FOR OFFICIAL USE

Section B **Total Marks**

X012/101

NATIONAL QUALIFICATIONS 2009

WEDNESDAY, 3 JUNE 9.00 AM – 10.30 AM

CHEMISTRY INTERMEDIATE 1

Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Date of birth
Day Month Year

Scottish candidate number

Number of seat

Necessary data will be found in the Chemistry Data Booklet for Intermediate 1 and Access 3.

Section A – Questions 1–20 (20 marks)

Instructions for completion of **Section A** are given on page two.

For this section of the examination you must use an **HB pencil**.

Section B (40 marks)

All questions should be attempted.

The questions may be answered in any order but all answers are to be written in this answer book, **and must be written clearly and legibly in ink**.

Rough work, if any should be necessary, should be written in this book, and then scored through when the fair copy has been written. If further space is required, a supplementary sheet for rough work may be obtained from the invigilator.

Additional space for answers will be found at the end of the book. If further space is required, supplementary sheets may be obtained from the invigilator and should be inserted inside the **front** cover of this booklet.

Before leaving the examination room you must give this book to the invigilator. If you do not, you may lose all the marks for this paper.

Read carefully

1 Check that the answer sheet provided is for **Chemistry Intermediate 1 (Section A)**.

2 For this section of the examination you must use an **HB pencil** and, where necessary, an eraser.

3 Check that the answer sheet you have been given has **your name**, **date of birth**, **SCN** (Scottish Candidate Number) and **Centre Name** printed on it.

Do not change any of these details.

4 If any of this information is wrong, tell the Invigilator immediately.

5 If this information is correct, **print** your name and seat number in the boxes provided.

6 The answer to each question is **either** A, B, C or D. Decide what your answer is, then, using your pencil, put a horizontal line in the space provided (see sample question below).

7 There is **only one correct** answer to each question.

8 Any rough working should be done on the question paper or the rough working sheet, **not** on your answer sheet.

9 At the end of the exam, put the **answer sheet for Section A inside the front cover of this answer book**.

Sample Question

To show that the ink in a ball-pen consists of a mixture of dyes, the method of separation would be

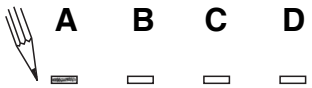
A chromatography

B fractional distillation

C fractional crystallisation

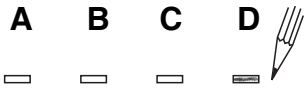
D filtration.

The correct answer is **A—**chromatography. The answer **A** has been clearly marked in **pencil** with a horizontal line (see below).



Changing an answer

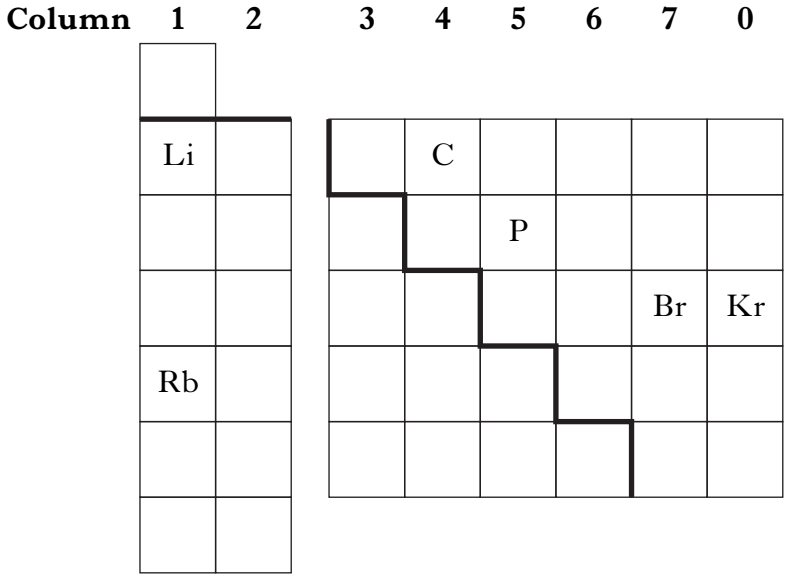
If you decide to change your answer, carefully erase your first answer and using your pencil, fill in the answer you want. The answer below has been changed to **D**.



SECTION A

This section of the question paper consists of 20 multiple-choice questions.

1. The diagram shows part of the Periodic Table.



Which **two** elements show similar chemical properties?

