WJEC GCSE SCIENCE B

SCIENCE



EXAM QUESTION PACK

UNIT 2 HIGHER TIER 4782 PAPERS

STEMUP

These questions belong to WJEC, not to us.

The examination questions, mark schemes and examiner reports in this pack were written and published by WJEC. They are past assessment materials, reproduced here so that students can revise from them.

What we do not own

STEMUP is not affiliated with WJEC and does not own, and makes no claim to own, any of the question, mark scheme or examiner report material in this pack. WJEC has not endorsed, approved or been involved in the production of it. WJEC and the qualification titles used here belong to their respective owners and appear for identification only.

Where to find the originals

WJEC publishes its past papers, mark schemes and examiner reports free of charge. Always check the current specification at wjec.co.uk before you revise, because content and wording can change between series.

If you hold the rights to any material in this pack and would like it amended or removed, contact admin@stemup.co.uk and we will act on it.

Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4782/02

S16-4782-02

SCIENCE B

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

P.M. WEDNESDAY, 15 June 2016

1 hour

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**16**	
2.	**11**	
3.	**5**	
4.	**9**	
5.	**6**	
6.	**13**	
Total	**60**	

4782 020001

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.

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 **2***(c)* and **5**.

A periodic table is printed on page 16.

© WJEC CBAC Ltd.

STEMUP.CO.UK

BLANK PAGE

© WJEC CBAC Ltd.

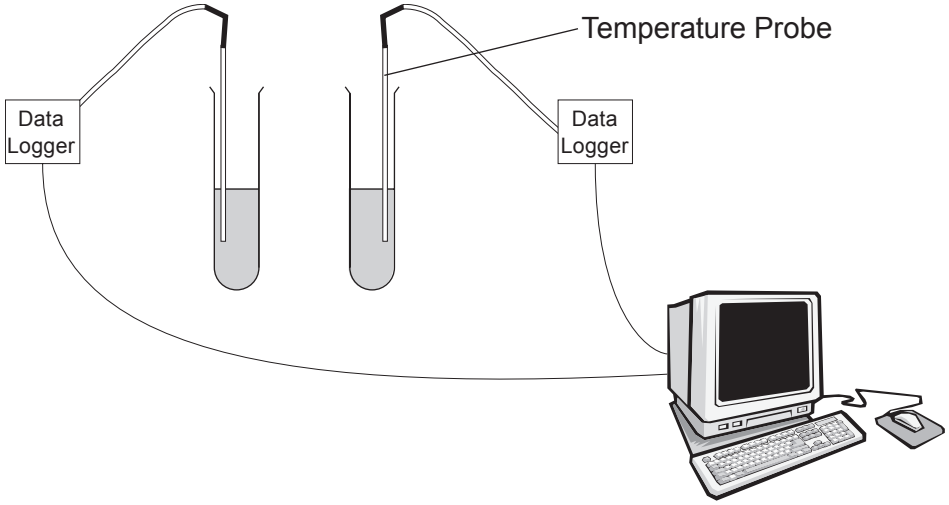
Examiner only

Answer **all** *questions.*

1. A student investigated the reactions of hydrochloric acid with different alkalis.

The student followed the method below:

- 20 cm^3 of sodium hydroxide solution was placed in tube 1
- 20 cm^3 of sodium carbonate solution was placed in tube 2
- 20 cm^3 of dilute hydrochloric acid was added in turn to each tube
- The temperature of each of the solutions was then recorded using a data logger



The equation for **Reaction 1** is given by:

$$HCl + NaOH \longrightarrow NaCl + H_2O$$

(a) Complete the balanced symbol equation for **Reaction 2**. [3]

$2HCl + Na_2CO_3 \longrightarrow$ ..... + ... + ...

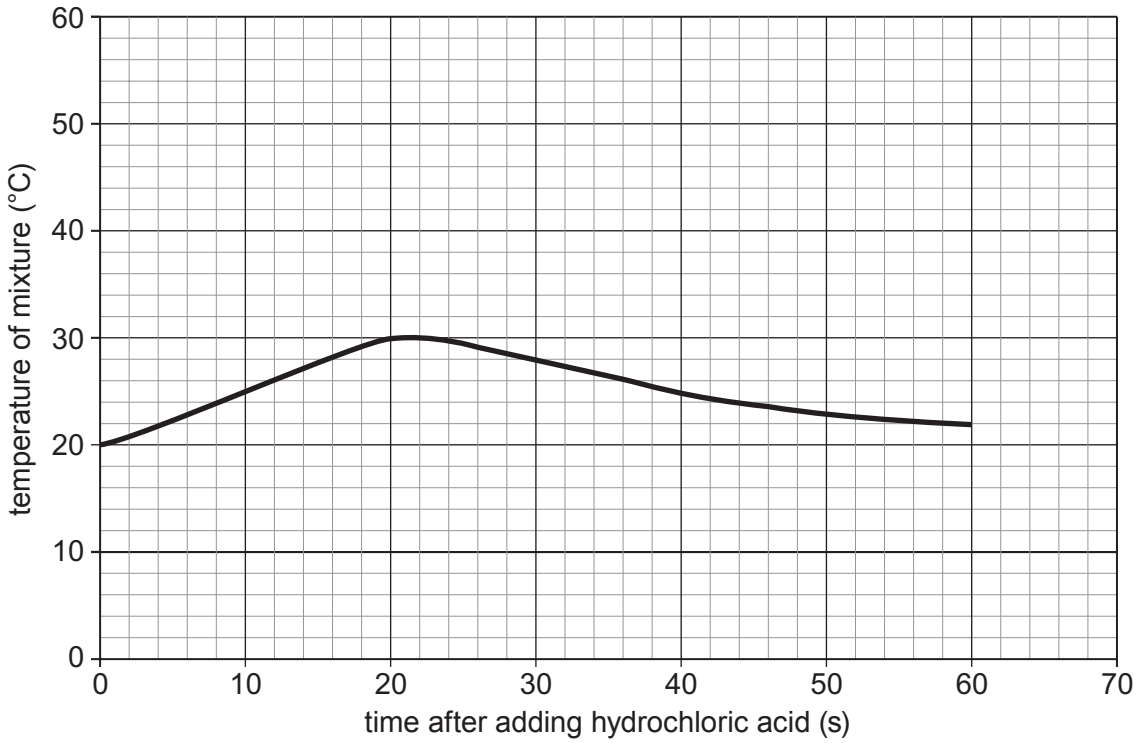
4782 020003

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(b) The temperature changes recorded for the reaction between sodium hydroxide and hydrochloric acid **(Reaction 1)** have been plotted for you.



(i) Plot the following results for **Reaction 2** on the graph above. [3]

Time after adding the hydrochloric acid (s)	Temperature of solution (°C)
0	20
10	30
20	55
30	48
40	45
50	42
60	40

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(ii) Complete the table to show the increase in temperature for the reactions. [2]

Reaction	Initial temperature (°C)	Maximum temperature (°C)	Maximum rise in temperature (°C)
1	.....	.....	.....
2	.....	.....	.....

(c) Describe the changes that occur in **Reaction 1** and **Reaction 2**. [4]

.....

.....

.....

.....

.....

.....

.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(d) The student calculated the concentration of the hydrochloric acid used in this investigation.

(i) To do this the student performed a titration. He measured 35.0 cm^3 of the hydrochloric acid into a flask and added a few drops of indicator. He then titrated 0.50 mol/dm^3 potassium hydroxide from a burette. The results of the titrations are shown below.

Calculate the mean titre. [1]

Trial	Volume of potassium hydroxide (cm^3)
1	65.40
2	65.30
3	64.30
Mean titre	.....

(ii) Calculate the concentration of the hydrochloric acid using the formula below. Give your answer to two decimal places. [3]

concentration of alkali × volume of alkali used = concentration of acid × volume of acid used.

Answer = ... mol/dm^3

16

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

2. Plastic technology is advancing rapidly with new plastics being made all the time.

(a) Plastic production relies on the formation of a polymer.

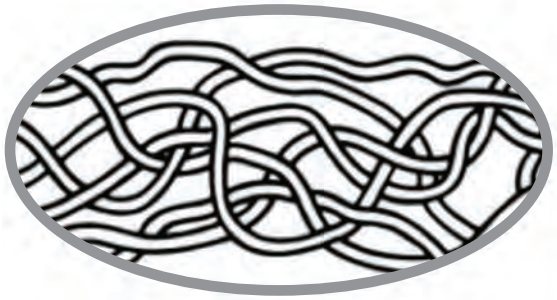
Describe the main **structural** differences between ethene and polyethene. [2]

.....

.....

.....

(b) Explain how the properties of thermoplastics (e.g. polyethene) and thermosets (e.g. melamine) are related to the structures shown. [3]



THERMOPLASTIC



THERMOSETTING

.....

.....

.....

.....

.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(c) The table below compares the production of 1 kg of a bioplastic called polylactic acid (PLA) with two traditional plastics.

	Polylactic (PLA) plastic	Polyethene	Polystyrene
energy consumption (kWh)	10.74	20.56	22.56
water consumption (dm^3)	74.61	67.05	184.86
CO_2 emissions (units)	2.60	5.62	5.02
solid waste (g)	0.84	1.74	2.22
source of raw materials	corn plants	crude oil	crude oil
biodegradable	yes	no	no

Use your knowledge and the information in the table to discuss the **advantages and disadvantages** of the production of bioplastics such as polylactic (PLA) compared to traditional plastics. [6 QWC]

Your answer should include:

- The data in the table
- Advantages of using bioplastics
- Disadvantages of using bioplastics

.....

.....

.....

.....

.....

.....

.....

.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

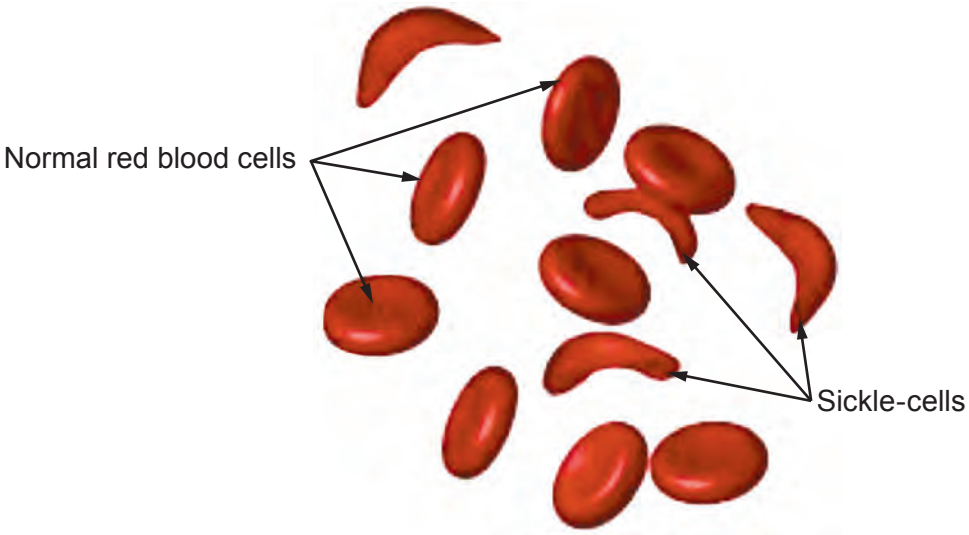
11

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

3. Sickle-cell anaemia is an inherited disease caused by a **recessive allele**. In a patient with this disease the haemoglobin in red blood cells develops abnormally. The cells form sickle shapes.



(a) James and Chinaza, a couple with a family history of sickle-cell anaemia, are both heterozygous for sickle-cell anaemia, often referred to as a 'sickle-cell trait'.

Use an appropriate diagram to calculate the chance of James and Chinaza producing a baby with sickle-cell anaemia. [3]

chance of sickle-cell anaemia = ...

(b) Suggest what advice a genetic counsellor may offer this couple. [2]

.....

.....

.....

5

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

4. The table contains some physical properties of four elements, **W**, **X**, **Y** and **Z**.

Element	Melting point (°C)	Boiling point (°C)	Conducts electricity?	Density (g/cm^3)
W	–101	–35	No	0.0029
X	98	890	Yes	0.97
Y	–7	59	No	3.1
Z	113	184	No	4.9

(a) Identify which of the above elements **W**, **X**, **Y** or **Z** are sodium and chlorine. Give **one** reason for each choice. [4]

(i) sodium .....

Reason .....

.....

(ii) chlorine .....

Reason .....

.....

(b) When a piece of sodium is exposed to air, the freshly cut surface immediately reacts with a gas in the air.

(i) Write a balanced symbol equation for this reaction. [3]

..... + ... ⟶ .....

(ii) Explain how the storage of sodium prevents this reaction. [2]

.....

.....

9

© WJEC CBAC Ltd.

Turn over.

STEMUP.CO.UK

Examiner only

5. The ultrasound image below shows the liver of a patient suffering from gall stones.



Discuss the use of ultrasound as a medical imaging technique. [6 QWC]

- Describe how the image is formed
- Describe the advantages over other imaging techniques
- Give other uses of this medical application

6

© WJEC CBAC Ltd.

