WJEC GCSE SCIENCE B

# SCIENCE



EXAM QUESTION PACK

UNIT 2 FOUNDATION 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

4782/01

S16-4782-01

# SCIENCE B

## UNIT 2: Science and Life in the Modern World
## FOUNDATION TIER

P.M. WEDNESDAY, 15 June 2016

1 hour

| For Examiner's use only | | |
|---|---|---|
| **Question** | **Maximum Mark** | **Mark Awarded** |
| **1.** | **6** | |
| **2.** | **11** | |
| **3.** | **6** | |
| **4.** | **6** | |
| **5.** | **10** | |
| **6.** | **13** | |
| **7.** | **8** | |
| **Total** | **60** | |

4782 010001

### 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 **7***(b)*.

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.** The box below contains the symbols and formulae of some elements and compounds.

| | | |
|---|---|---|
| $O_2$ | $Fe_2O_3$ | $PbBr_2$ |
| $H_2O$ | $CuSO_4$ | Cl |

Use the information in the box above to answer *(a)*.

*(a)* Give **one** example of:

(i) a compound [1]

.....

(ii) an element [1]

.....

*(b)* (i) Name the **elements** present in $H_2SO_4$. [3]

1. .....

2. .....

3. .....

(ii) State the total number of **atoms** in $CuSO_4$. [1]

.....

6



© WJEC CBAC Ltd.



**Turn over.**

STEMUP.CO.UK

Examiner only

**2.** Recent research has highlighted that obesity and lack of exercise are major causes of death in the UK.

John is overweight and is trying to lose weight to get fit. He is trying a number of exercises and calculates the energy used.

*(a)* (i) Complete the table below. [2]

| Type of exercise | Energy used (kcal/min) | Length of exercise (minutes) | Total energy used (kcal) |
|---|---|---|---|
| cycling | 5.0 | 70 | 350 |
| jogging | 8.5 | ..... | 255 |
| swimming | ..... | 40 | 212 |

(ii) State which exercise uses the most energy per minute. [1]

.....

*(b)* John is also trying to reduce his weight by cutting down his intake of snack foods.

He collected some information from his favourite snacks.

| | Snack foods (per 100 g) | | |
|---|---|---|---|
| | Caramel crunch | Cheesy crisps | Fruitex bar |
| energy (kcal) | 510 | 480 | 320 |
| salt (g) | 0.9 | 1.3 | 0.2 |
| fat (g) | 24.0 | 15.0 | 10.0 |
| protein (g) | 6.5 | 5.5 | 6.8 |
| fibre (g) | 2.1 | 3.2 | 16.0 |

(i) Which snack food would be the best choice to reduce his weight? Give **one** reason for your choice. [2]

Snack .....

Reason .....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(ii) John's favourite snack is the 'Caramel crunch'. Each bar has a mass of **50 g**. He eats two bars.

Calculate the energy in the two bars of 'Caramel crunch'. [1]

..... kcal

(iii) Calculate the time John would need to jog to use the energy in both bars. [1]

..... min

*(c)* Obesity and lack of exercise increase the risk of diabetes.

(i) Place a **tick (✓)** in the box to identify the hormone that controls sugar levels in the body. [1]

| | |
|---|---|
| Oestrogen | ☐ |
| Testosterone | ☐ |
| Insulin | ☐ |
| Adrenalin | ☐ |

(ii) State **two** ways that diabetics can control their blood sugar level. [2]

1. .....

2. .....

(iii) Name **one** other common disease associated with obesity. [1]

.....

11

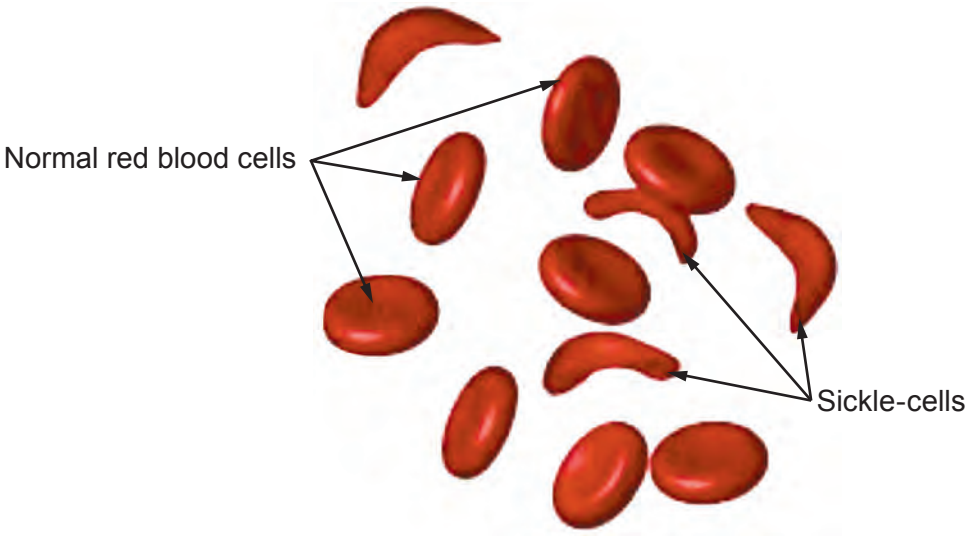
4782 010005



STEMUP.CO.UK

Examiner only

**3.** Sickle-cell anaemia is an inherited disease caused by a **recessive allele (e)**. James and Chinaza are patients with a family history of sickle-cell anaemia. In a patient with this disease, the red blood cells are not the normal shape. They form sickle shapes.




*(a)* State the genotype of a person who suffers from sickle-cell anaemia. [1]

.....

*(b)* (i) Complete the Punnett square below. [2]

| | | **Mother** | |
|---|---|---|---|
| | | E | e |
| **Father** | E | ..... | ..... |
| | e | ..... | ..... |

(ii) **Circle** the percentage chance of these parents producing a baby with sickle-cell anaemia: [1]

25% 50% 75% 100%

*(c)* A couple with a family history of sickle-cell anaemia are thinking of having children.

Give **two** pieces of advice a genetic counsellor may offer this couple. [2]

1. .....

2. .....

6

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

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



*(a)* Choose the correct terms from the box to complete the sentences below. [2]

| | | |
|---|---|---|
| high | radiation | X-rays |
| low | sound waves | light rays |

The image of the liver is formed using ultrasound. This technique uses ..... frequency ..... which bounce off the liver walls and back to the probe to form an image.

*(b)* Explain why ultrasound is used instead of X-rays for this type of scan. [2]

.....

.....

*(c)* Name **two** other medical uses of ultrasound. [2]

1. .....

2. .....

6



© WJEC CBAC Ltd.



**Turn over.**

STEMUP.CO.UK

Examiner only

**5.** The table below shows some of the physical properties of group 1 metals.

| Element | Symbol | Melting point (°C) | Boiling Point (°C) | Density ($g/cm^3$) | Electrical conductivity |
|---|---|---|---|---|---|
| lithium | Li | 180 | 1 340 | 0.53 | good |
| sodium | Na | 98 | 880 | 0.97 | good |
| potassium | K | 63 | 766 | 0.86 | good |
| rubidium | Ru | 39 | 686 | 1.48 | good |
| caesium | Cs | | 669 | 1.87 | good |

*(a)* Use **only** the information in the table to answer the following.

(i) State **one** property of group 1 metals which is common to **all** metals. [1]

.....

(ii) State **one** property of group 1 metals which is **not** common to all metals. [1]

.....

(iii) Predict the value for the melting point of caesium, giving **one** reason for your answer. [2]

Melting point of caesium ..... °C

Reason

.....

.....

(iv) Describe the general trend in the density of group 1 metals. [1]

.....

.....

(v) A laboratory technician collected 2 $cm^3$ of each of the group 1 metals named in the table. State which metal would have the smallest mass. [1]

.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

*(b)* When a freshly cut piece of potassium is exposed to air its surface immediately reacts with oxygen.

(i) Complete the word equation for this reaction. [1]

potassium + oxygen ⟶ .....

(ii) Describe how this reaction is prevented when storing potassium in the laboratory. [2]

.....

.....

.....

(iii) **Circle** the hazard symbol found on a bottle of potassium in the laboratory. [1]









10

© WJEC CBAC Ltd.



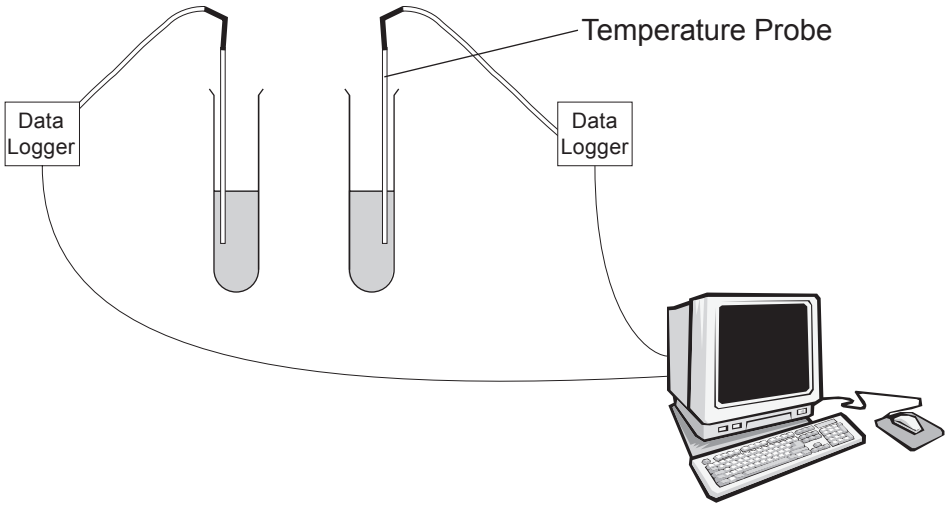
STEMUP.CO.UK

Examiner only

**6.** 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




*(a)* Complete the word equations for the reactions in this investigation. [4]

(i) **Reaction 1**

hydrochloric acid + sodium hydroxide ⟶ ..... + .....

(ii) **Reaction 2**

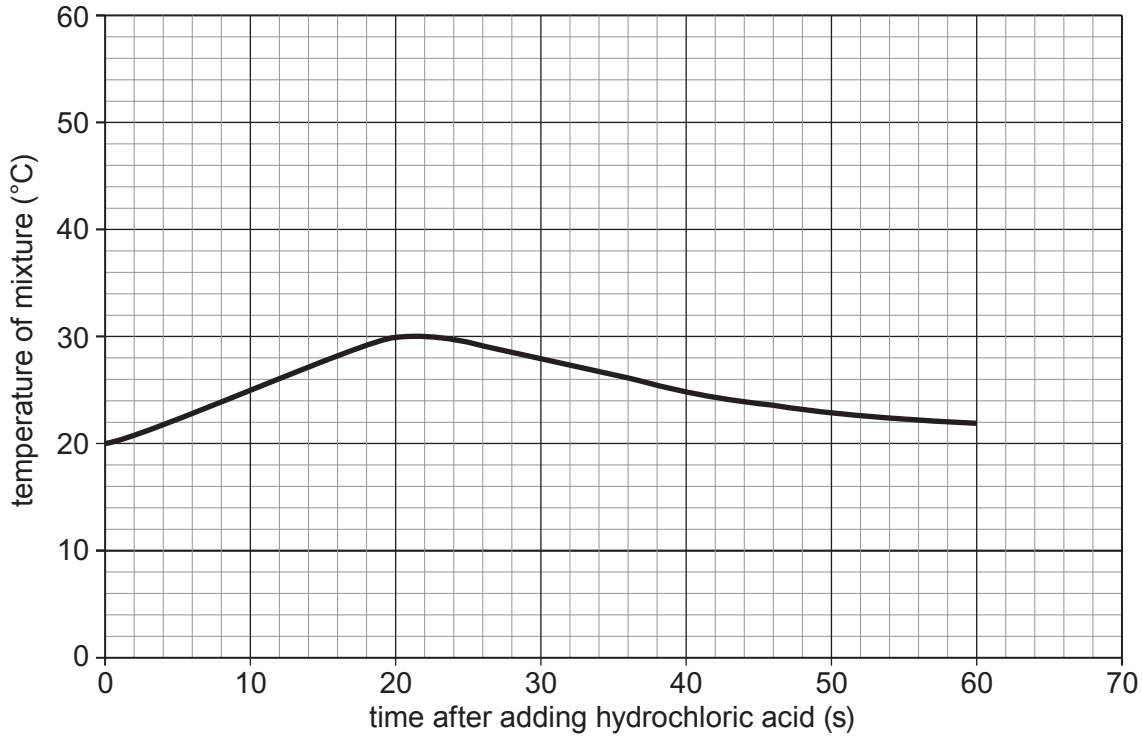
hydrochloric acid + sodium carbonate ⟶ ..... + ..... + water

© 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]

.....

.....

.....

.....

.....

.....

.....

13

© WJEC CBAC Ltd.



STEMUP.CO.UK

# BLANK PAGE

© WJEC CBAC Ltd.

Examiner only

**7.** 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)* 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

**END OF PAPER**

8

© 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

4782/01

W16-4782-01

# SCIENCE B

## UNIT 2: Science and Life in the Modern World
## FOUNDATION TIER

P.M. TUESDAY, 12 January 2016

1 hour

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

4782 010001

### 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 **7**(ii).

A periodic table is printed on page 20.

© WJEC CBAC Ltd.



STEMUP.CO.UK

Examiner only

*Answer* **all** *questions.*

**1.** Charlotte is learning about acids and alkalis. She has started to label the pH scale.

*(a)* Complete the pH scale using the substances named in the box below. [2]

| **ammonia** | **vinegar** | **sulfuric acid** |
|---|---|---|

| Colour | Red | Orange | Yellow | Green | Blue | Navy | Purple |
|---|---|---|---|---|---|---|---|
| pH Range | 0-2 | 3-4 | 5-6 | 7-8 | 9-10 | 11-12 | 13-14 |
| Substance | ..... | lemon juice | ..... | water | baking powder | ..... | sodium hydroxide |

*(b)* Sulfuric acid is a strong acid. **Circle** the correct chemical formula for sulfuric acid. [1]

H2SO4 $H^2SO^4$ $H_2SO_4$

*(c)* Use the Periodic Table on page 20 to:

(i) name **one** element that is in the same **period** as sodium; [1]

.....

(ii) name **one** element that is in the same **group** as sodium. [1]

.....

*(d)* Acids and alkalis react together in a neutralisation reaction. Tick (✓) **two** uses of neutralisation reactions below. [2]

treating heartburn with an antacid ☐

cleaning metal surfaces (rust treatment) ☐

dyeing clothes ☐

extracting iron from its ore ☐

making polymers ☐

7

© WJEC CBAC Ltd.



STEMUP.CO.UK

# BLANK PAGE

© WJEC CBAC Ltd.



STEMUP.CO.UK

Examiner only

**2.** Understanding how a cell functions is important when investigating disease.

*(a)* Match each part of the cell to its correct term. *One has been done for you*. [2]

| | |
|---|---|
| nucleus | These have different forms called alleles. |
| chromosome | This controls the cell's activities. |
| DNA | This contains coded information that controls the cell's functions. |
| gene | These exist as pairs and contain sections of DNA. |

*(b)* In human males and females there are 23 pairs of chromosomes in the nucleus of every skin cell.

(i) State **one** difference between the pairs of chromosomes in a male and female skin cell. [1]

.....

(ii) State **one** difference between the chromosomes in a sperm cell and a skin cell. [1]

.....

(iii) Sometimes new genes are formed by exposure to harmful chemicals or ionising radiation. Name this type of change. [1]

.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

*(c)* Huntington's is an inherited disease caused by a **dominant allele (D)**. We can predict the chance of a person suffering from this disease using a Punnett square.

(i) State the genotype of a Huntington's sufferer. [1]

.....

(ii) Complete the Punnett square below. [2]

| | | **Mother** | |
|---|---|---|---|
| | | d | d |
| **Father** | D | ..... | ..... |
| | d | ..... | ..... |

(iii) **Circle** the percentage chance of these parents producing a baby with Huntington's: [1]

25% 50% 75% 100%

9

4782 010005

© WJEC CBAC Ltd.



**Turn over.**

STEMUP.CO.UK

Examiner only

**3.** Olivia is studying the properties of alloys. The table below lists some of the properties and composition of a selection of alloys.

*(a)* State what is meant by the term *alloy*. [1]

.....

.....

| Alloy | Composition | Strength (MPa) | Density ($g/cm^3$) | Properties |
|---|---|---|---|---|
| mild steel | 99.75% iron<br>0.25% carbon | 841 | 7.85 | easily pressed into shape |
| brass | 67% copper<br>33% zinc | 550 | 8.55 | soft, easy to cast |
| bronze | 88% copper<br>12% tin | 500 | 8.70 | weather resistant, durable |
| stainless steel | ..... iron<br>18% chromium<br>8% nickel | 860 | 7.86 | resists corrosion |
| duralumin | 95% aluminium<br>4% copper<br>1% magnesium | 483 | 2.79 | strong, hard, lightweight |

*(b)* Use the information in the table to answer the questions that follow.

(i) State which is the most dense alloy. [1]

.....

(ii) Complete the table by calculating the percentage (%) of iron in stainless steel. [1]

*(Use this space for workings.)*

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(iii) Give **one** reason why duralumin is the alloy used for making the wings of an aeroplane. [1]

.....

(iv) Mild steel is the preferred alloy for making car doors. State **one** advantage of using mild steel for this purpose. [1]

.....

(v) A disadvantage of mild steel is that it corrodes (rusts). Suggest **one** element that can be added to iron to prevent corrosion. [1]

.....

(vi) The statue below is of King George IV in Trafalgar Square, London. It has been on show since 1843.



State the name of the alloy used to make the statue and give **one** reason for your choice. [2]

Alloy used .....

Reason .....

.....



© WJEC CBAC Ltd.



STEMUP.CO.UK

Examiner only

**4.** The steps below outline how a radiographer performs a gamma camera scan on a patient with suspected thyroid disease. These steps are in the wrong order.

*(a)* Place the statements in the correct order by putting letters in the boxes below. *The first one has been for you*. [2]

**A** The prescribed dose of radioactive iodine-123 is collected.

**B** The radioactive iodine-123 is absorbed by the body and travels in the blood; it targets the thyroid gland.

**C** With a computer, the gamma camera forms an image of the thyroid gland.

**D** The radioactive iodine-123 and delivery drug is given to the patient in a drink.

**E** The gamma camera detects the radiation given off by the radioisotope.

| | | | | |
|---|---|---|---|---|
| **A** | | | | |

*(b)* (i) State **one** risk associated with radioactive substances. [1]

.....

(ii) State **one** precaution a radiographer takes when using a gamma camera. [1]

.....

*(c)* State **one** difference and **one** similarity between gamma rays and ultrasound. [2]

Difference: .....

.....

Similarity: .....

.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

*(d)* Tick (✓) the hazard symbol found in the gamma camera room. [1]



☐



☐



☐

4782 010009

7

© WJEC CBAC Ltd.

