



General Certificate of Secondary Education  
2014–2015

Centre Number

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Candidate Number

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## Science: Single Award

Unit 2 (Chemistry)  
Foundation Tier

MV18

[GSS21]

WEDNESDAY 25 FEBRUARY 2015, MORNING

### TIME

1 hour, plus your additional time allowance.

### 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 eleven** questions.

### INFORMATION FOR CANDIDATES

The total mark for this paper is 60.

Quality of written communication will be assessed in Question 11.  
Figures in brackets printed at the end of each question 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.

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1 Saucepan handles are often made from plastic.



(a) Give **two** properties which make plastic a suitable material for making saucepan handles. [2 marks]

Choose from:

**strong** : **flexible** : **soft**

**shiny** : **easily moulded**

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

2. \_\_\_\_\_

(b) Explain fully why plastic saucepan handles are safer than metal handles. [2 marks]

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2 Some substances are dangerous and have **symbols** on their containers.



symbol

(a) What name is given to these symbols? [1 mark]

Circle the correct answer.

**security**

**universal**

**safety**

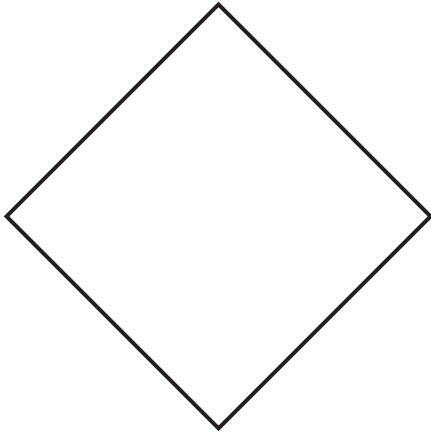
**hazard**

(b) Give **one** reason why symbols are better than words.  
[1 mark]

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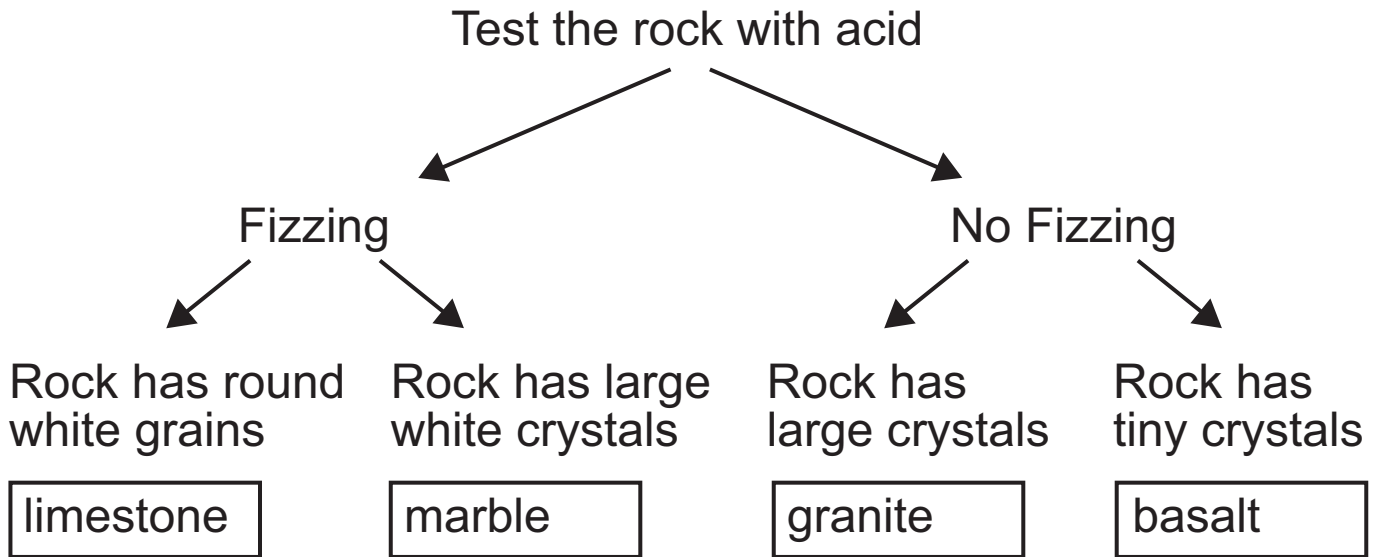
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(c) In the box below draw the symbol you would expect to see on a bottle of **toxic** weed killer. [1 mark]



3 (a) The Earth's crust is made up of many different kinds of solid rock.