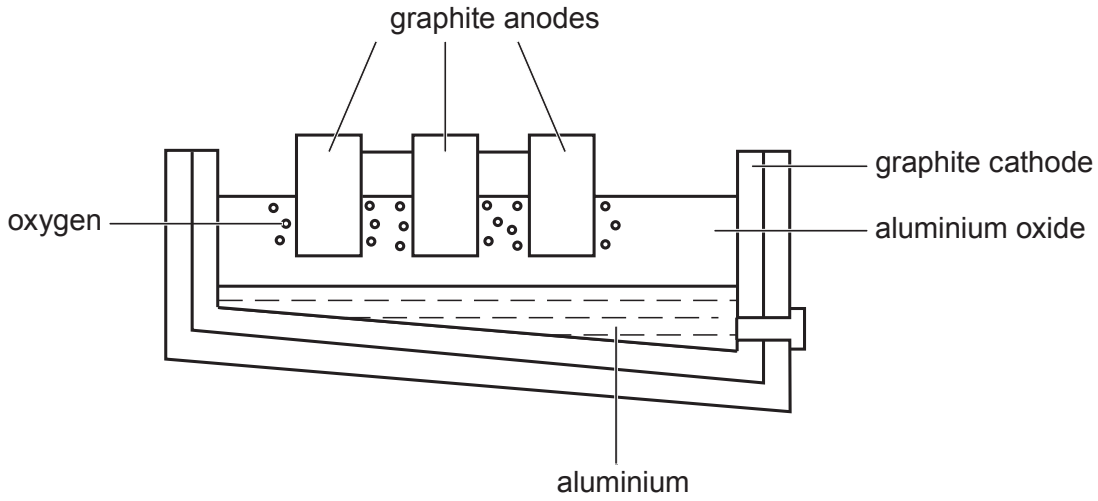
STEMUP.CO.UK

BLANK PAGE

© WJEC CBAC Ltd.

Examiner only

6. The process of electrolysis can be used to extract reactive metals from their ores.



(a) (i) Give the state *(solid, liquid or gas)* of the aluminium oxide used in this process. [1]

.....

(ii) Explain why the aluminium oxide must be in this state. [2]

.....

.....

.....

.....

(b) Explain what happens at the graphite cathode. [3]

.....

.....

.....

.....

.....

(c) Explain why aluminium ore is extracted using electrolysis rather than by chemical reduction. [2]

.....

.....

.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(d) The cost of electricity for producing one tonne of aluminium from its ore is £2500. Recycling aluminium uses only 5% of the electricity needed to extract it from its ore. Calculate the cost of the electricity needed to recycle 1 tonne of aluminium. [1]

Cost = £ .....

(e) Give **one** environmental reason why aluminium should be recycled apart from saving energy. [1]

.....

.....

(f) State **three** factors that need to be considered when deciding upon the location of a new aluminium production plant. [3]

.....

.....

.....

.....

13

END OF PAPER

© WJEC CBAC Ltd.

Turn over.

STEMUP.CO.UK

Periodic Table of the Elements

element name
atomic number
symbol

	1	2											3	4	5	6	7	0
1									hydrogen 1 **H**									helium 2 **He**
2	lithium 3 **Li**	beryllium 4 **Be**											boron 5 **B**	carbon 6 **C**	nitrogen 7 **N**	oxygen 8 **O**	fluorine 9 **F**	neon 10 **Ne**
3	sodium 11 **Na**	magnesium 12 **Mg**											aluminium 13 **Al**	silicon 14 **Si**	phosphorus 15 **P**	sulfur 16 **S**	chlorine 17 **Cl**	argon 18 **Ar**
4	potassium 19 **K**	calcium 20 **Ca**	scandium 21 **Sc**	titanium 22 **Ti**	vanadium 23 **V**	chromium 24 **Cr**	manganese 25 **Mn**	iron 26 **Fe**	cobalt 27 **Co**	nickel 28 **Ni**	copper 29 **Cu**	zinc 30 **Zn**	gallium 31 **Ga**	germanium 32 **Ge**	arsenic 33 **As**	selenium 34 **Se**	bromine 35 **Br**	krypton 36 **Kr**
5	rubidium 37 **Rb**	strontium 38 **Sr**	yttrium 39 **Y**	zirconium 40 **Zr**	niobium 41 **Nb**	molybdenum 42 **Mo**	technetium 43 **Tc**	ruthenium 44 **Ru**	rhodium 45 **Rh**	palladium 46 **Pd**	silver 47 **Ag**	Cadmium 48 **Cd**	Indium 49 **In**	tin 50 **Sn**	antimony 51 **Sb**	tellurium 52 **Te**	iodine 53 **I**	xenon 54 **Xe**
6	caesium 55 **Cs**	barium 56 **Ba**	lutetium 71 **Lu**	hafnium 72 **Hf**	tantalum 73 **Ta**	tungsten 74 **W**	rhenium 75 **Re**	osmium 76 **Os**	iridium 77 **Ir**	platinum 78 **Pt**	gold 79 **Au**	mercury 80 **Hg**	thallium 81 **Tl**	lead 82 **Pb**	bismuth 83 **Bi**	polonium 84 **Po**	astatine 85 **At**	radon 86 **Rn**
7	francium 87 **Fr**	radium 88 **Ra**																

© WJEC CBAC Ltd.

STEMUP.CO.UK

Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4782/02

S15-4782-02

SCIENCE B

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

P.M. TUESDAY, 9 June 2015

1 hour

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**13**	
2.	**15**	
3.	**9**	
4.	**13**	
5.	**10**	
Total	**60**	

4782 020001

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.

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 **2***(b)* and **5**(i).

A periodic table is printed on page 12.

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

Answer **all** *questions.*

1. Dilute sulfuric acid reacts with sodium carbonate. This reaction forms a salt, a gas and water.

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

sulfuric acid + sodium carbonate ⟶ ..... + ... + water

(b) A student performed the reaction above and measured the volume of gas given off.

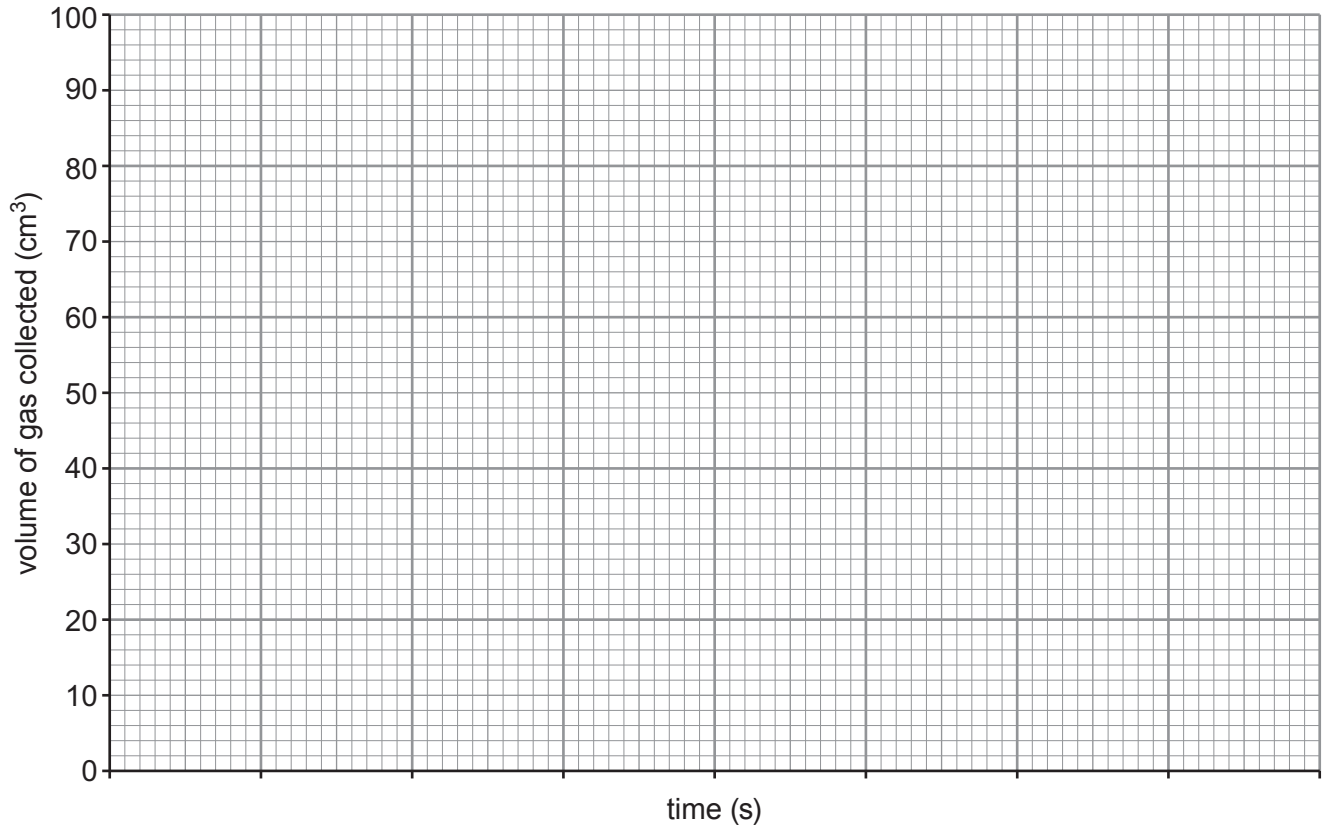
The student followed this method:

1. measured 25 cm^3 dilute sulfuric acid;
2. added the acid to a conical flask;
3. added the sodium carbonate to the acid (in excess) and started a stop watch;
4. collected the gas;
5. measured the total volume of gas produced every 20 seconds.

The results are shown in the table below.

Time (s)	0	20	40	80	100	120	140	160
Volume of gas collected (cm^3)	0	22	38	62	70	77	80	80

(i) Plot the graph to show the volume of gas collected. [4]



© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(ii) Use your graph to estimate the volume of gas collected after 1 minute. [1]

.....

(iii) Predict the volume of gas you would expect to be collected after 3 minutes. [2]

Volume after 3 minutes ..... cm^3

Give **one** reason for your answer.

.....

.....

(c) If the student repeated this experiment, he would need the same volume and concentration of acid.

State **two** *other* variables the student would need to control to ensure a fair test. [2]

1. .....

2. .....

(d) Dilute sulfuric acid has a pH of 2. Explain what happens to the pH during this reaction. [2]

.....

.....

.....

13

© WJEC CBAC Ltd.

Turn over.

STEMUP.CO.UK

Examiner only

2. *(a)* The radio-isotope iodine-131 is used in the treatment of thyroid cancer. The iodine-131 is mixed with water and given to the patient to drink. This is an example of internal radiotherapy.

(i) Explain how iodine-131 radiotherapy affects thyroid cancer cells. [2]

.....

.....

.....

(ii) Explain how external radiotherapy differs to internal therapy. [2]

.....

.....

.....

(b) Patients who have undergone this treatment are given the following advice:

DO NOT:

- use public transport;
- share cups, glasses, utensils or towels;
- visit young children or pregnant mothers;
- spend more than 30 minutes with visitors;
- breast feed.

DO:

- travel alone;
- flush the toilet at least twice after use.

Explain why this advice should be strictly followed. [6 QWC]

.....

.....

.....

.....

.....

.....

.....

.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

.....

.....

.....

.....

.....

.....

.....

.....

(c) Many different isotopes of radioactive iodine are used in medicine.

Isotope of iodine	Half life	Uses
^{123}I	13 hours	diagnostic nuclear imaging
^{125}I	60 days	treatment of prostate cancer in radiotherapy
^{131}I	8 days	treatment of thyroid cancer in radiotherapy

(i) Explain what is meant by the statement *'iodine-131 has a half-life of 8 days'*. [2]

.....

.....

(ii) A patient was injected with ^{125}I (iodine-125) on Jan 1st 2015. Calculate the fraction of the original amount that was left in his body on May 1st 2015. [3]

January

SUN	MON	TUE	WED	THU	FRI	SAT
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

February

SUN	MON	TUE	WED	THU	FRI	SAT
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

March

SUN	MON	TUE	WED	THU	FRI	SAT
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

April

SUN	MON	TUE	WED	THU	FRI	SAT
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

May

SUN	MON	TUE	WED	THU	FRI	SAT
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

June

SUN	MON	TUE	WED	THU	FRI	SAT
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30				

Fraction .....

© WJEC CBAC Ltd.

Turn over.

STEMUP.CO.UK

4782 020005

Examiner only

3. The table below shows some of the physical properties of group 1 and group 7 elements.

Group 1

Element	Melting point °C	Boiling point °C	Density g/cm^3
lithium	180	1340	0.5
sodium	98	880	0.98
potassium	63	760	0.86

Group 7

Element	Melting point °C	Boiling point °C	Density g/cm^3
fluorine	−220	−188	0.0016
chlorine	−101	−35	0.0029
bromine	−7	59	3.1

(i) Describe the trends in boiling points for both groups. [2]

.....

.....

.....

(ii) Complete the table to give the state (solid, liquid or gas) of the named elements at 20°C. The first one has been done for you. [2]

Element	Solid	Liquid	Gas
sodium	✓		
chlorine			
bromine			

(iii) Sodium reacts with water to form sodium hydroxide, an alkaline solution, and a gas. Complete the balanced symbol equation for this reaction. [2]

..... + ... ⟶ 2NaOH + ...

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(iv) Ethanoic acid (vinegar) reacts with sodium hydroxide. The equation is shown below.

$$CH_3COOH + NaOH \longrightarrow CH_3COONa + H_2O$$

In a titration 25.0 cm^3 of dilute ethanoic acid is needed to neutralise 20.0 cm^3 of sodium hydroxide solution of concentration 0.25 mol/dm^3.