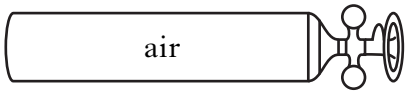
A Li and C

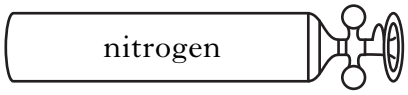
B C and P

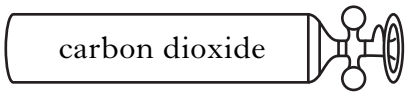
C Br and Kr

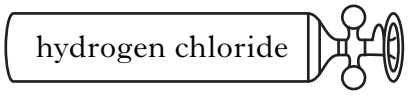
D Li and Rb

2. Which of the following cylinders contains a mixture of gases?

A 

B 

C 

D 

[Turn over

3. Which of the following compounds contains oxygen?

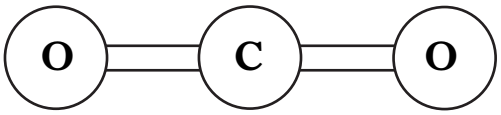
A Calcium chloride

B Lithium sulphide

C Potassium nitrate

D Sodium chloride

4. The diagram below shows a molecule of carbon dioxide.

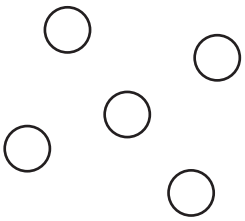


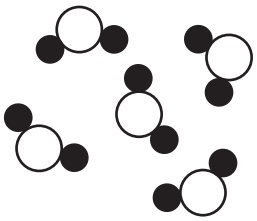
Which line in the table is correct for this molecule?

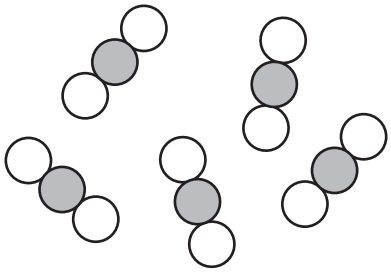
	Particles joined together in the molecule	**Strength of bonds inside the molecule**
A	atoms	weak
B	atoms	strong
C	ions	weak
D	ions	strong

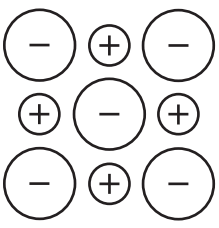
5. The structures of substances can be represented by models.

Which of the following models shows an element?

A 

B 

C 

D 

6. The formula for dinitrogen monoxide is

A NO

B NO_2

C N_2O

D N_2O_4.

7. The rusting of iron is also called

A corrosion

B combustion

C fermentation

D neutralisation.

8. Detergents are able to break up grease and oil into tiny droplets which can then mix with water.

This happens because

A detergents are soluble in oil only

B detergents are soluble in water only

C detergents are soluble in oil and water

D detergents are insoluble in oil and water.

9. Which of the following is a synthetic fibre?

A Cotton

B Nylon

C Silk

D Wool

10. Which of the following is a renewable fuel?

A Coal

B Petrol

C Diesel

D Ethanol

[Turn over

11. Which line in the table shows the plastic that is best suited for use in bullet-proof vests?

	Plastic	**Property**
A	Kevlar	very strong
B	PVC	flexible
C	Formica	high melting point
D	Perspex	lets light through

12. Polythene is a plastic which can be heated and re-shaped. Bacteria can **not** break it down.

Polythene can be described as

A thermosetting and biodegradable

B thermosetting and non-biodegradable

C thermoplastic and biodegradable

D thermoplastic and non-biodegradable.

13. Polymers can be made by joining together small molecules called monomers.

Which of the following is a monomer?

A Bakelite

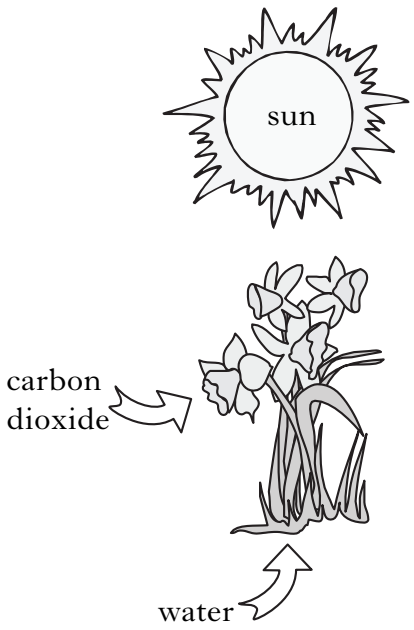
B Ethene

C Nylon

D Perspex

14. In sunlight, a reaction takes place in green plants.

In this reaction, carbon dioxide and water change into glucose and a gas.



What is the name for this reaction?