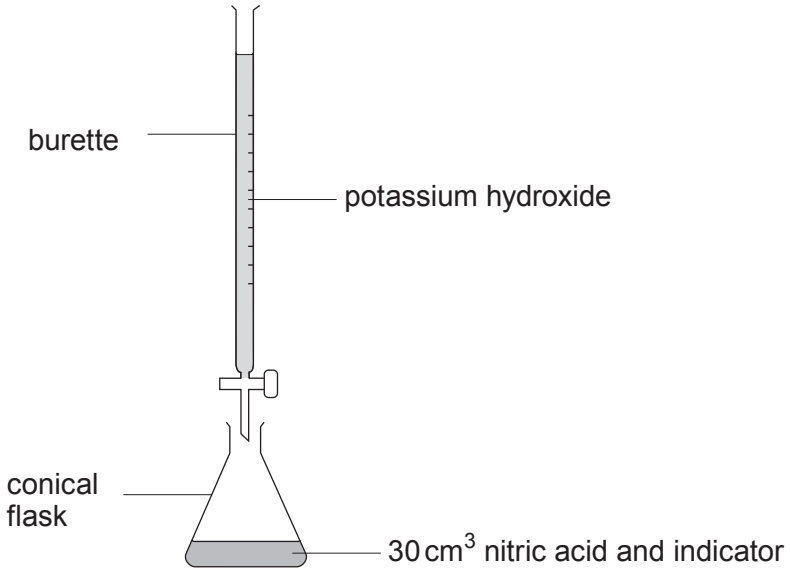


STEMUP.CO.UK

Examiner only

**5.** A student is making a fertiliser called potassium nitrate, by titrating an acid with an alkali.

acid + alkali ⟶ salt + water




*(a)* Complete the word equation using the correct compounds from the box. [2]

| | | |
|---|---|---|
| sulfuric acid | nitric acid | hydrochloric acid |
| potassium hydroxide | sodium hydroxide | magnesium hydroxide |

..... + ..... ⟶ potassium nitrate + water

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

*(b)* The student studied the following chart.

| Indicator | pH Range | Colour Change |
|---|---|---|
| methyl red | 4.2 – 6.2 | red to yellow |
| phenolphthalein | 8.0 – 9.0 | colourless to pink |
| thymol blue | 8.0 – 9.6 | yellow to blue |
| methyl orange | 3.1 – 4.4 | red to orange |

Use the information in the table to answer the questions below.

(i) Predict the colour that will be seen when methyl orange is added to nitric acid. [1]

.....

(ii) The student used **phenolphthalein** as an indicator. He added three drops to the nitric acid. The titration was stopped when the indicator changed colour. [1]

State the pH range when the indicator changes colour.

.....

*(c)* The student repeated the titration five times. The results are shown below.

| Titration | Volume of potassium hydroxide ($cm^3$) |
|---|---|
| 1 | 19.5 |
| 2 | 23.8 |
| 3 | 20.5 |
| 4 | 20.0 |
| 5 | 19.7 |

(i) State the value of the reading that should be ignored when you work out the mean titre. [1]

.....

(ii) Give **one** reason for your answer. [1]

.....

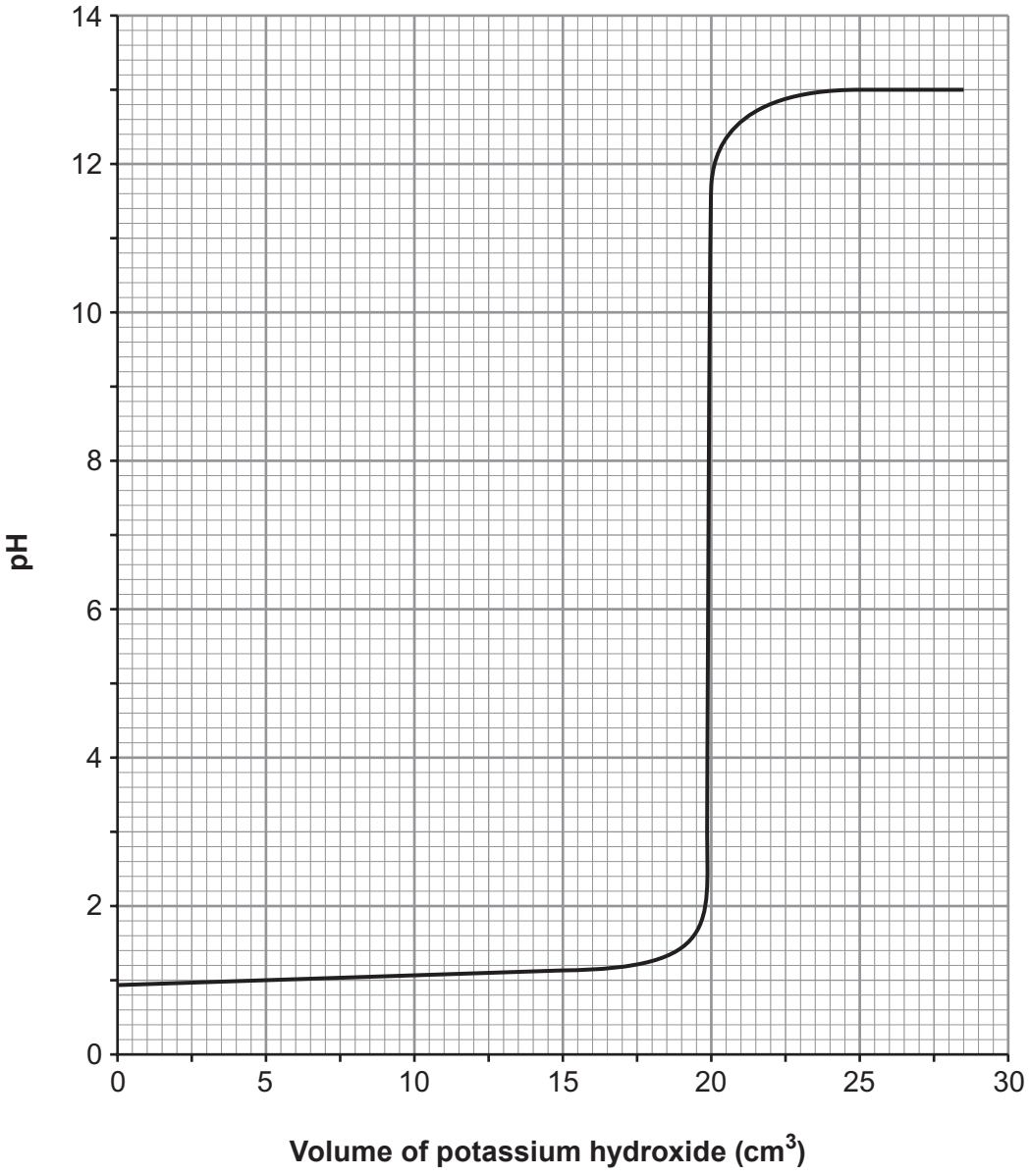
© WJEC CBAC Ltd.


**Turn over.**

STEMUP.CO.UK

Examiner only

*(d)* The graph below shows the pH changes that occurred during one of the titrations.




State the **volume** of alkali added when phenolphthalein changed colour. [1]

..... $cm^3$

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

*(e)* Complete the sentences below by underlining the correct word(s) in brackets. [3]

The titration of nitric acid and potassium hydroxide is called a ***(neutralisation / oxidation / reduction)*** reaction. The addition of the potassium hydroxide from the burette changes the pH. The pH ***(increases / decreases / stays the same)***. In this reaction potassium nitrate is formed; this is a ***(base / acid / salt)***.

10

© WJEC CBAC Ltd.



STEMUP.CO.UK

**Turn over.**

Examiner only

**6.** Gary is studying the food label on his favourite cereal packet.

The information below is from a breakfast cereal called *Brekky Hoops.*

| Nutritional information | Amount per 100 g | Amount in one serving (30 g) with 125 $cm^3$ of semi-skimmed milk | GDA | % of GDA per serving |
|---|---|---|---|---|
| energy | 279 kcal | 220 kcal | 2 000 kcal | ..... |
| protein | 6.5 g | 7.15 g | 55 g | 13 |
| carbohydrate | 76.6 g | 29.0 g | 265 g | 11 |
| of which sugars | 18.5 g | 11.7 g | 90 g | 13 |
| fat | 2.8 g | 3.5 g | 70 g | 5 |
| of which saturates | 0.3 g | 1.2 g | 20 g | 6 |
| fibre | 8.0 g | ..... | 120 g | 3 |
| sodium | 0.63 g | 0.30 g | ..... | 5 |

*(a)* Calculate the missing values to complete the table above. [3]

*(Use this space for workings)*

*(b)* State what is meant by the term 'GDA'. [2]

.....

.....

.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

*(c)* State **one** way Gary can reduce the fat content of **one serving** of his breakfast. [1]

.....

.....

*(d)* The percentage GDAs for this food label are based on an adult man. Explain **one** way in which the GDA would be different for a pregnant woman. [2]

.....

.....

.....

.....

*(e)* Sugar is often added to sweeten breakfast cereals. Describe **two** harmful effects of eating too much sugar. [2]

.....

.....

10

© WJEC CBAC Ltd.



**Turn over.**

STEMUP.CO.UK

Examiner only

**7.** The smoking and drinking habits of secondary school pupils have changed over the past 10 years. The Health and Social Care Information Centre (HSCIC) based its figures on a survey of **5 000** pupils at **174** schools.

The table shows the percentage (%) and numbers of pupils who have admitted to regular alcohol drinking and smoking.

| | 1st year of the survey | | 10th year of the survey | |
|---|---|---|---|---|
| | % of pupils | Numbers of pupils | % of pupils | Numbers of pupils |
| smokers | 9 | 450 | 3 | 150 |
| alcohol drinkers | 25 | 1 250 | 9 | 450 |

(i) Describe the long-term effects of excess alcohol on the body. [3]

.....

.....

.....

.....

(ii) Account for the changes shown by the survey. [6 QWC]

Your answer should address the following points:

- describe the changes shown by the survey;
- explain why these changes may have occurred.

.....

.....

.....

.....

.....

.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

9

**END OF PAPER**

© WJEC CBAC Ltd.



STEMUP.CO.UK

**Turn over.**

# BLANK PAGE

© WJEC CBAC Ltd.

# BLANK PAGE

© WJEC CBAC Ltd.

# 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

## JANUARY 2016

## SCIENCE B
## UNIT 2 - FOUNDATION TIER
## 4782/01

© WJEC CBAC Ltd.

STEMUP.CO.UK

## INTRODUCTION

This marking scheme was used by WJEC for the 2016 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was 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 conference was to ensure that the marking scheme was 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' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

© WJEC CBAC Ltd.

**GCSE SCIENCE B**

**UNIT 2 FOUNDATION TIER**

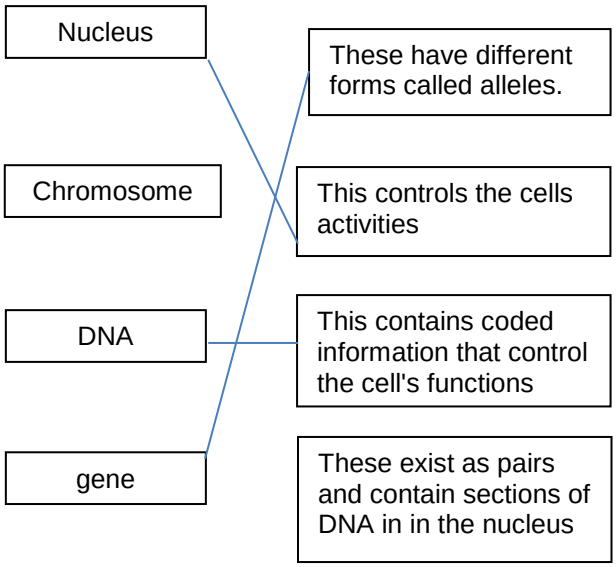
**JANUARY 2016 MARK SCHEME**

| Question | Mark Scheme | Marks |
|---|---|---|
| **1** (a) | All correct (2) one or two correct (1)<br>From left to right:<br>sulfuric acid<br>vinegar<br>ammonia | 2 |
| (b) | $H_2SO_4$ | 1 |
| (c) (i) | Any element from period 3<br>Accept element symbol | 1 |
| (ii) | Any Group 1<br>Accept element symbol | 1 |
| (d) | treatment of heart burn / cleaning metal surfaces<br>*If three boxes ticked, award a max of 1 mark*<br>*If four or more boxes ticked (0)* | 2 |

© WJEC CBAC Ltd.



STEMUP.CO.UK

| Question | Mark Scheme | Marks |
|---|---|---|
| **2** (a) | <br>All correct (2), two correct (1), one correct (0) | 2 |
| (b) (i) | Females XX same pair /Males XY | 1 |
| (ii) | Sperm cells contains only 23 chromosomes/no paired chromosomes in sperm cell | 1 |
| (iii) | mutation | 1 |
| (c) (i) | Dd or DD | 1 |
| (ii) | 1 mark for each correct row/column<br><br>\| | \| d \| d \|<br>\| D \| Dd \| Dd \|<br>\| d \| dd \| dd \| | 2 |
| (iii) | 50% | 1 |

© WJEC CBAC Ltd.



STEMUP.CO.UK

| Question | Mark Scheme | Marks |
|---|---|---|
| **3** (a) | mixture (1) metal plus another (named) element (1) | 1 |
| (b) (i) | bronze | 1 |
| (ii) | 74% | 1 |
| (iii) | low density, lightweight | 1 |
| (iv) | easily pressed into shape | 1 |
| (v) | chromium (accept nickel) | 1 |
| (vi) | bronze (1) weather resistant /durable | 2 |
| **4** (a) | (A) **D B E C**<br>All correct (2)<br>Two correct (1)<br>1 correct (0) | 2<br><br>1 |
| (b) (i) | causes cancer/mutations | 1 |
| (ii) | wear lead lined jacket / use machine behind lead glass | 1 |
| (c) | Difference - ultrasound – uses sound waves<br>gamma camera - uses ionising radiation/isotopes<br><br>Similarity – used to form images of organs / soft tissue / pass through the body | 1<br><br>1 |
| (d) |  | |
| **5** (a) | nitric acid (1) + potassium hydroxide (1) | 2 |
| (b) (i) | red | 1 |
| (ii) | 8.0-9.0 | 1 |
| (c) (i) | 23.8 | 1 |
| (ii) | higher than other readings/ very different | 1 |
| (d) | $20cm^3$ | 1 |
| (e) | neutralisation / increases / salt | 3 |

© WJEC CBAC Ltd.



STEMUP.CO.UK

| Question | Mark Scheme | Marks |
|---|---|---|
| **6** (a) | 11% / 3.6g / 6 | 3 |
| (b) | daily recommended quantity/amount (1) of a particular food type (1) | 2 |
| (c) | use a milk with less fat/use skimmed milk/eat less | 1 |
| (d) | increase in protein which is needed to help growth of baby<br>The statements must be correctly and coherently linked for two marks | 2<br>2 |
| (e) | Any two of: obesity, tooth decay, diabetes | |
| **7** (i) | Any three of:<br>liver disease, liver cancer, cancer, diabetes, impotence, infertility, depression, long term social implications | 3 |
| (ii) | **Indicative content**<br>• numbers of smokers has dropped<br>• numbers of pupils drinking alcohol dropped<br>• quote numbers or %<br>• publicity / Health campaigns to reduce<br>• reference to awareness of diseases related to smoking/alcohol<br><br>**Marking bands**<br><br>**5 - 6 marks.**<br>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.<br><br>**3 - 4 marks**<br>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.<br><br>**1 - 2 marks**<br>The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions.<br>The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.<br><br>**0 marks**<br>The candidate does not make any attempt or give a relevant answer worthy of credit. | 6 |



© WJEC CBAC Ltd.



STEMUP.CO.UK

| Surname | Centre Number | Candidate Number |
|---|---|---|
| Other Names | | 0 |

# GCSE

4782/01

S15-4782-01

# SCIENCE B

## UNIT 2: Science and Life in the Modern World
## FOUNDATION TIER

P.M. TUESDAY, 9 June 2015

1 hour

| For Examiner's use only | | |
|---|---|---|
| **Question** | **Maximum Mark** | **Mark Awarded** |
| **1.** | **3** | |
| **2.** | **3** | |
| **3.** | **10** | |
| **4.** | **10** | |
| **5.** | **13** | |
| **6.** | **13** | |
| **7.** | **8** | |
| **Total** | **60** | |

4782 010001

### 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 **7**(ii).

A periodic table is printed on page 16.

© WJEC CBAC Ltd.



STEMUP.CO.UK

Examiner only

*Answer* **all** *questions.*

**1.** The hazard symbols below are found in a medical physics laboratory.



**A**



**B**



**C**



**D**

Use the correct letter to identify the hazard symbol found on containers of: [3]

(i) concentrated sulfuric acid ☐

(ii) a radioactive source of iodine-131 ☐

(iii) concentrated potassium hydroxide ☐

☐

3

© WJEC CBAC Ltd.



STEMUP.CO.UK

Examiner only

**2.** The pH scale is used to identify whether a solution is acidic or alkaline.

| Colour | Red | Orange | Yellow | Green | Blue | Navy | Purple |
|---|---|---|---|---|---|---|---|
| pH Range | 0-2 | 3-4 | 5-6 | 7-8 | 9-10 | 11-12 | 13-14 |

Use this information to complete the table below. [3]

One row has been completed for you.

| Substance | pH | Indicator Colour | Acid/Alkali/Neutral |
|---|---|---|---|
| lemon juice | 2 | red | acid |
| vinegar | ..... | orange | acid |
| water | 7 | green | ..... |
| potassium hydroxide | 14 | ..... | alkali |

4782 010003

3

© WJEC CBAC Ltd.



**Turn over.**

STEMUP.CO.UK

Examiner only

**3.** *(a)* Use the periodic table on page 16 to answer the following questions.

(i) Name the element with the symbol **Br**. [1]

.....

(ii) Write the symbol for **chlorine**. [1]

.....

(iii) State **one** industrial use of chlorine. [1]

.....

(iv) State the general name of elements found in group 7. [1]

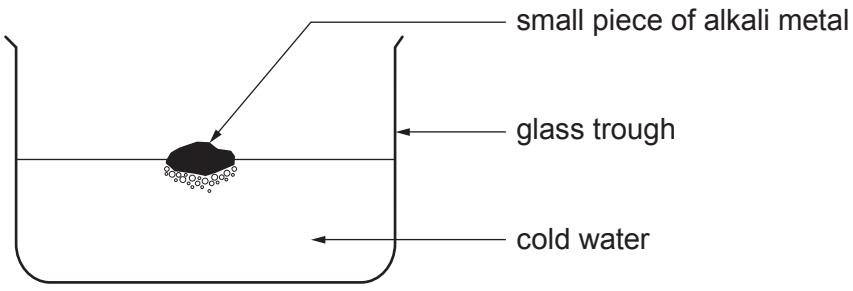
.....

*(b)* A teacher is demonstrating the group 1 metals and how they react with water.

She places a few drops of universal indicator into the water. She then adds a small amount of lithium.

She then repeats the experiment for sodium and potassium.

**Reaction of alkali metals with cold water**




© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(i) The students record their observations.

Draw straight lines to identify the metals from the student observations. [2]

| Student observations | Group 1 Metal |
|---|---|
| • The metal floats<br>• It forms a silver ball and moves rapidly about the surface of water<br>• The metal reacts in 30 seconds<br>• The universal indicator turns purple | lithium |
| • The metal melts<br>• It burns with a violet flame<br>• All the metal reacts in 10 seconds<br>• The universal indicator turns purple | sodium |
| • The metal keeps its shape<br>• The metal floats<br>• It reacts slowly<br>• The universal indicator turns blue | potassium |

(ii) Write the order of reactivity for these metals using the student observations. [2]

Most reactive .....

.....

Least reactive .....

*(c)* Complete the word equation for the reaction of potassium with water. [2]

potassium + water ⟶ ..... + .....

10

© WJEC CBAC Ltd.



STEMUP.CO.UK



4782 010005

Examiner only

**4.** The table below shows some properties of five elements.

| Element | Melting point (°C) | Boiling point (°C) | Density (g/cm$^3$) |
|---|---|---|---|
| iodine | 114 | 184 | 4.9 |
| aluminium | 660 | 2519 | 2.7 |
| cobalt | 1495 | 2870 | 8.9 |
| sulfur | 113 | 445 | 2.1 |
| iron | 1538 | 2862 | 7.9 |

*(a)* Use the information in the table to answer the questions.

(i) Give **two** reasons why cobalt is classified as a metal. [2]

1. .....

2. .....

(ii) Identify **one** non-metal from the table and give **one** reason for your choice. [2]

Non-metal .....

Reason .....

© WJEC CBAC Ltd.