Calculate the concentration of the ethanoic acid in mol/dm^3. [3]

Use the equation:

conc. of acid x vol. of acid = conc. of alkali x vol. of alkali

Concentration = ... mol/dm^3

9

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

4. Huntington's is an inherited disease that is caused by a dominant allele. Effects of this disease do not tend to appear until the person is over thirty years old. Muscular co-ordination and mental ability are affected.

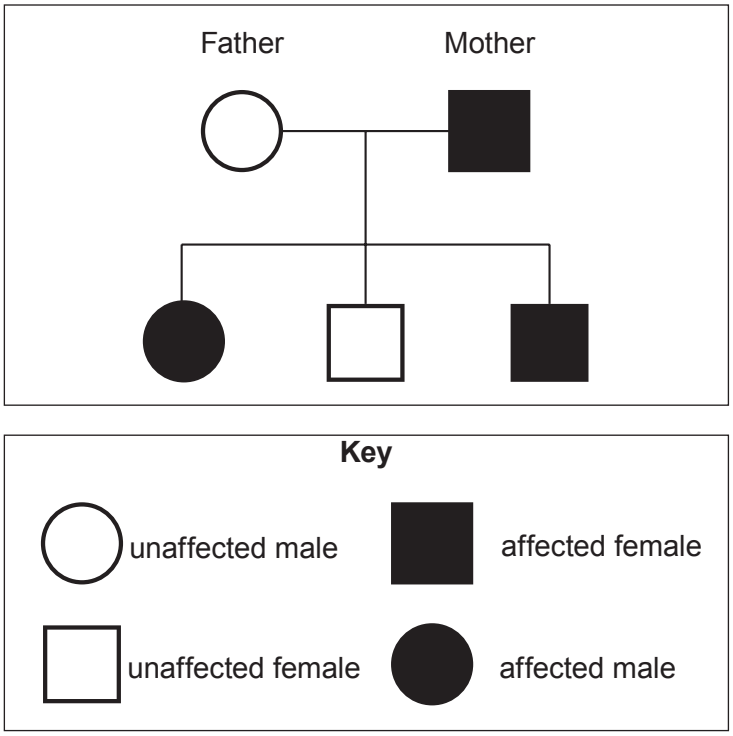
(a) Explain how mutations can cause diseases like Huntington's. [2]

.....

.....

.....

(b) The family tree below shows how Huntington's could be inherited.



The mother is said to be 'heterozygous for Huntington's'. Use the family tree to explain if this statement is correct. [2]

.....

.....

.....

(c) Carriers of this disease can now be identified earlier in life. Describe the ethical problems posed by this prior knowledge in a disease like Huntington's. [2]

.....

.....

.....

© WJEC CBAC Ltd.

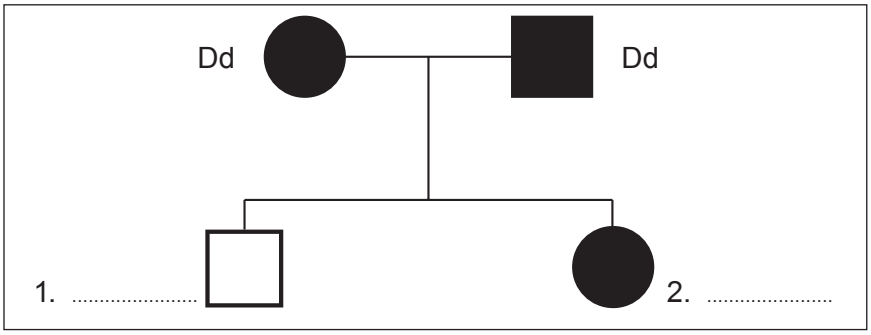
STEMUP.CO.UK

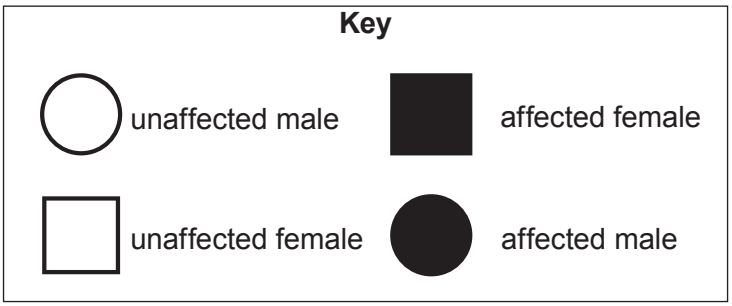
Examiner only

(d) Polydactylism is an unusual feature in the hand. Like Huntington's this feature is also inherited by a dominant allele. The family tree shows how this feature can be inherited for four members of a family.



(i) Complete the family tree to show the genotypes of the offspring in this family tree. [2]





(ii) Complete the Punnett square and calculate the chance of the homozygous polydactyl son (DD) and an unaffected female producing a child suffering from this condition. [3]

	.....	.....
.....	.....	.....
.....	.....	.....

Chance = ...%

STEMUP.CO.UK

Examiner only

(e) The image of the hand is formed by an X-ray. Describe how the X-ray is able to form this image. [2]

.....

.....

13

5. The National Institute for Health and Clinical Excellence (NICE) approves new drugs and treatments in the NHS in the UK. New drugs undergo stringent testing before they can be released for general use.

(i) Describe the main steps in testing and developing a new medical drug. [6 QWC]

In your account:

- describe the type of testing that is performed;
- identify some of the ethical issues that need to be taken into consideration in this process.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(ii) NICE is also responsible for performing a peer review process for every new treatment developed.
Describe what is meant by the term *'peer review process'*. [2]

.....

.....

.....

(iii) Aspirin is a medicine that was developed and approved many years ago. It is a common treatment for cardiovascular disease.
Describe the positive and negative effects it has on the patients who take it. [2]

.....

.....

.....

.....

10

END OF PAPER

© WJEC CBAC Ltd.

Turn over.

STEMUP.CO.UK

Periodic Table of the Elements

element name
atomic number
symbol

	1	2											3	4	5	6	7	0
1									hydrogen 1 **H**									helium 2 **He**
2	lithium 3 **Li**	beryllium 4 **Be**											boron 5 **B**	carbon 6 **C**	nitrogen 7 **N**	oxygen 8 **O**	fluorine 9 **F**	neon 10 **Ne**
3	sodium 11 **Na**	magnesium 12 **Mg**											aluminium 13 **Al**	silicon 14 **Si**	phosphorus 15 **P**	sulfur 16 **S**	chlorine 17 **Cl**	argon 18 **Ar**
4	potassium 19 K	calcium 20 **Ca**	scandium 21 **Sc**	titanium 22 **Ti**	vanadium 23 **V**	chromium 24 **Cr**	manganese 25 **Mn**	iron 26 **Fe**	cobalt 27 **Co**	nickel 28 **Ni**	copper 29 **Cu**	zinc 30 **Zn**	gallium 31 **Ga**	germanium 32 **Ge**	arsenic 33 **As**	selenium 34 **Se**	bromine 35 **Br**	krypton 36 **Kr**
5	rubidium 37 **Rb**	strontium 38 **Sr**	yttrium 39 **Y**	zirconium 40 **Zr**	niobium 41 **Nb**	molybdenum 42 **Mo**	technetium 43 **Tc**	ruthenium 44 **Ru**	rhodium 45 **Rh**	palladium 46 **Pd**	silver 47 **Ag**	Cadmium 48 **Cd**	Indium 49 **In**	tin 50 **Sn**	antimony 51 **Sb**	tellurium 52 **Te**	iodine 53 **I**	xenon 54 **Xe**
6	caesium 55 **Cs**	barium 56 **Ba**	lutetium 71 **Lu**	hafnium 72 **Hf**	tantalum 73 **Ta**	tungsten 74 **W**	rhenium 75 **Re**	osmium 76 **Os**	iridium 77 **Ir**	platinum 78 **Pt**	gold 79 **Au**	mercury 80 **Hg**	thallium 81 **Tl**	lead 82 **Pb**	bismuth 83 **Bi**	polonium 84 **Po**	astatine 85 **At**	radon 86 **Rn**
7	francium 87 **Fr**	radium 88 **Ra**																

© WJEC CBAC Ltd.

STEMUP.CO.UK

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**	

4782 020001

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.

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

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:

metal + acid ⟶ salt + hydrogen

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

magnesium + hydrochloric acid ⟶ ..... + ...

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

In her experiment she:

1. measured 25 cm^3 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

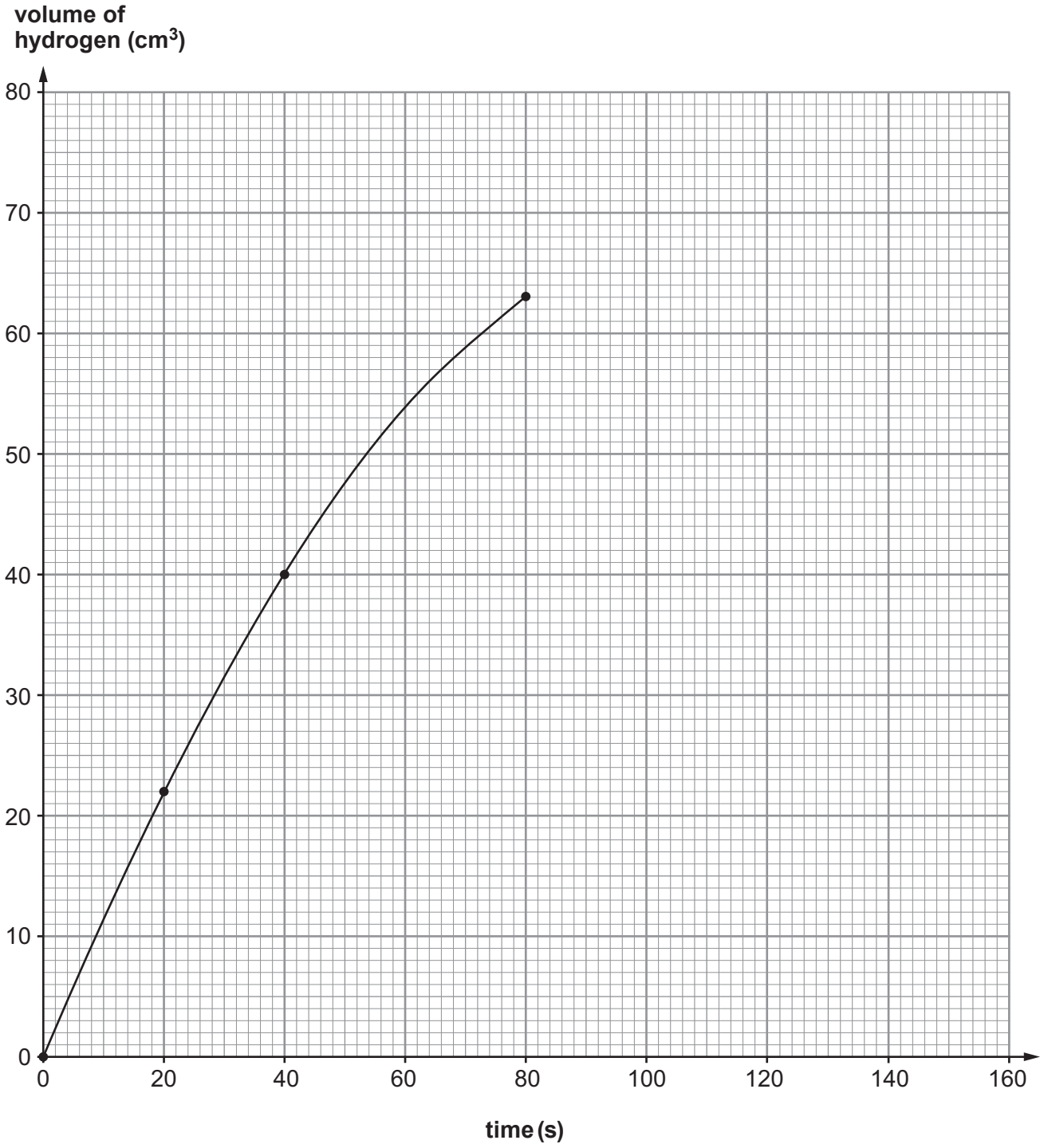
Time (s)	0	20	40	60	80	100	120	140	160
Volume of hydrogen (cm^3)	0	22	40		63	68	71	72	72

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(i) Complete the graph of her results. [3]



4782 020003

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

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

..... cm^3

(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]

.....

.....

.....

(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. .....

13

© WJEC CBAC Ltd.

Turn over.

STEMUP.CO.UK

BLANK PAGE

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

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	....	....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(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]

.....

.....

.....

8

© WJEC CBAC Ltd.