A Combustion

B Respiration

C Fermentation

D Photosynthesis

15. Which gas in the atmosphere is responsible for the greenhouse effect?

A Carbon dioxide

B Nitrogen

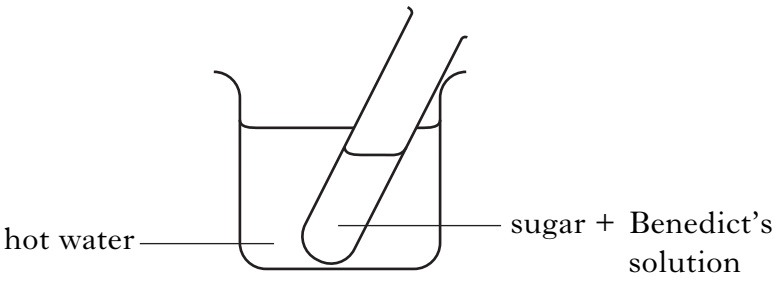
C Oxygen

D Argon

16. Which line in the table shows a compound which could be used as a fertiliser?

Compound	Elements present	Solubility in water
A	sodium, chlorine, oxygen	soluble
B	calcium, sulphur, oxygen	soluble
C	sodium, nitrogen, oxygen	soluble
D	calcium, phosphorus, oxygen	insoluble

17. Which sugar does **not** give a brick-red colour when tested with Benedict's solution?



A Maltose

B Sucrose

C Glucose

D Fructose

18. Which of the following classes of food keeps the gut working well?

A Carbohydrate

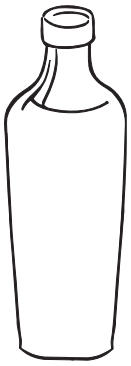
B Fat

C Fibre

D Protein

19. Which of the following drinks contains the most units of alcohol?

A



1 bottle of alcopop

B

1 measure of whisky

C

1 glass of wine

D

$\frac{1}{2}$ pint of beer

20. The most accurate term used to describe a chemical which fights micro-organisms is

A alcohol

B a drug

C a medicine

D an antibiotic.

Candidates are reminded that the answer sheet MUST be returned INSIDE this answer book.

[Turn over for Section B on *Page ten*

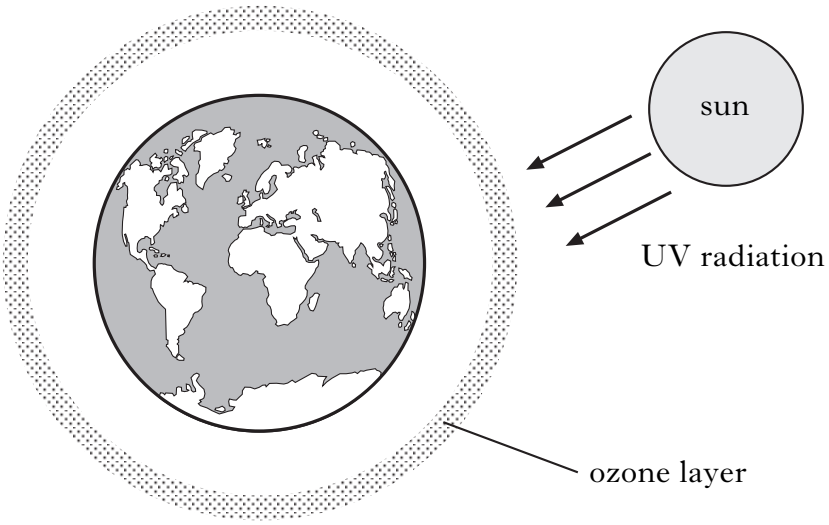
Marks

SECTION B

40 marks are available in this section of the paper.

All answers must be written clearly and legibly in ink.

1. Ozone forms naturally in the upper atmosphere from oxygen molecules. It protects the Earth from harmful UV radiation and is known as the ozone layer.



(*a*) The diagram shows a molecule of ozone.

Ozone

Write the molecular formula for ozone.

_____ **1**

(*b*) The following hazard symbols would be found on a container of ozone. Name each hazard.

