



*Rewarding Learning*

General Certificate of Secondary Education  
2015–2016

Centre Number

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Candidate Number

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## Science: Single Award

Unit 2 (Chemistry)  
Foundation Tier

[GSS21]

**MV18**

**THURSDAY 25 FEBRUARY 2016, MORNING**

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### **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 **9**.

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.

- 1 The hazard symbol below was found on a lorry carrying methylated spirit.



- (a) Name the hazard symbol shown above. [1 mark]

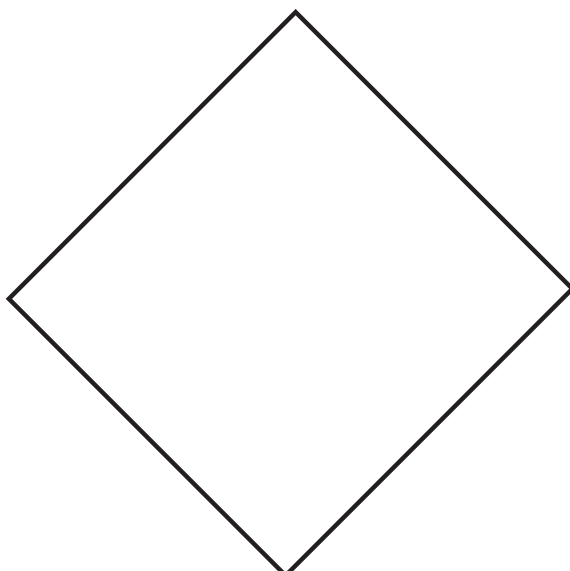
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- (b) Hazard symbols warn of danger. Give **one** reason why symbols are used and not just words. [1 mark]

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- (c) In the space below, draw the hazard symbol for a **toxic** substance. [1 mark]



2 (a) The pH scale is shown below.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
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(i) Suggest a pH value for stomach acid. [1 mark]

\_\_\_\_\_

(ii) What is the pH number of a neutral substance?  
[1 mark]

\_\_\_\_\_

When a wasp stings, it leaves an alkali in the wound.

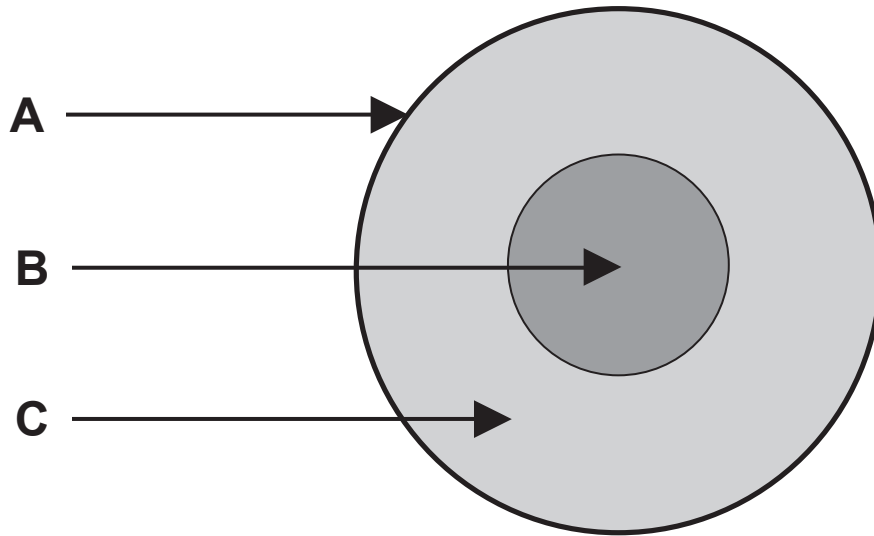


(b) Name a substance which could be **safely** used to neutralise the alkali. [1 mark]

Circle the correct answer.