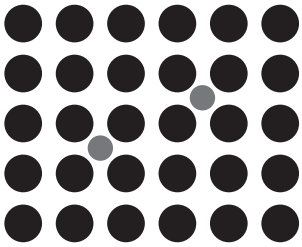
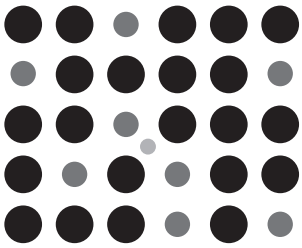
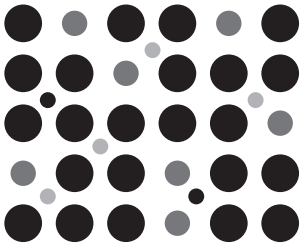
STEMUP.CO.UK

Examiner only

*(b)* The table below shows some information about three alloys of iron.

(i) Complete the table, using **only** the words in the box. [4]
*You will not need to use all the words.*

| | | |
|---|---|---|
| mild steel | rust resistant | hard but brittle |
| pig iron | high carbon steel | easily pressed into shape |

| Alloy of iron | Atomic arrangement | Composition | Properties |
|---|---|---|---|
| 1. ..... ..... |  | 99.8% iron<br>0.2% carbon | ..... ..... ..... |
| 2. ..... ..... |  | 98% iron<br>1.7% carbon<br>0.3% manganese | ..... ..... ..... |
| 3. stainless steel |  | 74% iron<br>0.3% carbon<br>……% chromium<br>7.7% nickel | ..... ..... ..... |

(ii) Calculate the percentage (%) of chromium in stainless steel. [1]
*Space for workings.*

(iii) State **one** way of changing the composition of an alloy of iron to make it harder. [1]

.....

4782 010007

10

© WJEC CBAC Ltd.


**Turn over.**

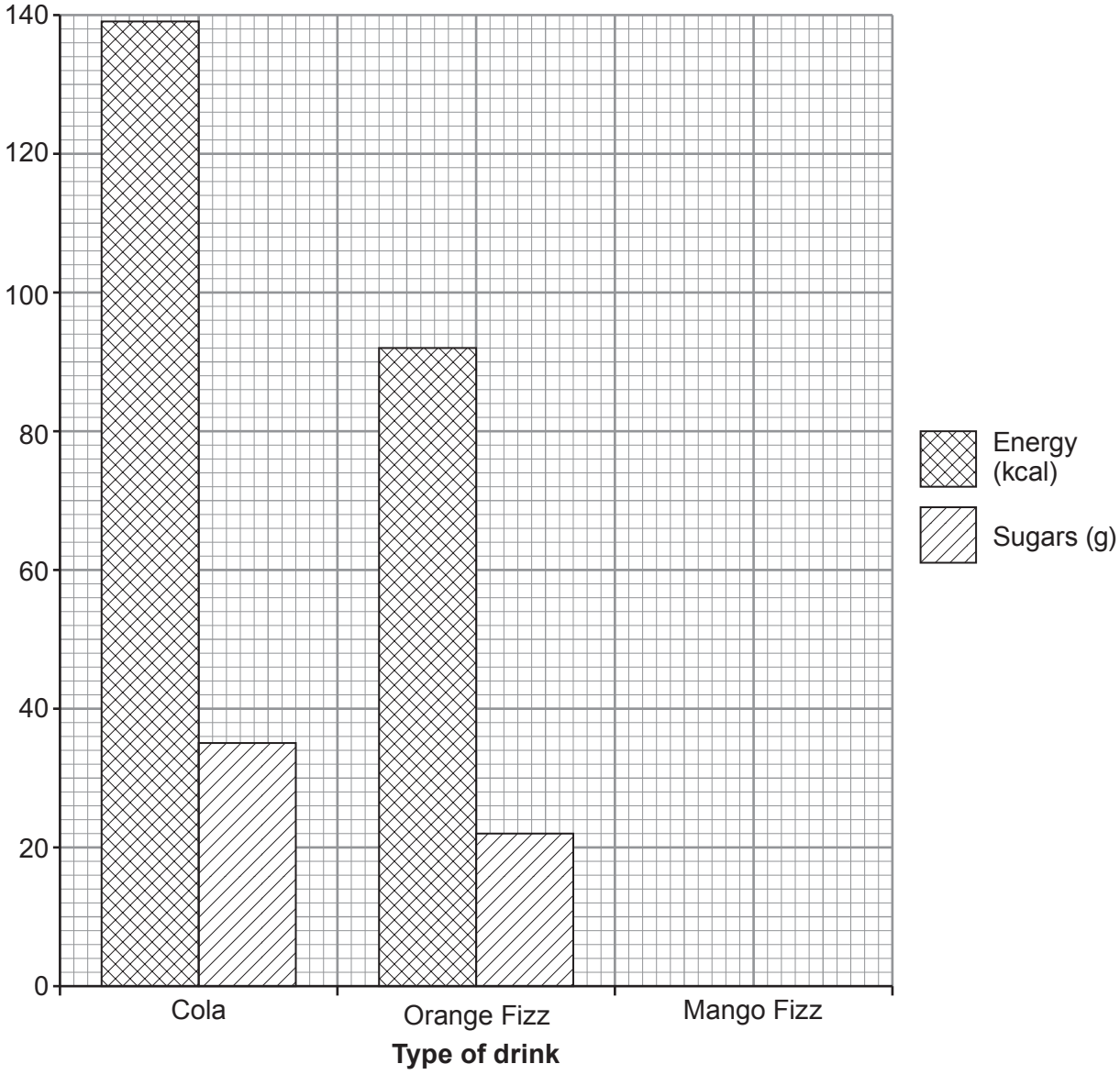
STEMUP.CO.UK

Examiner only

**5.** The table below compares the energy and sugar content in one can of different soft drinks.



| Name of soft drink | Energy (kcal) | Sugars (g) |
|---|---|---|
| Cola | 139 | 35 |
| Orange Fizz | 92 | 22 |
| Mango Fizz | 136 | 33 |




*(a)* (i) Complete the graph by plotting the information for Mango Fizz. [2]

(ii) Calculate the GDA for sugar given that Orange Fizz provides 25% of your GDA. [2]

..... g

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

*(b)* The table shows the energy used for different exercises.

(i) Complete the table below. [2]

| Type of exercise | Energy used (kcal/min) | Length of exercise (minutes) | Total energy used (kcal) |
|---|---|---|---|
| Jogging | 8.5 | 50 | 425 |
| Cycling | 5.5 | 60 | ..... |
| Swimming | 5.3 | ..... | 212 |

It is claimed that *'a student needs to jog for 15 minutes to use up the energy in **one** can of cola'*.

(ii) Use the information given to explain if this statement is correct. [3]

.....

.....

.....

*(c)* Researchers found that the risk of diabetes increased by 22% for people having one can of any of these soft drinks a day.

(i) Name the hormone that controls sugar levels in the body. [1]

.....

(ii) Explain why these soft drinks are not suitable for diabetics. [2]

.....

.....

.....

*(d)* Suggest **one** way of making these drinks healthier without affecting the taste. [1]

.....



© WJEC CBAC Ltd.



STEMUP.CO.UK

Examiner only

**6.** 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.

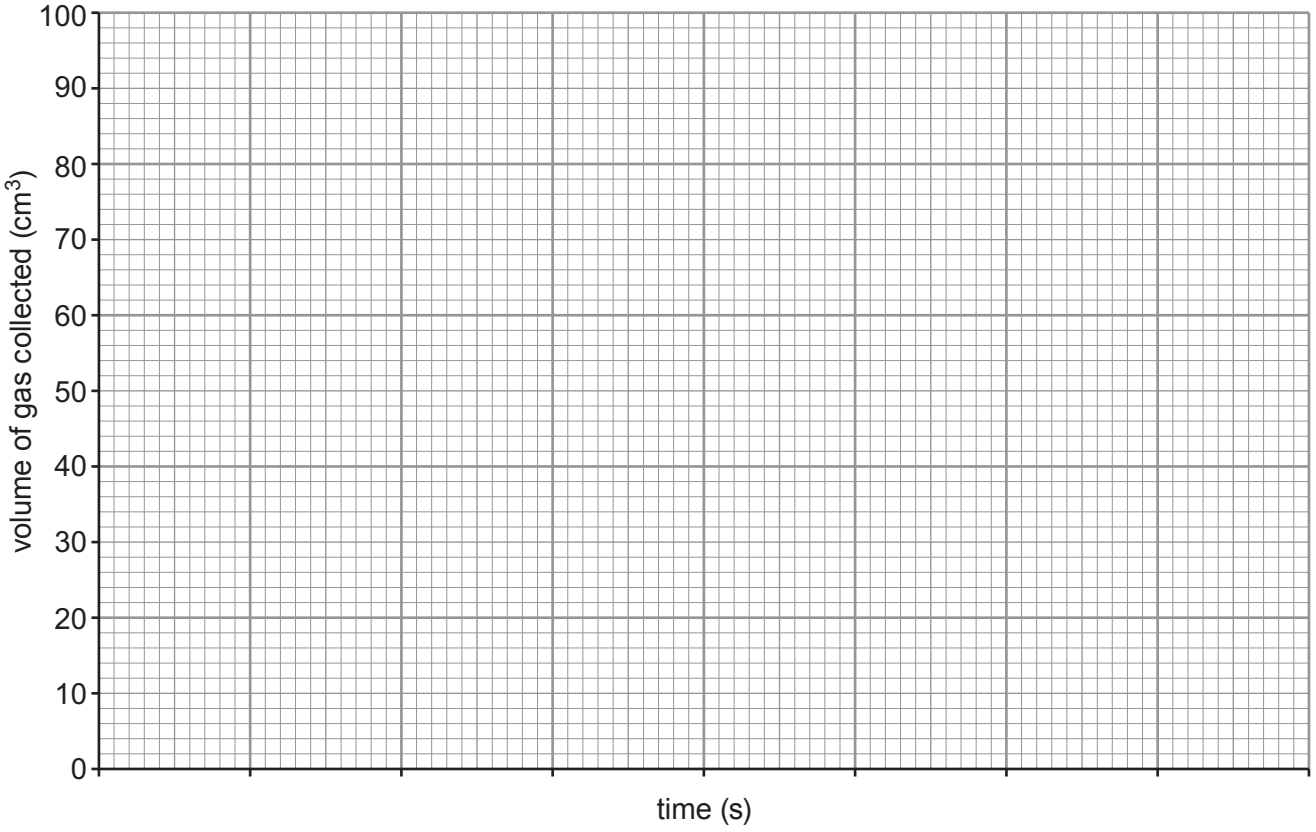
The student followed this method:

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, they 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

**7.** 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. Iodine-131 has a half-life of 8 days.

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

.....

.....

.....

(ii) 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

.....

.....

.....

.....

8

**END OF PAPER**

© WJEC CBAC Ltd.



STEMUP.CO.UK

**Turn over.**

# BLANK PAGE

© WJEC CBAC Ltd.

# 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** | 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** | 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** | 29 **Cu** | zinc 30 **Zn** | gallium 31 **Ga** | germanium 32 **Ge** | arsenic 33 **As** | selenium 34 **Se** | 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

4782/01

# SCIENCE B

## UNIT 2: Science and Life in the Modern World
## FOUNDATION TIER

P.M. TUESDAY, 10 June 2014

1 hour

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

4782 010001

### 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 **7***(b)*.

A periodic table is printed on page 16.

© WJEC CBAC Ltd.



STEMUP.CO.UK

Examiner only

*Answer* **all** *questions.*

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

| Element | Symbol | Metal or non-metal |
|---|---|---|
| copper | Cu | metal |
| sulphur | ..... | non-metal |
| potassium | K | ..... |

*(b)* Use the Periodic Table on page 16 to answer the following question.
Give the symbol **or** name of an element in the same **group** as potassium. [1]

.....

*(c)* The following table describes the properties of element **X** and element **Y**.

| Property | Element **X** | Element **Y** |
|---|---|---|
| Melting point (°C) | 1538 | 115 |
| Electrical conductivity (units) | 8 | 0 |
| Density (g/cm$^3$) | 8 | 2 |
| Thermal conductivity (units) | 10 | 0.1 |

(i) Place a tick (✓) in the box next to the one correct statement below. [1]

**X** and **Y** are both metals ☐

**X** and **Y** are both non-metals ☐

**X** is a metal and **Y** is a non-metal ☐

**X** is a non-metal and **Y** is a metal ☐

(ii) Use the information in the table to give **two** reasons for your choice. [2]

1. .....

2. .....

6

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

**2.** 'Be treatwise' is a new way to label treats like chocolate and sweets.
The information below is from a chocolate bar, the 'Choco Crunch Bar'.

**Choco Crunch Bar**

| Calories | Sugars | Fat | Saturates | Salt |
|---|---|---|---|---|
| 185 kcal | 25.7 g | 7.0 g | 5.0 g | 0.28 g |
| 9.0% GDA | 26% GDA | 10% GDA | 25% GDA | 5% GDA |

*(a)* Use the information above to answer the following questions for the 'Choco Crunch Bar'.

(i) State the **two** food groups that have the highest percentage of GDA (Guided Daily Amount). [2]

1. .....

2. .....

(ii) The 'Choco Crunch Bar' has 5.0 g of saturates which is 25% of your GDA. Calculate the total GDA for saturates. [2]

..... g

*(b)* The 'Choco Fruit Bar' has been made as a healthy alternative option to the 'Choco Crunch Bar'.

**Choco Fruit Bar**

| Calories | Sugars | Fat | Saturates | Salt |
|---|---|---|---|---|
| 150 kcal | 18.7 g | 5.0g | 3.0 g | 0.28 g |
| 7.5% GDA | 19% GDA | 7.1% GDA | 15% GDA | 5% GDA |

(i) Give **two** reasons why the 'Choco Fruit Bar' is healthier. [2]

1. .....

2. .....



© WJEC CBAC Ltd.



STEMUP.CO.UK

Examiner only

(ii) Calculate the total number of calories in **two** 'Choco Fruit Bars'. [1]

..... kcal

(iii) Later in the day a student goes running. Running uses 15 kcal of energy per minute. For how long must the student run to use the energy in both 'Choco Fruit Bars'? [2]

..... minutes

9

© WJEC CBAC Ltd.



STEMUP.CO.UK

Examiner only

**3.** The picture below is of a chromosome taken from a human white blood cell.



*(a)* (i) State the **total** number of chromosomes found in a human white blood cell. [1]

.....

(ii) Name the part of the cell where you would find the chromosomes. [1]

.....

(iii) Name the part of the chromosome that contains genetic information. [1]

.....

*(b)* (i) Cystic fibrosis is an inherited disease. We can predict the chance of a person suffering from this disease using a Punnett square. Complete the Punnett square to show the cross between two heterozygous parents. [1]

| | | **Mother** | |
|---|---|---|---|
| | | B | b |
| **Father** | B | ..... | ..... |
| | b | ..... | ..... |

(ii) What is the genotype of the cystic fibrosis sufferer? [1]

.....

(iii) **Circle** the correct answer which shows the percentage chance of these parents producing a baby with cystic fibrosis: [1]

0% 25% 50% 100%

*(c)* State **one** piece of advice that may be offered to these parents by a genetic counsellor. [1]

.....

4782 010005



© WJEC CBAC Ltd.



STEMUP.CO.UK

Examiner only

**4.** *(a)* Use the terms below to complete the following sentences about the harmful effects of smoking. [4]

| | | | |
|---|---|---|---|
| high blood pressure | oxygen | nitrogen | addictive |
| kidneys | lungs | cancer | |

(i) People find it difficult to give up smoking because nicotine is

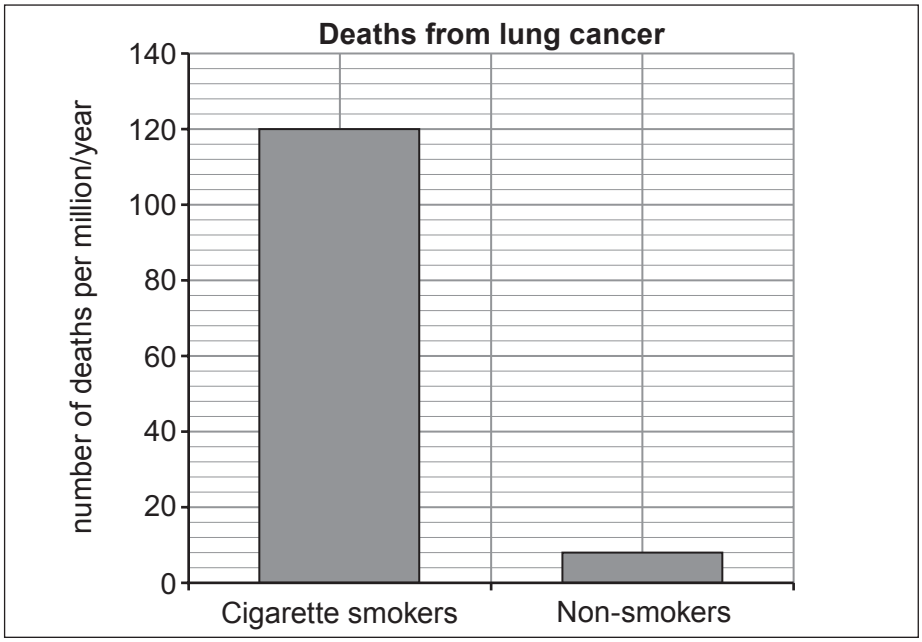
..... .

(ii) Nicotine narrows the arteries and causes ..... .

(iii) Tar coats the lining of the ..... making them less able to take in oxygen.

(iv) Carbon monoxide is a poisonous gas which combines with red blood cells making them unable to carry ..... around the body.

*(b)* Lung cancer is one of the most common diseases associated with smoking. The graph below gives information about the number of deaths from lung cancer for people aged 50-70 years old.




Use the information in the bar chart to answer the following questions.

(i) How many deaths per million per year are recorded for smokers? [1]

.....

(ii) A recent survey shows that 13 million people smoke in the UK. Calculate how many of those smoking, you expect to die per year from lung cancer. [2]

..... people

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

*(c)* State **two** ways in which the government in the UK has helped to reduce smoking. [2]

1. .....

.....

2. .....

.....

9



© WJEC CBAC Ltd.



