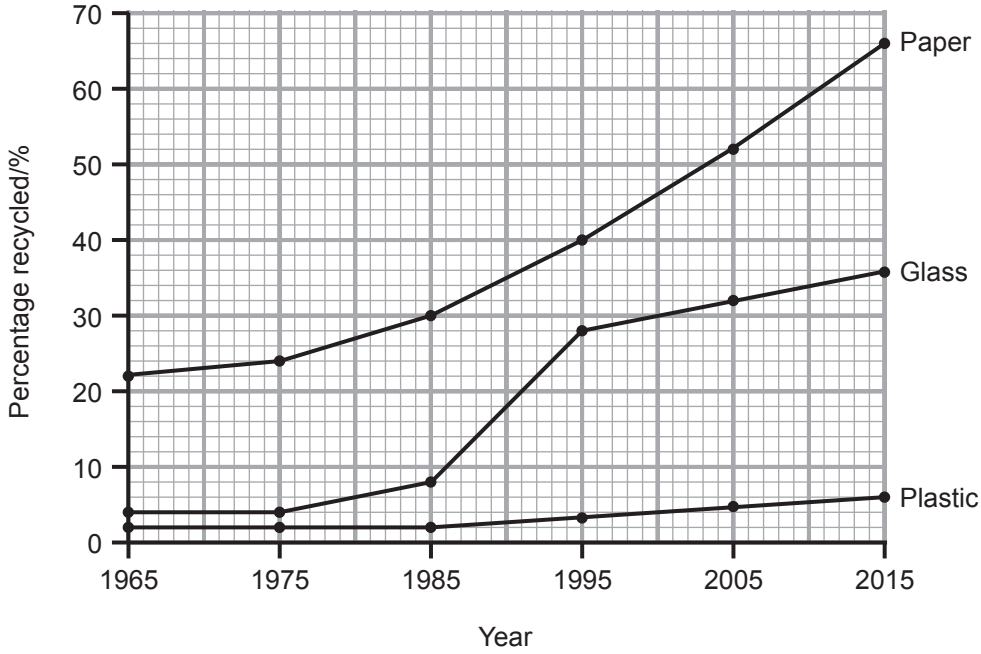
_____ [1]

Examiner Only

Marks Remark

7 (a) The graph below shows the percentage of plastic, glass and paper recycled in a country between the years 1965 to 2015.

Examiner Only	
Marks	Remark



Source: Principal Examiner

(i) Which material shows the biggest percentage increase between the years 1985 to 1995?

_____ [1]

(ii) Calculate the percentage increase for paper recycling from 1965 to 2015.

(Show your working out.)

_____ % [2]

(iii) Describe the steps in recycling glass after it has been delivered to a factory.

[3]

(b) Waste that does not get recycled often ends up in landfill sites.



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Waste items found in landfill include: aluminium cans, food waste, glass bottles, newspapers and plastic bags. Many items will remain in landfill sites for hundreds of years. Some of the waste gives off polluting gases and can produce foul-smelling liquids that leak into water supplies. A recent survey suggests that many new landfill sites need to be found each year due to the large volume of waste being produced.

Use **only** the information provided to answer parts (i) and (ii) below.

(i) Apart from food waste, suggest **one** other material which is biodegradable.

_____ [1]

(ii) Suggest **two** disadvantages of living near a landfill site.

1. _____

2. _____ [2]

(c) Some materials are non-biodegradable. Explain fully the term 'non-biodegradable'.

_____ [2]

(d) Suggest **one** way local authorities can encourage people to recycle more waste.

_____ [1]

Examiner Only

Marks Remark

9 (a) Some tap water contains dissolved metal ions which can make it hard.

(i) Give the name of **one** metal ion that causes tap water to be hard.

_____ [1]

(ii) Give **one** advantage and **one** disadvantage of hard water.

Advantage _____

Disadvantage _____

_____ [2]

(b) The hardness of three samples of water **X**, **Y** and **Z** was measured using soap solution. New samples were boiled and the experiment repeated.

The results are shown below.

Sample of water	Volume of soap solution needed to form a permanent lather/cm ³	
	Before boiling	After boiling
X	2	2
Y	17	17
Z	13	2

State the type of water in samples **Y** and **Z**. Explain your answers.

(i) Sample **Y** _____

_____ [2]

(ii) Sample **Z** _____

_____ [2]

Examiner Only

Marks Remark

THIS IS THE END OF THE QUESTION PAPER

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SYMBOLS OF SELECTED IONS

Positive ions

Name	Symbol
Ammonium	NH_4^+
Chromium(III)	Cr^{3+}
Copper(II)	Cu^{2+}
Iron(II)	Fe^{2+}
Iron(III)	Fe^{3+}
Lead(II)	Pb^{2+}
Silver	Ag^+
Zinc	Zn^{2+}

Negative ions

Name	Symbol
Carbonate	CO_3^{2-}
Dichromate	$\text{Cr}_2\text{O}_7^{2-}$
Ethanoate	CH_3COO^-
Hydrogen carbonate	HCO_3^-
Hydroxide	OH^-
Methanoate	HCOO^-
Nitrate	NO_3^-
Sulfate	SO_4^{2-}
Sulfite	SO_3^{2-}

DATA LEAFLET

For the use of candidates taking
Science: Chemistry,
Science: Double Award
or Science: Single Award

Copies must be free from notes or additions of any kind. No other type of data booklet or information sheet is authorised for use in the examinations.

SOLUBILITY IN COLD WATER OF COMMON SALTS, HYDROXIDES AND OXIDES

Soluble
All sodium, potassium and ammonium salts
All nitrates
Most chlorides, bromides and iodides EXCEPT silver and lead chlorides, bromides and iodides
Most sulfates EXCEPT lead and barium sulfates Calcium sulfate is slightly soluble

Insoluble
Most carbonates EXCEPT sodium, potassium and ammonium carbonates
Most hydroxides EXCEPT sodium, potassium and ammonium hydroxides
Most oxides EXCEPT sodium, potassium and calcium oxides which react with water

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chemistry
double award
single award

