



General Certificate of Secondary Education  
2017–2018

Centre Number

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Candidate Number

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# Science: Single Award

Unit 2 (Chemistry)  
Foundation Tier



[GSS21]

THURSDAY 9 NOVEMBER 2017, 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 ten** questions.

## INFORMATION FOR CANDIDATES

The total mark for this paper is 60.

Quality of written communication will be assessed in Question **10**.  
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	
10	
<b>Total Marks</b>	

1 The hazard symbol below is found on a bottle of oven cleaner.



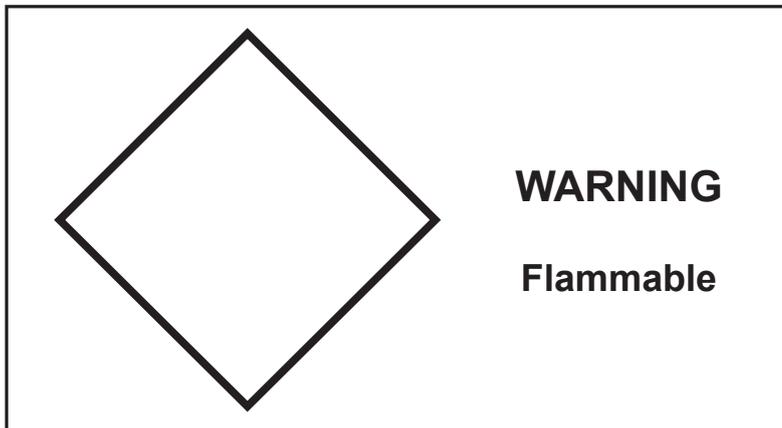
hazard symbol

Source: Principal Examiner

(a) Name this hazard symbol.

\_\_\_\_\_ [1]

(b) The label below is found on a bottle of white spirits which is a flammable liquid. Complete the label by drawing the correct hazard symbol for a flammable substance.



[1]

Examiner Only	
Marks	Remark

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

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

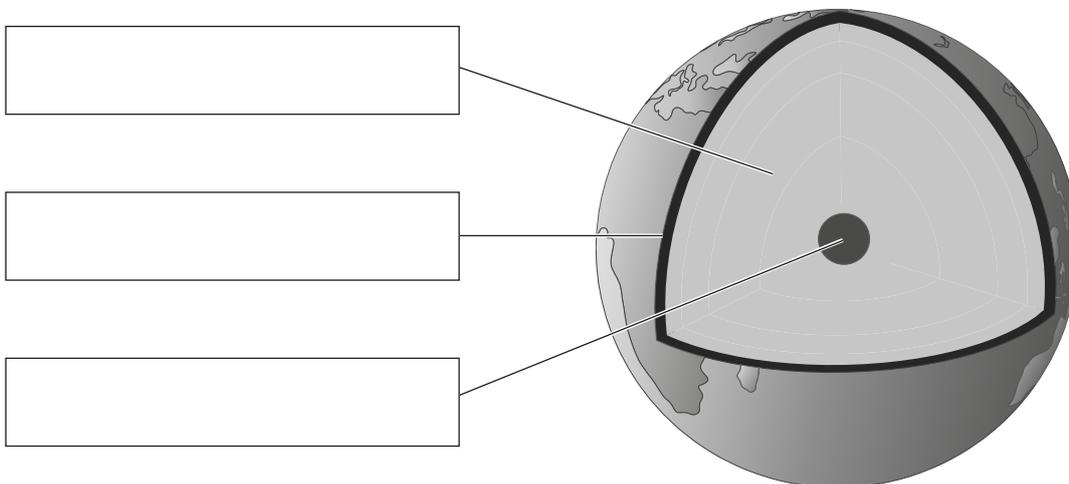
Type of rock	Example
metamorphic	limestone
sedimentary	granite
	marble

[2]

(b) The diagram below shows the structure of the Earth. Label the diagram.

Choose from:

- crust      nucleus      core      mantle      skin**



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[3]

Examiner Only	
Marks	Remark

3 The table below shows the soil pH that some plants grow best in.

Plant	pH
raspberry	5.0 – 6.0
lettuce	6.0 – 7.0
blackcurrant	5.5 – 8.2
brussel sprouts	5.5 – 6.8
cauliflower	7.0 – 8.0
potato	4.5 – 6.0
apple	5.0 – 6.5
cabbage	7.0 – 8.0
onion	6.0 – 7.0

Using information in the table and your knowledge answer the following questions.