_____ _____ **1**

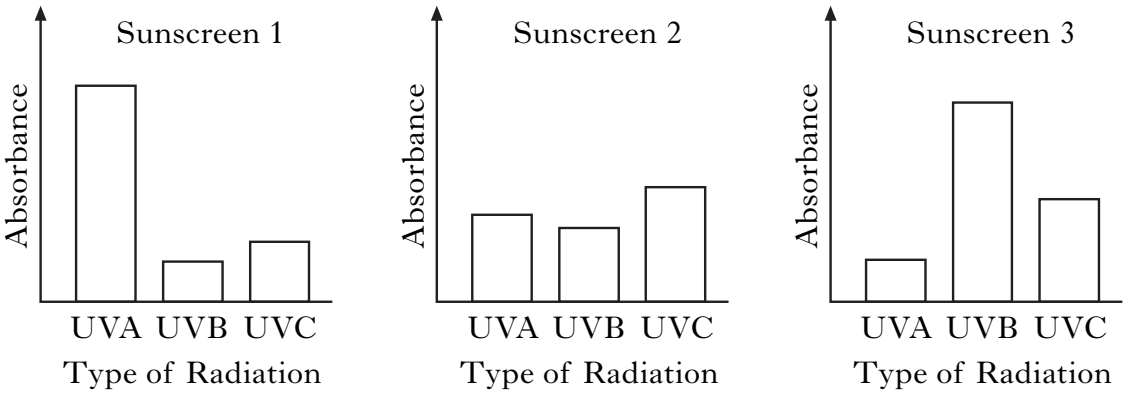
Marks

1. (continued)

(*c*) Sunscreens protect skin by absorbing UV radiation.

There are three types of UV radiation: UVA, UVB and UVC.

The graphs show how three sunscreens absorb UV radiation.



UVB radiation causes the skin to go red.

Which of these sunscreens would be best at stopping the skin from going red?

_____ **1**

(3)

[Turn over

2. Pure water boils at 100 °C.

The following equipment was used to investigate the effect that adding salt has on the boiling point of water.

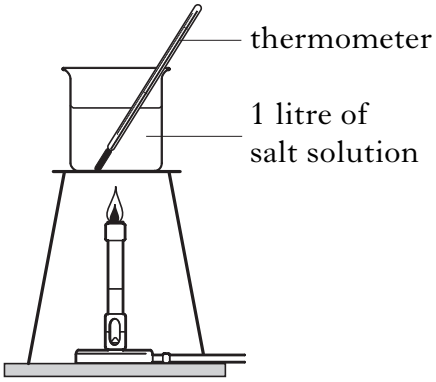
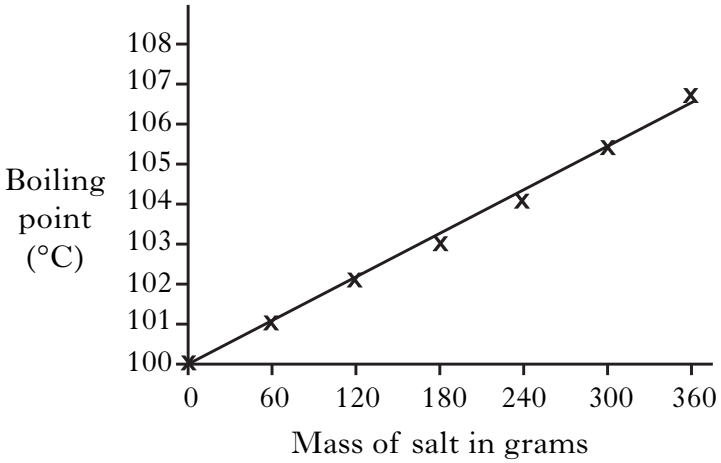


Table of Results

	Boiling point (°C)
0	100
60	101
120	102
180	103
240	104
300	105
360	106

Graph of Results



DO NOT WRITE IN THIS MARGIN

Marks

(*a*) Use the graph to complete the table of results by adding the missing heading. **1**

(*b*) By how much is the boiling point of water **raised** when 60 g of salt is added?

_____ °C **1**

(*c*) When 420 g of salt is added not all of the salt dissolves.

Complete the sentence.

When no more salt will dissolve, a _____ solution has been formed. **1**

(3)

Marks

3. The table shows the pH values of some common solutions.

Solutions	pH
wine	3
lemonade	4
black coffee	7
baking soda	9
bleach	12

(*a*) Name the **two** acids.

_____ and _____ **1**

(*b*) Name the solution which is neutral.

_____ **1**

(*c*) When acids react with alkalis, salts are formed.

A student carried out a **PPA** to investigate the solubility of some salts.

The results are shown.

Name of salt	Soluble/Insoluble
ammonium sulphate	soluble
ammonium phosphate	soluble
calcium phosphate	insoluble
potassium nitrate	soluble
sodium nitrate	soluble

(i) What did the student **see** at the end of the experiment that showed calcium phosphate is insoluble?

_____

_____ **1**

(ii) Name the acid that could be used to make the salt potassium nitrate.