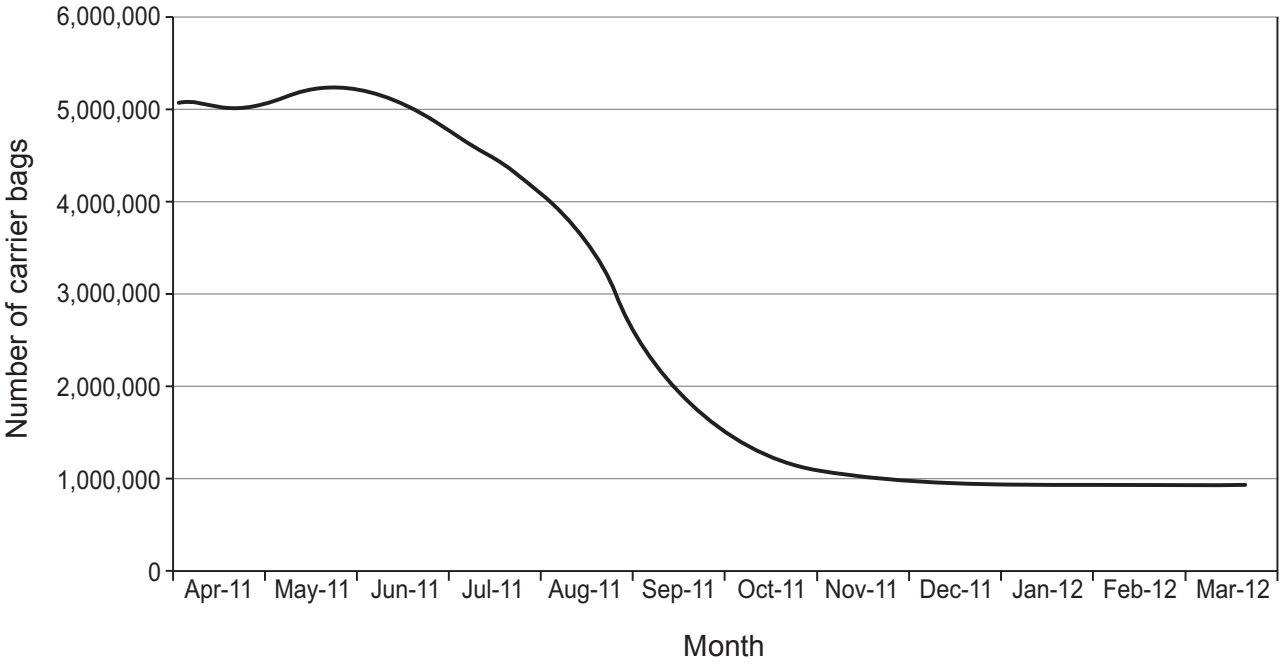
Turn over.

STEMUP.CO.UK

Examiner only

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]

.....

.....

.....

.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(b) Explain the benefits of using less plastic.

Your answer should refer to: [6 QWC]

- use of resources
- economic impact
- environmental impact.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

9

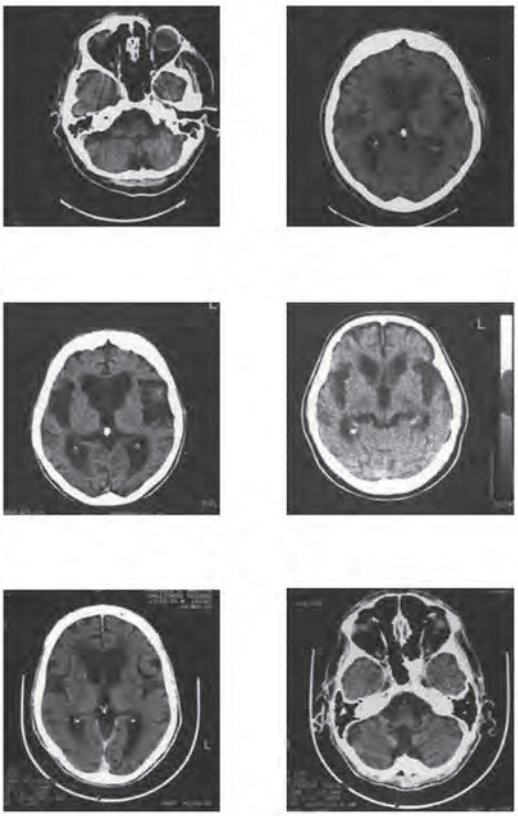
© WJEC CBAC Ltd.

STEMUP.CO.UK

Turn over.

Examiner only

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. .....

.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(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]

.....

.....

.....

.....

9

STEMUP.CO.UK

Examiner only

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]

.....

.....

(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]

.....

.....

.....

7

© WJEC CBAC Ltd.

STEMUP.CO.UK

BLANK PAGE

© WJEC CBAC Ltd.

Examiner only

6. The image of the thyroid gland below is from a gamma camera.



(a) Describe how iodine-123 is used to generate an image from the gamma camera. Your answer should refer to: [6 QWC]

- how it is administered;
- detecting the radiation;
- formation of the image.

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(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]

.....

.....

.....

14

END OF PAPER

© WJEC CBAC Ltd.

STEMUP.CO.UK

Periodic Table of the Elements

element name
atomic number
symbol

	1	2											3	4	5	6	7	0
1									hydrogen 1 **H**									helium 2 **He**
2	lithium 3 **Li**	beryllium 4 **Be**											boron 5 **B**	carbon 6 **C**	nitrogen 7 **N**	oxygen 8 **O**	fluorine 9 **F**	neon 10 **Ne**
3	sodium 11 **Na**	magnesium 12 **Mg**											aluminium 13 **Al**	silicon 14 **Si**	phosphorus 15 **P**	sulfur 16 **S**	chlorine 17 **Cl**	argon 18 **Ar**
4	potassium 19 K	calcium 20 **Ca**	scandium 21 **Sc**	titanium 22 **Ti**	vanadium 23 **V**	chromium 24 **Cr**	manganese 25 **Mn**	iron 26 **Fe**	cobalt 27 **Co**	nickel 28 **Ni**	copper 29 **Cu**	zinc 30 **Zn**	gallium 31 **Ga**	germanium 32 **Ge**	arsenic 33 **As**	selenium 34 **Se**	bromine 35 **Br**	krypton 36 **Kr**
5	rubidium 37 **Rb**	strontium 38 **Sr**	yttrium 39 **Y**	zirconium 40 **Zr**	niobium 41 **Nb**	molybdenum 42 **Mo**	technetium 43 **Tc**	ruthenium 44 **Ru**	rhodium 45 **Rh**	palladium 46 **Pd**	silver 47 **Ag**	Cadmium 48 **Cd**	Indium 49 **In**	tin 50 **Sn**	antimony 51 **Sb**	tellurium 52 **Te**	iodine 53 **I**	xenon 54 **Xe**
6	caesium 55 **Cs**	barium 56 **Ba**	lutetium 71 **Lu**	hafnium 72 **Hf**	tantalum 73 **Ta**	tungsten 74 **W**	rhenium 75 **Re**	osmium 76 **Os**	iridium 77 **Ir**	platinum 78 **Pt**	gold 79 **Au**	mercury 80 **Hg**	thallium 81 **Tl**	lead 82 **Pb**	bismuth 83 **Bi**	polonium 84 **Po**	astatine 85 **At**	radon 86 **Rn**
7	francium 87 **Fr**	radium 88 **Ra**																

© WJEC CBAC Ltd.

STEMUP.CO.UK

GCSE MARKING SCHEME

SCIENCE B

SUMMER 2014

© WJEC CBAC Ltd.

STEMUP.CO.UK

INTRODUCTION

The marking schemes which follow were those used by WJEC for the Summer 2014 examination in GCSE SCIENCE B. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

	Page
Unit 1 - Foundation Tier	1
Unit 1 - Higher Tier	5
Unit 2 - Foundation Tier	10
Unit 2 - Higher Tier	13

© WJEC CBAC Ltd.

STEMUP.CO.UK

GCSE SCIENCE B

UNIT 2 - FOUNDATION TIER (4782/01)

SUMMER 2014 MARK SCHEME

<table>
<tr><th colspan="3">Question</th><th>Marking detail</th><th>Mark</th></tr>
<tr><td>1.</td><td>(a)</td><td></td><td>S, Metal</td><td>2</td></tr>
<tr><td></td><td>(b)</td><td></td><td>Any group 1 metal – Li/Na etc (Not: li, na)</td><td>1</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>X is a metal Y is a non-metal</td><td>1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>X metal high melting point/high density/electrical conductor (1) (Not: X mp =1538)
Y non-metal low melting point/low density/non-conductor electricity/ poor heat conductor (1)</td><td>2</td></tr>
<tr><td>2.</td><td>(a)</td><td>(i)</td><td>Sugars, saturates</td><td>2</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>5g x 4 (1)= 20g (1)</td><td>2</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>Any two of: less calories, sugar, fat, saturates</td><td>2</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>2 x 150 = 300 kcal</td><td>1</td></tr>
<tr><td></td><td></td><td>(iii)</td><td>300/15 (1) = 20 minutes (1) (Allow ecf)</td><td>2</td></tr>
<tr><td>3.</td><td>(a)</td><td>(i)</td><td>46 or 23 pairs</td><td>1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Nucleus</td><td>1</td></tr>
<tr><td></td><td></td><td>(iii)</td><td>DNA or gene/allele</td><td>1</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td><table><tr><td></td><td>B</td><td>b</td></tr><tr><td>B</td><td>BB</td><td>Bb</td></tr><tr><td>b</td><td>Bb</td><td>bb</td></tr></table></td><td>1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>bb</td><td>1</td></tr>
<tr><td></td><td></td><td>(iii)</td><td>25%</td><td>1</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>IVF/ adoption/genetic screen of gametes/embryo</td><td>1</td></tr>
</table>

© WJEC CBAC Ltd.

STEMUP.CO.UK

<table>
<tr><th colspan="3">Question</th><th>Marking detail</th><th>Mark</th></tr>
<tr><td>4.</td><td>(a)</td><td></td><td>(i) addictive (ii) high blood pressure (iii) lungs
(iv) oxygen</td><td>4</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>120</td><td>1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>13 x 120(1) = 1560(1) (Allow ecf from b(i))</td><td>2</td></tr>
<tr><td></td><td>(c)</td><td></td><td>Any two of: Smoking ban in public places, ban advertisement, ban sponsorship, warning messages on packaging , tax , advertising dangers of smoking, raising age to buy cigarettes (Not: e-cigarettes)</td><td>2</td></tr>
<tr><td>5.</td><td>(a)</td><td></td><td>Magnesium chloride/ hydrogen</td><td>2</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>Complete all points correctly (half square tolerance) (2) two points correct (1)
join points with line correctly (1)</td><td>3</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>54 cm^3</td><td>1</td></tr>
<tr><td></td><td></td><td>(iii)</td><td>Repeat the expt.</td><td>1</td></tr>
<tr><td></td><td></td><td>(iv)</td><td>pH gets closer to 7 / rises/ gets closer to neutral (1) since the acid is used up/ neutralised (1)
Two marks can be awarded if points are correctly and coherently connected</td><td>2</td></tr>
<tr><td></td><td></td><td>(v)</td><td>Volume = 72 cm^3 /does not increase (1)
All Mg/substrates used up/reaction stops (1)</td><td>2</td></tr>
<tr><td></td><td>(c)</td><td></td><td>Temperature / conc of HCl / mass of iron pieces/ any other suitable/ same surface area. (Not: same amount of acid/iron)</td><td>2</td></tr>
<tr><td>6.</td><td>(a)</td><td></td><td>1 mark each correct answer
<table>
<tr><th>Raw material</th><th>Chemical name</th><th>Purpose</th></tr>
<tr><td>limestone</td><td>calcium carbonate</td><td>Removes impurities which forms the waste called slag</td></tr>
<tr><td>hot air</td><td>oxygen</td><td>Allows the coke to burn</td></tr>
<tr><td>coke</td><td>carbon</td><td>Burns to produce carbon dioxide and carbon monoxide (1)</td></tr>
<tr><td>haematite</td><td>Iron oxide (1)</td><td>The ore that contains iron (1)</td></tr>
</table></td><td>3</td></tr>
<tr><td></td><td>(b)</td><td></td><td>£8 (1)
£163 (allow ecf from table) (1)</td><td>2</td></tr>
<tr><td></td><td>(c)</td><td></td><td>More reactive than iron (1) would not be reduced by carbon (1).</td><td>2</td></tr>
</table>

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question	Marking detail	Mark
7. (a)	Candidates must give argued response. The claim made by Welsh government is valid because use has dropped (1) since the graph shows the number of bags used as gone down from 5 to 1 million/significantly (1) but already dropping before the charge was introduced. (1) **OR** The claim made by Welsh government is not valid because use dropped before charges were introduced (1) Since October use has only dropped by (about) half a million (1) which is about 30% (1) *The points must be coherently as correctly connected for three marks.*	3
(b)	**Indicative content** • less resources/oil used • improved sustainability • saves money • effect on - world's oceans / marine life • effect on land fill/ toxic gases released by burning **Marking Bands** **5-6 marks** The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3-4 marks** The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1-2 marks** The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit.	6QWC

© WJEC CBAC Ltd.