(a) Name the plant that will grow in the **most** alkaline soil.

\_\_\_\_\_ [1]

(b) The soil in Amy's garden has a pH of 5.5.

(i) How many plants will grow well in her garden?

\_\_\_\_\_ [1]

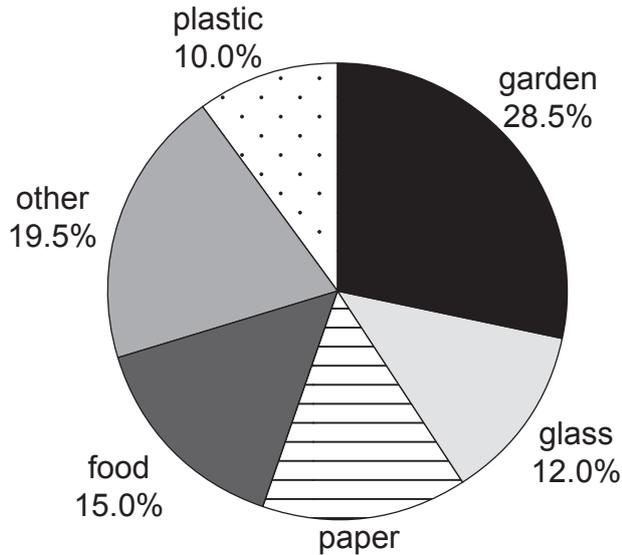
(ii) Amy wants to grow cabbage. Explain fully why she needs to add lime to the soil in her garden.

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_ [2]

Examiner Only	
Marks	Remark

**BLANK PAGE**  
**(Questions continue overleaf)**

- 4 The pie chart below gives information about the type of waste found in a household bin.



- (a) Calculate the percentage of waste which is paper.

(Show your working out.)

\_\_\_\_\_ % [2]

- (b) Give **two** ways in which local councils encourage households to recycle.

1. \_\_\_\_\_

2. \_\_\_\_\_ [2]

- (c) State **one** advantage of recycling glass.

\_\_\_\_\_

\_\_\_\_\_ [1]

- (d) Some waste is described as non-biodegradable. What is meant by the term non-biodegradable?