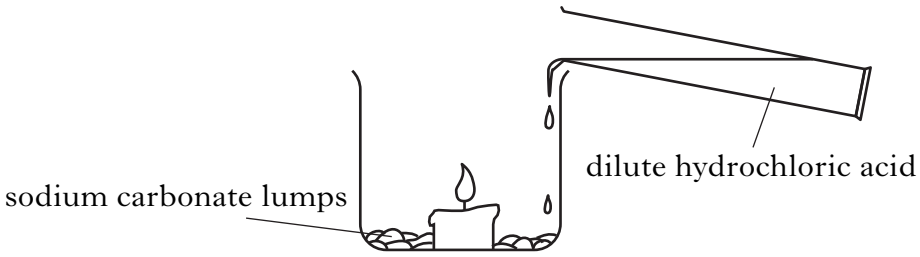
_____ **1**

(4)

Marks

4. Carbon dioxide gas can be used in fire extinguishers.

A student set up the following experiment to show that carbon dioxide gas can put out a flame.

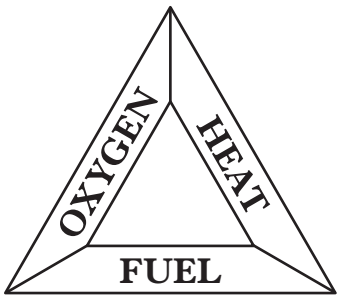


(*a*) Complete the word equation to show the reactants and the third product.

	+		→	sodium chloride	+	water	+	

1

(*b*) A fire triangle shows what is needed for burning.



(i) Which part of the fire triangle is removed by carbon dioxide gas?

_____ **1**

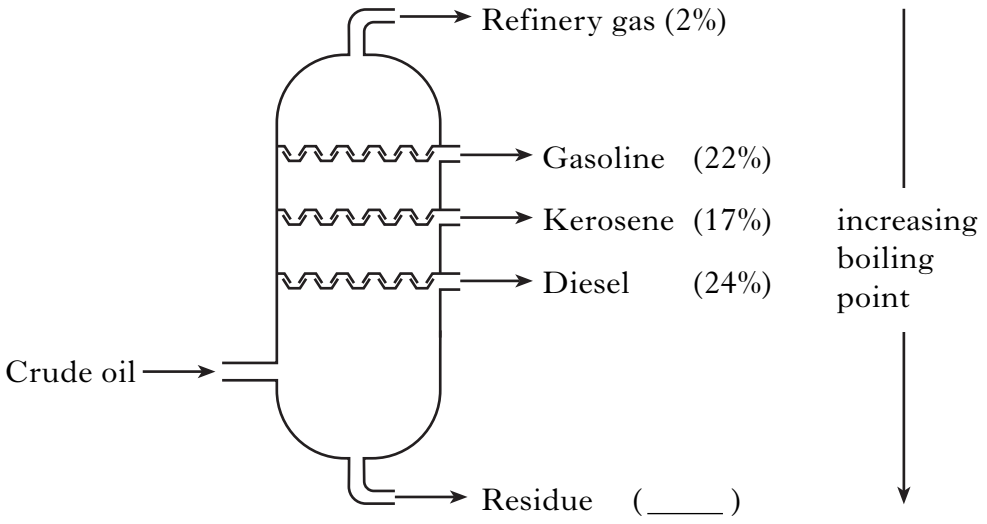
(ii) State another name for burning.

_____ **1**

(3)

Marks

5. Crude oil is a mixture of hydrocarbons which can be separated into different fractions.



(*a*) Name the process used to separate crude oil into fractions.

_____ **1**

(*b*) The fractions contain hydrocarbons.
Name the elements present in hydrocarbons.

_____ **1**

(*c*) Complete the sentence by (circling) the correct word.

The gasoline fraction boils at a [higher lower] temperature than those in the kerosene fraction. The molecules in the gasoline fraction are [smaller larger] than those in the kerosene fraction. **1**

(*d*) Calculate the percentage of crude oil that remains as residue.

_____ % **1**

(4)

[Turn over

Marks

6. Solder is a mixture of tin and lead.

(*a*) What name is given to materials, such as solder, which are a mixture of metals?

_____ **1**

(*b*) The table shows how changing the percentage of tin can alter the melting point of solder.

Solder	Percentage of tin	Melting point in °C
A	40	260
B	50	227
C	67	190

(i) What effect does increasing the percentage of tin have on the melting point of solder?

_____

_____ **1**

(ii) Another type of solder contains 55% tin.

Predict the temperature at which this solder will melt.

_____ °C **1**

(*c*) 'Tin-lead' solder is now being replaced by solder that does not contain lead.

Suggest a reason for replacing the lead used in solder.