**toothpaste** : **hydrochloric acid** : **vinegar**

3 Below is a diagram of the structure of the Earth.



(a) Complete the table below to match each layer to its correct name. [3 marks]

Choose from:

core

mantle

nucleus

crust

Layer	Name
A	
B	
C	

(b) Complete the following sentence. [1 mark]

The surface of the Earth contains three types of rock; these are called igneous, sedimentary and

\_\_\_\_\_ .

4 Garden furniture is often made from plastic.



(a) Suggest **one** property that makes plastic a suitable material for making garden furniture. Explain why this property makes it suitable. [2 marks]

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(b) Wood can also be used to make garden furniture. It absorbs water, is easily available, and can be cut into many shapes.

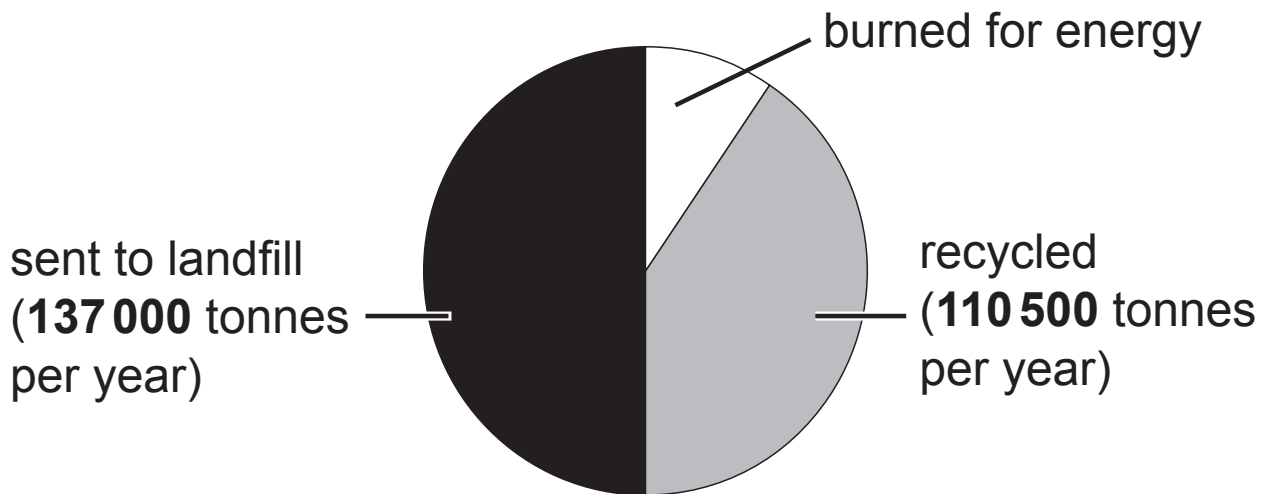
Using the information above, give **one** disadvantage of using wood to make garden furniture. Explain your answer. [2 marks]

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The pie chart below shows three methods used in the UK to dispose of waste plastic.



In the UK a total of **275 000** tonnes of waste plastic is disposed of each year.

(c) Calculate the amount of waste plastic that is burned for energy each year. [2 marks]

(Show your working out.)

\_\_\_\_\_ tonnes

(d) Given below is information about three types of fibres used to make clothing.

Type of fibre	Strength	Keeps its shape	Weight	Ability to absorb water	Biodegradable
Cotton	average	no	heavy	good	yes
Nylon	very strong	yes	light	average	no
Polyester	strong	yes	very light	poor	no

(i) Name the natural fibre shown in the table above.  
[1 mark]

\_\_\_\_\_

(ii) Which fibre would be the best to use in the manufacture of raincoats? Choose **two** properties from the table to support your answer. [2 marks]

Fibre \_\_\_\_\_

Property 1 \_\_\_\_\_

Property 2 \_\_\_\_\_



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**(Questions continue overleaf)**

5 (a) Given below are the steps a student used to test for hard water.

They are **not** in the correct order.