**Turn over.**

STEMUP.CO.UK

Examiner only

**5.** 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**

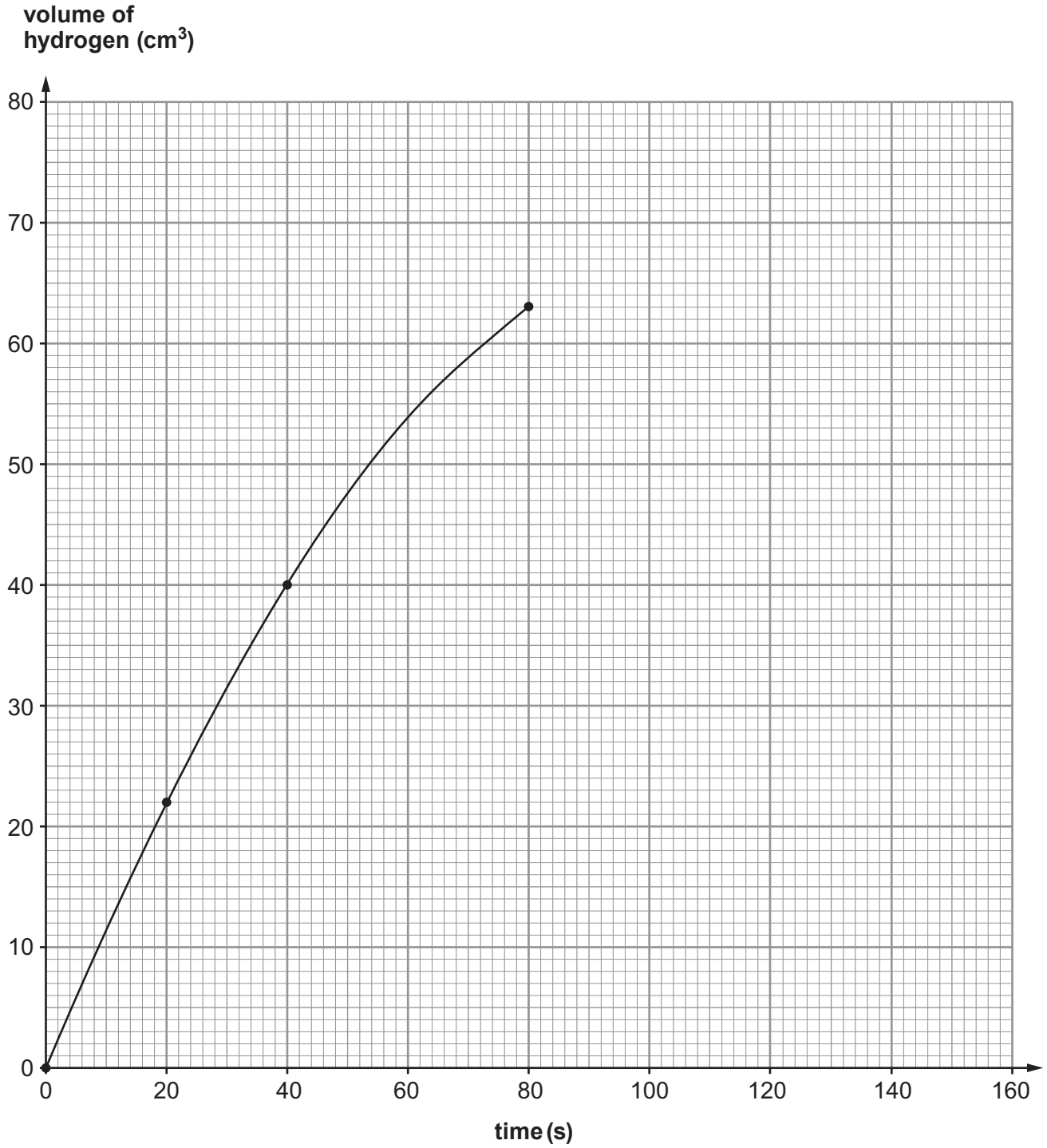
| Time (s) | 0 | 20 | 40 | 60 | 80 | 100 | 120 | 140 | 160 |
|---|---|---|---|---|---|---|---|---|---|
| Volume of hydrogen ($cm^3$) | 0 | 22 | 40 | | 63 | 68 | 71 | 72 | 72 |

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

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




© 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.

STEMUP.CO.UK

# BLANK PAGE

© WJEC CBAC Ltd.

Examiner only

**6.** *(a)* Complete the following table about the extraction of iron in the blast furnace. [3]
*You will need to use some of the terms and statements in the box below when you complete the table.*

- sandstone
- burns to produce carbon dioxide and carbon monoxide
- this ore contains aluminium
- the ore that contains iron
- aluminium oxide
- iron oxide

| 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. [2]

| Raw material | Mass needed (tonnes) | Cost per tonne of raw material (£) | Cost in producing one tonne of iron (£) |
|---|---|---|---|
| iron ore | 1.75 | 60 | 105 |
| coke | 0.25 | 120 | 30 |
| limestone | 0.25 | 80 | 20 |
| hot air | 4.0 | 2 | ..... |
| | | Total cost | £ ..... |

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

.....

.....

.....

7

© WJEC CBAC Ltd.



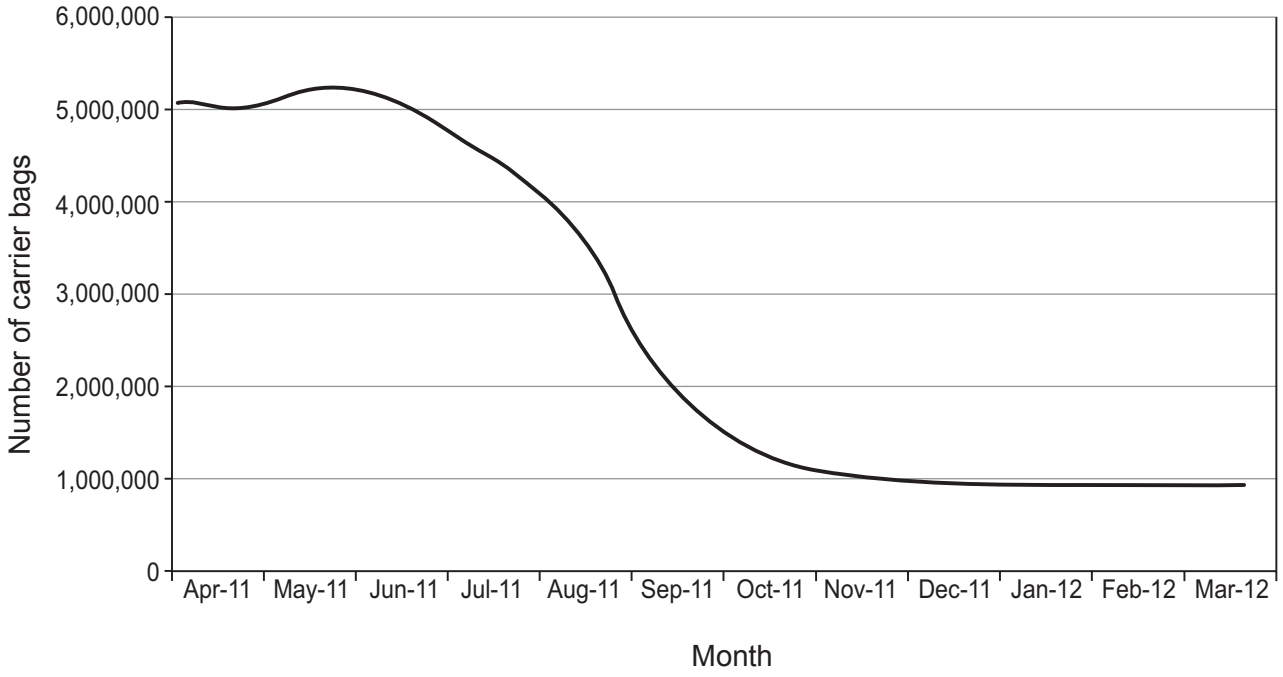
STEMUP.CO.UK

**Turn over.**

Examiner only

**7.** 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

**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** | 14 **Si** | phosphorus 15 **P** | 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)<br>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<br>(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)<br>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)<br>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)<br>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)<br>£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.<br>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)<br>**OR**<br>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)<br>*The points must be coherently as correctly connected for three marks.* | 3 |
| (b) | **Indicative content**<br>• less resources/oil used<br>• improved sustainability<br>• saves money<br>• effect on - world's oceans / marine life<br>• effect on land fill/ toxic gases released by burning<br><br>**Marking Bands**<br><br>**5-6 marks**<br>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.<br>**3-4 marks**<br>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.<br>**1-2 marks**<br>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.<br>**0 marks**<br>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)<br>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)<br>*Two marks can be awarded if points are correctly and coherently corrected.* | 2 |
| | | (v) | 72$cm^3$(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<br>80<br>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.



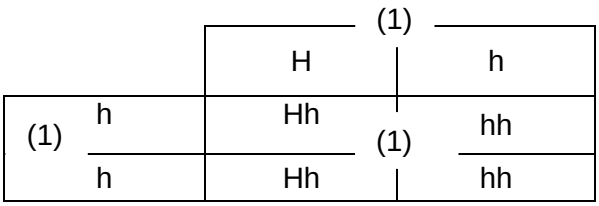
STEMUP.CO.UK

| Question | Marking detail | Mark |
|---|---|---|
| **3.** (a) | Candidates must give argued response.<br>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)<br>OR<br>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**<br>• Less resources/oil used<br>• improved sustainability<br>• Saves money<br>• effect on - world's oceans / marine life<br>• effect on land fill/ toxic gases released by burning<br><br>**Marking bands**<br><br>**5-6 marks**<br>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.<br><br>**3 – 4 marks**<br>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.<br><br>**1 – 2 marks**<br>The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions.<br>The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar.<br><br>**0 marks**<br>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) | <br>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).<br>*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:<br>• shows smoking in boys and girls has dropped from 2001 (1)<br>• continues to drop since 2007 (1)<br>• drop in numbers greater in girls since 2007 than boys (1)<br>• fall in smoking was bigger before ban (1)<br>• 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**<br>• radio-isotope added to drug (ETDA)<br>• injected into patient<br>• iodine absorbed by thyroid gland<br>• patient positioned under the gamma camera<br>• gamma camera detects gamma radiation<br>• computer forms an image<br>**Marking bands**<br>**5-6 marks**<br>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.<br>**3 – 4 marks**<br>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.<br>**1 – 2 marks**<br>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.<br>**0 marks**<br>The candidate does not make any attempt or give a relevant answer worthy of credit. | 6QWC |
| (b) (i) | Time taken for ½ (1)<br>the radioactive particles/ mass of radioactive isotope/count rate/activity/nuclei to decay (1) | 2 |
| (ii) | 5 half-lives (1)<br>1/32 or 0.03125 (1) | 2 |
| (iii) | Half-life long enough for formation of an image (1)<br>but not too long to do any harm (1) or<br>(other isotopes half-life too short or too long)<br>*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)<br>*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

4782/01

# SCIENCE B

## UNIT 2: Science and Life in the Modern World
## FOUNDATION TIER

A.M. TUESDAY, 14 January 2014

1 hour

| For Examiner's use only | | |
|---|---|---|
| **Question** | **Maximum Mark** | **Mark Awarded** |
| **1.** | **4** | |
| **2.** | **6** | |
| **3.** | **8** | |
| **4.** | **8** | |
| **5.** | **12** | |
| **6.** | **10** | |
| **7.** | **6** | |
| **8.** | **6** | |
| **Total** | **60** | |

4782
010001

### 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 **8**.

A periodic table is printed on page 20.

© WJEC CBAC Ltd.



STEMUP.CO.UK

# BLANK PAGE

© WJEC CBAC Ltd.

*Answer* **all** *questions.*

**1.** Complete the tables below.

| Element | Symbol | Metal/non-metal |
|---|---|---|
| iron | Fe | metal |
| magnesium | Mg | ..... |
| ..... | S | non-metal |

[2]

| Compound | Formula |
|---|---|
| ammonia | $NH_3$ |
| potassium hydroxide | ..... |
| ..... | NaCl |

[2]

4



© WJEC CBAC Ltd.

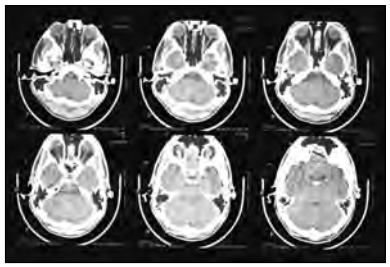




STEMUP.CO.UK

Examiner only

**2.** *(a)* Draw **one** line to match each image with the correct scanning device. *The first one has been done for you.* [2]

| Image | Scanning device |
|---|---|
|  | CAT Scan |
|  | Gamma camera |
|  | Ultrasound |
|  | X-ray |

© WJEC CBAC Ltd.



STEMUP.CO.UK

Examiner only

*(b)* (i) State **one** difference between an X-ray image and a CAT scan image. [1]

.....

(ii) State **one** of the risks associated with using X-rays. [1]

.....

(iii) State **one** precaution a radiographer takes to reduce exposure to X-rays. [1]

.....

(iv) Identify the hazard symbol found in all X-ray rooms.
Tick (✓) the correct symbol below. [1]



☐



☐



☐



© WJEC CBAC Ltd.





STEMUP.CO.UK

4782 010005

Examiner only

**3.** Eating too many foods that contain animal fat can cause obesity and a build-up of cholesterol in the blood.

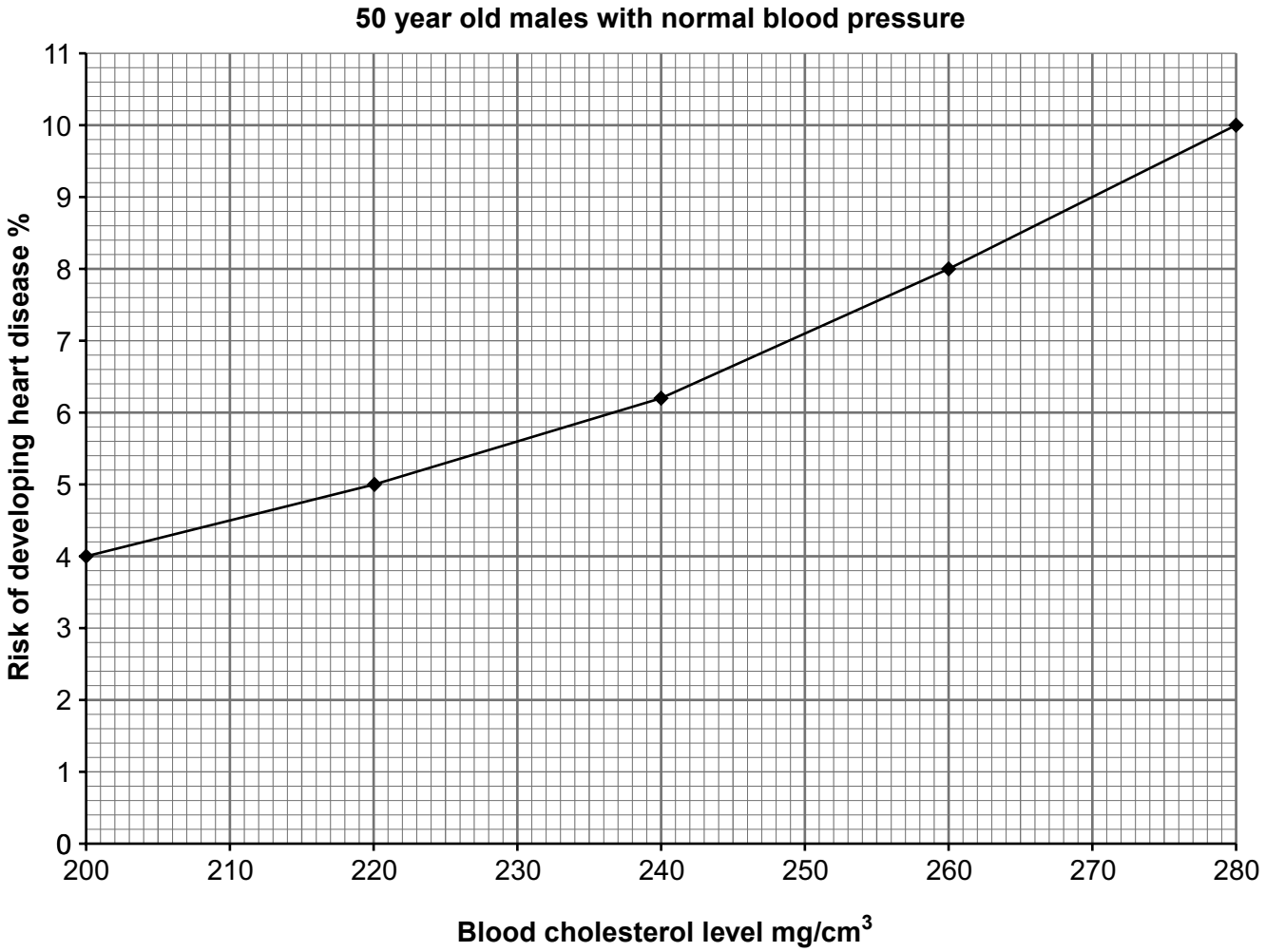
A recent study was carried out by a Welsh hospital where all volunteers were **50 year old males** with **normal blood pressure**. The study investigated the risk of developing heart disease and blood cholesterol levels.

*(a)* Name **two** factors that made this study a fair test. [2]

(i) .....

(ii) .....

*(b)* The graph below shows the results of the study.




Use the graph to answer the following questions.

(i) Estimate the risk of developing heart disease if the blood cholesterol level is 230 mg/cm$^3$. [1]

.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(ii) Describe the link between blood cholesterol levels and the risk of developing heart disease. [1]

.....

.....

.....

*(c)* A patient has a high blood cholesterol level. Complete the table below to describe the effect of changing foods in their diet on their blood cholesterol level. [2]

| Food | Intake | Effect on blood cholesterol |
|---|---|---|
| white rice | eat more | no effect |
| steak | eat less | ..... |
| high fibre cereal | ..... | reduce |
| chips | eat less | reduce |

*(d)* You can reduce your risk of developing heart disease by changing your diet. State **two** *other* ways of reducing the risk of developing heart disease. [2]

1. .....

2. .....

8

4782 010007

© WJEC CBAC Ltd.



**Turn over.**

STEMUP.CO.UK

Examiner only

**4.** A student was studying the effect of pH on the growth of different crops.

*(a)* The steps below outline how the student would measure the pH of a soil sample. These steps are in the wrong order.

Place the steps in the correct order. *The first one has been done for you*. [3]

**A** Collect about 50 g of soil from the allotment.

**B** Using a clean filter paper and funnel, filter the mixture into a beaker.

**C** Shake the water and soil together.

**D** Add some universal indicator to the filtrate and record the colour change.

**E** Carefully add about 50 $cm^3$ of water to the soil.

| | | | | |
|---|---|---|---|---|
| **A** | | | | |

*(b)* Use your knowledge and the information in the pH table to help you answer the questions below.

| Colour | red | orange | yellow | green | blue | navy | purple |
|---|---|---|---|---|---|---|---|
| pH Range | 0-2 | 3-4 | 5-6 | 7-8 | 9-10 | 11-12 | 13-14 |

(i) The student tested soil from the school allotment and found it gave a yellow colour. What is the pH of the soil? [1]

.....

(ii) The student needs to change the pH of the soil in the school allotment to neutral. **Circle** a suitable substance from the list below that could be used to do this. [1]

| | | | |
|---|---|---|---|
| acid | alkali | water | neutral salt |

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(iii) The table below lists the vegetables the student wants to grow and their preferred soil pH's.
**Complete the table** below which shows the preferred soil pH for some different vegetables. [2]

| Crop | pH of soil | Colour of soil after testing |
|---|---|---|
| potatoes | 6 | yellow |
| sugar beet | 9 | blue |
| turnips | 5 | ..... |
| beans | ..... | green |

(iv) Name **one** crop that would grow well in the school allotment. [1]

.....

8

4782 010009

© WJEC CBAC Ltd.

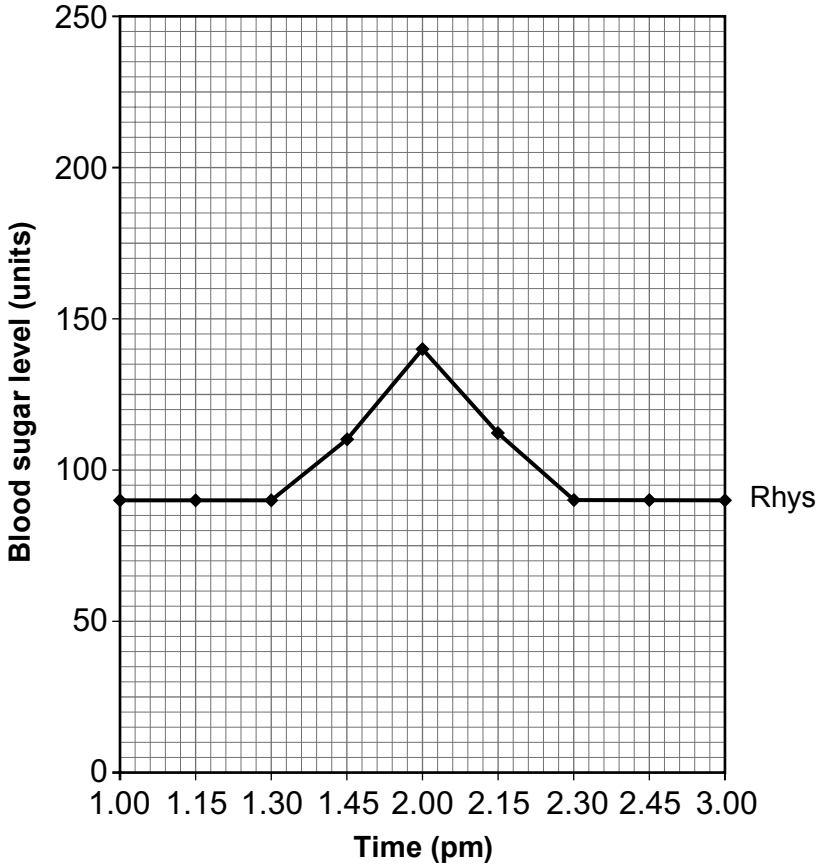
STEMUP.CO.UK

Examiner only

**5.** The table below shows the blood sugar levels of Rhys and Kevin over a two hour period.

| Time (pm) | | 1.00 | 1.15 | 1.30 | 1.45 | 2.00 | 2.15 | 2.30 | 2.45 | 3.00 |
|---|---|---|---|---|---|---|---|---|---|---|
| Blood sugar levels (units) | Rhys | 90 | 90 | 90 | 110 | 140 | 112 | 90 | 90 | 90 |
| | Kevin | 90 | 90 | 90 | 130 | 170 | 190 | 200 | 210 | 210 |

*(a)* Rhys' blood sugar has been plotted. Plot the blood sugar levels for Kevin. Join the points with a ruler. [3]




*(b)* (i) At 1.30pm both Rhys and Kevin ate food that contained some carbohydrate. Describe how the blood sugar levels of Rhys and Kevin changed between 1.30pm and 3.00pm. [4]

Rhys

.....