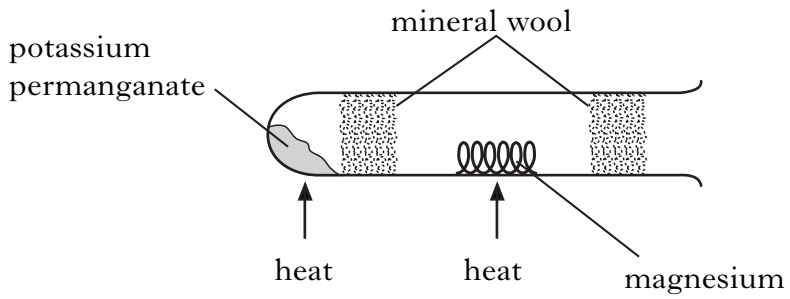
_____ **1**

(4)

Marks

7. A student investigated how well metals can react with oxygen.

The apparatus used is shown.



(*a*) Potassium permanganate releases oxygen when heated.

State the chemical test for oxygen.

_____ **1**

(*b*) Three metals were tested.

(i) Complete the table to show the results for magnesium.

(You may wish to use page 6 of the data booklet to help you.)

Metal	**Observation**
copper	Dull red glow
magnesium	
zinc	Bright red glow

1

(ii) Name a metal which would **not** react with oxygen.

(You may wish to use page 6 of the data booklet to help you.)

_____ **1**

(3)

[Turn over

Marks

8. In the **PPA "Factors which affect Lathering"**, one factor which is investigated is the volume of detergent used.

The table shows the height of the lather obtained when different volumes of detergent were used.

Experiment	Height of lather in centimetres	
	First attempt	Second attempt
1	0·3	0·2
2	0·4	0·4
3	0·8	1·0

(*a*) During the investigation the volume of detergent was changed.

Describe how this was done.

_____

_____ **1**

(*b*) Why was each experiment repeated?

_____ **1**

(*c*) In hard water areas, detergents are used because soap does not form a lather.

What forms when soap is used with hard water?

_____ **1**

(3)

Marks

9. Vitamins and minerals are substances which are required to keep the body healthy.

(*a*) Name an element found in milk and dairy products required by the body to keep bones strong.

_____ **1**

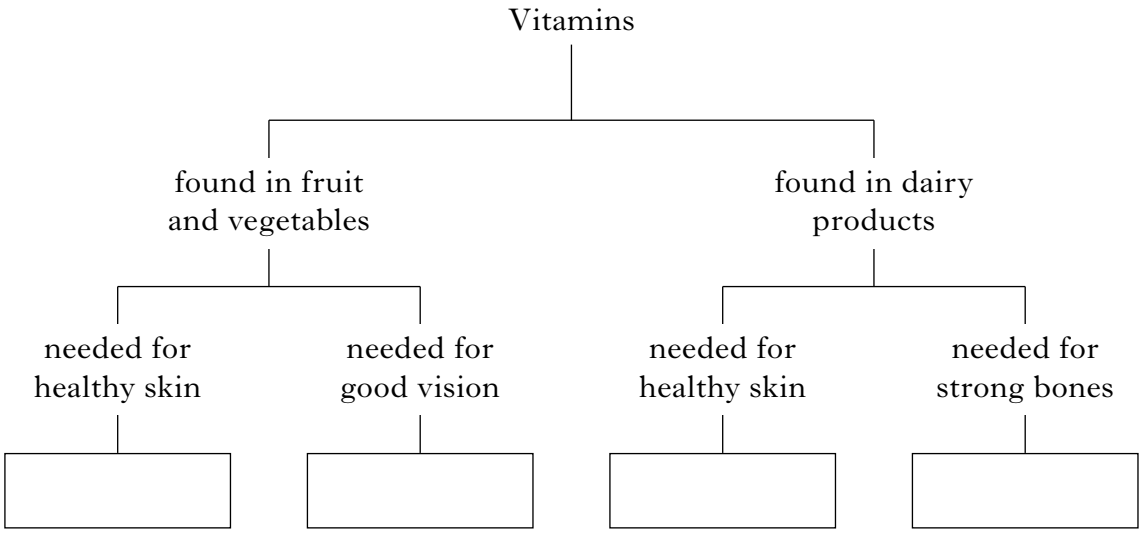
(*b*) **Vitamin D** is needed by people to strengthen their bones. Sunlight is needed for the body to make **vitamin D**. **Vitamin D** is also found in dairy products.

Vitamin A is important for our eyes. It protects their surface and helps us see in dim light. The best source of **vitamin A** is fish liver oil. The body can also get **vitamin A** by eating carrots – the orange substance in carrots (called carotene) is turned into **vitamin A** by the body.

Scurvy, a skin disease, is caused by a lack of **vitamin C**. **Vitamin C** is found in green vegetables and citrus fruits such as lemons and limes.

Vitamin B2, which is found in dairy products, is also needed for healthy skin.

(i) Use the information above to complete the following key by entering the names of the vitamins in the correct boxes.



