

Surname	Centre Number	Candidate Number
Other Names		0



GCSE

4782/02

SCIENCE B

**UNIT 2: Science and Life in the Modern World
HIGHER TIER**

P.M. TUESDAY, 10 June 2014

1 hour

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	13	
2.	8	
3.	9	
4.	9	
5.	7	
6.	14	
Total	60	

ADDITIONAL MATERIALS

In addition to this paper you may require a calculator and ruler.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

If you run out of space, use the continuation pages at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded that assessment will take into account the quality of written communication used in your answer to question **3(b)** and **6(a)**.

A periodic table is printed on page 16.

Answer **all** questions.

1. Neutralisation reactions occur when acids and alkali react together. Metals can also neutralise acids. The general equation for the reaction between a metal and acid is given by:



- (a) Complete the word equation for the reaction below. [2]

magnesium + hydrochloric acid \longrightarrow +

- (b) Kate is studying the reaction between hydrochloric acid and the metal magnesium.

In her experiment she:

1. measured 25 cm³ dilute hydrochloric acid at 20 °C with a measuring cylinder;
2. added the acid to a conical flask;
3. added 1 g of magnesium to the acid and started a stop watch;
4. measured the total volume of gas every 20 seconds.

The results of her experiment are shown below.

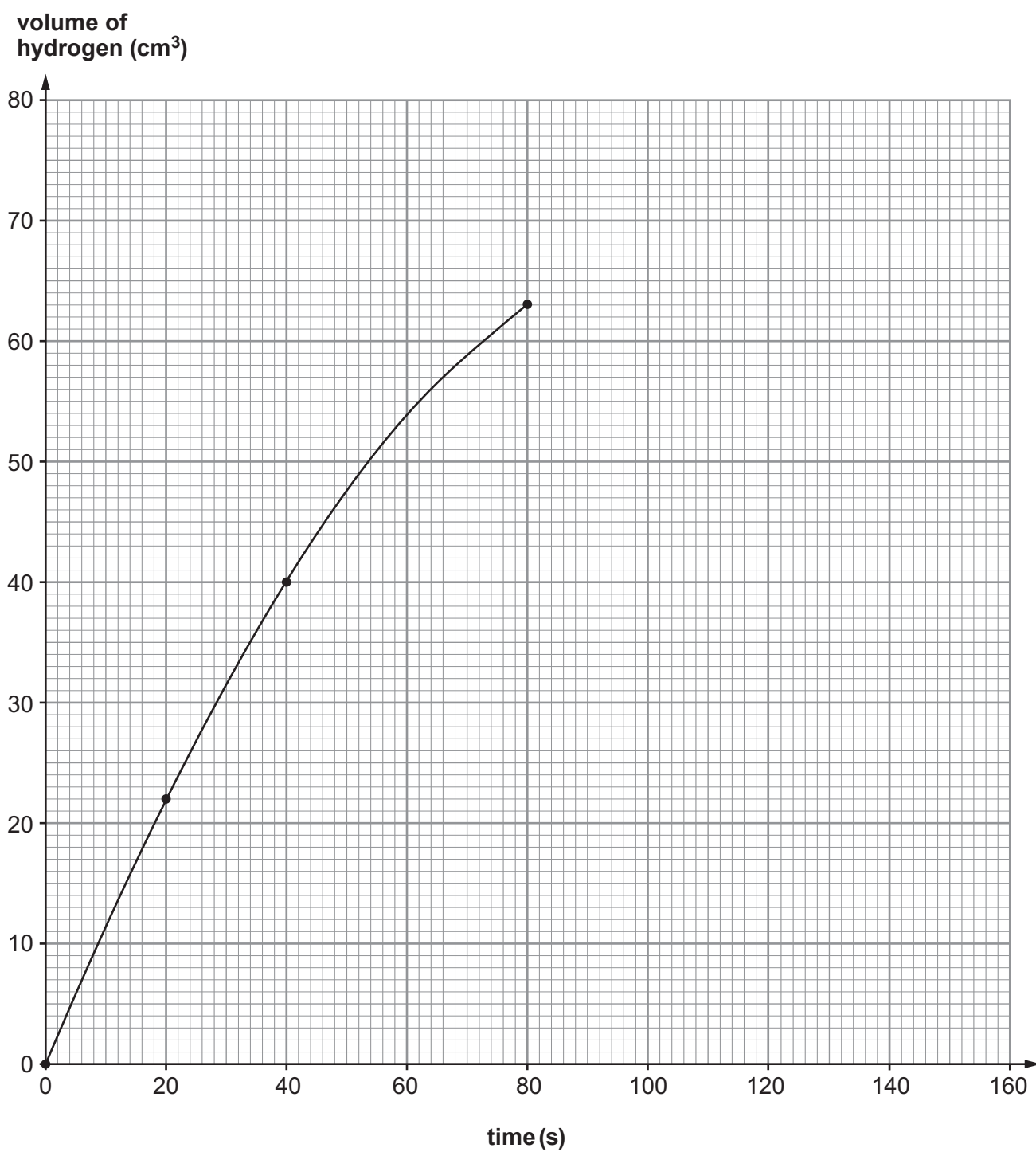
Kate's Results

Time (s)	0	20	40	60	80	100	120	140	160
Volume of hydrogen (cm ³)	0	22	40		63	68	71	72	72

(i) Complete the graph of her results.

[3]

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- (ii) Kate has lost her result for 60 s. Use your graph to estimate the volume of gas at 60 s. [1]

..... cm³

- (iii) State **one** way in which Kate can improve the validity of her experiment. [1]

