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**	

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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.

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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

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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

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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]

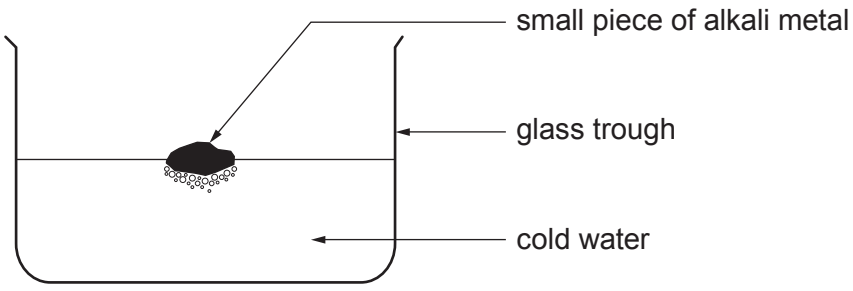
.....

(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



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(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 • It forms a silver ball and moves rapidly about the surface of water • The metal reacts in 30 seconds • The universal indicator turns purple	lithium
• The metal melts • It burns with a violet flame • All the metal reacts in 10 seconds • The universal indicator turns purple	sodium
• The metal keeps its shape • The metal floats • It reacts slowly • 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

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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 .....

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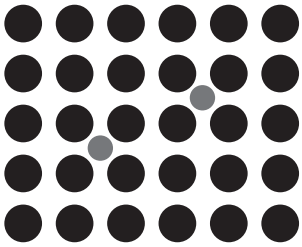
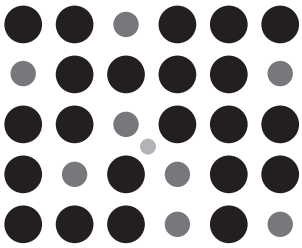
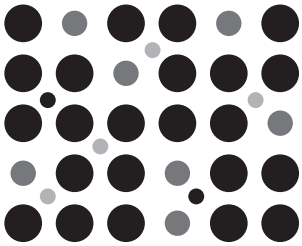
(b) The table below shows some information about three alloys of iron.

(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 0.2% carbon	....
2.		98% iron 1.7% carbon 0.3% manganese	....
3. stainless steel		74% iron 0.3% carbon ……% chromium 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]

.....

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Turn over.

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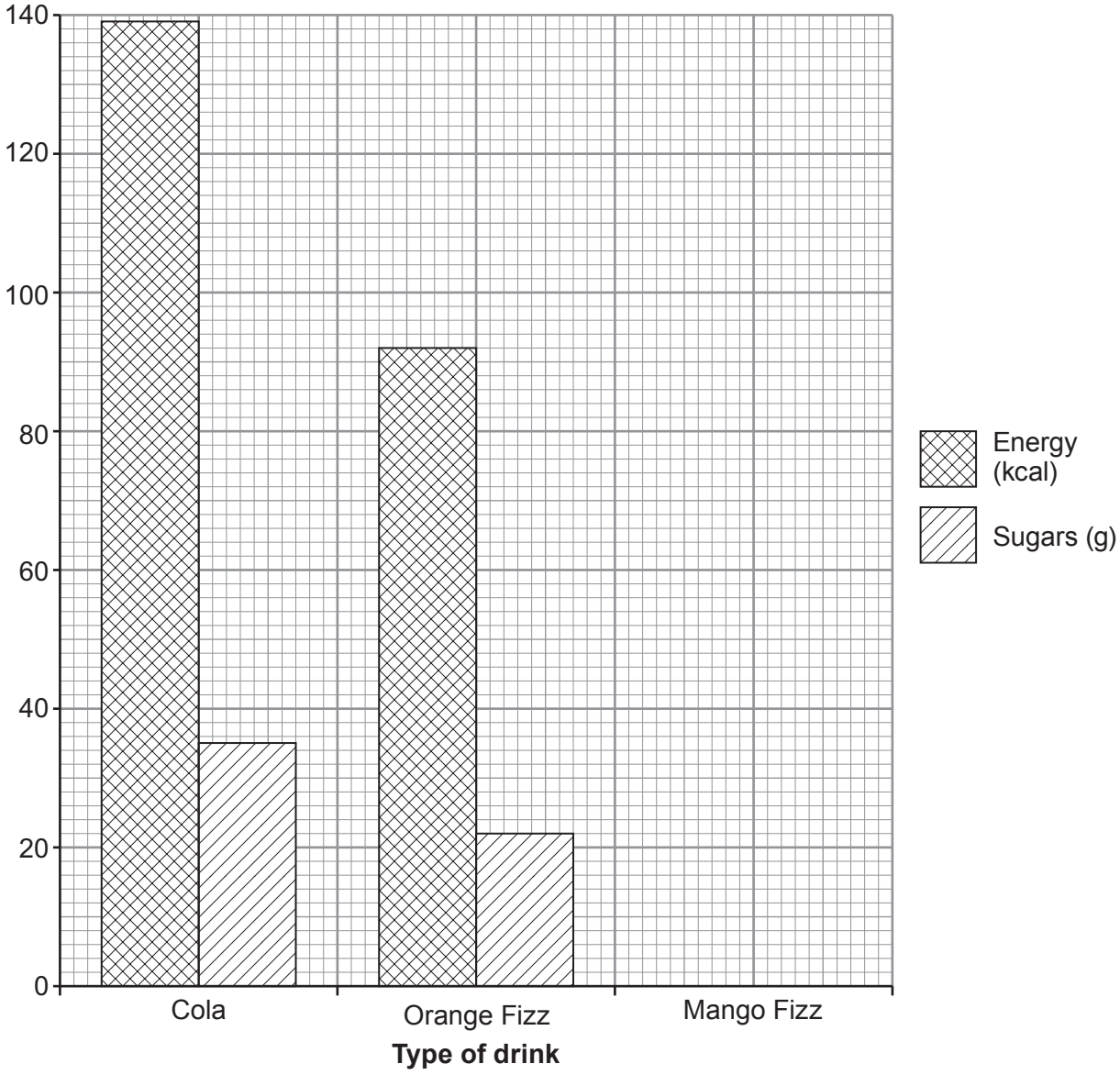
5. The table below compares the energy and sugar content in one can of different soft drinks.

