

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	

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.

Answer **all** questions.

Examiner
only

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



(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]

.....

.....

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]

.....

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

.....

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

[2]

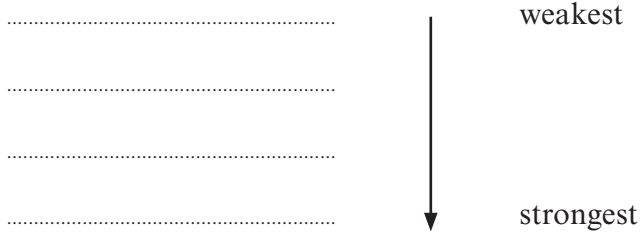
Metal

Reason

.....

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

[1]



9

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

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 \longrightarrow +

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]

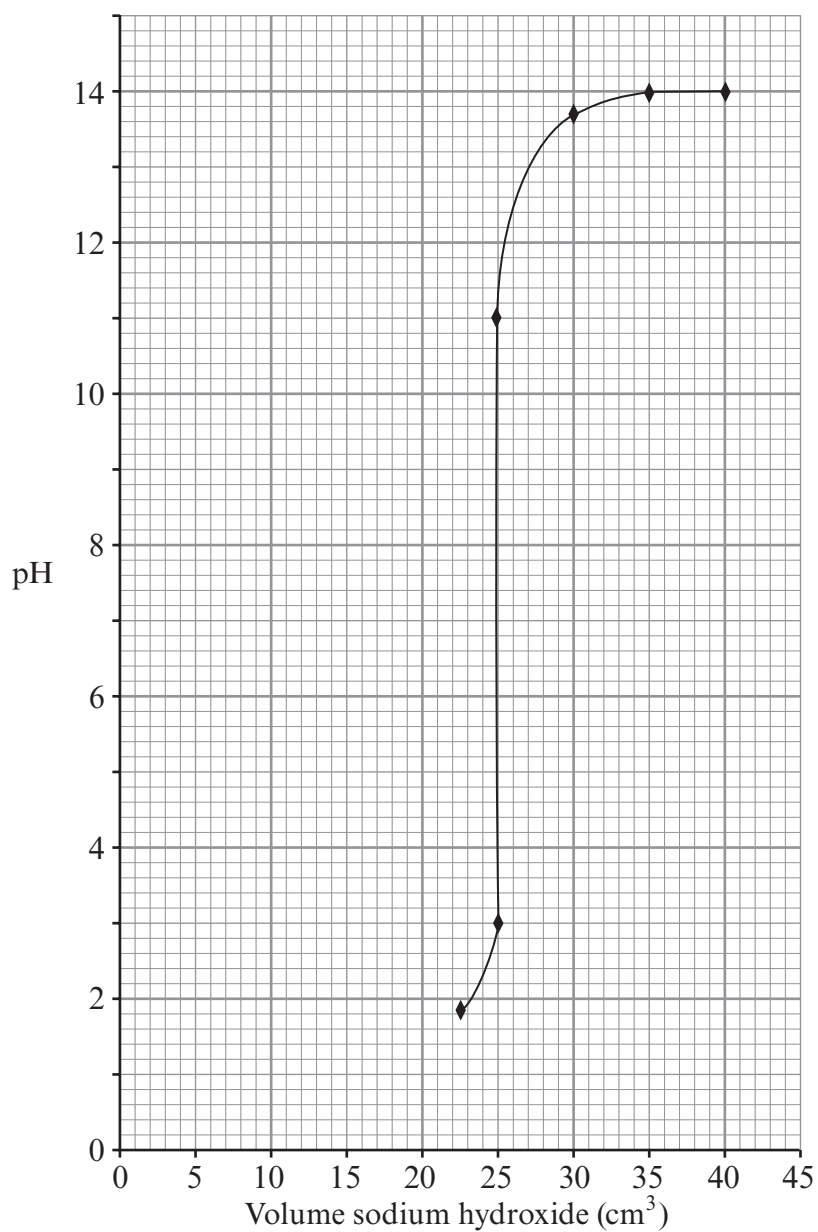
.....

(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



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

..... cm³

(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 cm³ of dilute acid into a conical flask.
2. Add a few drops of universal indicator.
3. Add 40 cm³ of sodium hydroxide solution to a burette.
4. Add 2 cm³ 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]

.....

.....

.....

.....

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]

.....

.....

.....

- (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

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
<i>of which</i> sugars (g)	0.1	0.4	0.1	0.4
Fat (g)	8.5	.....	5.0	20.0
<i>of which</i> 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]