Four of these are named below including some information on how to identify them.



Using **only** the information above, answer the following questions.

(i) Describe the appearance of limestone. [1 mark]

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(ii) Give **one** difference between basalt and granite. [1 mark]

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**(b) (i)** Which **type** of rock is basalt? [1 mark]

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**(ii)** Marble is an example of a metamorphic rock. Name **one** other metamorphic rock. [1 mark]

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- 4 Nanomaterials can be used in tennis balls and golf balls. This makes tennis balls bounce higher and golf balls fly straighter. Nanotechnology is also used in the making of trousers and socks so they will last longer and are cooler in summer.

Scientists think that nanotechnology has the potential to change the way we live if used in medicine and construction materials. However they suggest that much more work and time is needed to establish the dangers of nanoparticles before they are widely used in everyday life.

- (a) What is the value of one **nanometre**? [1 mark]

Tick (✓) the correct answer in the table below.

Value	Tick
1000 m	
1 m	
0.001 m	
0.000000001 m	

- (b) (i) From the information provided, give the advantage of using nanomaterials in golf balls. [1 mark]

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- (ii) Give **one** use of nanomaterials in medicine. [1 mark]

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(iii) Why are scientists concerned about the use of nanomaterials? [1 mark]

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(c) Shown below is a baby's bottle made from plastic.



The plastic changes colour from blue to red when hot liquids are added.

What type of smart material is this plastic? [1 mark]

Circle the correct answer.

**thermochromic**

**photochromic**

**electrochromic**

- 5 (a) The diagram below shows a fingerprint taken by the police from a crime scene.



- (i) Name the type of fingerprint pattern shown above.  
[1 mark]
- 

- (ii) The police have three suspects whose fingerprints are shown below.



**A**



**B**



**C**

Which suspect (**A**, **B** or **C**) was at the crime scene?  
[1 mark]

Suspect \_\_\_\_\_

**(b)** Explain fully how a fingerprint can be taken from a white surface. [3 marks]

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**(c)** Flame tests can also be used to solve crime. Complete the table below about results of a flame test. [2 marks]

<b>Metal ion</b>	<b>Flame colour</b>
potassium	lilac
	blue-green
sodium	

- 6 In May 2010, an earthquake near the city of Santiago in Chile destroyed most of the buildings and killed hundreds of people. The earthquake did not come as a surprise to scientists who had predicted it a week earlier.



The table below shows how the Richter scale is used to compare the size of earthquakes.

<b>Richter scale value</b>	<b>Effect of earthquake</b>
Less than 2	People do not feel the earthquake
2–3.9	People feel the earthquake but it rarely causes damage to buildings
4–4.9	People feel the earthquake and it causes minor damage to buildings
5–5.9	Shaking of the ground and major damage to some buildings
6–7.9	Violent shaking of the ground and many buildings destroyed
8–10	Very violent shaking of the ground and most buildings destroyed

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

- (a) Suggest a Richter scale value for the earthquake that happened near Santiago in Chile. [1 mark]

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- (b) Suggest **one** reason why governments and people often ignore scientists' predictions of an earthquake. [1 mark]

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- (c) Earthquakes less than 2 on the Richter scale are a common occurrence in the UK. Suggest why people in the UK are unconcerned by these earthquakes. [1 mark]