.....

- (iv) Explain what happens to the pH during this reaction. [2]

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- (v) Predict the volume of hydrogen you would expect to be collected after 200 s. Give **one** reason for your answer. [2]

.....

.....

.....

- (c) Kate wants to compare the volume of hydrogen given off every 20 seconds if she repeated the experiment with iron instead of magnesium. State **two** variables that need to be controlled to ensure a fair test. [2]

1.

2.

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2. (a) Complete the following table about the extraction of iron in the blast furnace.

[3]

Raw material	Chemical name	The purpose of the raw material
limestone	calcium carbonate	Removes impurities which form the waste called slag
hot air	oxygen	Allows the coke to burn
coke	carbon
haematite

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- (b) The table below shows information about the materials required for the production of **one tonne** of iron.

Complete the table to calculate the total cost of producing **one** tonne of iron. [3]

Raw material	Mass needed (tonnes)	Cost per tonne of raw material (£)	Cost in producing one tonne of iron (£)
iron ore	1.75	60.50
coke	0.25	120.90	30.22
limestone	0.25	20.00
hot air	4.0	2.25	9.00
		Total cost	£

- (c) Aluminium is also extracted from its ore. Explain why aluminium cannot be extracted in a blast furnace using coke (carbon). [2]

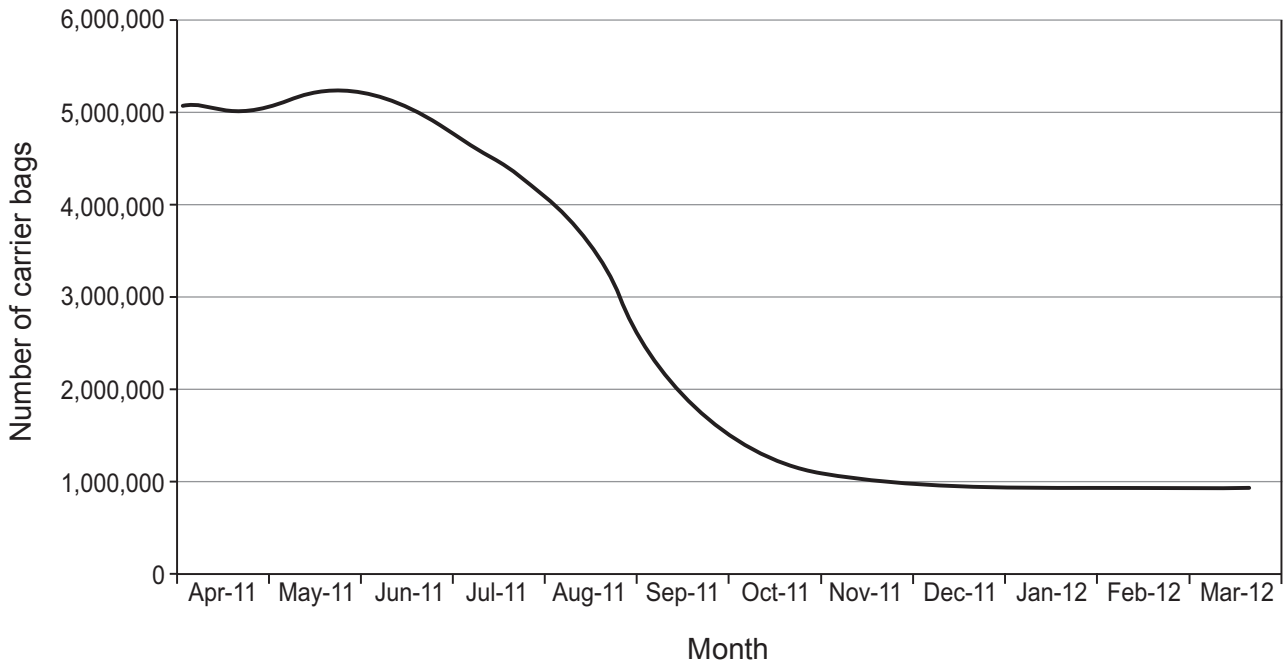
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3. On 1 October 2011, Wales became the first UK country to introduce a charge for plastic single-use carrier bags. In the latest estimates from the Welsh Government, they claim that there has been an 80-90% drop in 'plastic single-use' carrier bags.