**A** Stop adding soap solution when a permanent lather forms

**B** Add 5 cm<sup>3</sup> of soap solution and shake well

**C** Measure 25 cm<sup>3</sup> of water into a conical flask

**D** Record the volume of soap used to form a permanent lather

**E** Continue adding soap solution 5 cm<sup>3</sup> at a time

(i) Using the letters **A**, **B**, **C**, **D** and **E** put the steps in the correct order. The first one has been done for you. [2 marks]

**C**

\_\_\_\_\_

(ii) Suggest why the student shakes the water samples after adding soap solution. [1 mark]

\_\_\_\_\_

(iii) Apart from taste, give **one** advantage of drinking hard water. [1 mark]

\_\_\_\_\_

(b) Water can be hard or soft; and hard water can be temporary or permanent.

Using lines, match each statement to the correct type of water. [2 marks]

**Statement**

**Type of water**

Easily makes a lather with soap

Permanent hard water

Temporary hard water

Can be softened by boiling

Soft water

(c) Name **one** chemical compound which causes temporary hardness in water. [1 mark]

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(c) Beryllium is in Group 2 of the Periodic Table.  
Which **one** of these statements is correct for beryllium?  
Tick (✓) the correct box. [1 mark]

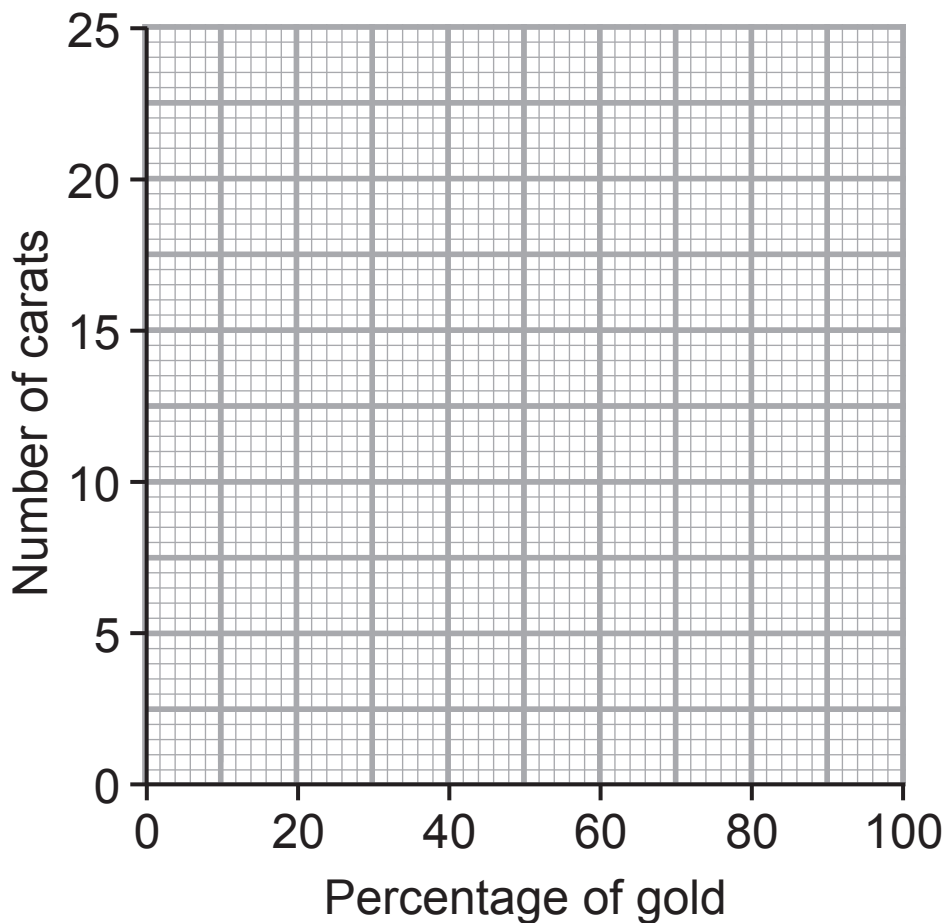
Statement	Tick
it is a halogen	
it belongs to the same Period as oxygen	
it is a compound	

- 7 (a) Gold is a metal element used in jewellery. The purity of gold is often measured in carats.

