

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	

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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 20.

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

H²SO⁴

H₂SO₄

(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

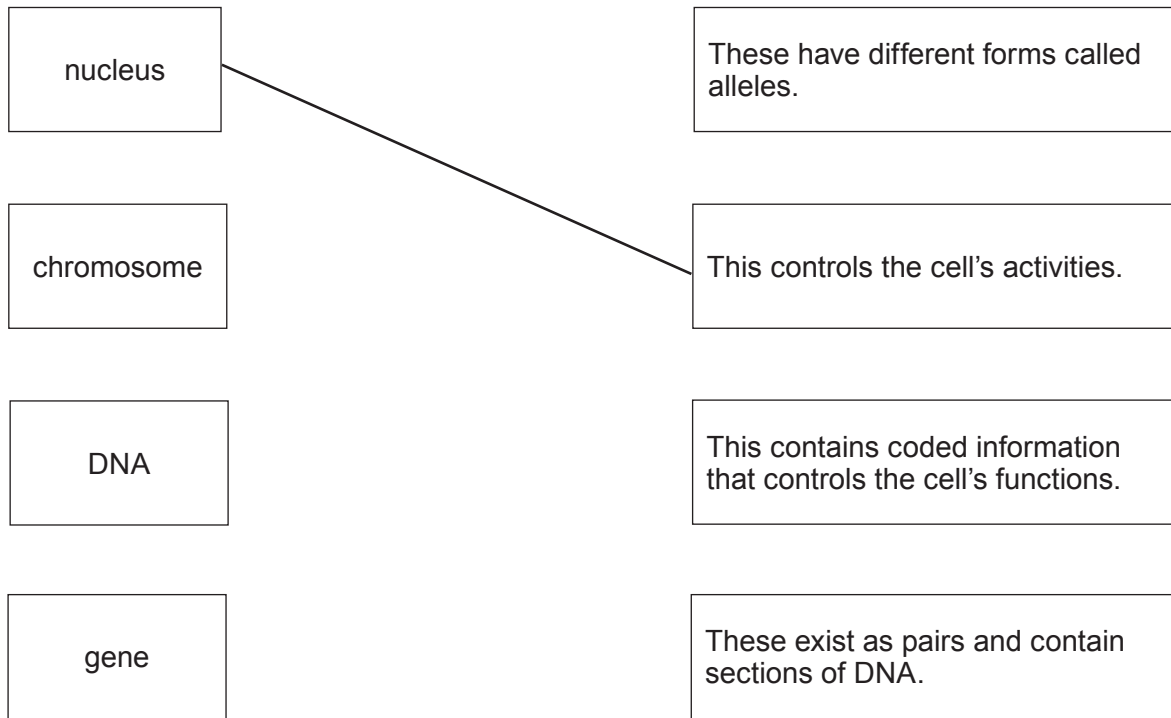
extracting iron from its ore

making polymers

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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]



(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]

.....

(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%

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 0.25% carbon	841	7.85	easily pressed into shape
brass	67% copper 33% zinc	550	8.55	soft, easy to cast
bronze	88% copper 12% tin	500	8.70	weather resistant, durable
stainless steel	..... iron 18% chromium 8% nickel	860	7.86	resists corrosion
duralumin	95% aluminium 4% copper 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]

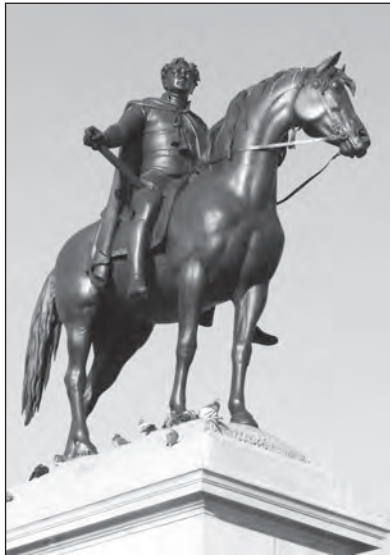
(Use this space for workings.)

- (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

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				
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(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:

.....

(d) Tick (✓) the hazard symbol found in the gamma camera room.

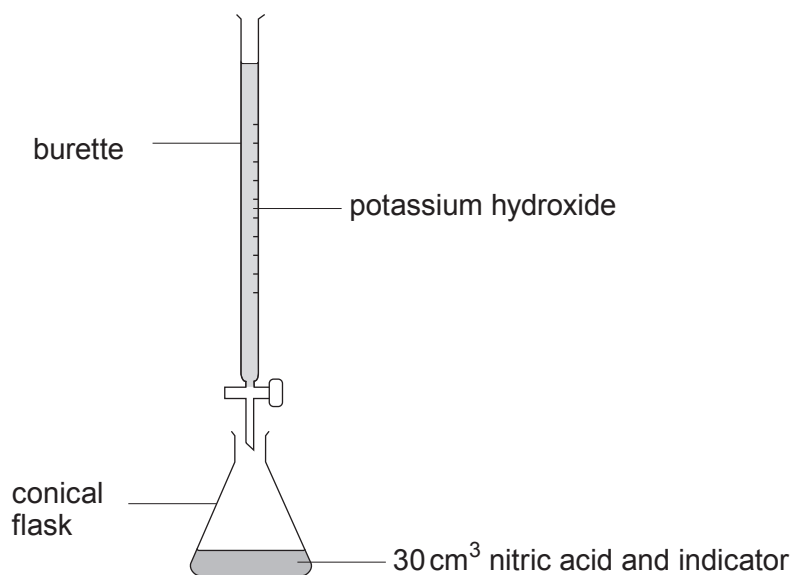
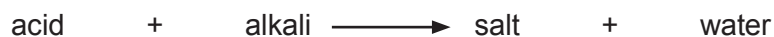
[1]