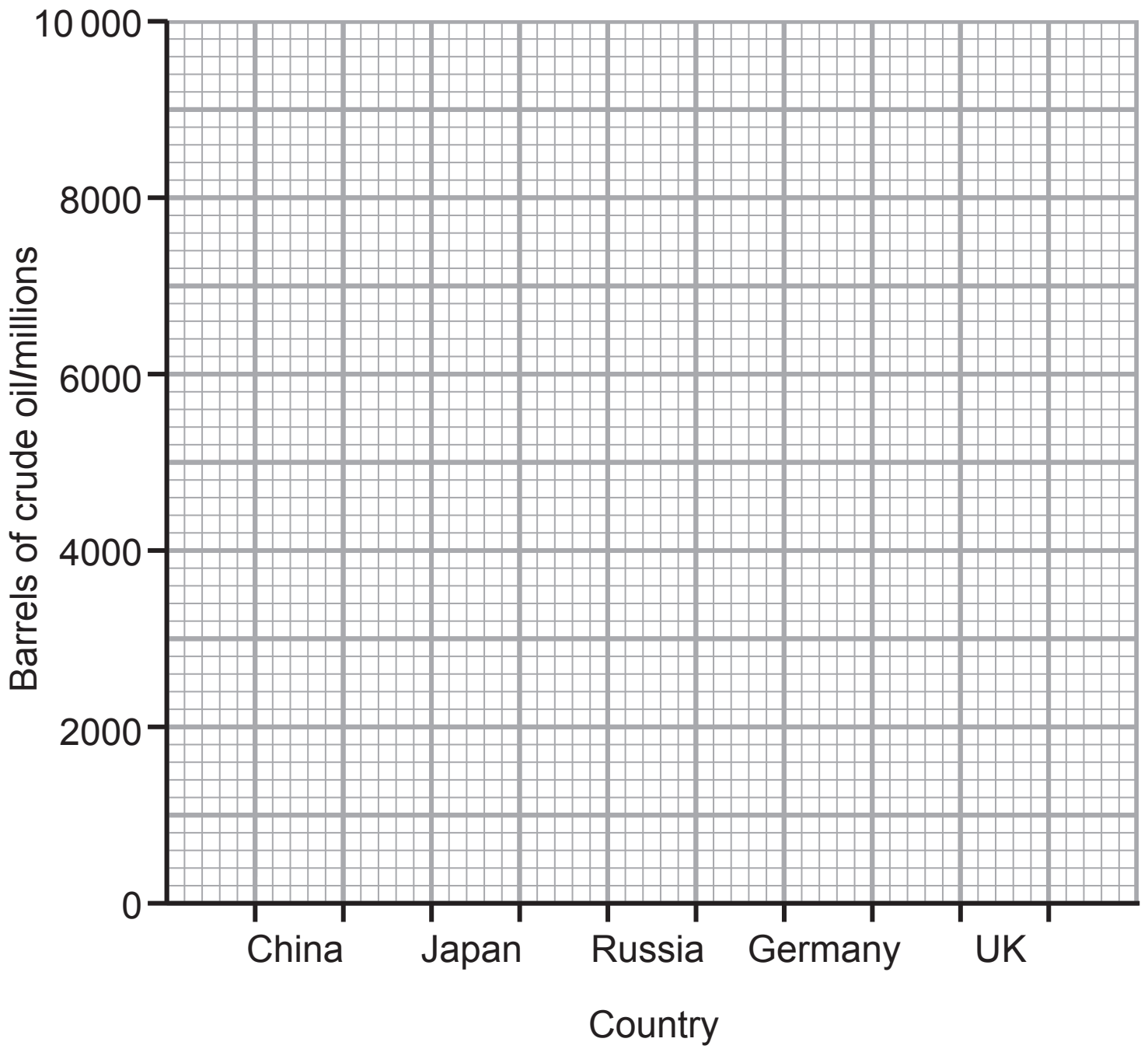
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- 7 The table below gives information about the population of five countries and how much crude oil they use per day.

Country	Barrels of crude oil/ millions	Population/ millions
China	9800	1350
Japan	4400	180
Russia	3200	165
Germany	2400	82
UK	1600	61

- (a) Draw a **bar chart** on the grid opposite to show how many barrels of crude oil are used by each country. [2 marks]
- (b) France has a population of 70 million people. Predict how many barrels of crude oil France would use per day. [1 mark]
- \_\_\_\_\_ million
- (c) Petrol can be obtained from crude oil by an industrial process.  
Name this process. [2 marks]
- \_\_\_\_\_



8 (a) Stomach ache can be caused by too much hydrochloric acid in the stomach.

Indigestion tablets can be used to reduce the amount of acid in the stomach as they contain calcium carbonate.



(i) Complete the word equation opposite for this reaction. [2 marks]

(ii) What name is given to this type of reaction? [1 mark]

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carbon  
dioxide

+

+

↑

hydrochloric  
acid

+

calcium  
carbonate

Some hydrochloric acid is added to excess calcium carbonate.

The graph opposite shows how the volume of carbon dioxide produced changes with time.