.....

Kevin

.....

.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(ii) At what time did Rhys' blood sugar level return to normal? [1]

.....

(iii) What is Kevin's blood sugar level at the time when Rhys' blood sugar level returned to normal? [1]

.....

*(c)* The blood sugar level in the body is usually controlled by a hormone. Name the organ that produces this hormone. [1]

.....

*(d)* Kevin suffers from diabetes. State **two** ways in which diabetics control their blood sugar level. [2]

1. .....

2. .....

12

© WJEC CBAC Ltd.



**Turn over.**

STEMUP.CO.UK

Examiner only

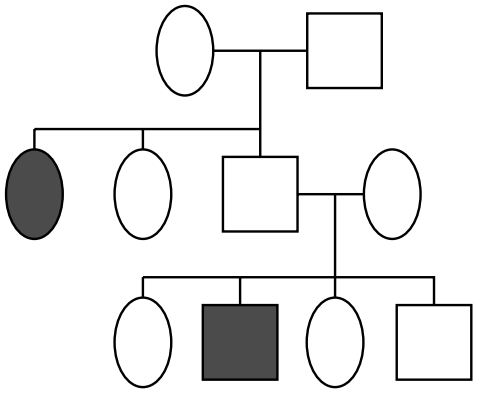
**6.** Cystic fibrosis is an inherited disease.

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

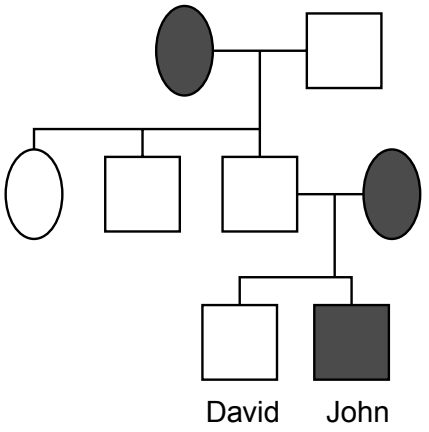
.....

*(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 = ..... %

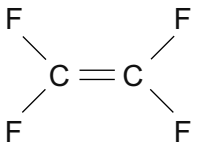
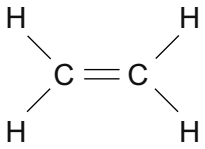
10



STEMUP.CO.UK

Examiner only

**7.** *(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)* (i) **Name** the process by which polyethene is made. [1]

.....

(ii) What is the main **structural** difference between a molecule of ethene and a molecule of polyethene? [1]

.....

.....

*(c)* State **two** reasons why recycling of plastics, such as polyethene, is important for the environment. [2]

.....

.....

.....

6

© WJEC CBAC Ltd.



STEMUP.CO.UK

Examiner only

**8.** 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

**END OF PAPER**

© WJEC CBAC Ltd.



STEMUP.CO.UK

Examiner only

**For continuation only.**

© WJEC CBAC Ltd.



STEMUP.CO.UK

Examiner only

**Acknowledgements:**

© *thesleepless1/iStockphoto.com*

© *paintings/Shutterstock.com*

© *attem/Shutterstock.com*

# 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** | 14 **Si** | phosphorus 15 **P** | 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** | cobolt 27 **Co** | nickel 28 **Ni** | copper 29 **Cu** | zinc 30 **Zn** | gallium 31 **Ga** | germanium 32 **Ge** | arsenic 33 **As** | 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

## 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.

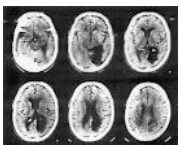

| | Page |
|---|---|
| Unit 1 Science B - Foundation Tier | 1 |
| Unit 1 Science B - Higher Tier | 5 |
| Unit 2 Science B - Foundation Tier | 10 |
| Unit 2 Science B - Higher Tier | 14 |


© 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<br><br>KOH (1), sodium chloride (1) (Do not accept chlorine in place of chloride) | 2<br><br>2 |
| **2** (a) |    <br>**CAT Scan.**<br>**Gamma camera**<br>**Ultrasound**<br>**X-ray.**<br><br>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<br>If more than 1 sign ticked, 0 marks. | 1 |

© WJEC CBAC Ltd.



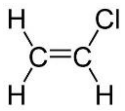
STEMUP.CO.UK

| Question | | | Marking Details | Mark |
|---|---|---|---|---|
| **3** | (a) | | Any **two** of:<br><br>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**<br>high fibre cereal - **eat more** | 2 |
| | (d) | | Any **two** of:<br><br>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,<br>1 mark if 7 or 8 points correctly plotted<br>0 marks if less than 7 points correctly plotted.<br>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<br>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<br>2 - control carbohydrate/sugar intake<br>(any order allowed) | 2 |

© WJEC CBAC Ltd.



STEMUP.CO.UK

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

© WJEC CBAC Ltd.



STEMUP.CO.UK

| Question | Marking Details | Mark |
|---|---|---|
| **8** | **Indicative content**<br>• Correct apparatus/chemicals<br>○ burette<br>○ suitable named acid<br>○ flask/container for antacid<br><br>• Key steps<br>○ crush the tablet in given volume of water<br>○ titrate against acid<br>○ suitable indicator/data logger<br><br>• Conclusion<br>○ compare titres<br>○ high titre - more acid needed to neutralise tablet.<br>○ therefore stronger tablet<br><br>**Marking Bands**<br><br>**5-6 marks**<br>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.<br><br>**3-4 marks**<br>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.<br><br>**1-2 marks**<br>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.<br><br>**0 marks**<br>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/<br>David - Nn</td><td>1<br>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><br>Complete table for David and Lucy correct (1)<br>Fill centre table correctly (1)<br><br>Chance - 25% (based on table – allow ecf)</td><td>2<br><br>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><br>Construct table with Lucy and John (1)<br>Fill centre correctly (1)<br><br>Chance - 50% (based on table – allow ecf)</td><td>2<br><br>1</td></tr>
</table>

© WJEC CBAC Ltd.



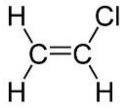
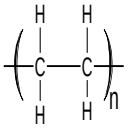
STEMUP.CO.UK

| Question | Marking Details | Mark |
|---|---|---|
| 2 | **Indicative content**<br><br>• Correct apparatus/ chemicals<br>  ○ burette<br>  ○ suitable named acid<br>  ○ flask/container for antacid<br><br>• Key steps.<br>  ○ crush the tablet in given volume of water<br>  ○ titrate against acid<br>  ○ suitable indicator/data logger<br><br>• Conclusion<br>  ○ compare titres<br>  ○ high titre - more acid needed to neutralise tablet<br>  ○ therefore stronger tablet<br><br>**Marking Bands**<br><br>**5-6 marks.**<br>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.<br><br>**3-4 marks**<br>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.<br><br>**1-2 marks**<br>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.<br><br>**0 marks**<br>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)<br>Only four points correctly plotted (1)<br>Plots joined and labelled 'non-smoker' (1) | 3 |
| | | (ii) | Difference 6.3 - 4.1 = 2.2% | 2 |
| | (b) | | Increase in cholesterol increase in risk<br>smoking increases risk further | 2 |
| | (c) | | Any **two** from:<br><br>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)<br>are strong bonds (1)<br>which are not broken by heating (1)<br><br>*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)<br>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:<br><br>Zinc sulfate-rayon / source of zinc in foods / fertilisers<br><br>**One** from:<br><br>Potassium nitrate-fertilisers / food additive / food preservation / gun powder / fireworks | 1<br><br>1 |

© WJEC CBAC Ltd.



STEMUP.CO.UK

| Question | | | Marking Details | Mark |
|---|---|---|---|---|
| **6** | (a) | (i) | Radioisotope is injected / ingested<br>(accept: radioisotope taken inside the body radioisotope) (1)<br>the radioisotope kills cancer cells(1) | 2 |
| | | (ii) | (8 hours is) the time taken for 50% / ½ (1)<br>of radioactive substance to decay (1)<br><br>*Points must be correctly and coherently linked to obtain 2 marks* | 2 |
| | | (iii) | Correct workings (1)<br>Correct answer 1/16$^{th}$ (1) | 2 |
| | (b) | | (Technicians) risk accidental / continual exposure (to iodine-131) (1)<br>which is a source of ionising radiation (1)<br>that can damage cells / cause mutations/cancer (1)<br><br>*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<br>Type 2 - body cells do not respond to insulin | 2 |
| (b) | Indicative content<br>• graph 1 - insulin produced in response to increased sugar levels (Carbohydrate meal)<br>• blood Sugar levels fall to normal<br>• sugar converted to glycogen in liver<br>• graph 2 - diabetic<br>• insulin administered (injected) prior to increased blood sugar (Carbohydrate meal)<br>• blood sugar converted by liver to glycogen<br><br>**Marking Bands**<br><br>**5-6 marks**<br>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.<br><br>**3-4 marks**<br>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.<br><br>**1-2 marks**<br>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.<br><br>**0 marks**<br>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

4782/01

# SCIENCE B

## UNIT 2: Science and Life in the Modern World
## FOUNDATION TIER

P.M. MONDAY, 10 June 2013

1 hour

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

4782
010001

### 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 **7***(c)*.

A periodic table is printed on page 16.

© WJEC CBAC Ltd.



STEMUP.CO.UK

Examiner only

*Answer* **all** *questions.*

**1.** The diagram below shows chromosomes from a human liver cell.



© *Pasieka/Science Photo Library*

*(a)* Use the information in the box below to complete the following sentences. [4]

| | | | | |
|---|---|---|---|---|
| singles | pairs | 46 | nucleus | 96 |
| DNA | triplets | 22 | cytoplasm | |

(i) Chromosomes are found in the part of a cell called the ..... .

(ii) In a human liver cell there are ..... chromosomes.

(iii) The chromosomes in a liver cell are always found in ..... .

(iv) Chromosomes are strands of a chemical called ..... .

*(b)* Describe **two** differences between the chromosomes in a human liver cell and a human sperm cell. [2]

.....

.....

6

© WJEC CBAC Ltd.



STEMUP.CO.UK

Examiner only

**2.** Cystic fibrosis is an inherited disease caused by a faulty gene. If a person has the genotype **BB** they do **not** suffer from this disease. It is caused by the recessive allele (gene) **b**.

(i) Brian (Bb) and Anwen (Bb) are both carriers of this disease but do not suffer from cystic fibrosis.

Complete the Punnett square below to show the cross between Brian and Anwen. [3]

| | ..... | ..... |
|---|---|---|
| ..... | ..... | ..... |
| ..... | ..... | ..... |

(ii) What is the genotype of a cystic fibrosis sufferer? [1]

.....

(iii) **Circle** the correct answer. [1]

The chance of Brian and Anwen producing a baby with cystic fibrosis is:

0% 25% 50% 100%

(iv) State the term to describe a change to existing genes. [1]

.....

6



© WJEC CBAC Ltd.



STEMUP.CO.UK

Examiner only

**3.** A trainee metal worker has researched the properties of some metals.

*(a)* Complete the table by naming the missing metal and symbol. [2]

*(b)* Use the information in the table to answer the following questions.

| Metal | aluminium | ..... | titanium | iron |
|---|---|---|---|---|
| Symbol | ..... | Cu | Ti | Fe |
| Melting point (°C) | 661 | 1084 | 1668 | 1538 |
| Density ($g/cm^3$) | 3 | 9 | 5 | 8 |
| Electrical Conductivity (units) | 4 | 6 | 1 | 1 |
| Strength (units) | 11 | 70 | 434 | 10 |
| Thermal conductivity (units) | 237 | 401 | 22 | 10 |

(i) Which is the best metal for electrical wiring? [2]

Metal .....

Reason .....

.....

(ii) Which is the best metal to make the body of an aircraft? [2]

Metal .....

Reason .....

.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(iii) Which is the best metal to make the bottom of a saucepan? [2]

Metal .....

Reason .....

.....

*(c)* List the metals in order of **increasing** strength. [1]

..... weakest

.....

.....

..... strongest

9

4782 010005

© WJEC CBAC Ltd.



STEMUP.CO.UK

Examiner only

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




*(a)* The sentences below describe how the image was formed. **Underline** the correct word in each bracket in the following paragraph. [2]

The image of the baby is formed using ultrasound. This technique uses (high / low / light) frequency (ripple / sound / light) waves for the safe monitoring of the baby during development.

*(b)* (i) Explain why ultrasound is used for this type of scan instead of x-rays. [2]

.....

.....

(ii) Name **one** *other* medical use of ultrasound. [1]

.....

5

© WJEC CBAC Ltd.



STEMUP.CO.UK

Examiner only

**5.** *(a)* Identify the hazard symbol found on a bottle of concentrated hydrochloric acid using the correct word from the box below. [1]

| | | | |
|---|---|---|---|
| biohazard | irritant | corrosive | radioactive |



.....

*(b)* David investigated the neutralisation reaction between hydrochloric acid and sodium hydroxide.

(i) Complete the **word** equation for this neutralisation reaction below. [2]

**hydrochloric acid + sodium hydroxide** ⟶ ..... + .....

| Colour | red | orange | yellow | green | blue | navy | purple |
|---|---|---|---|---|---|---|---|
| pH Range | 0-2 | 3-4 | 5-6 | 7 | 9-10 | 11-12 | 13-14 |

(ii) What **colour** is universal indicator in a **neutral** solution? [1]

.....



© WJEC CBAC Ltd.



**Turn over.**

STEMUP.CO.UK

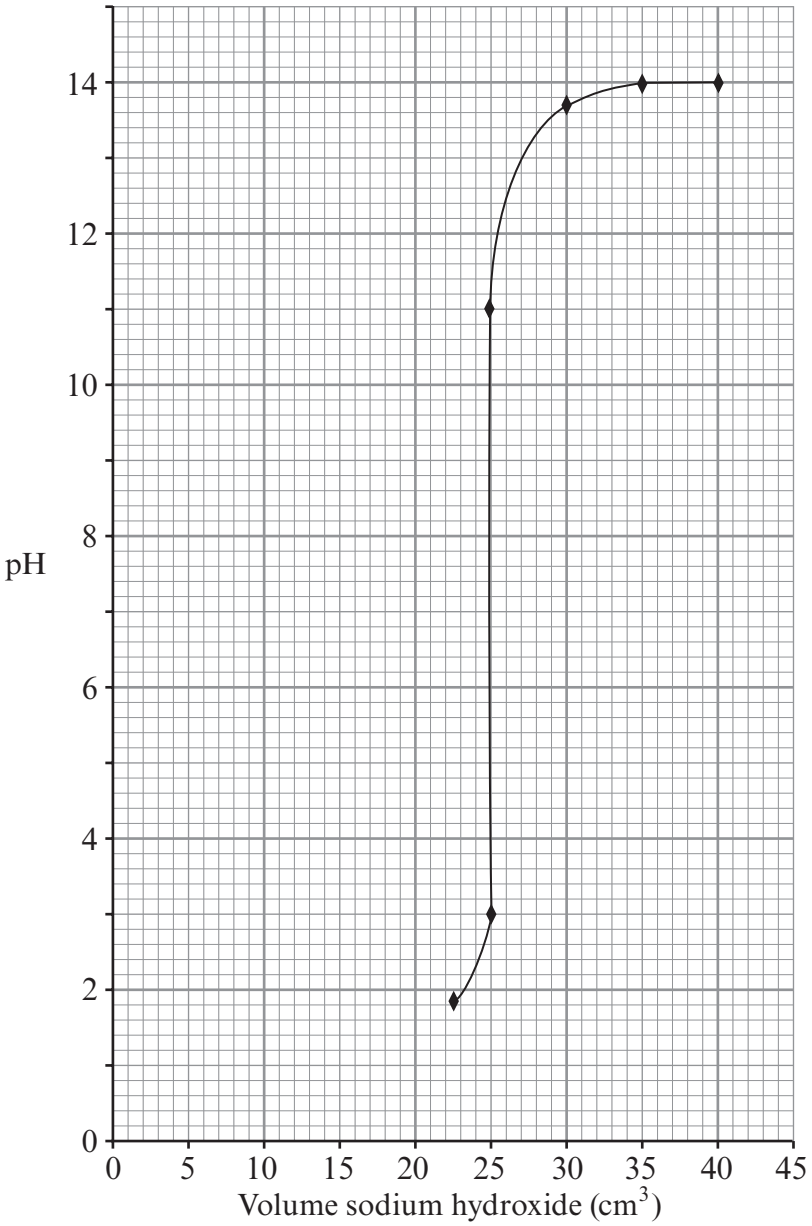
Examiner only

*(c)* David measured the pH as he added sodium hydroxide solution to dilute hydrochloric acid from a burette. He has started to plot a graph of his results.

(i) The table below shows some of the results that David has not yet plotted in his 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 the sodium hydroxide solution required to neutralise the dilute hydrochloric acid. [1]

..... $cm^3$

*(d)* Acids and alkalis react to form a salt and water. In an experiment to make a salt, 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]

.....

.....

.....

.....

11

© WJEC CBAC Ltd.





STEMUP.CO.UK

Examiner only

**6.** *(a)* The information below is an outline of the steps that are followed when a patient undergoes a gamma camera scan using radio-isotopes. The procedure is in the wrong order.

Place the statements below in the correct order using the boxes provided. *The first one has been done for you.* [3]

**A.** The patient is injected with radio-isotope.

**B.** A drug is labelled with radio-isotope.

**C.** A gamma camera detects the radio-isotope.

**D.** A computer forms an image of the target organ.

**E.** The drug moves through blood stream to the target organ.

**Correct order:**

| | | | | |
|---|---|---|---|---|
| B | | | | |

*(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

**7.** 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]

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

**END OF PAPER**

12

© 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

# 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** | 6 **C** | nitrogen 7 **N** | oxygen 8 **O** | fluorine 9 **F** | neon 10 **Ne** |
| 3 | sodium 11 **Na** | magnesium 12 **Mg** | | | | | | | | | | | 13 **Al** | silicon 14 **Si** | phosphorus 15 **P** | sulfur 16 **S** | chlorine 17 **Cl** | 18 **Ar** |
| 4 | potassium 19 **K** | 20 **Ca** | scandium 21 **Sc** | titanium 22 **Ti** | vanadium 23 **V** | chromium 24 **Cr** | manganese 25 **Mn** | iron 26 **Fe** | 27 **Co** | nickel 28 **Ni** | 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** | 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** | 77 **Ir** | platinum 78 **Pt** | gold 79 **Au** | mercury 80 **Hg** | thallium 81 **Tl** | lead 82 **Pb** | bismuth 83 **Bi** | polonium 84 **Po** | 85 **At** | radon 86 **Rn** |
| 7 | francium 87 **Fr** | radium 88 **Ra** | | | | | | | | | | | | | | | | |

© WJEC CBAC Ltd

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.