The following graph shows the decline in the number of 'plastic single use' carrier bags sold in a major supermarket chain in Wales for the period April 2011 – March 2012.



- (a) Use the information in the graph to explain whether the claim made by the Welsh government is valid. [3]

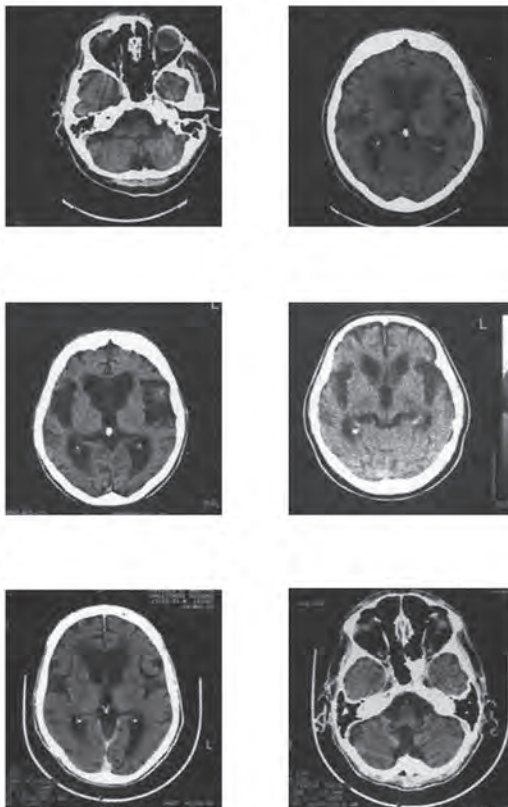
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4. Huntington's is an inherited genetic disease caused by a dominant allele and is not usually diagnosed until 35 to 45 years of age. The diagnosis is usually confirmed by genetic testing and CAT scan.



- (a) Give **three** reasons why a CAT scan is used in the diagnosis of Huntington's. [3]

1.
2.
3.

- (b) (i) Complete the Punnett square to show the offspring produced by a heterozygous father and a mother who does not suffer from Huntington's. [3]

.....		
.....		

- (ii) Calculate the chance that their first child will suffer from Huntington's. [1]

..... %

- (c) Explain what advice could be given to this couple to avoid the possibility of producing a child suffering with Huntington's. [2]

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5. In the UK about 100 000 people die due to smoking related diseases each year. The table below indicates the estimated numbers of 11-15 year olds that **admitted** to have started smoking in the years 2001-2013. These estimates have been based on questionnaires completed each year by about 1 000 pupils.

Estimated Number of Children Aged 11-15 Starting Smoking, UK, 2001-2013

Year	Boys	Girls
2001	128 000	172 000
2003	128 000	160 000
2005	128 000	190 000
2007	85 000	100 000
2009	75 000	101 000
2011	74 000	81 000
2013	71 000	73 000

- (a) The data in the table shows that the number of boys that have admitted to smoking has dropped by 44.5% from 2001 to 2013.

Calculate the percentage drop for girls over the same period. [2]

Drop = %

- (b) (i) State **one** assumption that has been made in the recorded information above. [1]

.....
.....

- (ii) State how the data could be **scientifically** confirmed. [1]

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.....

- (c) The ban on smoking in public places was introduced in 2007. Use the information in the table to comment on the impact of this ban on smoking in 11-15 year olds. [3]

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(b) The table below shows some isotopes of iodine.

Radio-isotope	Symbol	Half-life
iodine-111	^{111}I	2.5 seconds
iodine-123	^{123}I	13.2 hours
iodine-131	^{131}I	8 days

(i) State what is meant by the term *half-life*. [2]

.....

(ii) Calculate the **fraction** of the original amount of iodine-123 that would be left in the body after 66 hours. [2]

Fraction =

(iii) Iodine is absorbed by the thyroid. Explain why iodine-123 is the most suitable for this technique. [2]

.....

(iv) Explain why a patient should only have a limited number of gamma camera investigations in a year. [2]

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END OF PAPER