\_\_\_\_\_

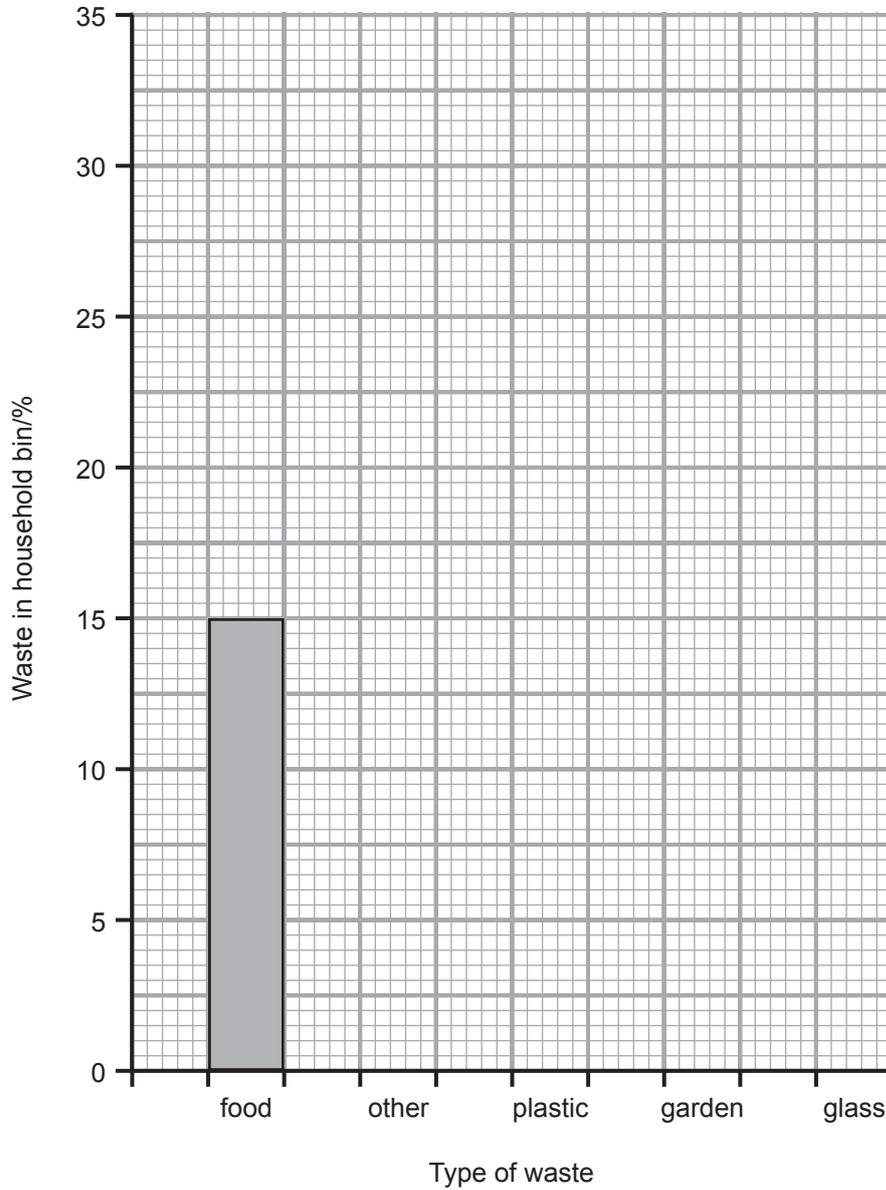
\_\_\_\_\_

\_\_\_\_\_ [2]

Examiner Only	
Marks	Remark

(e) Use information from the pie chart opposite to complete the graph below.

You do **not** need to plot the value for paper.



[2]

Examiner Only	
Marks	Remark

- 5 (a) Materials that come from living things are described as natural. Other materials are described as man-made.

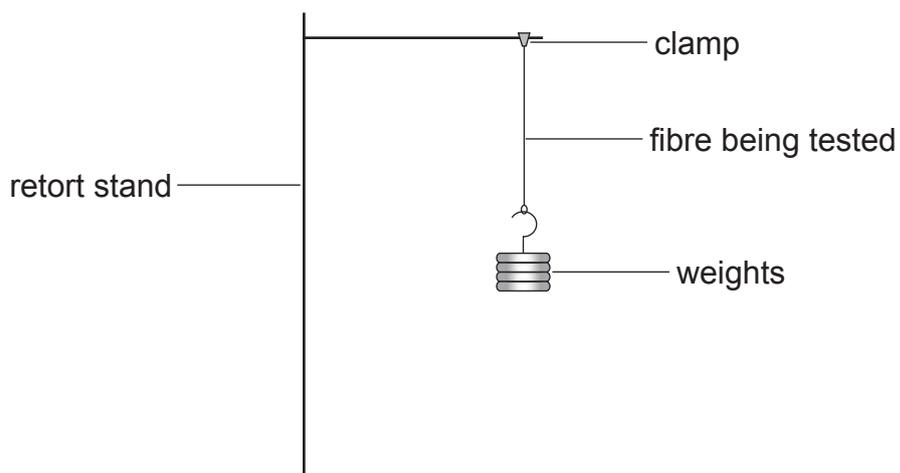
Place the following materials in the correct column of the table below.

cotton                  wool                  nylon                  linen

Natural	Man-made

[2]

- (b) A student carried out an investigation to test the strength of different fibres. The apparatus he used is shown below.



The weight that broke each fibre was measured and recorded in the table below.

Fibre	Breaking weight/N
A	23
B	53
C	21
D	35
E	46

- (i) Place the five fibres (**A**, **B**, **C**, **D** and **E**) in order of strength starting with the strongest.

	<b>strongest</b>	
_____		
_____		
_____		
_____		
_____		
	▼	
	<b>weakest</b>	

[2]

- (ii) Suggest **one** thing that needed to be done to make the results valid (a fair test).

\_\_\_\_\_

\_\_\_\_\_ [1]

A fishing line must be able to hold a weight of at least 22 N .

- (iii) Which fibre (**A**, **B**, **C**, **D** or **E**) would **not** be suitable for making this fishing line?

\_\_\_\_\_ [1]

- (c) In Northern Ireland around 100 years ago many people were employed in the linen industry.