2

(ii) Name **two** vitamins which the body can make itself.

vitamin _____ vitamin _____ **1**

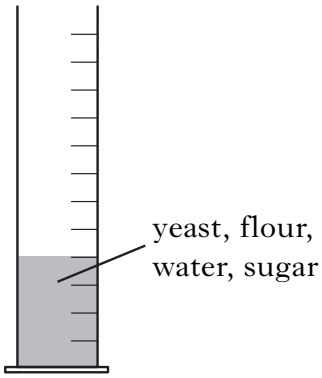
(4)

[Turn over

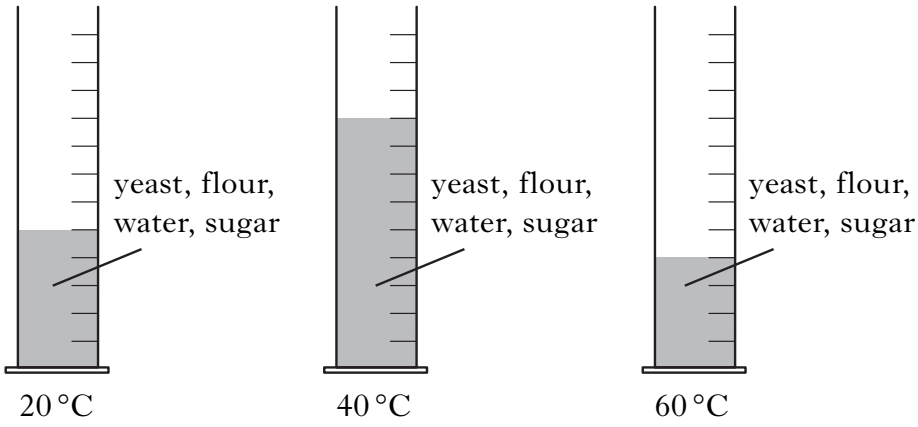
Marks

10. Sugar, flour, water and yeast are used to make dough for bread. Carbon dioxide is produced in the reaction which is catalysed by enzymes in yeast. The carbon dioxide causes the dough to rise.

The following experiment was used to investigate this.



(*a*) The experiment was carried out under different conditions.



What factor was being investigated?

_____ **1**

(*b*) When the experiment was carried out at 60 °C, the dough did not rise.

Suggest a reason for this.

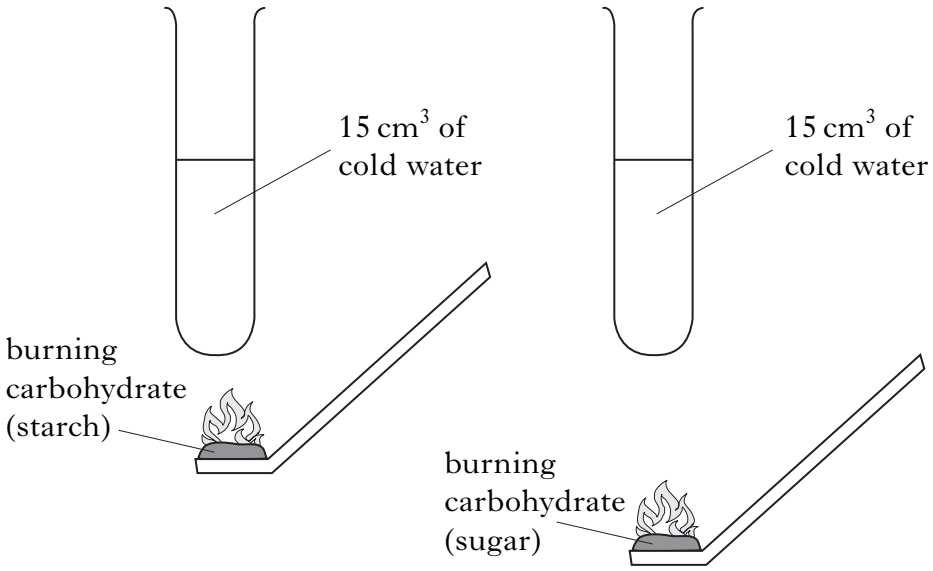
_____

_____ **1**

(2)

Marks

11. In the **PPA**, **"Burning Carbohydrates"**, the heat energy given out by burning different carbohydrates is compared.



(*a*) Name the piece of equipment which is needed to allow the student to compare the heat energy released.

_____ **1**

(*b*) Why can this experiment **not** be described as a fair test?

_____

_____ **1**

(2)

[Turn over

Marks

12. As well as carbohydrates, a bar of chocolate contains minerals, protein and fat.

(*a*) The table shows the elements present in the minerals in a bar of chocolate. The percentages of each element in the minerals is also shown.