**(b)** Describe fully the trend shown by these results.  
[2 marks]

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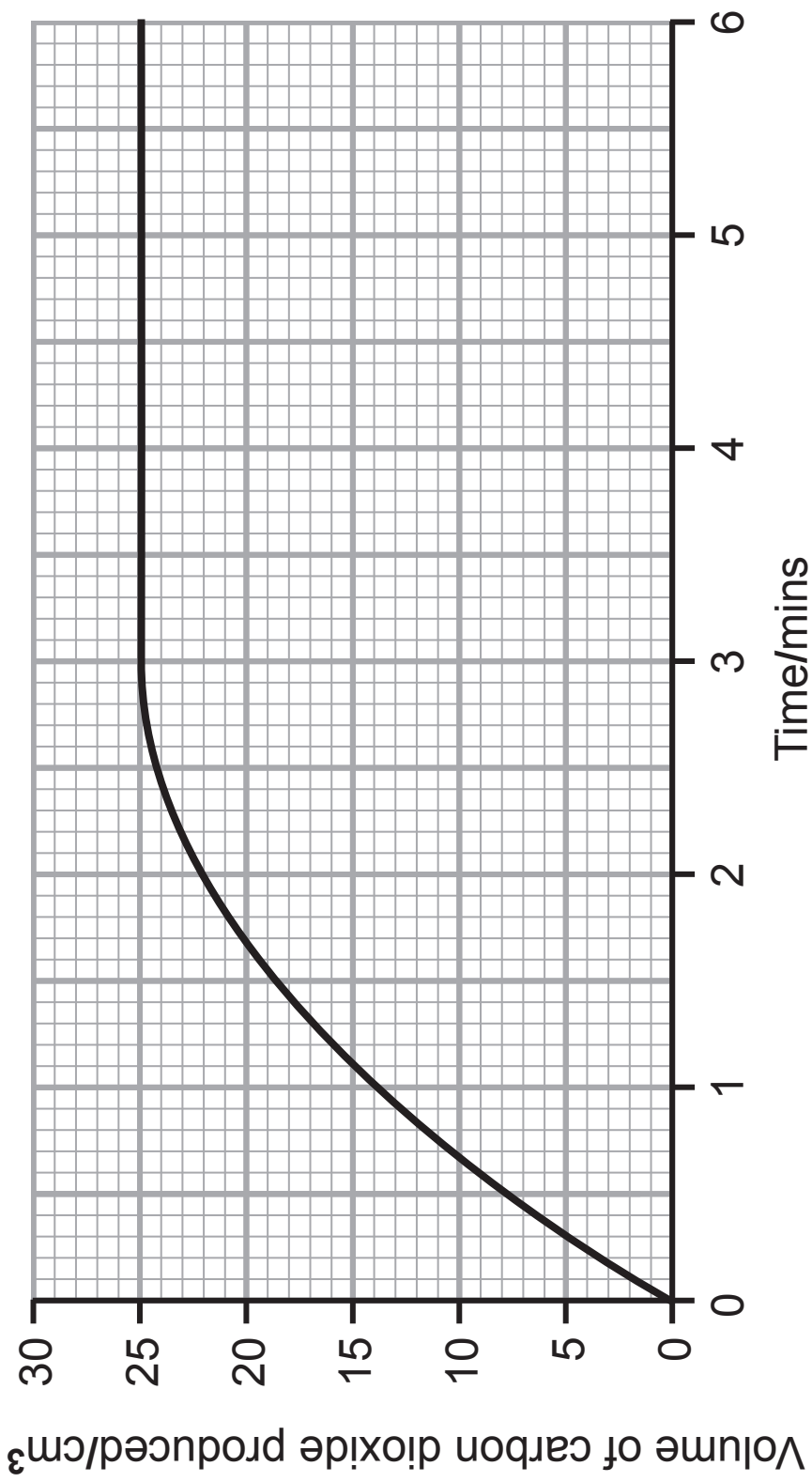
**(c)** Describe the test for carbon dioxide. [2 marks]

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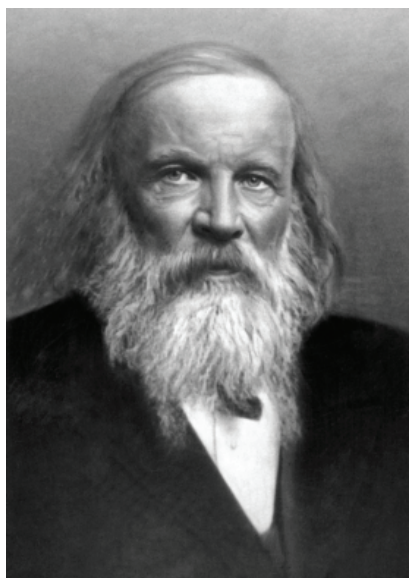
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- 9 In 1869 the scientist pictured below put the sixty known elements into a Periodic Table.