The table below shows how the number of carats is related to the percentage of gold.

Percentage of gold	Number of carats
100	24
92	22
75	18
38	9

- (i) On the grid below plot and draw a line graph for this information. [2 marks]



**(ii)** State the trend shown by this information.  
[1 mark]

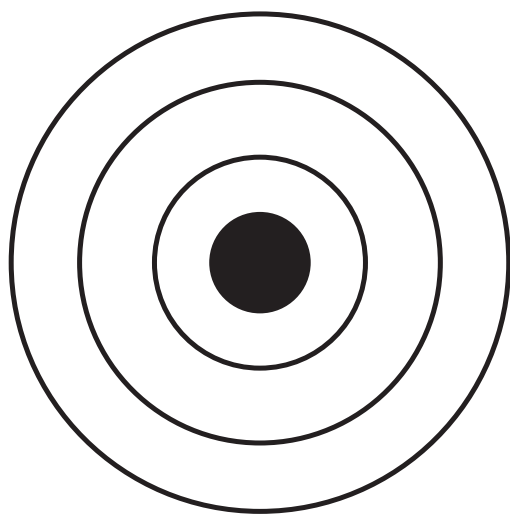
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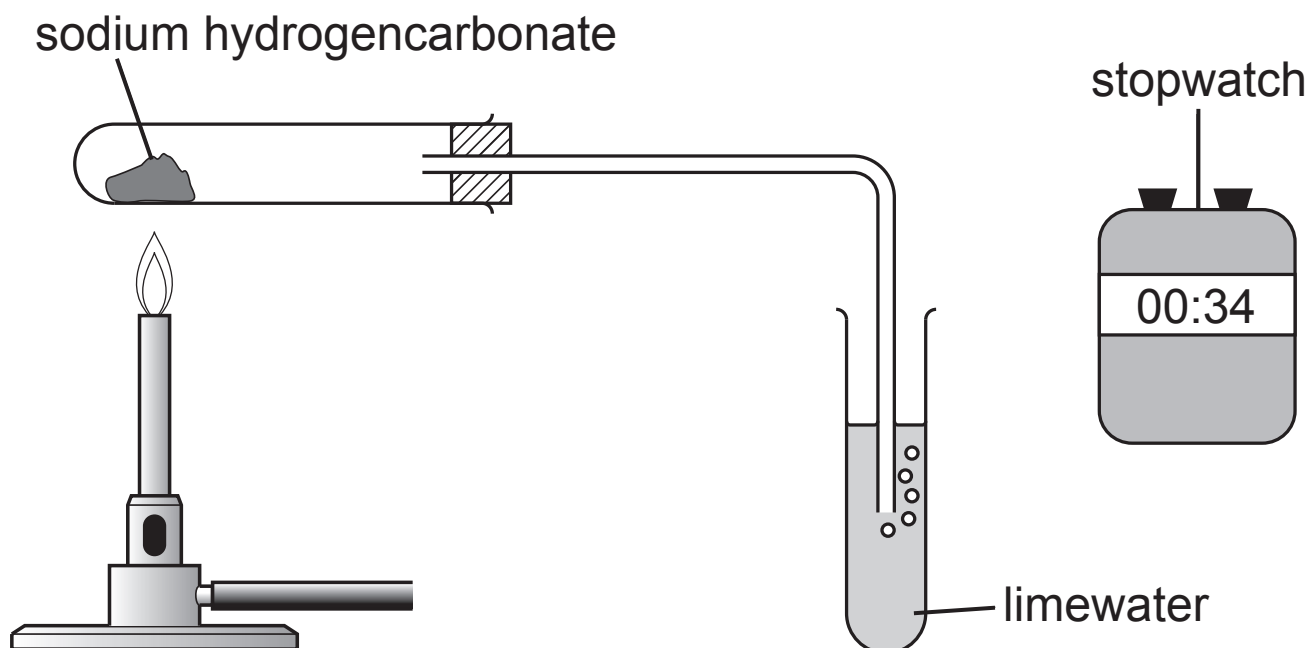
**(iii)** Use the graph to find the percentage of gold in a 14 carat gold ring. [1 mark]