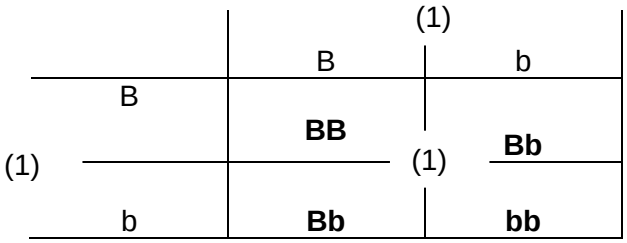

| | Page |
|---|---|
| Unit 1 - Foundation Tier | 1 |
| Unit 1 - Higher Tier | 5 |
| Unit 2 - Foundation Tier | 11 |
| Unit 2 - Higher Tier | 14 |


© 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)<br><u>best</u> <u>electrical</u> conductivity / high<u>est</u> <u>electrical</u> conductivity (1)<br>(Not: 'good' electrical conductor) | 2 |
| | | (ii) | Aluminium (1)<br>low<u>est</u> density (1)<br>(Also accept titanium (1) – strong<u>est(1)</u>) | 2 |
| | | (iii) | Copper(1)<br>high<u>est</u> <u>thermal</u> conductivity (1) | 2 |
| | (c) | | Weakest iron<br>aluminium<br>copper<br>Strongest titanium<br>*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,<br>so will not cause cancer / cause mutations<br>(Also accept: x-rays go straight through (1) but sound wave bounce off layers of different density (1))<br>*One mark for making a valid point*<br>*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)<br>join points with line correctly (1) | 3 |
| | | (ii) | 25 $cm^3$ | 1 |
| | (d) | | Repeat test without indicator<br>stop adding sodium hydroxide at pH 7 / add only 25 $cm^3$ sodium hydroxide<br>evaporate off (excess) water | 3 |
| **6.** | (a) | | B (given) A, E, C, D<br>all correct (3), two or three correct (2), one correct (1) | 3 |
| | (b) | (i) | Time taken for 50%/½ (1)<br>of activity / radioactive substance / mass / atoms to decay (1)<br>(Not: radiation) | 2 |
| | | (ii) | $^{99}Tc$ (is most suitable),<br>since it has a half-life that is just long enough to be monitored.<br>*one mark for making a valid point*<br>*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)<br>Correct answer 1/8$^{th}$ (1) | 2 |

© WJEC CBAC Ltd.



STEMUP.CO.UK

| QUESTION | | | Answer | MARK |
|---|---|---|---|---|
| **7.** | (a) | (i) | Allows a common standard/fair comparison/test (1)<br>so making it easier to compare different foods (1)<br>*one mark for making a valid point*<br>*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**<br>• Fat content reduced / monounsaturated reduced most<br>• Less salt and fat in 'healthy' crisps<br>• Less salt / blood pressure and strokes<br>• Reduce obesity / cardiovascular disease / chance of diabetes<br>• Reduced use of NHS resources<br><br>**Marking Bands**<br><br>**5 – 6 marks**<br>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.<br><br>**3 – 4 marks**<br>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.<br><br>**1 – 2 marks**<br>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.<br><br>**0 marks**<br>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)<br>join points with line correctly (1) | 3 |
| | | (ii) | 25 $cm^3$ | 1 |
| | (b) | | NaCl | 1 |
| | (c) | | Repeat test without indicator<br>stop adding sodium hydroxide at pH 7 / add only 25 $cm^3$ sodium hydroxide<br>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)<br>of activity/radioactive substance / mass / atoms to decay (Not: radiation) (1) | 2 |
| | | (ii) | $^{99}Tc$ (is most suitable),<br>since it has a half-life that is just long enough to be monitored.<br>*one mark for making a valid point*<br>*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)<br>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)<br>so making it easier to compare different foods (1)<br>*one mark for making a valid point*<br>*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**<br>• Fat content reduced / Monounsaturated reduced most<br>• Less salt and fat in 'healthy' crisps<br>• Less salt / blood pressure and strokes<br>• Reduce obesity / cardiovascular disease / chance of diabetes<br>• Reduced use of NHS resources<br><br>**Marking bands**<br><br>**5 – 6 marks**<br>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.<br><br>**3 – 4 marks**<br>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.<br><br>**1 – 2 marks**<br>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.<br><br>**0 marks**<br>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<br>Use letters from (a)<br>Parents (1)<br>Cross (allow ecf) (1)<br><br>75% (1) | 3 |
| | (c) | | 50% chance of being a carrier / 25% chance having child with sickle cell (1)<br>so should consider adoption / ivf from non-carrier<br><br>*one mark for making a valid point*<br>*Two marks can be only awarded for correctly and coherently connecting points* | 2 |
| **5.** | (a) | | Lead<br>positively charged (ions) attracted to opposite charge cathode where they gain electrons/form atoms<br><br>*one mark for making each valid point*<br>*Three marks can be only awarded for correctly and coherently connecting points* | 3 |
| | (b) | | $PbBr_2 \rightarrow Pb + Br_2$<br>(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<br>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**<br>• Ultrasound / high frequency sound waves<br>• Sound wave bouncing / reflecting<br>• Two structures of different density<br>• Ionising radiation not used<br>• Safer to unborn/less chance of cancer<br><br>**Marking bands**<br><br>**5 – 6 marks**<br>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.<br><br>**3 – 4 marks**<br>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.<br><br>**1 – 2 marks**<br>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.<br><br>**0 marks**<br>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<br>difference = 2 000 000 – 333 000 = 1 667 000<br>% increase = 500.6 (accept 500%) | 1<br>1<br>1 |
| | (b) | | Require less energy to manufacture<br>take less time to break down compared to traditional plastics therefore, cause less harm to environment.<br>*Three marks can be only awarded for correctly and coherently connecting points* | 3 |
| | (c) | | **Any three from:**<br>• Land use no longer available for growing crops<br>• Price food may rise/ shortage food<br>• Make contribution to deforestation (making room for growing crops)<br>• More expensive<br>• Release methane when they compost | 3 |



© WJEC CBAC Ltd.



STEMUP.CO.UK

| Surname | Centre Number | Candidate Number |
|---|---|---|
| Other Names | | 0 |

# New GCSE

4782/01

# SCIENCE B

## UNIT 2: Science and Life in the Modern World
## FOUNDATION TIER

A.M. MONDAY, 14 January 2013

1 hour

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

4782
010001

### 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

A Periodic Table is printed on page 20.

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 **8***(b)*.

© WJEC CBAC Ltd.



STEMUP.CO.UK

Examiner only

*Answer* **all** *questions.*

**1.** The table below shows the names of some of the **elements** of the Periodic Table, a copy of which is found on page 20.

| Name | carbon | gold | iron | aluminium | copper | sodium |
|---|---|---|---|---|---|---|
| Symbol | C | Au | ..... | ..... | Cu | Na |

*(a)* (i) Complete the table above by writing the symbols for iron and aluminium. [2]

(ii) Name **one** metal that is not found as an ore. ..... [1]

*(b)* Use the Periodic Table on page 20 to help answer the following questions.

(i) Give the symbol or name of an element in the Periodic Table that is in the same **group** as potassium, K. [1]

.....

(ii) Give the symbol or name of an element in the Periodic Table that is in the same **period** as lithium, Li. [1]

.....

*(c)* What is the name given to the elements in **group 7**? ..... [1]

6

© WJEC CBAC Ltd.



STEMUP.CO.UK

Examiner only

**2.** Peter is studying food labels on snack foods.

*(a)* (i) Name **one** health risk associated with obesity. [1]

.....

(ii) Salt is often added to processed snack foods. Describe **one harmful** effect of eating too much salt. [1]

.....

.....

*(b)* Peter is obese and wants to lose weight. Use the information in the table to answer the following questions.

| | Snack foods (per 100 g) | | |
|---|---|---|---|
| | Cheesy snacks | Space snacks | Fruity bars |
| Energy (kJ) | 1650 | 1750 | 1200 |
| Salt (g) | 3.0 | 0.8 | 0.2 |
| Fibre (g) | 4.0 | 3.1 | 16.0 |

Which snack in the table would be the best choice for him to eat? Give **one** reason for your choice. [2]

Snack .....

Reason .....

*(c)* Peter eats two fruity bars that contain 1 200 kJ of energy in each bar. Later in the day he goes cycling. Cycling uses 800 kJ of energy per hour.

(i) Calculate the energy in two bars. [1]

Energy = ..... kJ

(ii) For how **long must he cycle** to use the energy in **both** bars? [1]

Answer .....

6

© WJEC CBAC Ltd.



STEMUP.CO.UK

4782 010003

Examiner only

**3.** The table below shows the colours of universal indicator at different pH ranges.

| Colour | Red | Orange | Yellow | Green | Blue | Navy | Purple |
|---|---|---|---|---|---|---|---|
| pH Range | 0-2 | 3-4 | 5-6 | 7 | 8-9 | 10-12 | 13-14 |

*(a)* Hydrochloric acid has a pH of 1.
State the **colour** of universal indicator in hydrochloric acid. [1]

.....

*(b)* The equation below shows the reaction between potassium hydroxide solution and hydrochloric acid.

$HCl + KOH \longrightarrow KCl + H_2O$

Name the **salt** formed in this reaction [1]

.....

*(c)* In an experiment, sulfuric acid reacted with sodium hydroxide forming a neutral solution of a salt and water.

(i) State the colour that would be seen if universal indicator is added to the solution [1]

.....

(ii) Complete the word equation below for this reaction.

sulfuric acid + sodium hydroxide ⟶ ..... + ..... [2]

(iii) What is the term used to describe this type of reaction? [1]

.....

6

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

**4.** Iron is extracted from its ore in a blast furnace. Steel production has been a traditional manufacturing industry in South Wales.



*©Uwe Niggemeier*

*(a)* The table below shows information about the raw materials used in a blast furnace. Complete the table using the terms in the box. [2]

| aluminium oxide | compound | iron oxide | element | bauxite |
|---|---|---|---|---|

| Raw material | Chemical name | Type of material |
|---|---|---|
| haematite | ..... | compound |
| coke | carbon | element |
| limestone | calcium carbonate | ..... |



© WJEC CBAC Ltd.



STEMUP.CO.UK

Examiner only

*(b)* The table below describes the properties of different metal alloys.

| Alloy | Composition | Properties |
|---|---|---|
| mild steel | 99.8% iron<br>0.2% carbon | Easily pressed into shape |
| high carbon steel | 98.0% iron<br>1.7% carbon<br>0.3% manganese | Hard but brittle |
| manganese steel | 85.0% iron<br>1.2% carbon<br>..... % manganese | Very hard |
| stainless steel | 74.0% iron<br>0.3% carbon<br>18.0% chromium<br>7.7% nickel | Rust resistant |

Use the information in the table to answer the questions that follow.

(i) **Complete** the table by calculating the percentage (%) manganese in manganese steel. [1]

(ii) State **one** way of changing the composition to make a harder alloy of steel. [1]

.....

.....

(iii) Which **two** metals have been added to make stainless steel rust resistant? [2]

.....

.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

(iv) Which alloy would be most suitable for making kitchen sinks? Give **one** reason. [2]

Alloy used for kitchen sinks .....

Reason .....

.....

(v) Which alloy would be most suitable for making car doors? Give **one** reason. [2]

Alloy used for car doors .....

Reason .....

.....

10

4782 010007

© WJEC CBAC Ltd.



**Turn over.**

STEMUP.CO.UK

Examiner only

**5.** Polyvinyl chloride (PVC) is an example of a plastic.

*(a)* Name **two** *other* plastics. [2]

.....

The list below states some of the properties of PVC.

**1** Strong

**2** Light

**3** Weather resistant

**4** Non-toxic

**5** Does not conduct electricity

**6** Good thermal insulator.

*(b)* The following items are made out of PVC. For each item, identify the property **2**, **3**, **4**, **5** or **6** that makes it suitable for this use. Each number can only be used once.
*One has been completed for you.* [3]

| Use | | Property |
|---|---|---|
|  | Toy blocks | **1** |
|  | Blood storage bags | ..... |
|  | Window frames | ..... |
|  | Covering electrical cables | ..... |

5

© WJEC CBAC Ltd.



STEMUP.CO.UK

# BLANK PAGE

4782
010009

*Images*
*©Graja/Shutterstock*
*©istockphoto/Jarek Joeperc*
*©Kekyalyaynen/Shutterstock*
*©mini/Shutterstock*

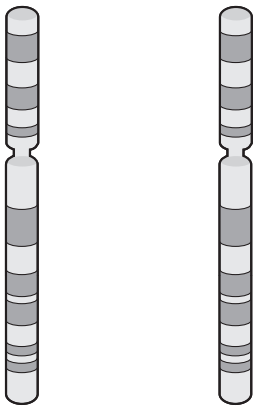
© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

**6.** David and Ffion are both heterozygous for the cystic fibrosis allele.

It has been found that chromosome 7 contains the cystic fibrosis gene. The pair of chromosome 7 is shown below.



chromosome 7

*(a)* (i) Using **N** for a healthy allele, state the genotype of a person who is heterozygous for the cystic fibrosis allele. [1]

.....

(ii) David and Ffion are married. Complete the Punnett Square below to show which alleles David and Ffion's children may inherit. [3]

| | | |
|---|---|---|
| | ..... | ..... |
| ..... | ..... | ..... |
| ..... | ..... | ..... |

(iii) What is the chance of their child being born with cystic fibrosis? [1]

Answer ..... %

*(b)* When a patient suffers from cystic fibrosis, the code of their DNA has changed. What term describes this change? [1]

.....

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

*(c)* Cystic fibrosis patients are monitored with X-rays.

(i) Which part of their bodies would be routinely X-rayed? [1]

.....

(ii) Explain why patients should have a limited number of X-rays in one year. [2]

.....

.....

.....

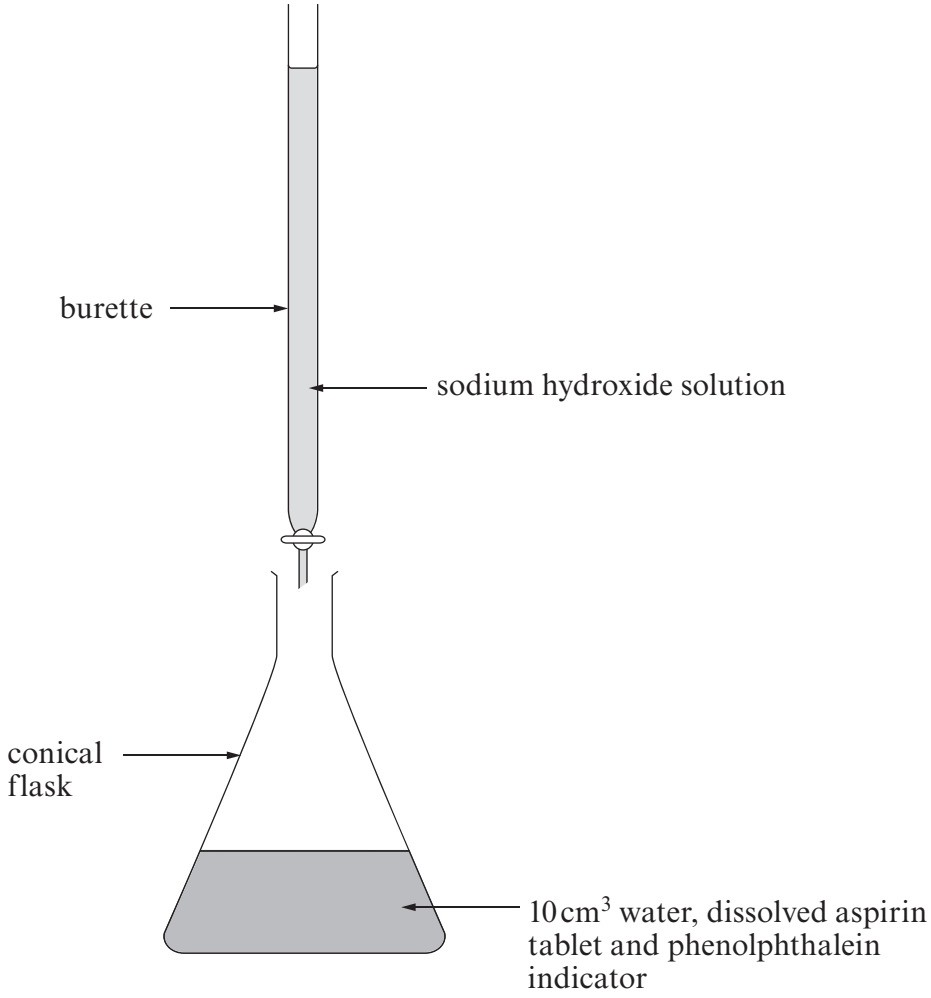
9

© WJEC CBAC Ltd.



STEMUP.CO.UK

**7.** Heulwen performed an experiment to find the strength of different aspirin tablets. The active ingredient in aspirin is an acid. By adding just enough alkali it is possible to determine the strength of a particular tablet.




- A flask containing aspirin and the indicator phenolphthalein was prepared.
- Heulwen added sodium hydroxide from a burette.
- She stopped her experiment when the indicator changed colour.
- Her results are shown below.

| Aspirin tablet | Mass of tablet (g) | Volume of water added to dissolve the aspirin ($cm^3$) | Volume of sodium hydroxide used ($cm^3$) | Cost per packet containing 10 tablets (p) |
|---|---|---|---|---|
| **A** | 0.50 | 10 | 16.0 | 40 |
| **B** | 0.75 | 10 | 15.0 | 40 |
| **C** | 0.25 | 10 | 5.0 | 50 |
| **D** | 0.50 | 10 | 2.5 | 50 |

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

*(a)* Use the information in the table on the opposite page to answer the following questions.

(i) State which aspirin tablet is the strongest giving **one** reason for your choice. [2]

Strongest tablet .....

Reason for choice. .....

.....

(ii) Calculate the cost **per gram** for tablet **D**. [2]

Answer ..... p/g

*(b)* How could Heulwen improve her confidence in her results? [1]

.....

*(c)* (i) Aspirin is often used to treat patients suffering from cardiovascular disease. Explain how aspirin helps these patients. [2]

.....

.....

(ii) State **two** possible side effects from taking aspirin tablets. [2]

.....

.....

9

© WJEC CBAC Ltd.



**Turn over.**

STEMUP.CO.UK

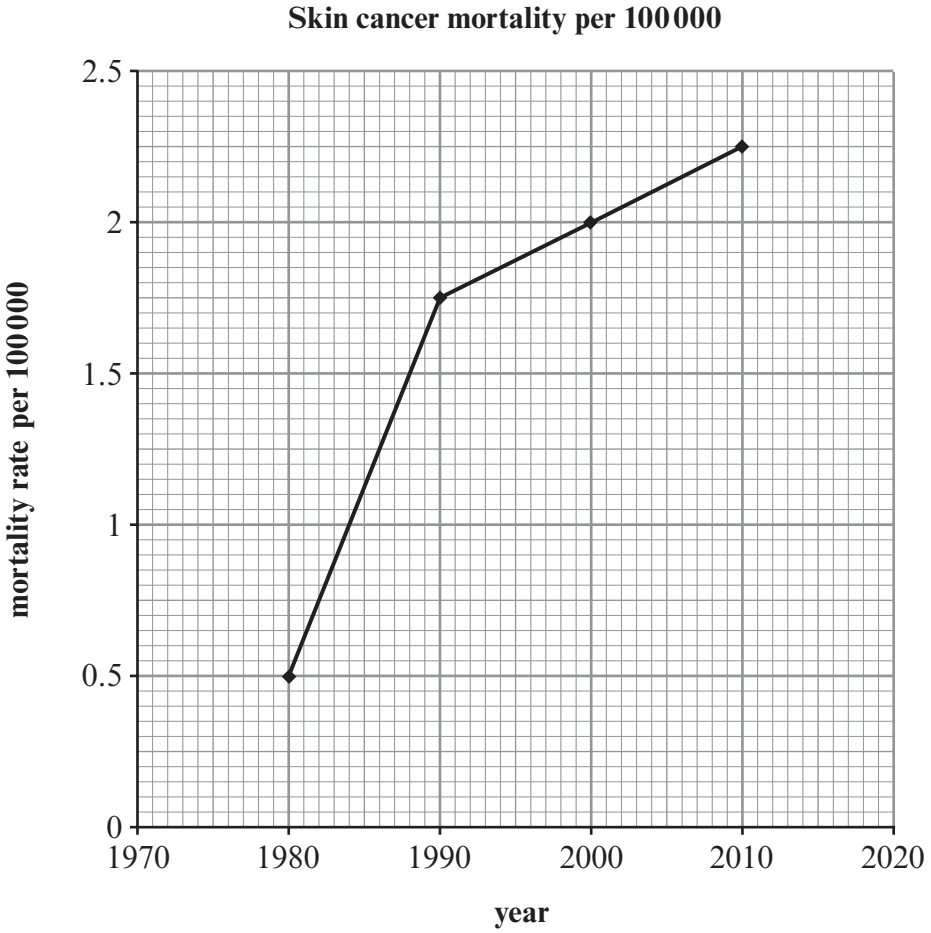
# BLANK PAGE

© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

**8.** The information below from Cancer Research UK shows how the mortality rate for skin cancer has changed over the last 30 years.
The mortality rate measures the number of deaths caused by a particular disease per 100 000 people per year.