STEMUP.CO.UK

GCSE SCIENCE B

UNIT 2 - HIGHER TIER (4782/02)

SUMMER 2014 MARK SCHEME

Question			Marking detail	Mark
1.	(a)		Magnesium chloride, hydrogen	2
	(b)	(i)	Complete all points (2) two points correct (1) (half square tolerance) join points with line correctly (1)	3
		(ii)	54 cm^3	1
		(iii)	**Repeat** the expt.	1
		(iv)	pH gets closer to 7 / rises/ gets closer to neutral (1) since the acid is used up/ neutralised (1) *Two marks can be awarded if points are correctly and coherently corrected.*	2
		(v)	72cm^3(1) reaction is complete/all the substrates used up (named e.g. Mg or acid) reaction stops (1)	2
	(c)		Any two of: Temperature / conc of HCl / size of iron pieces/ any other suitable. (Not: same amount of acid/iron	2
2.	(a)		Iron oxide / burns to produce CO_2 and CO / the ore that contains iron.	3
	(b)		105.88 80 165.10 (allow ecf)	3
	(c)		Aluminium higher in the reactivity series (more reactive) and therefore cannot be reduced by carbon. *Two marks can be awarded if points are correctly corrected.*	2

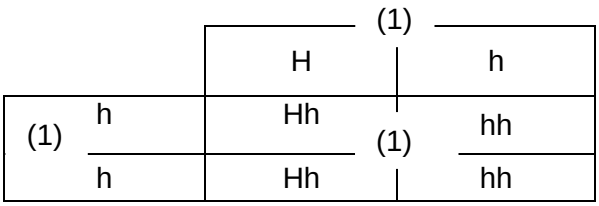
© WJEC CBAC Ltd.

STEMUP.CO.UK

Question	Marking detail	Mark
3. (a)	Candidates must give argued response. The claim made by Welsh government is valid because use has dropped (1) since the graph shows the number of bags used as gone down from 5 to 1 million/significantly (1) but already dropping before the charge was introduced. (1) OR The claim made by Welsh government is not valid because use dropped before charges were introduced (1) Since October use has only dropped by (about) half a million (1) which is about 30% (1)	3
(b)	**Indicative content** • Less resources/oil used • improved sustainability • Saves money • effect on - world's oceans / marine life • effect on land fill/ toxic gases released by burning **Marking bands** **5-6 marks** The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3 – 4 marks** The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1 – 2 marks** The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit.	6QWC

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question	Marking detail	Mark
4. (a)	**Any three of:** multiple images, 3D images, images of soft tissue, non-invasive, image formed from different angles	3
(b) (i)	 Any suitable letters accepted	3
(ii)	50%	1
(c)	Father passes on gene for Huntington (1) so could use sperm from donor/or consider adoption/genetic screening (1). *Two points need to be correctly and coherently corrected.*	2
5 (a)	100*(172000-73000)/172000 (1) = 57.57% (57.6%) (Accept: 55:5%) (1)	2
(b) (i)	Pupils have told the truth	1
(ii)	Chemically test the pupils (test for raised CO levels in breath)/ blood test	1
(c)	Any three from: • shows smoking in boys and girls has dropped from 2001 (1) • continues to drop since 2007 (1) • drop in numbers greater in girls since 2007 than boys (1) • fall in smoking was bigger before ban (1) • difficult to say if ban has made difference since figures already falling (1)	3

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question	Marking detail	Mark
6 (a)	**Indicative content** • radio-isotope added to drug (ETDA) • injected into patient • iodine absorbed by thyroid gland • patient positioned under the gamma camera • gamma camera detects gamma radiation • computer forms an image **Marking bands** **5-6 marks** The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3 – 4 marks** The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1 – 2 marks** The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit.	6QWC
(b) (i)	Time taken for ½ (1) the radioactive particles/ mass of radioactive isotope/count rate/activity/nuclei to decay (1)	2
(ii)	5 half-lives (1) 1/32 or 0.03125 (1)	2
(iii)	Half-life long enough for formation of an image (1) but not too long to do any harm (1) or (other isotopes half-life too short or too long) *Two points need to be correct and coherently corrected.*	2
(iv)	Repeated exposure to ionising radiation, from camera (1) can damage DNA/cause cancer (1) *Two points need to be correct and coherently corrected.*	2

© WJEC CBAC Ltd.

STEMUP.CO.UK

Surname	Centre Number	Candidate Number
Other Names		0

GCSE

4782/02

SCIENCE B

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

A.M. TUESDAY, 14 January 2014

1 hour

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**10**	
2.	**6**	
3.	**10**	
4.	**9**	
5.	**8**	
6.	**9**	
7.	**8**	
Total	**60**	

4782
020001

ADDITIONAL MATERIALS

In addition to this paper you may require a calculator and a 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 **2** and **7***(b)*.

A periodic table is printed on page 16.

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

Answer **all** *questions.*

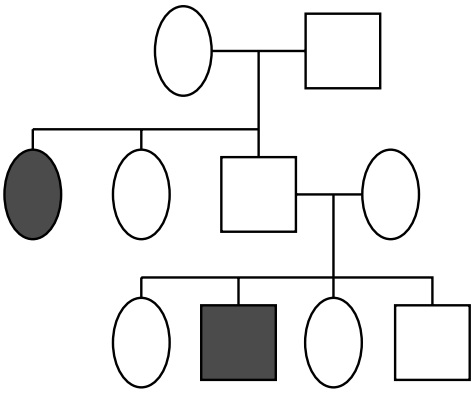
1. Cystic fibrosis is an inherited disease.

(a) Name the section of DNA that causes cystic fibrosis. [1]

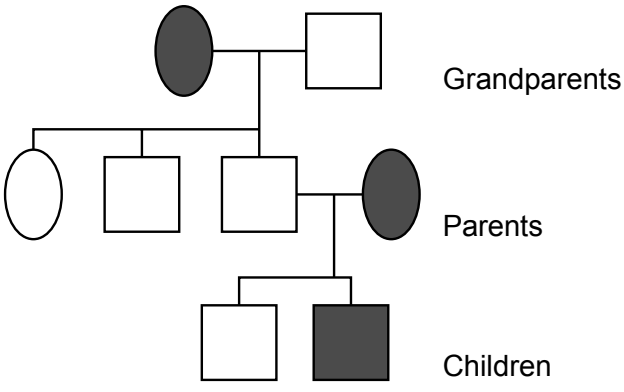
.....

(b) The family trees below show how cystic fibrosis has been inherited.

Lucy's family tree



David and John's family tree



Key

non-suffering female

non-suffering male

female suffering from cystic fibrosis

male suffering from cystic fibrosis

Use the letters:
N = normal allele
n = cystic fibrosis allele

(i) Use the information above to state the genotype of: [2]

John .....

David .....

(ii) Lucy is heterozygous. Write down Lucy's genotype. [1]

.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(c) (i) Complete the Punnett square below and use it to calculate the chance of **Lucy** and **David** having a child with cystic fibrosis. [3]

	.....	.....
.....	.....	.....
.....	.....	.....

Chance = ... %

(ii) Construct a Punnett square and use it to calculate the chance of **Lucy** and **John** having a child with cystic fibrosis. [3]

Chance = ... %

10

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

2. A student was given three different types of antacid tablets.

Design an experiment he would need to carry out to determine the most effective tablet in treating acid indigestion.

- Identify the key steps in the investigation.
- Describe how the results could be used to reach a conclusion.

(6 QWC)

6

© WJEC CBAC Ltd.

STEMUP.CO.UK

BLANK PAGE

© WJEC CBAC Ltd.

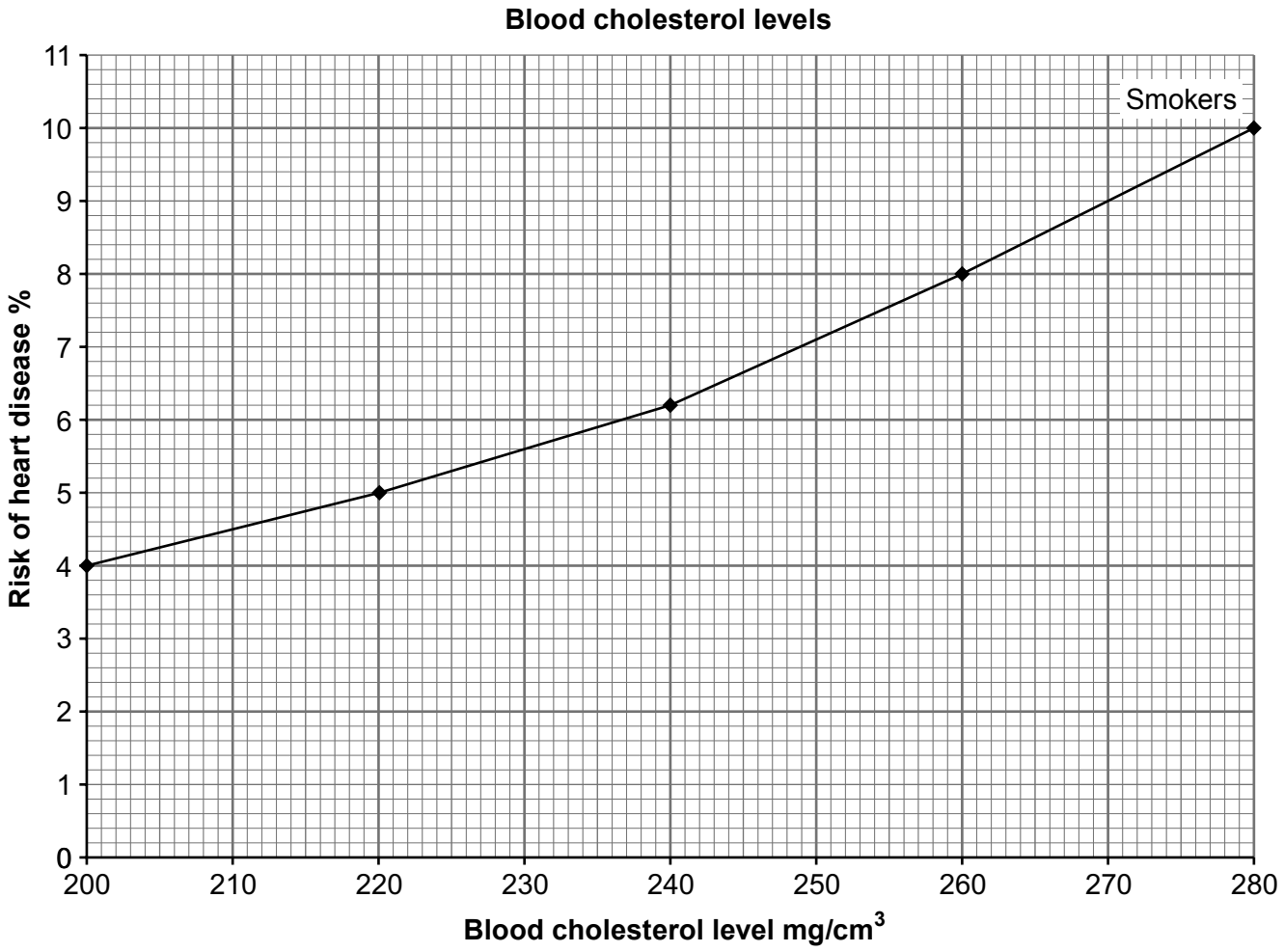
STEMUP.CO.UK

Examiner only

3. A diet rich in animal fats can cause a build-up of cholesterol in the blood. The table below shows the results of a recent study, linking blood cholesterol levels and the risk of developing heart disease.

Blood cholesterol /mg per cm^3	200	220	240	260	280
Non-smokers Risk of developing heart disease %	2.4	3.6	4.5	5.5	6.6

(a) (i) Plot information from the table on the graph paper below. Label your plot **non-smokers**. [3]



(ii) Use the information to calculate the difference in risk of developing heart disease for smokers and non-smokers at a cholesterol level of 240 mg/cm^3. [2]

.....

.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(b) State **two** conclusions that can be made from this study. [2]

1. .....

2. .....

(c) State **two** controls the researchers should use to make this a fair test. [2]

1. .....

2. .....

(d) Suggest **one** way in which this study could be changed to improve the validity of the results. [1]

.....

.....

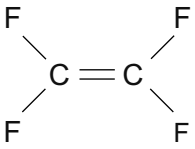
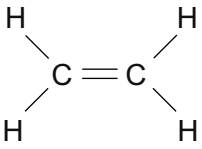
10

4782
020007

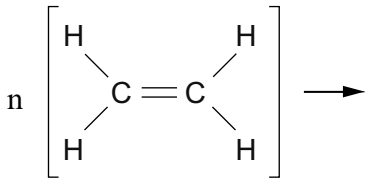
STEMUP.CO.UK

Examiner only

4. *(a)* Complete the following table. [2]

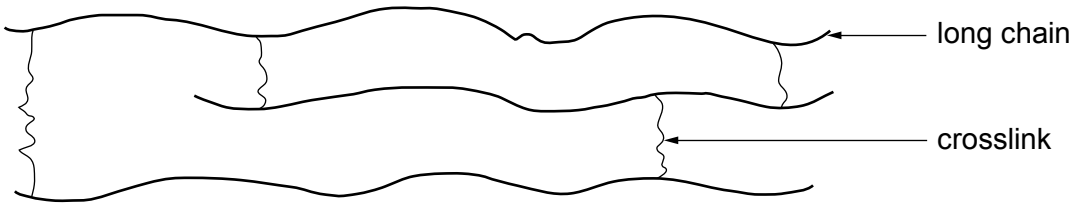
Monomer name	tetrafluoroethene	ethene	vinyl chloride
Polymer	PTFE	Polyethene	PVC
Formula	.....	C_2H_4	C_2H_3Cl
Structural Formula			.....

(b) Complete the symbol equation for the polymerisation of ethene. [2]



n ..... → .....

(c) Use the diagram below to explain why melamine does not soften on heating. [3]



.....

.....

.....

.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(d) PTFE has been used to develop new artificial veins to transport blood around the body in patients with cardiovascular disease.
State **two** properties of PTFE that makes it suitable for this use. [2]

.....