- (a) Name the scientist pictured above. [1 mark]
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- (b) Name the unreactive **group** of elements not included in his table because they had not been discovered by 1869. [1 mark]
- 

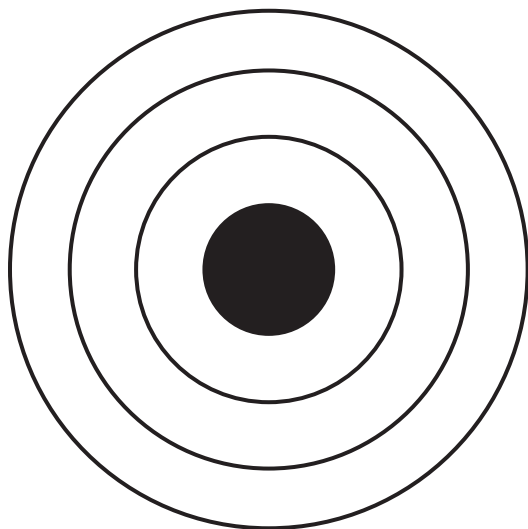
- (c) Sodium is in Group 1 of the modern Periodic Table.

- (i) Complete the table below to show the number of each different particle in a sodium atom. [3 marks]

You may find your Data Leaflet helpful.

	Number of protons	Number of neutrons	Number of electrons
sodium (Na)			

- (ii) Complete the diagram below to show the electronic structure of a sodium atom. [1 mark]



sodium atom

- (d) When sodium is added to water there is a violent reaction during which it moves on the water surface.

- (i) Give **two** other observations during this reaction. [2 marks]

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

2. \_\_\_\_\_

- (ii) Name the alkaline solution formed during this reaction. [1 mark]

\_\_\_\_\_

(e) Potassium and sodium are both in Group 1 of the Periodic Table.

Give **two** reasons why these metals are in the same Group. [2 marks]

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

\_\_\_\_\_

2. \_\_\_\_\_

\_\_\_\_\_

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**(Questions continue overleaf)**

**10 (a)** Some students investigated the hardness of water in four towns (**W**, **X**, **Y** and **Z**). The following method was used for each town.

1. Measure 25 cm<sup>3</sup> of water and add to a conical flask.
2. Add 1 cm<sup>3</sup> of soap solution and shake well.
3. Repeat step 2 until a permanent lather forms.
4. Record the volume of soap solution used.
5. Boil another 25 cm<sup>3</sup> of water and repeat steps 1 to 4.

The results are shown below.

	Volume of soap solution/cm <sup>3</sup>	
Town	before boiling	after boiling
<b>W</b>	26	1
<b>X</b>	6	6
<b>Y</b>	24	17
<b>Z</b>	1	1

(i) Name a piece of apparatus the students could have used to measure 1 cm<sup>3</sup> of soap solution. [1 mark]

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(ii) Suggest **one** way in which the reliability of the results could have been improved. [1 mark]

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**(b)** What can you conclude about the hardness of the water from Town **Y**? Explain your answer. [2 marks]

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**(c)** Apart from using more soap, give **one** disadvantage of using hard water. [1 mark]

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

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## SOURCES

- Pg 3, Q1** .....Source: saucepan © Dimedrol68 / iStock / Thinkstock  
**Pg 4, Q2** .....Source:thick bleach, © Cordelia Molloy / Science Photo Library  
**Pg 9, Q4** .....Source: Baby bottle, © DimaP / iStock / Thinkstock  
**Pg 10, Q5(a)** ..... Source: Fingerprint Diagram, © Science Source / Science Photo Library  
**Pg 10, Q5(a)(ii)** . Source: Fingerprints Diagram, © Science Source / Science Photo Library  
**Pg 12, Q6** ..... Source:Earthquake, © Ria Novosti / Science Photo Library  
**Pg 16, Q8(a)** ..... Source: Indigestion Tablets, © GIPhotoStock / Science Photo Library  
**Pg 20, Q9** ..... Source: Picture of scientist from 1869, © Ria Novosti / Science Photo Library

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Question Number	Marks
1	
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11	
<b>Total Marks</b>	

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