*(a)* Use the graph to calculate the percentage change in the mortality rate for skin cancer from 1980 to 2010. [3]

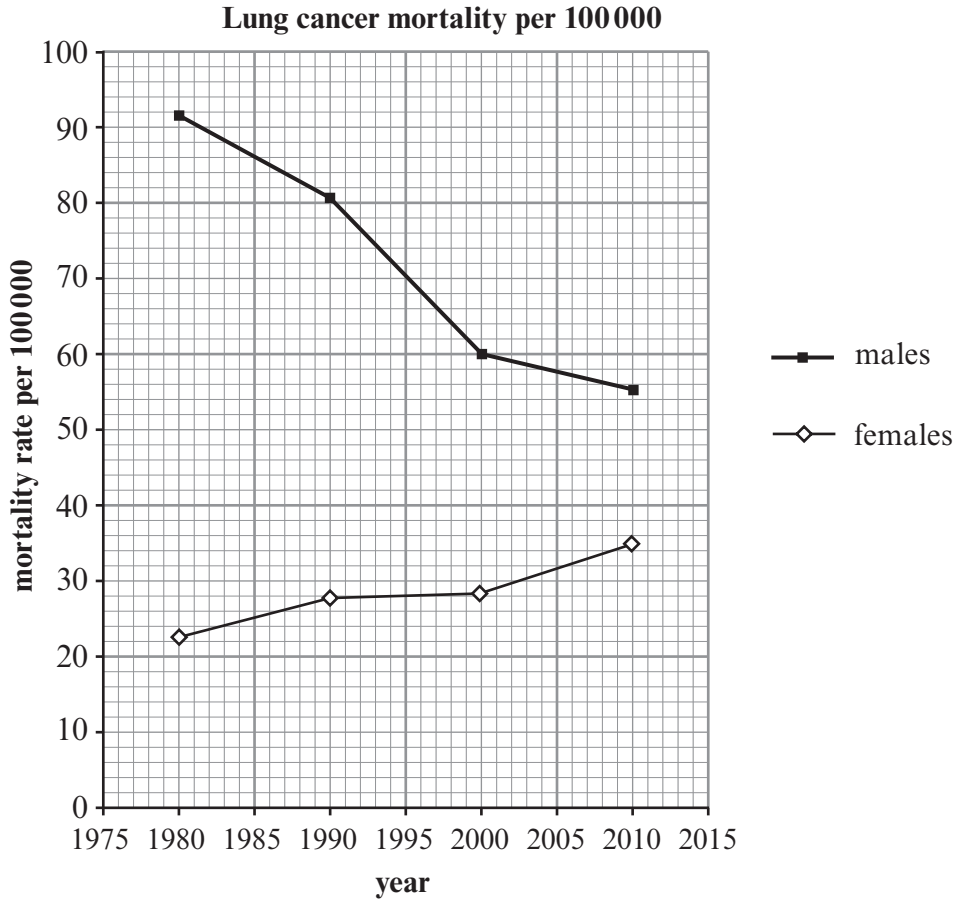
Percentage change: .....

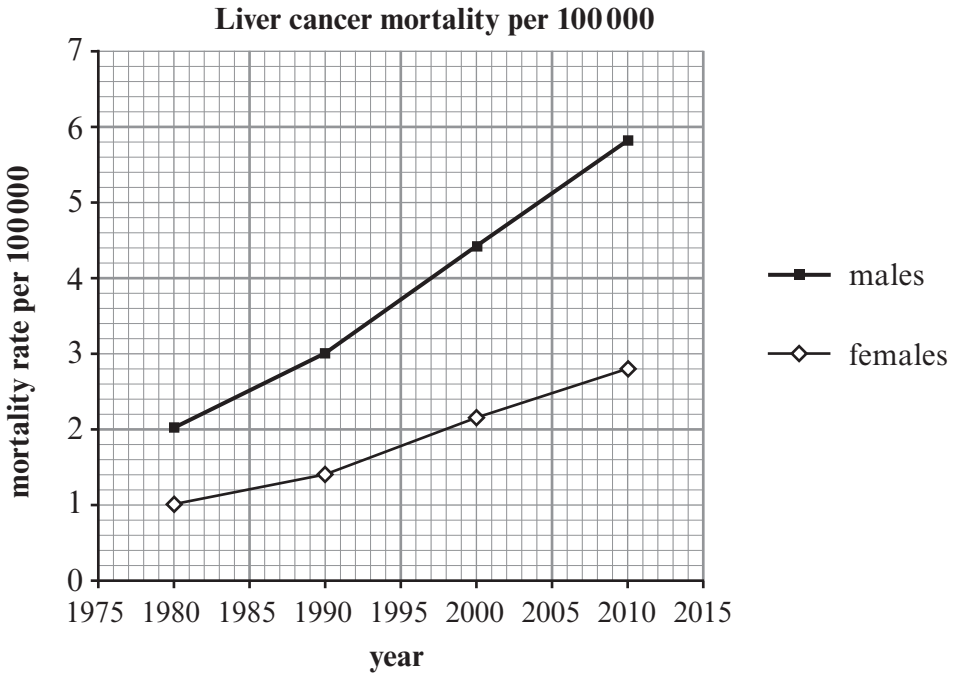
© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

*(b)* Use the information in the graphs below to describe the changes in mortality rates for lung and liver cancer explaining why these changes have occurred. [6]
[*QWC*]




© WJEC CBAC Ltd.

STEMUP.CO.UK

Examiner only

9

**END OF PAPER**

© WJEC CBAC Ltd.



**Turn over.**

STEMUP.CO.UK

Examiner only

**Continuation only**

© WJEC CBAC Ltd.



STEMUP.CO.UK

Examiner only

**Continuation only**

© 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** | 9 **F** | neon 10 **Ne** |
| 3 | sodium 11 **Na** | magnesium 12 **Mg** | | | | | | | | | | | 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** | 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** | 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

## JANUARY 2013

© WJEC CBAC Ltd.

STEMUP.CO.UK

## INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 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 |
|---|---|
| UNIT1 - FOUNDATION TIER | 1 |
| UNIT 1 - HIGHER TIER | 5 |
| UNIT 2 - FOUNDATION TIER | 11 |


© WJEC CBAC Ltd.

STEMUP.CO.UK

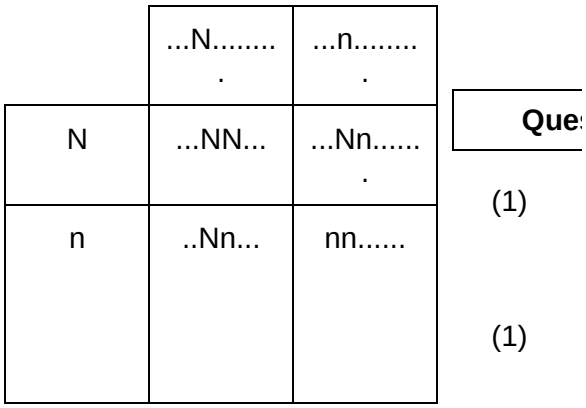
## GCSE SCIENCE B – UNIT 2 (FOUNDATION TIER)

| Question | | | Answers | Marks |
|---|---|---|---|---|
| **1** | (a) | (i) | Fe, Al | 2 |
| | | (ii) | Gold / Au | 1 |
| | (b) | (i) | Sodium / Na or any other group 1 element | 1 |
| | | (ii) | Carbon / C or any other second period element | 1 |
| | (c) | | Halogens | 1 |
| **2** | (a) | (i) | Diabetes / cardiovascular disease (named) | 1 |
| | | (ii) | High blood pressure / stroke | 1 |
| | (b) | | Snack - Fruity bars | 1 |
| | | | Reason - Lowest energy<br>(accept – no snack – no extra energy) | 1 |
| | (c) | (i) | 2 x 1200 = 2400 | 1 |
| | | (ii) | 2400/800 = 3hrs ecf | 1 |
| **3** | (a) | | Red | 1 |
| | (b) | | Potassium chloride | 1 |
| | (c) | (i) | Green | 1 |
| | | (ii) | Sodium sulphate, water | 1, 1 |
| | | (iii) | Neutralisation | 1 |
| **4** | (a) | | Iron oxide, compound | 2 |
| | (b) | (i) | 13.8% | 1 |
| | | (ii) | Add more carbon/manganese | 1 |
| | | (iii) | Chromium, nickel | 2 |
| | | (iv) | Stainless steel / rust resistant | 2 |
| | | (v) | Mild steel, easily pressed into shape (2) | 2 |
| **5** | (a) | | Two of: Polyester, neoprene, polyester, polystyrene, acrylic plastics | 2 |
| | (b) | | 4. Non-toxic | 1 |
| | | | 3. Weather resistant | 1 |
| | | | 5. Does not conduct electricity. | 1 |

© WJEC CBAC Ltd.



STEMUP.CO.UK

| Question | | | Answers | Marks |
|---|---|---|---|---|
| **6** | (a) | (i) | Nn (1) | 1 |
| | | (ii) | (1)   (1) (1) | 3 |
| | | (iii) | 25% (Allow ecf from a(i)) | 1 |
| | (b) | | Mutation | 1 |
| | (c) | (i) | Chest/lungs | 1 |
| | | (ii) | *1 mark can be awarded for making a valid point.*<br>X-rays <u>ionising</u> radiation/can damage DNA | 1 |
| | | | *The second point can be awarded for coherently and correctly linking the conclusion so causing cancer / mutations* | 1 |
| **7** | (a) | (i) | A, reason – more active ingredient (per gram)/requires more sodium hydroxide to neutralise | 2 |
| | | (ii) | 50/10 = 5 (1) 5x2 = 10 (p) (1) | 2 |
| | (b) | | Repeat her experiment | 1 |
| | (c) | (i) | *1 mark can be awarded for making a valid point*<br>Reduce blood clots<br>*The second point can be awarded for coherently and correctly linking the conclusion.* | 2 |
| | | (ii) | So reducing (the chance) heart attacks<br>Stomach bleeding, stomach ulcers | 2 |

© WJEC CBAC Ltd.



STEMUP.CO.UK

| Question | | Answers | Marks |
|---|---|---|---|
| **8** | (a) | 100x(2.25-0.5) / 0.5 = 350% (take readings from the graph) | 3 |
| | (b) | **Indicative content:**<br>• Increased liver cancer (for males / females).<br>• Increased alcohol consumption (for both men and women.<br>• Lung cancer. Males – rate fallen.<br>• Lung cancer. Females – rate about same / slight increase.<br>• Drop in number of males smoking but not females.<br><br>**5-6 marks**<br>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.<br><br>**3-4 marks**<br>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.<br><br>**1-2 marks**<br>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.<br><br>**0 marks**<br>the candidate does not make any attempt or give a relevant answer worthy of credit. | 6 |



© WJEC CBAC Ltd.



STEMUP.CO.UK

| Surname | Centre Number | Candidate Number |
|---|---|---|
| Other Names | | 0 |

# New GCSE

4782/01

# SCIENCE B

## UNIT 2: SCIENCE AND LIFE IN THE MODERN WORLD FOUNDATION TIER

A.M. THURSDAY, 12 January 2012

1 hour

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

4782
010001

### 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 **9***(d)*.



STEMUP.CO.UK

*Answer* **all** *questions.*

**1.** Rebecca is an apprentice laboratory technician at a local factory. She is learning about elements.

*(a)* Complete the table below. [3]

| Element | Symbol | Metal/Non-metal |
|---|---|---|
| sodium | Na | ..... |
| carbon | ..... | non-metal |
| ..... | Zn | metal |

*(b)* The following table describes the properties of four elements.

| Property | Element W | Element X | Element Y | Element Z |
|---|---|---|---|---|
| melting point | –7.3°C | 1084°C | 7.2°C | 650°C |
| electrical conductor | No | Yes | No | Yes |

Which **two** elements are metals? [1]

Element ..... and element .....





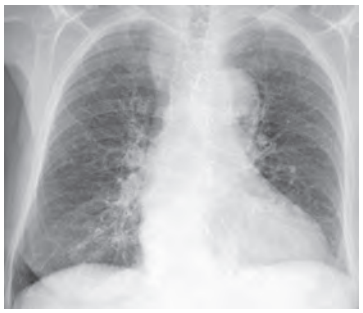
STEMUP.CO.UK

**2.** This question is about lifestyle and health.

*(a)* **Four** causes of diseases are:

**1** Fatty foods
**2** Smoking
**3** Alcohol
**4** X-rays

For each disease below, identify a possible cause from the list above by putting a **number** from above in each box. [3]

| Disease | | Cause |
|---|---|---|
|  | **Bronchitis** | ..... |
|  | **Liver Disease** | ..... |
|  | **Obesity** | ..... |





STEMUP.CO.UK

Examiner only

*(b)* It is important to control the amount of salt in our diet. Select the correct health risk from the box below to complete the sentences which follow.

| high blood pressure | asthma | muscle cramps | blindness |
|---|---|---|---|

(i) Too **much** salt in the diet can lead to ..... [1]

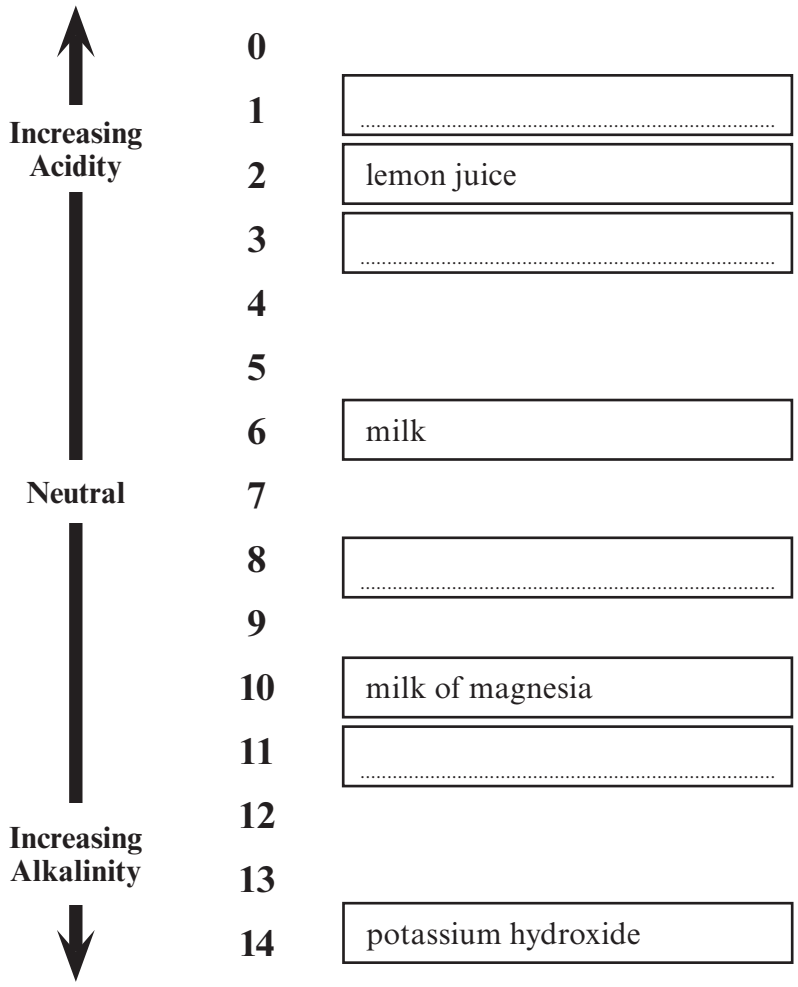
(ii) Too **little** salt in the diet can lead to ..... [1]

5

**3.** Llinos works for an analytical laboratory. One test she carries out is to measure the pH of different samples.

On the pH scale below write in the boxes the positions of the following substances. [3]

| hydrochloric acid | ammonia | baking soda | vinegar *(a weak acid)* |
|---|---|---|---|




3



STEMUP.CO.UK

Examiner only

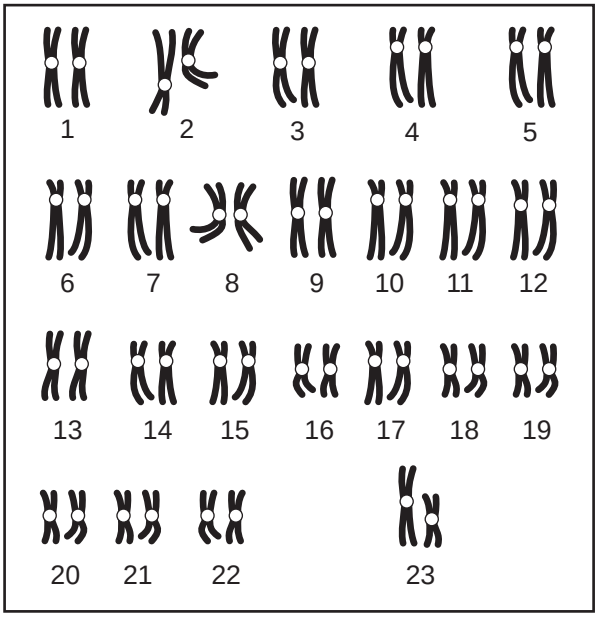
**4.** Medical technicians need a good understanding about how cells work. It is important when investigating the causes of many diseases.

*(a)* Choose words from the box below to complete the sentences that follow.

| chromosomes | genes | organs | nucleus | tissue |
|---|---|---|---|---|

Each body cell contains a ..... which controls the cell's activities and characteristics. This contains pairs of ..... which are made up of many sections of DNA called ..... . [3]

*(b)* The diagram below shows human chromosomes taken from a male skin cell.




(i) How many chromosomes are in the nucleus of a male skin cell? [1]

.....

(ii) Describe a difference between a skin cell and sperm cell. [2]

.....

.....

(iii) State how the diagram of the chromosomes would be different for a female. [1]

.....

*(c)* In genetic diseases like cystic fibrosis we see changes in the genes of the chromosomes. State the term we use that describes these changes. [1]

.....