.....

.....

9

STEMUP.CO.UK

Examiner only

5. Sulfuric acid reacts with zinc carbonate ($ZnCO_3$) to form a useful salt.

(i) Write a **balanced** chemical equation for this reaction. [3]

.....

(ii) Name the salt that would be formed by reacting hydrochloric acid with potassium hydroxide solution. [1]

.....

(iii) Name the acid and alkali needed to produce potassium nitrate. [2]

acid .....

alkali .....

(iv) State **one** industrial use for the following salts: [2]

1. zinc sulfate .....
2. potassium nitrate .....

8

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

6. Radioactive iodine-131 is routinely used as internal radiotherapy in the treatment of thyroid cancers.

(a) (i) Describe what is meant by the term *internal radiotherapy*. [2]

.....

.....

.....

(ii) Iodine-131 has a **half-life** of 8 days. Explain what this means. [2]

.....

.....

.....

(iii) Calculate the **fraction** of the original amount of iodine-131 that would be left in the body after 32 days. [2]

.....

.....

.....

(b) Explain why there may be a health risk for medical technicians who administer iodine-131. [3]

.....

.....

.....

.....

9

© WJEC CBAC Ltd.

Turn over.

STEMUP.CO.UK

Examiner only

7. *(a)* Diabetes is a common disease in which a person can have high blood sugar (glucose) level. Distinguish between **type 1** and **type 2** diabetes. [2]

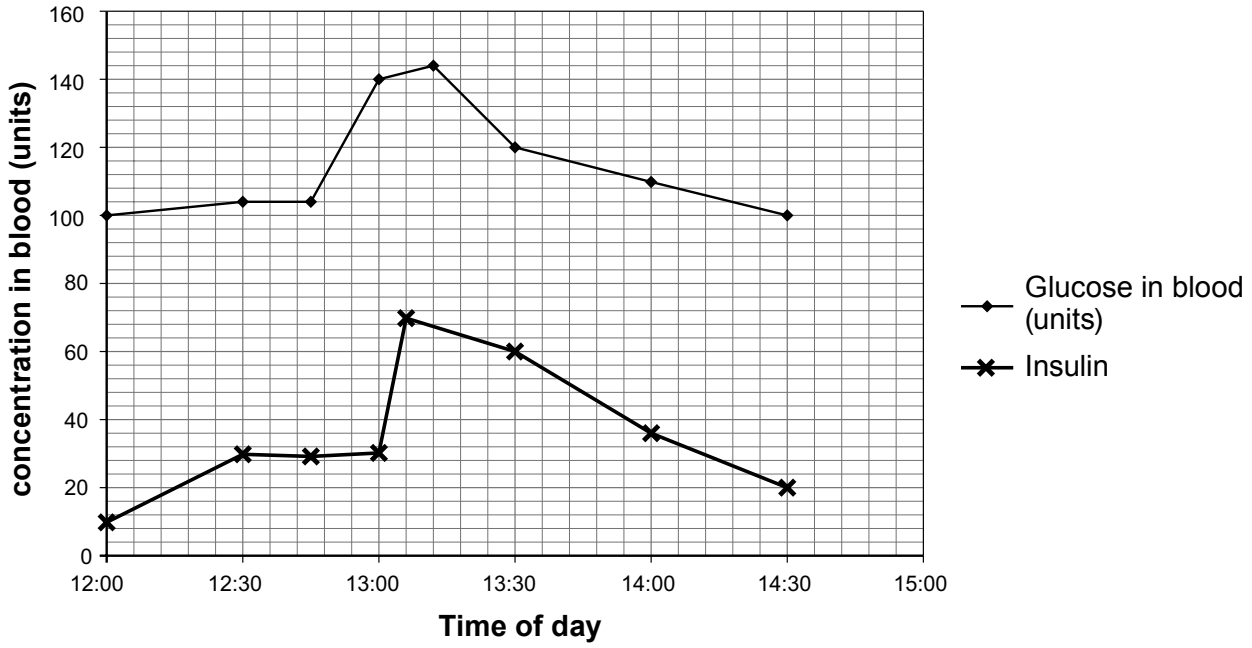
.....

.....

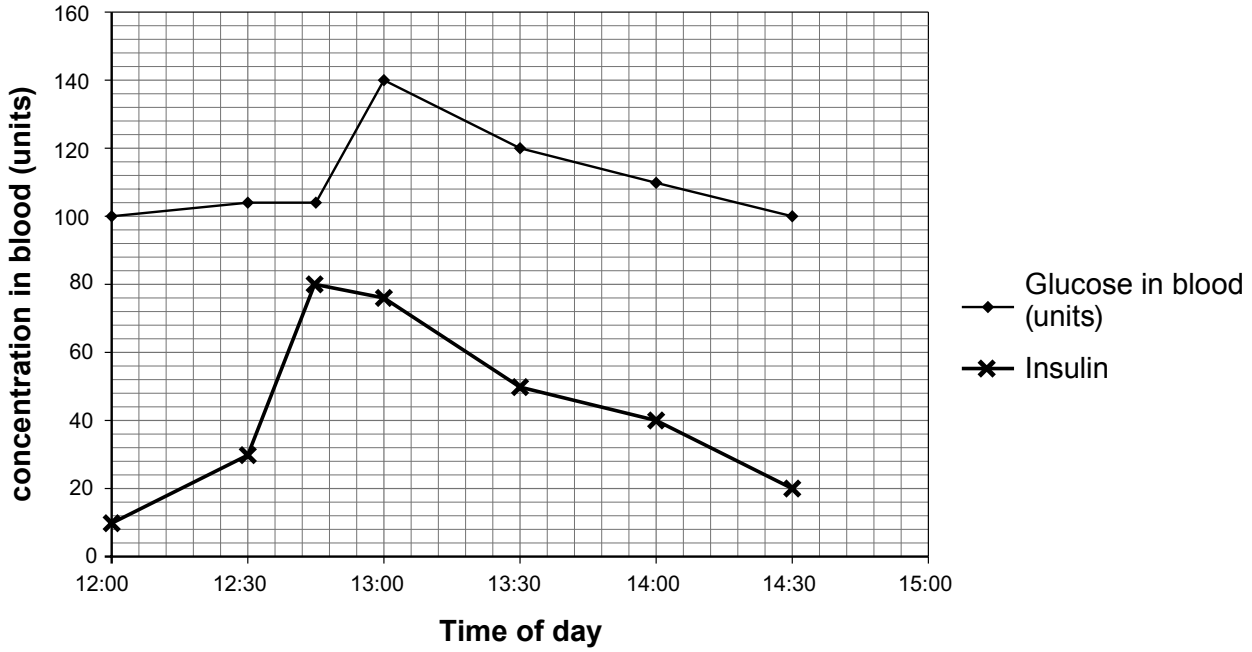
.....

(b) The graphs show the blood sugar levels from two different people. One is suffering from type 1 diabetes; the other is a non-sufferer.

Graph **A**



Graph **B**



© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

Account for the differences between the two graphs obtained in this study. [6 QWC]

- Describe what the information in graph **A** shows.
- Describe what the information in graph **B** shows.
- Explain how you can deduce from the graphs which is the sufferer.

8

END OF PAPER

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

For continuation only.

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

Periodic Table of the Elements

element name
atomic number
symbol

1	2											3	4	5	6	7	0
								hydrogen 1 **H**									helium 2 **He**
lithium 3 **Li**	beryllium 4 **Be**											boron 5 **B**	carbon 6 **C**	nitrogen 7 **N**	oxygen 8 **O**	fluorine 9 **F**	neon 10 **Ne**
sodium 11 **Na**	magnesium 12 **Mg**											aluminium 13 **Al**	silicon 14 **Si**	phosphorus 15 **P**	sulfur 16 **S**	chlorine 17 **Cl**	argon 18 **Ar**
potassium 19 K	calcium 20 **Ca**	scandium 21 **Sc**	titanium 22 **Ti**	vanadium 23 **V**	chromium 24 **Cr**	manganese 25 **Mn**	iron 26 **Fe**	cobalt 27 **Co**	nickel 28 **Ni**	copper 29 **Cu**	zinc 30 **Zn**	gallium 31 **Ga**	germanium 32 **Ge**	arsenic 33 **As**	selenium 34 **Se**	bromine 35 **Br**	krypton 36 **Kr**
rubidium 37 **Rb**	strontium 38 **Sr**	yttrium 39 **Y**	zirconium 40 **Zr**	niobium 41 **Nb**	molybdenum 42 **Mo**	technetium 43 **Tc**	ruthenium 44 **Ru**	rhodium 45 **Rh**	palladium 46 **Pd**	silver 47 **Ag**	Cadmium 48 **Cd**	Indium 49 **In**	tin 50 **Sn**	antimony 51 **Sb**	tellurium 52 **Te**	iodine 53 **I**	xenon 54 **Xe**
caesium 55 **Cs**	barium 56 **Ba**	lutetium 71 **Lu**	hafnium 72 **Hf**	tantalum 73 **Ta**	tungsten 74 **W**	rhenium 75 **Re**	osmium 76 **Os**	iridium 77 **Ir**	platinum 78 **Pt**	gold 79 **Au**	mercury 80 **Hg**	thallium 81 **Tl**	lead 82 **Pb**	bismuth 83 **Bi**	polonium 84 **Po**	astatine 85 **At**	radon 86 **Rn**
francium 87 **Fr**	radium 88 **Ra**																

© WJEC CBAC Ltd.

STEMUP.CO.UK

GCSE MARKING SCHEME

GCSE SCIENCE B

JANUARY 2014

© WJEC CBAC Ltd.

STEMUP.CO.UK

INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 2014 examination in GCSE SCIENCE B. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

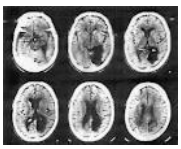
	Page
Unit 1 Science B - Foundation Tier	1
Unit 1 Science B - Higher Tier	5
Unit 2 Science B - Foundation Tier	10
Unit 2 Science B - Higher Tier	14

© WJEC CBAC Ltd.

STEMUP.CO.UK

GCSE SCIENCE B

Unit 2 Foundation Tier

Question	Marking Details	Mark
1	Metal (1), sulfur/sulphur (1). Do not accept sulfate/sulphate KOH (1), sodium chloride (1) (Do not accept chlorine in place of chloride)	2 2
2 (a)	    **CAT Scan.** **Gamma camera** **Ultrasound** **X-ray.** All correct 2 marks; 2 or 1 correct 1 mark; 1 or 0 correct 0 marks.	2
(b) (i)	X-ray 2D one image / CT 3D/multiple images	1
(ii)	Cause cancer	1
(iii)	Use lead apron/stand behind (lead) glass/screen	1
(iv)	 tick If more than 1 sign ticked, 0 marks.	1

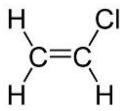
© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking Details	Mark
3	(a)		Any **two** of: all patients 50 years / male / with normal blood pressure	2
	(b)	(i)	5.5 – 5.6	1
		(ii)	Increase in cholesterol increase in risk	1
	(c)		steak - **reduce** high fibre cereal - **eat more**	2
	(d)		Any **two** of: stop smoking, reduce obesity more exercise, medication / aspirin / statin (Do not accept incorrect medication e.g. paracetamol	2
4	(a)		(A)- **ECBD** (all correct 3 marks; 2 correct 2 marks; 1 correct 1 mark	3
	(b)	(i)	pH 5-6	1
		(ii)	Alkali	1
		(iii)	Yellow, pH 7-8 / 7 / 8	2
		(iv)	Potatoes/turnips	1
5	(a)		2 marks for all points correctly plotted, 1 mark if 7 or 8 points correctly plotted 0 marks if less than 7 points correctly plotted. 1 point for correctly joining up points. (Allow ecf for points incorrectly drawn)	3
	(b)	(i)	Rhys - Sugar level increases (1) returned to normal /returned to 90 / returned to start level after about an hour (1)	2
			Kevin - Sugar levels increase (1) stay high does not return to normal(1) (may use numbers in description)	2
		(ii)	2.30 pm	1
		(iii)	200 (units)	1
	(c)		Pancreas	1
	(d)		1 - <u>inject</u> insulin 2 - control carbohydrate/sugar intake (any order allowed)	2

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking Details	Mark
6	(a)		Genes	1
	(b)	(i)	John - nn David – Nn	1 1
		(ii)	Lucy - Nn	1
	(c)	(i)	(Lucy) (David) N, n / N: NN, Nn / n: Nn, nn Complete table for David **and** Lucy correct (1) Fill centre table correctly (1) Chance 25% (based on table - allow ecf)	2 1
		(ii)	(Lucy) (John) N, n / n: Nn, nn / n: Nn, nn Construct table with Lucy and Norman (1) Fill centre correctly (1) Chance 50% (based on table - allow ecf)	2 1
7	(a)		C_2F_4 	1
	(b)	(i)	Polymerisation	1
		(ii)	Ethene is a small molecule Polyethene is a long chain molecule	1
	(c)		Any **two** from: reduces use of crude oil/resources less waste in land fill, less impact - on oceans/wild life (marine)	2

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question	Marking Details	Mark
8	**Indicative content** • Correct apparatus/chemicals ○ burette ○ suitable named acid ○ flask/container for antacid • Key steps ○ crush the tablet in given volume of water ○ titrate against acid ○ suitable indicator/data logger • Conclusion ○ compare titres ○ high titre - more acid needed to neutralise tablet. ○ therefore stronger tablet **Marking Bands** **5-6 marks** The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3-4 marks** The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1-2 marks** The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit	6 (QWC)

© WJEC CBAC Ltd.