Element	Percentage
magnesium	25
phosphorus	10
iron	20
zinc	8
calcium	2

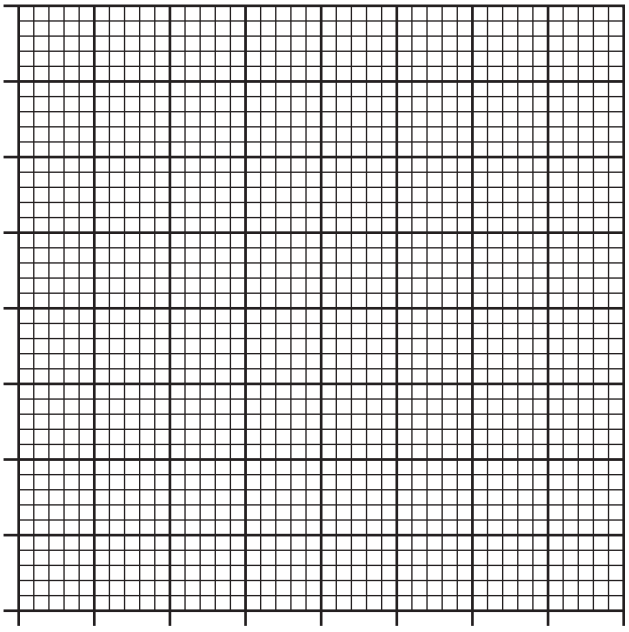
(i) Name the non-metal found in the minerals in the bar of chocolate.

_____ **1**

(ii) Use the information in the table to:

- label and complete the scale on the vertical axis;
- draw a bar graph of the results.

(Additional graph paper, if required, can be found on page 24.)

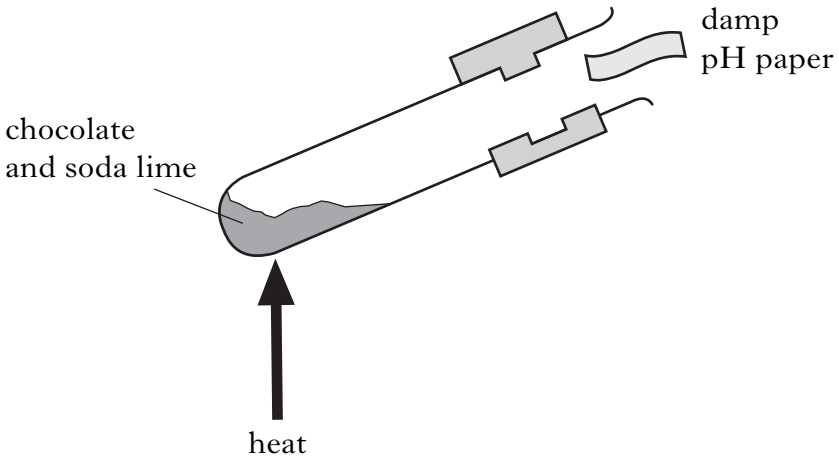


2

Marks

12. (continued)

(*b*) The protein present in the bar of chocolate reacts with soda lime and a gas is given off.



What colour would the damp pH paper turn?

_____ **1**

(*c*) How would you show that chocolate also contains fat?

_____

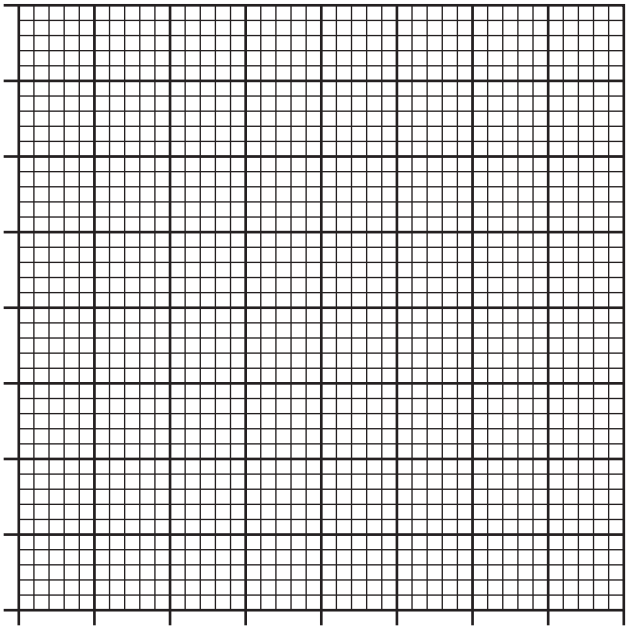
_____ **1**

(5)

[*END OF QUESTION PAPER*]

ADDITIONAL SPACE FOR ANSWERS

ADDITIONAL GRAPH PAPER FOR QUESTION 12(*a*)(ii).



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