4782 010005

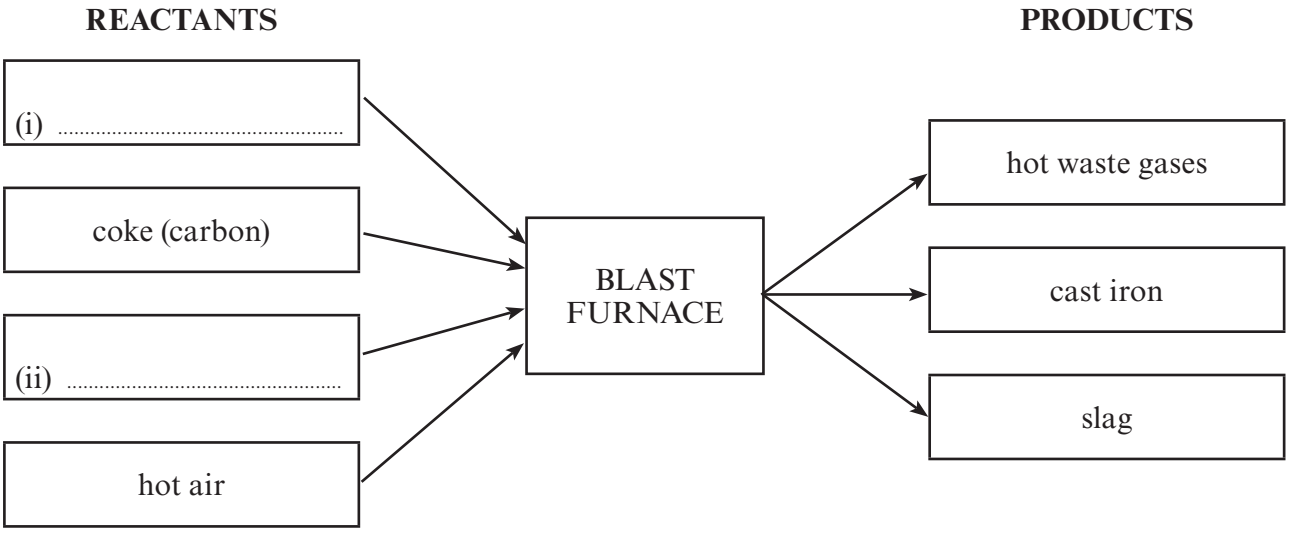


STEMUP.CO.UK

Examiner only

**5.** Port Talbot in South Wales is home to one of the largest steel works in the UK. In this steel works iron is extracted in a blast furnace. The melting temperature of iron is 1535°C.

*(a)* A number of substances are added to the blast furnace to extract the iron from its ore. The diagram below shows what materials are fed into a blast furnace and the products of the reactions that occur in the furnace.
Add the missing reactants to the boxes below needed for the reaction. [2]




*(b)* (i) Carbon monoxide is formed by burning coke (carbon). Complete the **word** equation for this process. [1]

carbon + ..... ⟶ carbon monoxide

(ii) The carbon monoxide then reacts with iron ore. The equation for the reaction is given below.

$$Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$$

**Name** the compound that is reduced in this reaction. [1]

.....

*(c)* What should the **minimum** temperature of the blast furnace be? Give a reason for your answer. [2]

Minimum temperature ..... °C

Reason for your answer.

.....

.....



STEMUP.CO.UK

# BLANK PAGE

4782
010007



Turn over.

Examiner only

**6.** Neutralisation reactions occur when acids and alkalis react to form a salt and water. This question concerns the neutralisation of potassium hydroxide with hydrochloric acid.

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

hydrochloric acid + potassium hydroxide ⟶ ..... + .....

*(b)* The following table shows the colours of universal indicator at different pH ranges.

| Colour | Red | Orange | Yellow | Green | Blue | Navy Blue | Purple |
|---|---|---|---|---|---|---|---|
| pH range | 0-2 | 3-4 | 5-6 | 7 | 8-9 | 10-12 | 13-14 |

The salt formed in this reaction is a **neutral** compound. What colour would universal indicator change to when added to a solution of the salt? [1]

.....

*(c)* Two methods have been suggested for making a salt by neutralising potassium hydroxide with hydrochloric acid.

| **Method A** | **Method B** |
|---|---|
| **Step 1** Pour 50 $cm^3$ of dilute hydrochloric acid into a beaker.<br><br>**Step 2** Add dilute potassium hydroxide to the 100 $cm^3$ mark of the beaker. | **Step 1** Pipette 25 $cm^3$ of dilute potassium hydroxide into a conical flask.<br><br>**Step 2** Add a few drops of indicator.<br><br>**Step 3** Add dilute hydrochloric acid to the potassium hydroxide from a burette until the indicator changes colour.<br><br>**Step 4** Do the experiment again, without the indicator, adding the same volume of acid as in step 3. |

(i) A student using **Method A** gets a solution which turns universal indicator paper yellow. Explain whether this method has given a **neutral** solution of the salt. [2]

.....

.....

.....

(ii) Why was an indicator used in **Method B**? [1]

.....

.....



STEMUP.CO.UK

Examiner only

(iii) Why was **Method B** done a second time without an indicator? [1]

.....

.....

(iv) **Name** a method that could be used to separate the salt from the water. [1]

.....

*(d)* The following hazard is printed on a bottle of hydrochloric acid.
Give **two** precautions to take when handling hydrochloric acid. [2]



.....

.....

.....

10

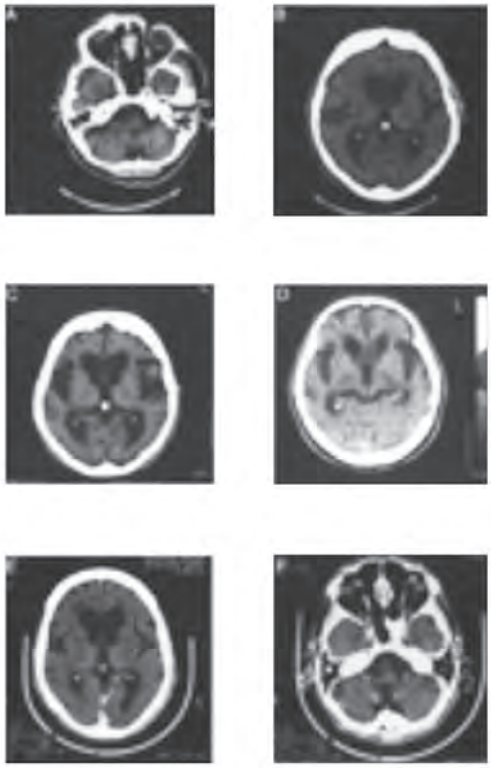


**Turn over.**

STEMUP.CO.UK

Examiner only

**7.** Huntington's is an inherited genetic disease caused by the dominant allele **D**. The CAT scan below shows images of the brain of a person suffering from Huntington's.



*(a)* State **one** difference between an X-ray image and a CAT scan. [1]

.....

.....

*(b)* X-rays and CAT scans use *ionising radiation*. State **one** of the risks associated with using such techniques. [1]

.....



STEMUP.CO.UK

Examiner only

*(c)* Daniel (**Dd**) is a 45 year old Huntington's sufferer. Angharad, Daniel's wife, is an **unaffected female**. Daniel and Angharad are thinking about having children.

(i) Complete the Punnet square below to show the possible genotypes of their children. [3]

| | ..... | ..... |
|---|---|---|
| ..... | ..... | ..... |
| ..... | ..... | ..... |

(ii) What is the chance that one of their children will suffer from Huntington's? [1]

Chance = ..... %

(iii) What advice would a genetic counsellor offer Daniel and Angharad in light of this information? [2]

.....

.....

.....

8



**Turn over.**

STEMUP.CO.UK

Examiner only

**8.** In a recent report by the National Obesity Forum high obesity rates were recorded in certain parts of the UK. The table below shows some of the 'best' and 'worst' areas of the country.

| Best areas | Percentage registered with GP as obese (%) | Worst Areas | Percentage registered with GP as obese (%) |
|---|---|---|---|
| Camden (London) | 3.9 | Merthyr Tydfil (Wales) | 10.6 |
| Westminster (London) | 4.8 | Barnsley (North England) | 10.8 |
| Lambeth (London) | 5.6 | Rhondda (Wales) | 11.1 |
| Dagenham (Kent) | 9.3 | Shetland (Scotland) | 15.5 |

*(a)* All the 'best areas' are in the 'South of England'. Suggest why the 'South of England' may have less of an obesity problem than other parts of the UK. [2]

.....

.....

*(b)* There are approximately 22 000 people living in Shetland (Scotland).

(i) Use the equation below to calculate the actual number of people living in Shetland who are registered with their GP's as obese. [2]

$$\text{Number of obese people} = \frac{\%\text{ of registered obese patients} \times \text{population of Shetland}}{100}$$

Total number of people in Shetland who are registered obese = .....

(ii) State **one** assumption that has been made in your calculation of the number of obese people in Shetland. [1]

.....

.....

(iii) Suggest **one** method by which more accurate data for the number of obese people in the different regions could be obtained. [1]

.....

.....

6



STEMUP.CO.UK

Examiner only

**9.** Carrier bags made out of polyethene have been used by supermarkets for more than 25 years.



*(a)* **Name** the process by which the polymer polyethene is made from the monomer ethene. [1]

.....

*(b)* What is the main **structural** difference between ethene and polyethene molecules? [1]

.....

*(c)* Give **two** reasons why polyethene is a good material for making carrier bags. [2]

1. .....

2. .....

*(d)* Recently supermarkets have been put under pressure by the government to reduce the number of polyethene carrier bags given out. In Wales supermarkets are now required to charge their customers for these polyethene bags.

Explain how using less polyethene bags will benefit the environment. [6]
[*QWC*]

.....

.....

.....

.....

.....

.....

.....

.....

.....

10



**Turn over.**

STEMUP.CO.UK

Examiner only



STEMUP.CO.UK

Examiner only



STEMUP.CO.UK

WJEC
CBAC

# GCSE MARKING SCHEME

## SCIENCE B

## JANUARY 2012

STEMUP.CO.UK

## INTRODUCTION

The marking schemes which follow were those used by WJEC for the January 2012 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 2 – Foundation Tier | 1 |
| Unit 2 – Higher Tier | 5 |

# UNIT 2

## FOUNDATION TIER

<table>
<tr><th colspan="3">Question</th><th>Answers/Explanatory Notes</th><th>Mark</th></tr>
<tr><td>1.</td><td>(a)</td><td>(i)</td><td>1 mark each correct response.<br><br><table><tr><td>Element</td><td>Symbol</td><td>Metal/Non Metal</td></tr><tr><td>sodium</td><td>Na</td><td>metal</td></tr><tr><td>carbon</td><td>C (NOT:c)</td><td>non-metal</td></tr><tr><td>zinc</td><td>Zn</td><td>metal</td></tr></table></td><td>3</td></tr>
<tr><td></td><td>(b)</td><td></td><td>Element X and element Z<br>(Both X and Z must be stated for mark)</td><td>1</td></tr>
<tr><td>2.</td><td>(a)</td><td></td><td>Bronchitis – 2 (Smoking) (1)<br>Liver disease – 3 (Alcohol) (1)<br>Obesity – 1 (Fatty foods) (1)</td><td>3</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>High blood pressure (1)</td><td>1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Muscle cramps (1)</td><td>1</td></tr>
<tr><td>3.</td><td></td><td></td><td>All four correct 3 marks; three correct 2 marks; two correct 1 mark; one correct 0 marks.<br><br>Order (top to bottom):<br>Hydrochloric acid, vinegar, baking soda, ammonia</td><td>3</td></tr>
<tr><td>4.</td><td>(a)</td><td></td><td>nucleus (1), chromosomes (1), genes (1)</td><td>3</td></tr>
<tr><td></td><td>(b)</td><td>(i)</td><td>46/23 pairs (1)</td><td>1</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>Skin cell: Chromosomes are in pairs/ 23 pairs/there are 46 chromosomes (1)<br><br>Sperm cell: Only 23 chromosomes/not found in pairs (1)</td><td>2</td></tr>
<tr><td></td><td></td><td>(iii)</td><td>Female XX chromosome instead of Male XY</td><td>1</td></tr>
<tr><td></td><td>(c)</td><td></td><td>Mutation</td><td>1</td></tr>
</table>



STEMUP.CO.UK

| Question | | | Answers/Explanatory Notes | Mark |
|---|---|---|---|---|
| 5. | (a) | (i) & (ii) | iron ore, limestone | **2** |
| | (b) | (i) | carbon + **oxygen** → carbon monoxide<br><br>*Do **not** accept air in place of oxygen* | **1** |
| | | (ii) | iron oxide / $Fe_2O_3$ | **1** |
| | (c) | | Minimum Temp = 1535°C (1)<br>Below 1535°C iron is a solid (which cannot be easily separate from coke). (1)<br>Alternative response.<br>above 1535°C iron is liquid, (which flows to bottom of furnace/easily separated). (1)<br>Not just: 1535 is melting point | **2** |
| 6. | (a) | | → potassium chloride (1) + water (1) | **2** |
| | (b) | | Green | **1** |
| | (c) | (i) | One mark can be awarded for making a valid point<br><br>'Yellow colour means the pH is 5 – 6' (1)<br><br>The second mark can only be awarded if the candidate coherently and correctly links the conclusion to the point above.<br>'therefore (salt) solution not neutral' (1) | **2** |
| | | (ii) | To find the neutralisation point. | **1** |
| | | (iii) | Otherwise indicator will be mixed with salt/to produce pure salt | **1** |
| | | (iv) | Evaporation | **1** |
| | (d) | | Any two of: wear safety glasses, wear lab coat, wear gloves | **2** |



STEMUP.CO.UK

| Question | | | Answers/Explanatory Notes | Mark |
|---|---|---|---|---|
| 7. | (a) | | X-rays 2D but CT 3D /<br>X-ray one image / CT large number of processed images | **1** |
| | (b) | | Destroys DNA/increased risk of cancer/radiation sickness | **1** |
| | (c) | (i) | <table><tr><td></td><td>**(1)**<br>**d**</td><td>**d**</td></tr><tr><td>**(1)**<br>**D**</td><td>**(1)**<br>**Dd**</td><td>**Dd**</td></tr><tr><td>**d**</td><td>**dd**</td><td>**dd**</td></tr></table><br>Use ecf to mark grid | **3** |
| | | (ii) | .....**50%** -Answer must be based upon Punnett square. | **1** |
| | | (iii) | Indicate high risk of baby suffering from disease (1)<br>Perform genetic screening of developing embryo/ consider medical options if positive/ use donor eggs / IVF/use sperm bank/adopt. (1) | **2** |
| 8. | (a) | | More affluent (money), able to buy a balanced/healthy diet. | **2** |
| | (b) | (i) | 3410<br>Correct workings but wrong answer, (1) | **2** |
| | | (ii) | All obese people are registered by the GP/have a GP | **1** |
| | | (iii) | Survey the populations (in the different regions) | **1** |
| 9. | (a) | | Polymerisation | **1** |
| | (b) | | Ethene molecules are small/polythene molecules are long/large | **1** |
| | (c) | | Any two from - cheap/inexpensive/water proof/flexible/strong | **2** |



STEMUP.CO.UK

| Question | Answers/Explanatory Notes | Mark |
|---|---|---|
| (d) | **Indicative content**<br><br>• Use less resources to make bags<br>• Effect on – world's oceans/marine life<br>• Effect on land fill<br>• Non-biodegradable<br>• Reuse/recycle<br><br>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 inclusion or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.<br><br>3 – 4 marks: The candidate construct 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.<br><br>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.<br><br>0 marks: The candidate does not make any attempt or give a relevant answer worthy of credit. | **6 (QWC)**<br><br>6 |



STEMUP.CO.UK

# UNIT 2

## HIGHER TIER

| Question | Answers/Explanatory Notes | Mark |
|---|---|---|
| 1. (a) | X-rays 2D CT 3D (1)<br>X-ray one image CT large number of processed images (1) | **2** |
| (b) | Destroys DNA/increased risk of cancer/radiation sickness | **1** |
| (c) (i) | <table><tr><td></td><td>**(1)**<br>**d**</td><td>**d**</td></tr><tr><td>**(1)**<br>**D**</td><td>**(1)**<br>**Dd**</td><td>**Dd**</td></tr><tr><td>**d**</td><td>**dd**</td><td>**dd**</td></tr></table> | **3** |
| (ii) | ....50....% -Answer must be based upon Punnett square(1) | |
| (iii) | Indicate high risk of baby suffering from disease (1)<br>Perform genetic screening of developing embryo/ consider medical options if positive/ use donor eggs and IVF/use sperm bank/adopt. (1) | **2** |
| 2. (a) | More affluent (money), able to buy a balanced/healthy diet | **2** |
| (b) (i) | 3410<br>Correct workings but wrong answer (1) | **2** |
| (ii) | All obese people are registered the GP/have a GP | **1** |
| (iii) | Survey the populations (in the different regions) | **1** |



STEMUP.CO.UK

| Question | Answers/Explanatory Notes | Mark |
|---|---|---|
| 3. (a) | Polymerisation | **1** |
| (b) | Ethene molecules are small/polythene molecules are long/large | **1** |
| (c) | Any two from – cheap; inexpensive; water proof; flexible; strong. | **2** |
| (d) | Indicative content<br>• Use less resources to make bags<br>• Effect on – world's oceans/marine life<br>• Effect on land fill<br>• Non-biodegradable<br>• Reuse/recycle<br>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 inclusion or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.<br>3 – 4 marks The candidate construct 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.<br>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.<br>0 marks The candidate does not make any attempt or give a relevant answer worthy of credit. | **6(QWC)**<br>**6** |



STEMUP.CO.UK

| Question | | | Answers/Explanatory Notes | Mark |
|---|---|---|---|---|
| 4. | (a) | (i) | Neutralisation (accept acid-base reaction) | **1** |
| | | (ii) | Missing Numbers<br>2, 1 respectively | **2** |
| | (b) | | Calcium carbonate + hydrochloric acid → calcium chloride + carbon dioxide + water<br><br>Reactants correct (1)<br>Products following an arrow (1) | **2** |
| | (c) | (i) | Use pH meter | **1** |
| | | (ii) | One mark can be awarded for making a valid point:<br><br>Tablet B is most effective<br>since pH is raised most by these tablets<br><br>The second mark can only be awarded if the candidate coherently and correctly links the two points together. | **2** |
| 5. | (a) | | Children/foetus will be exposed to radiation. (1)<br>Young children (and foetus) are (more) sensitive to radiation/DNA more easily changed/damaged (than older people) (1) | **2** |
| (b) | (i) | | Radioisotope injected/inviter/insider the body (1) to treat cancer (1) | **2** |
| | (ii) | | Time taken for ½ (1) the number of radioactive nuclei to decay (1)<br>The second mark can only be awarded if the candidate coherently and correctly links the two parts together. | **2** |
| | (iii) | | Fraction = 1/16<br>correct workings only – 1mark | **2** |
| (c) | | | One mark for making valid point:<br>DNA of cancerous cells damaged (1) so causing them to die/reproduce more slowly (1)<br>Second point can only be awarded if two points coherently and correctly linked | **2** |



STEMUP.CO.UK

| Question | Answers/Explanatory Notes | Mark |
|---|---|---|
| 6. (a) | Total fats AMBER/MEDIUM (1)<br>Salt RED/High (1) | **2** |
| (b) | Allows fair comparison | **1** |
| (c) | 100 x 427/2580 (1) 16.6% (Accept 16, 16.5, 16.55, 17%) | **2** |
| (d) | **Indicative content**<br>• Reduce fat/saturated fat/reduce animal fat/use vegetable fat<br>• Decreasing fat in diet (helps) reduce weight gain/obesity<br>• Decreasing fat also reduces chance of cardiovascular disease/chance of heart attack/stroke.<br>• Reduce salt (amber)<br>• Too much salt increase chance of high blood pressure/stroke/heart attack<br><br>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 inclusion or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar.<br><br>3 – 4 marks The candidate construct 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.<br><br>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.<br><br>0 marks The candidate does not make any attempt or give a relevant answer worthy of credit. | **6 (QWC)** |



STEMUP.CO.UK

| Question | | Answers/Explanatory Notes | Mark |
|---|---|---|---|
| 7. | (a) | $CO_2 + C \rightarrow 2CO$<br>1 mark correct formula used<br>1 mark correct balancing | **2** |
| | (b) | 1 mark for a valid point:<br>Removes oxygen (1) reducing iron ore/iron oxide to iron (1)<br><br>Two points must be coherently linked to obtain 2 marks | **2** |
| | (c) | Any two of: cost of labour, transport, lower cost of imports | **2** |



STEMUP.CO.UK