Explain fully why fewer people are employed in this industry today.

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ [2]

Examiner Only	
Marks	Remark

6 The table below gives information about three elements.

(a) Complete the table.

Element	Atomic number	Mass number	Number of neutrons	Electronic structure
carbon	6	12	6	
magnesium	12	24		2.8.2
lithium		7	4	2.1

[3]

(b) State what is meant by the term mass number.

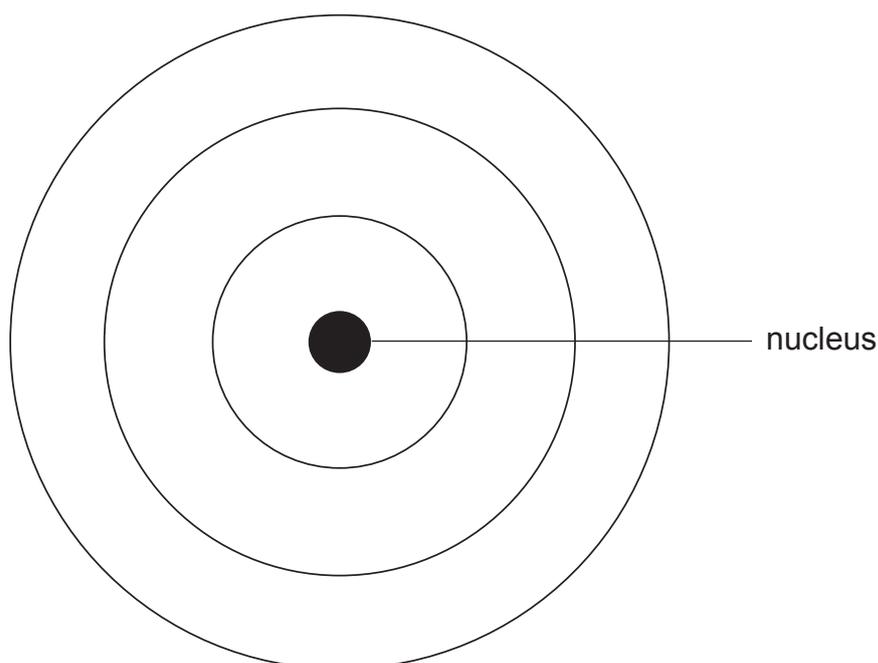
\_\_\_\_\_

\_\_\_\_\_ [1]

(c) Magnesium is found in Group 2 of the Periodic Table.  
What name is given to Group 2 elements?

\_\_\_\_\_ [1]

(d) Complete the diagram below to show how the 13 electrons of aluminium are arranged.



[1]

Examiner Only	
Marks	Remark

- 7 The hydrocarbons in crude oil are separated into different fractions by fractional distillation. The table below shows some of the properties of these fractions.

Fraction	Number of carbon atoms in chain	Boiling point range /°C	State at room temperature	Ease of catching fire
refinery gas	1 – 4	–160 to 20	gas	↑
petrol	5 – 9	20 to 70	liquid	
naphtha	6 – 11	70 to 120	liquid	
paraffin	11 – 18	120 to 170	liquid	
diesel oil	16 – 20	170 to 230	liquid	
fuel oil	21 – 70	230 to 350	liquid	
bitumen	more than 70	above 350	solid	

- (a) State **one** trend shown by this information.

\_\_\_\_\_ [1]

- (b) Using information from the table, explain why petrol is suitable for use as a fuel.

\_\_\_\_\_  
 \_\_\_\_\_ [2]

- (c) Explain how the fractions in crude oil are separated by fractional distillation.

\_\_\_\_\_  
 \_\_\_\_\_ [2]

Examiner Only

Marks Remark

- 8 (a) The table below shows some information about the elements found in Period 2 of the Periodic Table.

<b>Name of element</b>	Lithium	Beryllium	Boron	Carbon	Nitrogen	Oxygen	Fluorine	Neon
<b>Symbol</b>	Li	Be	B	C	N	O	F	Ne
<b>Atomic number</b>	3	4	5	6	7	8	9	10
<b>Mass number</b>	7	9	11	12	14	16	19	20
<b>Melting point/°C</b>	180	1287	2076	3500	-210	-219	-220	-249
<b>Boiling point/°C</b>	1342	2970	3927	4827	-196	-183	-188	-246
<b>Metallic character</b>	Metal	Metal	Semi-Metal	Non-Metal	Non-Metal	Non-Metal	Non-Metal	Non-Metal

Use this information and your knowledge to answer the following questions.