STEMUP.CO.UK

GCSE SCIENCE B

Unit 2 Higher Tier

<table>
<tr><th colspan="3">Question</th><th>Marking Details</th><th>Mark</th></tr>
<tr><td>1</td><td>(a)</td><td></td><td>Genes</td><td>1</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>John - nn/
David - Nn</td><td>1
1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Lucy - Nn</td><td>1</td></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td><table><tr><td></td><td></td><td>(Lucy)</td></tr><tr><td></td><td></td><td>N</td><td>n</td></tr><tr><td>(David)</td><td>N</td><td>NN</td><td>Nn</td></tr><tr><td></td><td>n</td><td>Nn</td><td>nn</td></tr></table>
Complete table for David and Lucy correct (1)
Fill centre table correctly (1)

Chance - 25% (based on table – allow ecf)</td><td>2

1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td><table><tr><td></td><td></td><td>(Lucy)</td></tr><tr><td></td><td></td><td>N</td><td>n</td></tr><tr><td>(John)</td><td>n</td><td>Nn</td><td>nn</td></tr><tr><td></td><td>n</td><td>Nn</td><td>nn</td></tr></table>
Construct table with Lucy and John (1)
Fill centre correctly (1)

Chance - 50% (based on table – allow ecf)</td><td>2

1</td></tr>
</table>

© WJEC CBAC Ltd.

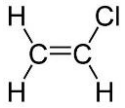
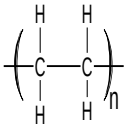
STEMUP.CO.UK

Question	Marking Details	Mark

2	**Indicative content**
	
	• Correct apparatus/ chemicals
	  ○ burette
	  ○ suitable named acid
	  ○ flask/container for antacid
	
	• Key steps.
	  ○ crush the tablet in given volume of water
	  ○ titrate against acid
	  ○ suitable indicator/data logger
	
	• Conclusion
	  ○ compare titres
	  ○ high titre - more acid needed to neutralise tablet
	  ○ therefore stronger tablet
	
	Marking Bands
	
	5-6 marks.
	The candidate constructs an articulate integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.
	
	3-4 marks
	The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.
	
	1-2 marks
	The candidate makes some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.
	
	0 marks
	The candidate does not make any attempt of give a relevant answer worthy of credit.
		6 QWC

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking Details	Mark
3	(a)	(i)	All points correctly plotted (2) Only four points correctly plotted (1) Plots joined and labelled 'non-smoker' (1)	3
		(ii)	Difference 6.3 - 4.1 = 2.2%	2
	(b)		Increase in cholesterol increase in risk smoking increases risk further	2
	(c)		Any **two** from: Patients all same age / same sex / same blood pressure / same ethnicity	2
	(d)		Repeat study with many more patients / different ages / different sex / different ethnicity	1
4	(a)	(i)	C_2F_4	1
				1
	(b)			2
	(c)		Cross links between chains (1) are strong bonds (1) which are not broken by heating (1) *Points must be correctly and coherently linked to obtain 3 marks*	3
	(d)		Non-stick, unreactive	2
5		(i)	H_2SO_4 (1) + $ZnCO_3$ →$Zn\ SO_4$ + CO_2(1) + H_2O (1) 3 marks can only be awarded if equation is correctly balanced	3
		(ii)	Potassium chloride	1
		(iii)	Nitric acid, potassium hydroxide	2
		(iv)	**One** from: Zinc sulfate-rayon / source of zinc in foods / fertilisers **One** from: Potassium nitrate-fertilisers / food additive / food preservation / gun powder / fireworks	1 1

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question			Marking Details	Mark
6	(a)	(i)	Radioisotope is injected / ingested (accept: radioisotope taken inside the body radioisotope) (1) the radioisotope kills cancer cells(1)	2
		(ii)	(8 hours is) the time taken for 50% / ½ (1) of radioactive substance to decay (1) *Points must be correctly and coherently linked to obtain 2 marks*	2
		(iii)	Correct workings (1) Correct answer 1/16th (1)	2
	(b)		(Technicians) risk accidental / continual exposure (to iodine-131) (1) which is a source of ionising radiation (1) that can damage cells / cause mutations/cancer (1) *Points must be correctly and coherently linked to obtain 3 marks*	3

© WJEC CBAC Ltd.

STEMUP.CO.UK

Question	Marking Details	Mark
7 (a)	Type 1 - body does not produce enough insulin Type 2 - body cells do not respond to insulin	2
(b)	Indicative content • graph 1 - insulin produced in response to increased sugar levels (Carbohydrate meal) • blood Sugar levels fall to normal • sugar converted to glycogen in liver • graph 2 - diabetic • insulin administered (injected) prior to increased blood sugar (Carbohydrate meal) • blood sugar converted by liver to glycogen **Marking Bands** **5-6 marks** The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3-4 marks** The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1-2 marks** The candidate makes some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit.	6 (QWC)

© WJEC CBAC Ltd.

STEMUP.CO.UK

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. MONDAY, 10 June 2013

1 hour

For Examiner's use only		
Question	**Maximum mark**	**Mark Awarded**
1.	8	
2.	11	
3.	12	
4.	6	
5.	8	
6.	6	
7.	9	
Total	**60**	

4782
020001

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***(c)* and **6**.

A periodic table is printed on page 16.

© WJEC CBAC Ltd.

STEMUP.CO.UK

Answer **all** *questions.*

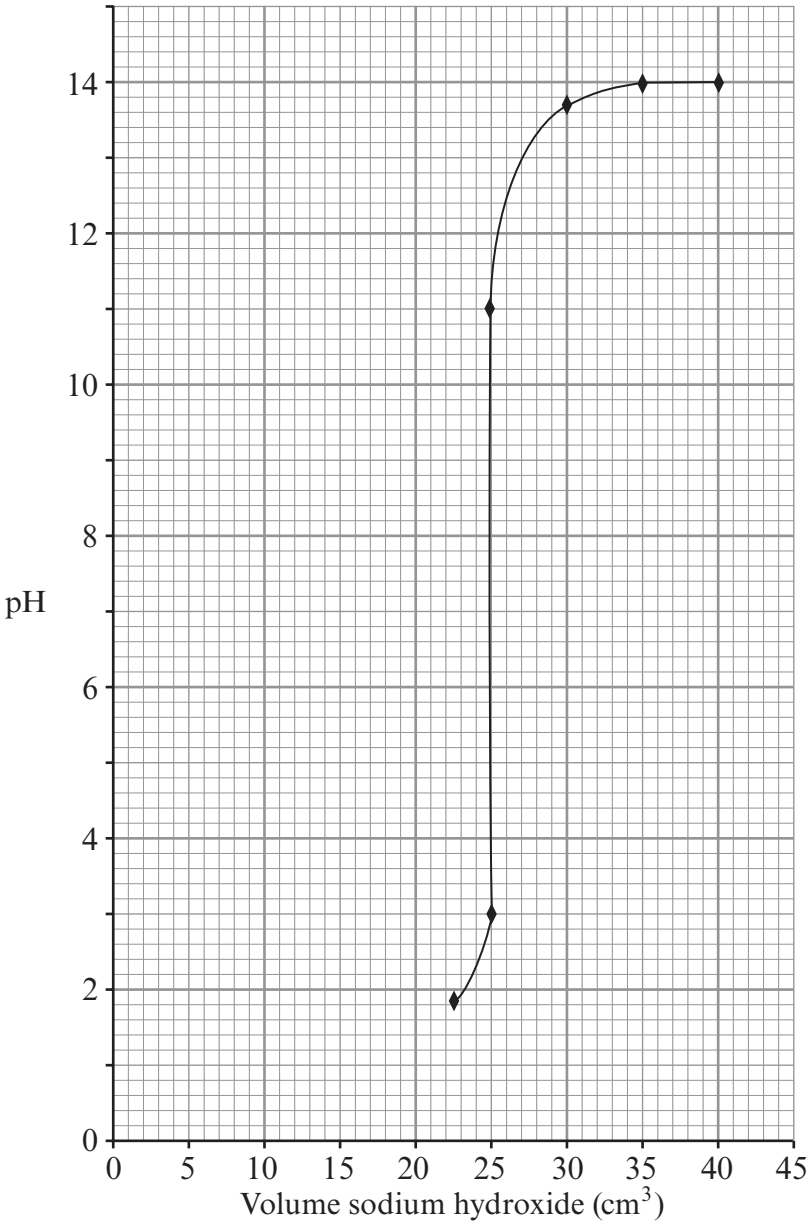
Examiner only

1. David is investigating the neutralisation reaction between hydrochloric acid and sodium hydroxide. He measured the pH as he added sodium hydroxide solution to dilute hydrochloric acid from a burette. He has started to plot his results in a graph.

(a) (i) The table below shows results that David has not yet plotted in the graph. Use these results to complete his graph. Join the points. [3]

Volume of sodium hydroxide (cm^3)	pH reading
0	1.0
5	1.0
10	1.1
15	1.2
20	1.5

David's graph showing pH against volume of sodium hydroxide



© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(ii) Use the graph to find the volume of sodium hydroxide solution required to neutralise the dilute hydrochloric acid. [1]

..... cm^3

(b) Give the chemical formula of the salt formed when David reacted hydrochloric acid with sodium hydroxide. [1]

.....

(c) Acids and alkalis react to form a salt and water. In this experiment David followed the method below.

Method:

1. Pipette 25 cm^3 of dilute acid into a conical flask.
2. Add a few drops of universal indicator.
3. Add 40 cm^3 of sodium hydroxide solution to a burette.
4. Add 2 cm^3 of sodium hydroxide solution to the dilute acid from the burette.
5. Record the pH using a colour chart.
6. Repeat steps 4 and 5 until all the sodium hydroxide solution is added.

Suggest **three** changes to this method which will allow David to make a **pure** salt. [3]

.....

.....

.....

.....

8

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

2. *(a)* A gamma camera is used in diagnosing cancer. Describe the steps involved in forming this diagnostic image. [3]

.....

.....

.....

.....

.....

(b) The information in the table describes some of the properties of radio-isotopes.

Radio-isotope	Symbol	Half-life
carbon-14	^{14}C	5730 years
cobalt-57	^{57}Co	271 years
technetium-99	^{99}Tc	6 hours
oxygen-15	^{15}O	2 minutes

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

.....

.....

(ii) Explain which of these radio-isotopes would be most suitable for use in producing gamma camera images. [2]

.....

.....

.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(c) (i) Iodine-131 is used in internal radiotherapy. What is meant by the term *internal radiotherapy*? [2]

.....

.....

(ii) Iodine-131 has a half-life of 8 days. Calculate the **fraction** of the original amount of iodine-131 that would be left in the body after 24 days. [2]

Fraction = ...

11

© WJEC CBAC Ltd.

Turn over.

STEMUP.CO.UK

Examiner only

3. The table below shows information from two packets of crisps.

	Typical Nutritional Values			
	Ready Salted Crisps **Original**		Ready Salted Crisps **'Better Living'** Brand	
	per 25 g pack	**per 100 g**	**per 25 g pack**	**per 100 g**
Energy (kJ)	552	2200	420	1680
Protein (g)	1.6	6.5	1.7	6.8
Carbohydrate (g)	12.3	49.0	14.6	58.4
of which sugars (g)	0.1	0.4	0.1	0.4
Fat (g)	8.5	.....	5.0	20.0
of which saturates	0.7	2.8	0.4	1.6
monounsaturated	6.8	27.2	4.3	17.2
polyunsaturated	1.0	4.0	.....	1.2
Fibre (g)	1.0	4.0	1.2	4.8
Salt (g)	0.5	2.0	0.3	1.0

(a) (i) Explain why all values on food labels are quoted **per 100 g**. [2]

.....

.....

.....

(ii) Complete the table by inserting the **two** missing values. [2]

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(b) The information below shows the guideline daily amounts (GDA) of salt for children and adults.

	Guideline daily amounts of salt (g)
Men	6.0
Women	6.0
Children (5-10)	4.0

Mandy, a ten year old girl, eats **one** packet of **'Original'** ready salted crisps for her school lunch. What percentage of her daily amount of salt do these crisps provide? [2]

Percentage of daily allowance of salt = ...

(c) The manufacturer of the **'Better Living'** brand claims they are healthier for you. Use the information in the table, and your understanding of lifestyle choices, to assess this claim. [6 QWC]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

4782 020007

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

4. Sickle-cell anaemia is an inherited disease. It is caused by a recessive allele which controls the production of haemoglobin. Haemoglobin is found in red blood cells.

(a) Give the genotype of a **homozygous** sufferer. [1]

.....

(b) Bill and Alison show 'sickle-cell trait'. They are both heterozygous for the sickle-cell allele.

Use an appropriate diagram to calculate the chance of Bill and Alison producing a healthy baby. [3]

Chance of a healthy baby = ...

(c) Explain what advice a genetic counsellor may offer this family. [2]

.....

.....

.....