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



- (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



(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

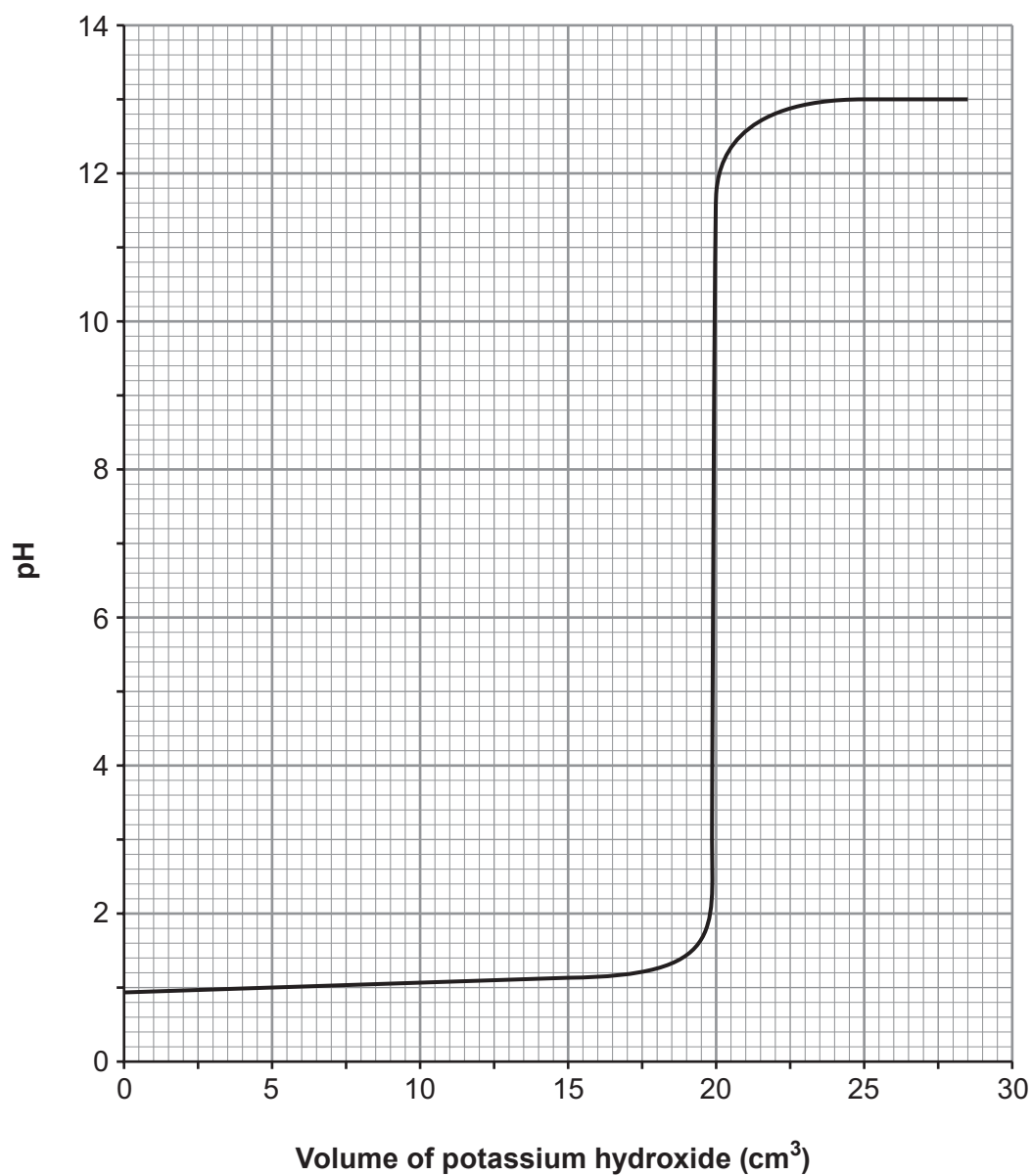
(i) State the value of the reading that should be ignored when you work out the mean titre. [1]

.....

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

.....

(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]

..... cm³

- (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**).

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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 100g	Amount in one serving (30g) with 125 cm ³ of semi-skimmed milk	GDA	% of GDA per serving
energy	279 kcal	220 kcal	2000 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]

.....

.....

.....

(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

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 **5000** pupils at **174** schools.

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

	1 st year of the survey		10 th year of the survey	
	% of pupils	Numbers of pupils	% of pupils	Numbers of pupils
smokers	9	450	3	150
alcohol drinkers	25	1250	9	450

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

.....

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- (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.

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