- (i) Name the element which is a halogen.

\_\_\_\_\_ [1]

- (ii) Name the element which has three electrons in its outer shell.

\_\_\_\_\_ [1]

- (iii) Name the **metal** with the lowest boiling point.

\_\_\_\_\_ [1]

- (iv) Describe the trend in metallic character across Period 2.

\_\_\_\_\_  
 \_\_\_\_\_ [1]

Examiner Only

Marks Remark

(b) Lithium is a reactive metal.

- (i) Lithium reacts with fluorine to form the compound lithium fluoride. What is the formula of lithium fluoride?

Circle the correct answer.



[1]

- (ii) Lithium also reacts with water. Complete the word equation for this reaction.

lithium + water →

+ hydrogen

[1]

- (iii) Apart from seeing bubbles of hydrogen gas, give **one** other observation you would make when lithium reacts with water.

\_\_\_\_\_

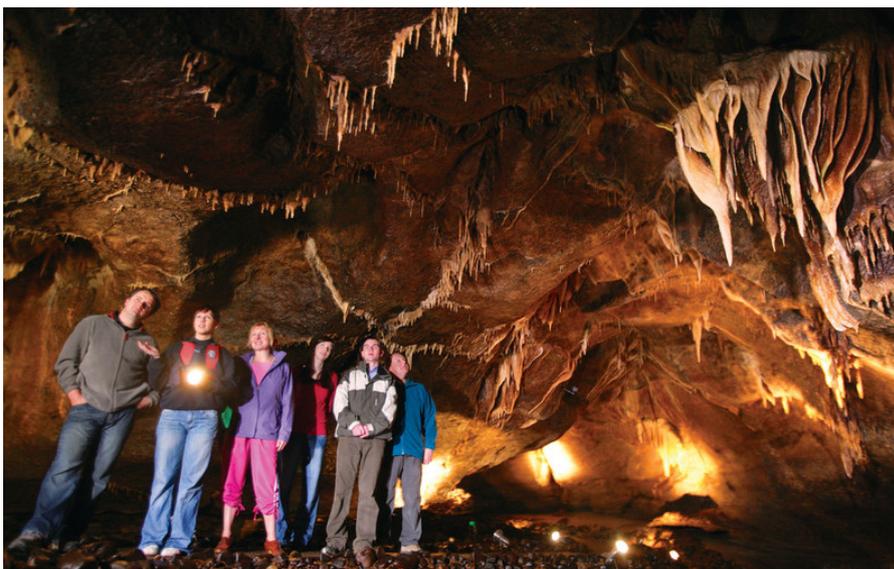
\_\_\_\_\_ [1]

Examiner Only

Marks

Remark

- 9 The photograph below was taken on a tour of the Marble Arch Caves in County Fermanagh which is a hard water area.



© Northern Ireland Tourist Board

- (a) Give **two** advantages of drinking the water in a hard water area.

1. \_\_\_\_\_
2. \_\_\_\_\_ [2]

- (b) A student investigated the hardness of different water samples. The results are shown below.

Sample	Volume of soap solution needed to form a lather before boiling/cm <sup>3</sup>	Volume of soap solution needed to form a lather after boiling/cm <sup>3</sup>
A	2	2
B	16	7
C	18	2
D	24	2
E	22	22

Examiner Only

Marks Remark

- (i) Which two samples (**A, B, C, D** or **E**) contained **only** temporary hardness?

\_\_\_\_\_ and \_\_\_\_\_ [1]

- (ii) Which sample of water (**A, B, C, D** or **E**) was the hardest?

\_\_\_\_\_ [1]

- (iii) Which sample (**A, B, C, D** or **E**) contained both temporary and permanent hardness?

\_\_\_\_\_ [1]

- (c) Temporary hard water undergoes thermal decomposition to form 'fur' in kettles.

- (i) What is meant by the term thermal decomposition?

\_\_\_\_\_  
\_\_\_\_\_ [2]

- (ii) Give the chemical name for 'fur' in kettles.

\_\_\_\_\_ [1]

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Marks	Remark



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**THIS IS THE END OF THE QUESTION PAPER**

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