\_\_\_\_\_ %

**(b)** Aluminium is often added to gold in jewellery. An atom of aluminium has 13 electrons. Complete the diagram below to show how all these electrons are arranged.  
[1 mark]



- 8 Sarah investigated the effect of heating a **small** amount of sodium hydrogencarbonate using the apparatus shown below.



Sarah's observations are shown in the table below.

<b>Time interval/ seconds</b>	<b>Observations</b>
0 to 30	Small number of gas bubbles observed in limewater. The limewater remained colourless
31 to 60	A large number of gas bubbles. The limewater turned cloudy
61 to 90	No bubbles



**(a)** In this investigation:

**(i)** name the gas produced. [1 mark]

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**(ii)** name the type of reaction that produced this gas.  
[1 mark]

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**(b)** Suggest **one** reason for Sarah's observations between 0 and 30 seconds. [1 mark]

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**(c)** Explain fully Sarah's observation between 61 and 90 seconds. [2 marks]

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- 9 The fingerprint shown below was found on the door of a stolen black car.



Describe how the fingerprint can be taken from the black car and kept as evidence.

Your answer should include:

- the type of fingerprint shown above,
- why the fingerprint may be useful in helping solve the crime.

[6 marks]



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**10** The reactivity of three metals, copper, zinc and magnesium, was investigated by adding a small amount of each to sulfate solutions of the other metals.

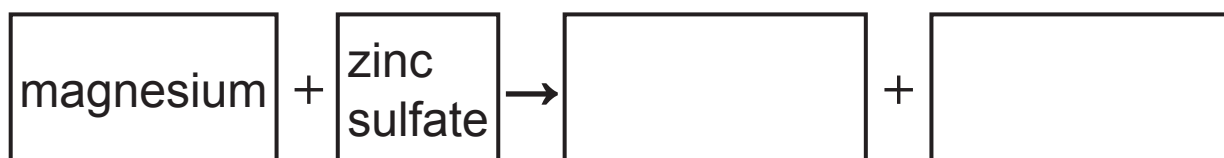
Some results are shown below.

If there was a reaction a tick (✓) was used; for no reaction a cross (X) was used.

<b>Solution</b> <b>Metal</b>	Copper sulfate	Zinc sulfate	Magnesium sulfate
Copper		X	
Zinc			
Magnesium		✓	

(a) Use your knowledge of the reactivity series to complete the table above. [2 marks]

(b) Complete the word equation for the reaction between magnesium and zinc sulfate. [2 marks]



(c) Name this type of reaction. [1 mark]

\_\_\_\_\_

**11** The table shows some chemicals that can be separated from **one** barrel of crude oil.

<b>Chemicals</b>	<b>Amount in one barrel/gallons</b>
petrol	2.2
jet fuel	4.8
fuel oil	2.8
diesel	8.0
others	7.4

(a) Name the process used to separate crude oil into these different chemicals. [1 mark]

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(b) Name **one** other chemical that can be separated from crude oil. [1 mark]