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

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(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]

.....

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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.

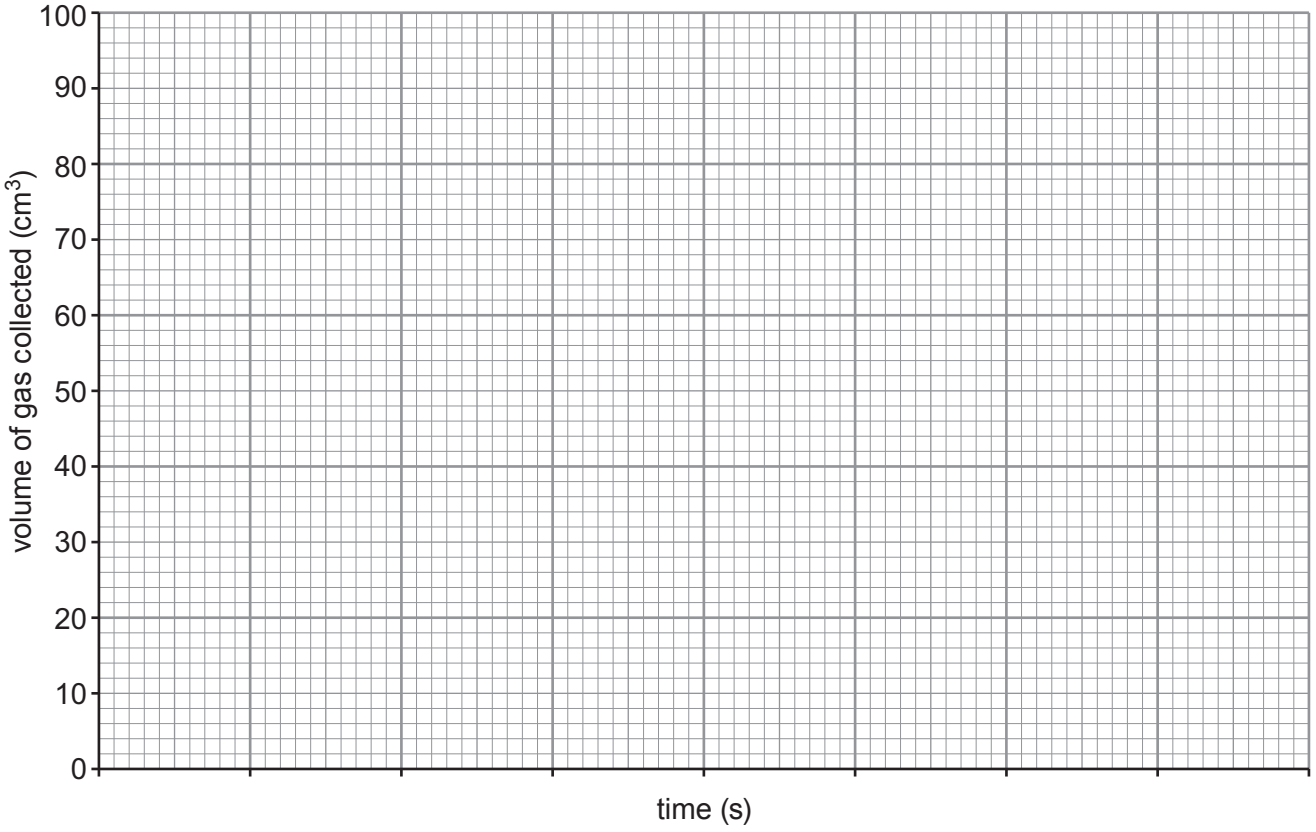
The student followed this method:

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]



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(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]

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.....

.....

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Turn over.

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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]

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8

END OF PAPER

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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**																