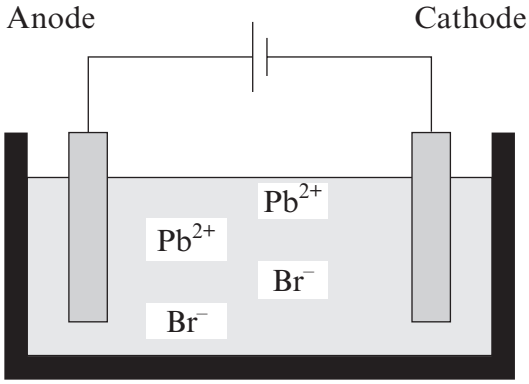
6

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

5. The metal lead can be obtained from the compound lead bromide by electrolysis.



Key

Br^- Bromide ion
Pb^{2+} Lead ion

(a) Explain which element is formed at the cathode. [3]

.....

.....

.....

(b) Write the balanced chemical symbol equation for the extraction of lead by electrolysis. [3]

.....

(c) Identify the main chemical risk associated with this experiment and **one** safety precaution that would be needed to reduce this risk. [2]

.....

.....

.....

8

© WJEC CBAC Ltd.

Turn over.

STEMUP.CO.UK

Examiner only

6. Charlotte is pregnant and has just had her 20 week scan. The image of her baby is shown below.



Explain how this image has been produced and describe its advantages over other imaging techniques that use electromagnetic radiation. [6 QWC]

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

7. The **total** use of bioplastics in the European Union was **333 000** tonnes in 2008.

The European Union has predicted the potential use of bioplastics in different sectors of the European economy for 2014. This is shown in the table below.

Use of bioplastic	Tonnes per year *(predicted for 2014)*
catering products	450 000
organic waste bags	100 000
bioplastic foils	530 000
nappies	320 000
vegetable packaging	400 000
all other uses	200 000

(a) Calculate the percentage **increase** in the use of bioplastics in the European Union from 2008 to 2014. [3]

Answer .....

(b) Many environmental institutions promote the use of bioplastics. Explain why the use of bioplastics is being promoted. [3]

.....

.....

.....

.....

(c) The worldwide demand for bioplastics is expected to continue to grow. Outline disadvantages of using bioplastics. [3]

.....

.....

.....

.....

END OF PAPER

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

For continuation only

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

For continuation only

© WJEC CBAC Ltd.

Turn over.

STEMUP.CO.UK

BLANK PAGE

© WJEC CBAC Ltd.

STEMUP.CO.UK

BLANK PAGE

© WJEC CBAC Ltd.

STEMUP.CO.UK

Periodic Table of the Elements

element name
atomic number
symbol

	1	2											3	4	5	6	7	0
1									hydrogen 1 **H**									helium 2 **He**
2	lithium 3 **Li**	beryllium 4 **Be**											boron 5 **B**	carbon 6 **C**	nitrogen 7 **N**	oxygen 8 **O**	fluorine 9 **F**	neon 10 **Ne**
3	sodium 11 **Na**	magnesium 12 **Mg**											aluminium 13 **Al**	silicon 14 **Si**	phosphorus 15 **P**	sulfur 16 **S**	chlorine 17 **Cl**	argon 18 **Ar**
4	potassium 19 **K**	calcium 20 **Ca**	scandium 21 **Sc**	titanium 22 **Ti**	vanadium 23 **V**	chromium 24 **Cr**	manganese 25 **Mn**	iron 26 **Fe**	cobalt 27 **Co**	nickel 28 **Ni**	copper 29 **Cu**	zinc 30 **Zn**	gallium 31 **Ga**	germanium 32 **Ge**	arsenic 33 **As**	selenium 34 **Se**	bromine 35 **Br**	krypton 36 **Kr**
5	rubidium 37 **Rb**	strontium 38 **Sr**	yttrium 39 **Y**	zirconium 40 **Zr**	niobium 41 **Nb**	molybdenum 42 **Mo**	technetium 43 **Tc**	ruthenium 44 **Ru**	rhodium 45 **Rh**	palladium 46 **Pd**	silver 47 **Ag**	Cadmium 48 **Cd**	Indium 49 **In**	tin 50 **Sn**	antimony 51 **Sb**	tellurium 52 **Te**	iodine 53 **I**	xenon 54 **Xe**
6	caesium 55 **Cs**	barium 56 **Ba**	lutetium 71 **Lu**	hafnium 72 **Hf**	tantalum 73 **Ta**	tungsten 74 **W**	rhenium 75 **Re**	osmium 76 **Os**	iridium 77 **Ir**	platinum 78 **Pt**	gold 79 **Au**	mercury 80 **Hg**	thallium 81 **Tl**	lead 82 **Pb**	bismuth 83 **Bi**	polonium 84 **Po**	astatine 85 **At**	radon 86 **Rn**
7	francium 87 **Fr**	radium 88 **Ra**																

© WJEC CBAC Ltd.

(4782-02)

STEMUP.CO.UK

GCSE MARKING SCHEME

SCIENCE B

SUMMER 2013

© WJEC CBAC Ltd.

STEMUP.CO.UK

INTRODUCTION

The marking schemes which follow were those used by WJEC for the Summer 2013 examination in GCSE SCIENCE B. They were finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conferences were held shortly after the papers were taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conferences was to ensure that the marking schemes were interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conferences, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about these marking schemes.

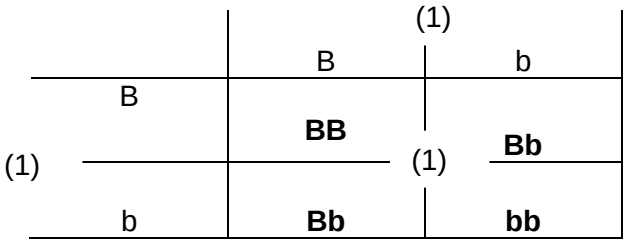
	Page
Unit 1 - Foundation Tier	1
Unit 1 - Higher Tier	5
Unit 2 - Foundation Tier	11
Unit 2 - Higher Tier	14

© WJEC CBAC Ltd.

STEMUP.CO.UK

GCSE SCIENCE B

UNIT 2 - FOUNDATION TIER

QUESTION			Answer	MARK
1.	(a)	(i)	Nucleus	1
		(ii)	46	1
		(iii)	Pairs	1
		(iv)	DNA	1
	(b)		Body cell - chromosomes in pairs / sperm cells not paired	1
			Different numbers in each / 46 present in body cells <u>and</u> 23 in sperm cell	1
2.		(i)		3
		(ii)	bb	1
		(iii)	25%	1
		(iv)	Mutation	1
3.	(a)		Copper, Al	2
	(b)	(i)	Copper (1) <u>best</u> <u>electrical</u> conductivity / high<u>est</u> <u>electrical</u> conductivity (1) (Not: 'good' electrical conductor)	2
		(ii)	Aluminium (1) low<u>est</u> density (1) (Also accept titanium (1) – strong<u>est(1)</u>)	2
		(iii)	Copper(1) high<u>est</u> <u>thermal</u> conductivity (1)	2
	(c)		Weakest iron aluminium copper Strongest titanium *All in correct order for mark*	1

© WJEC CBAC Ltd.

STEMUP.CO.UK

QUESTION			Answer	MARK
4.	(a)		High, sound	2
	(b)	(i)	Does not use (ionising) radiation, so will not cause cancer / cause mutations (Also accept: x-rays go straight through (1) but sound wave bounce off layers of different density (1)) *One mark for making a valid point* *Two marks can be only awarded for correctly and coherently connecting points*	2
		(ii)	Examine the heart / blood vessels / shatter gall / kidney stones / to find cancerous growths (Not: 'brain scan')	1
5.	(a)		Corrosive	1
	(b)	(i)	Sodium chloride + water	2
		(ii)	Green	1
	(c)	(i)	All points correct (2) four points correct (1) join points with line correctly (1)	3
		(ii)	25 cm^3	1
	(d)		Repeat test without indicator stop adding sodium hydroxide at pH 7 / add only 25 cm^3 sodium hydroxide evaporate off (excess) water	3
6.	(a)		B (given) A, E, C, D all correct (3), two or three correct (2), one correct (1)	3
	(b)	(i)	Time taken for 50%/½ (1) of activity / radioactive substance / mass / atoms to decay (1) (Not: radiation)	2
		(ii)	^{99}Tc (is most suitable), since it has a half-life that is just long enough to be monitored. *one mark for making a valid point* *2 marks can be only awarded for correctly and coherently connecting points*	2
	(c)	(i)	Inject / ingest radioisotope / (accept radiotherapy taken inside the body) (1) radiotherapy / radioisotope kills cancer cells (1)	2
		(ii)	Correct workings (1) (Accept 3 (half-lives))(1) Correct answer 1/8th (1)	2

© WJEC CBAC Ltd.

STEMUP.CO.UK

QUESTION			Answer	MARK
7.	(a)	(i)	Allows a common standard/fair comparison/test (1) so making it easier to compare different foods (1) *one mark for making a valid point* *Two marks can be only awarded for correctly and coherently connecting points*	2
		(ii)	34.0, 0.3	2
	(b)		0.5 ×100/4.0 (1) 12.5% (1)	2
	(c)		**Indicative content** • Fat content reduced / monounsaturated reduced most • Less salt and fat in 'healthy' crisps • Less salt / blood pressure and strokes • Reduce obesity / cardiovascular disease / chance of diabetes • Reduced use of NHS resources **Marking Bands** **5 – 6 marks** The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3 – 4 marks** The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1 – 2 marks** The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit.	**6**

© WJEC CBAC Ltd.

STEMUP.CO.UK

GCSE SCIENCE B

UNIT 2 - HIGHER TIER

QUESTION			ANSWER	MARK
1.	(a)	(i)	All points correct (2) two or three points correct (1) join points with line correctly (1)	3
		(ii)	25 cm^3	1
	(b)		NaCl	1
	(c)		Repeat test without indicator stop adding sodium hydroxide at pH 7 / add only 25 cm^3 sodium hydroxide evaporate off (excess) water	3
2.	(a)		Radio-isotope attached to drug, injected into patient, target an organ	3
	(b)	(i)	Time taken for 50% / ½ (1) of activity/radioactive substance / mass / atoms to decay (Not: radiation) (1)	2
		(ii)	^{99}Tc (is most suitable), since it has a half-life that is just long enough to be monitored. *one mark for making a valid point* *Two marks can be only awarded for correctly and coherently connecting points*	2
	(c)	(i)	Inject/ingest radioisotope / (accept radiotherapy taken inside the body) (1) radiotherapy / radioisotope kills cancer cells (1)	2
		(ii)	Correct workings (1) Correct answer 1/8^{th} (1)	2

© WJEC CBAC Ltd.

STEMUP.CO.UK

QUESTION			ANSWER	MARK
3.	(a)	(i)	Allows a common standard / fair comparison/test (1) so making it easier to compare different foods (1) *one mark for making a valid point* *Two marks can be only awarded for correctly and coherently connecting points*	2
		(ii)	34.0, 0.3	2
	(b)		0.5 × 100/4 (1) 12.5% (1)	2
	(c)		**Indicative content** • Fat content reduced / Monounsaturated reduced most • Less salt and fat in 'healthy' crisps • Less salt / blood pressure and strokes • Reduce obesity / cardiovascular disease / chance of diabetes • Reduced use of NHS resources **Marking bands** **5 – 6 marks** The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3 – 4 marks** The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1 – 2 marks** The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit.	6QWC

© WJEC CBAC Ltd.

STEMUP.CO.UK

QUESTION			ANSWER	MARK
4.	(a)		Both lower case e.g. hh	1
	(b)		Correctly drawn Punnett square or cross diagram Use letters from (a) Parents (1) Cross (allow ecf) (1) 75% (1)	3
	(c)		50% chance of being a carrier / 25% chance having child with sickle cell (1) so should consider adoption / ivf from non-carrier *one mark for making a valid point* *Two marks can be only awarded for correctly and coherently connecting points*	2
5.	(a)		Lead positively charged (ions) attracted to opposite charge cathode where they gain electrons/form atoms *one mark for making each valid point* *Three marks can be only awarded for correctly and coherently connecting points*	3
	(b)		$PbBr_2 \rightarrow Pb + Br_2$ (Allow max of 2 if one correct half equation is given)	3
	(c)		bromine gas <u>plus</u> formed/given off/which is toxic / corrosive use a fume cupboard	2

	H	h
H	HH	Hh
h	Hh	hh

© WJEC CBAC Ltd.

STEMUP.CO.UK

QUESTION			Answer	MARK
6.			**Indicative content** • Ultrasound / high frequency sound waves • Sound wave bouncing / reflecting • Two structures of different density • Ionising radiation not used • Safer to unborn/less chance of cancer **Marking bands** **5 – 6 marks** The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. **3 – 4 marks** The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. **1 – 2 marks** The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. **0 marks** The candidate does not make any attempt or give a relevant answer worthy of credit.	**6**

© WJEC CBAC Ltd.

STEMUP.CO.UK

QUESTION			ANSWER	MARK
7.	(a)		Total = 2 000 000 tonnes difference = 2 000 000 – 333 000 = 1 667 000 % increase = 500.6 (accept 500%)	1 1 1
	(b)		Require less energy to manufacture take less time to break down compared to traditional plastics therefore, cause less harm to environment. *Three marks can be only awarded for correctly and coherently connecting points*	3
	(c)		**Any three from:** • Land use no longer available for growing crops • Price food may rise/ shortage food • Make contribution to deforestation (making room for growing crops) • More expensive • Release methane when they compost	3

© WJEC CBAC Ltd.

STEMUP.CO.UK