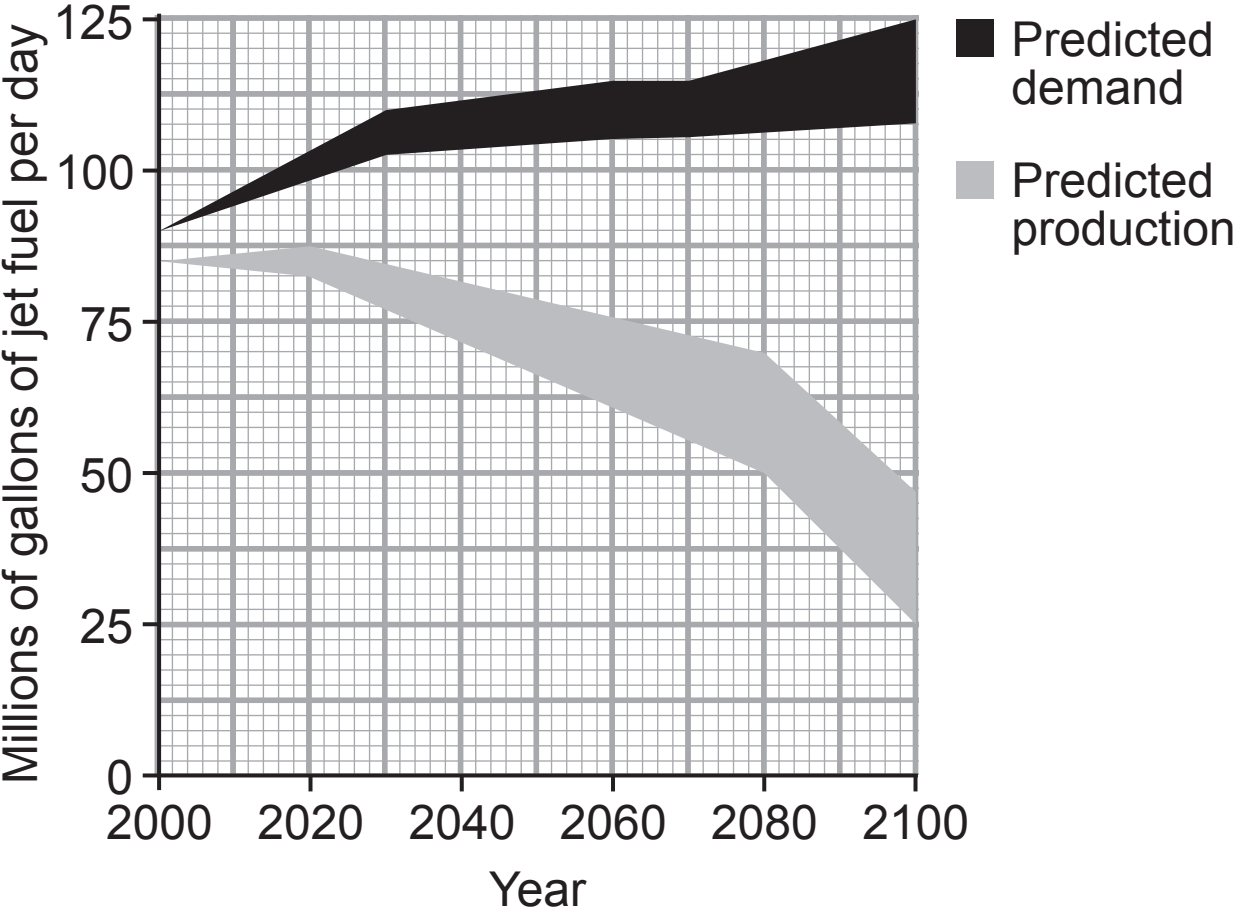
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(c) A plane needs 4800 gallons of **jet fuel** for one journey. Calculate how many barrels of crude oil are needed for this journey. [2 marks]

(Show your working out.)

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The graph below shows the predicted demand for jet fuel. It also shows the predicted production of jet fuel from crude oil.



(d) Use the graph to explain why airline companies are investing large amounts of money to find alternative sources of fuel for their aircraft. [2 marks]

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(e) Suggest **two** reasons why these predictions may not be accurate. [2 marks]

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

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

**Sources:**

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Q4 . . . Image of garden furniture © venusphoto / iStock / Thinkstock

Q9 . . . Image of a fingerprint © Science Source / Science Photo Library

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Question Number	Marks
1	
2	
3	
4	
5	
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7	
8	
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10	
11	
<b>Total Marks</b>	

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