

FOR OFFICIAL USE

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Section B

Total
Marks

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X012/101

NATIONAL
QUALIFICATIONS
2011

THURSDAY, 26 MAY
1.00 PM – 2.30 PM

CHEMISTRY
INTERMEDIATE 1

Fill in these boxes and read what is printed below.

Full name of centre

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Town

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Forename(s)

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Surname

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Date of birth

Day Month Year

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Scottish candidate number

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Number of seat

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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

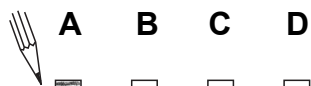
- 1 Check that the answer sheet provided is for **Chemistry Intermediate 1 (Section A)**.
- 2 For this section of the examination you must use an **HB pencil** and, where necessary, an eraser.
- 3 Check that the answer sheet you have been given has **your name, date of birth, SCN** (Scottish Candidate 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 examination, 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

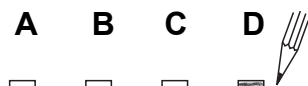
- A chromatography
- B fractional distillation
- C fractional crystallisation
- D filtration.

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

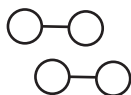
This section of the question paper consists of 20 multiple-choice questions.

1. Which hazard does the following symbol indicate?

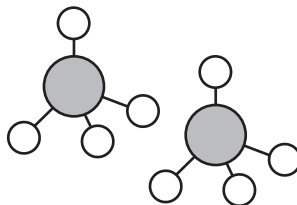


- A Corrosive
B Flammable
C Irritant
D Toxic
2. The structures of substances can be represented by models.
Which model shows a **compound** made of molecules?

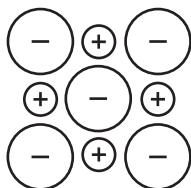
A



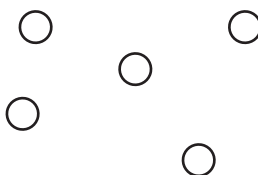
B



C



D



3. When water changes to steam
- A strong bonds between atoms in water molecules are broken
B strong bonds between water molecules are broken
C weak bonds between atoms in water molecules are broken
D weak bonds between water molecules are broken.

4. As water is added to an acid, the acid becomes

- A more acidic and its pH goes down
- B more acidic and its pH goes up
- C less acidic and its pH goes up
- D less acidic and its pH goes down.

5. sodium hydroxide + sulphuric acid \longrightarrow salt + water

The name of the salt produced in this reaction is

- A hydrogen sulphate
- B hydrogen sulphide
- C sodium sulphate
- D sodium sulphide.

6. Which of the following elements is a conductor of electricity?

- A Aluminium
- B Iodine
- C Silicon
- D Sulphur

7. Which of the following metals is found uncombined in the Earth's crust?

- A Magnesium
- B Sodium
- C Gold
- D Iron

8. Which type of cleaning chemical gives a scum with hard water?

- A Soap
- B Shampoo
- C Washing-up liquid
- D Soapless detergent

9. Cleaning chemicals remove oil and grease stains from clothes by

- A cracking the oil and grease
- B boiling off the oil and grease
- C neutralising the oil and grease
- D breaking up the oil and grease into tiny droplets.

10. Which of the following fibres is made by the chemical industry?

- A Cotton
- B Nylon
- C Silk
- D Wool

11. Which line in the table shows properties of a plastic which could be suitable for use in greenhouses instead of glass?

	Lets light through	Effect of heat	Effect of light
A	yes	none	becomes brittle
B	no	none	none
C	yes	none	very little
D	yes	cracks	very little

12. Plastics are said to be biodegradable if they are broken down by

- A bacteria in the soil
- B acid in the soil
- C plants in the soil
- D water in the soil.

13. Which of the following gases is toxic and can be produced when plastics burn?

- A Nitrogen
- B Water vapour
- C Carbon monoxide
- D Carbon dioxide

[Turn over

14. Which of the following compounds could be used as a fertiliser?
(You may wish to use page 4 of the data booklet to help you.)
- A Calcium carbonate
 - B Potassium phosphate
 - C Magnesium chloride
 - D Iron sulphate
15. Which of the following foods contains more fat than carbohydrate?
(You may wish to use page 7 of the data booklet to help you.)
- A Bread
 - B Peanuts
 - C Rice
 - D Spaghetti
16. What percentage of body weight is water?
- A less than 40%
 - B between 40% and 50%
 - C between 50% and 60%
 - D more than 60%
17. Which of the following compounds can be used to break down starch?
- A Acid
 - B Alcohol
 - C Fat
 - D Sugar
18. Which of the following statements about fibre in the diet is **not** true?
- A It keeps the gut working well.
 - B It absorbs water and swells.
 - C It prevents constipation.
 - D It supplies vitamins.

19. Alcohol is made by the fermentation of glucose.
Distillation can then be used to
- A increase the glucose concentration
 - B decrease the alcohol concentration
 - C increase the alcohol concentration
 - D decrease the glucose concentration.
20. Which of the following drugs can fight micro-organisms?
- A Antibiotics
 - B Caffeine
 - C Nicotine
 - D Alcohol

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

[Turn over for Section B on *Page eight*

Marks

SECTION B**40 marks are available in this section of the paper.****All answers must be written clearly and legibly in ink.**

1. Chlorine, fluorine and argon are the names of elements found in the Periodic Table.

(a) Are they metals or non-metals?

(You may wish to use page 1 of the data booklet to help you.)

1

(b) Argon is found in column 0 of the Periodic Table.

Name an element which has similar chemical properties to Argon.

1

(c) Fluorine is used to make sodium fluoride which is added to drinking water.

Why is sodium fluoride added to drinking water?

**1
(3)**

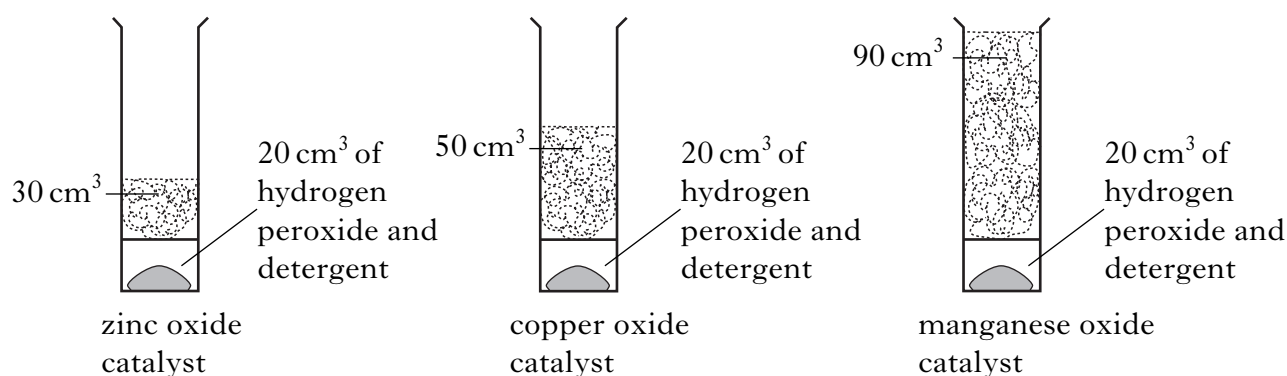
Marks

2. A student carried out an investigation using three catalysts; zinc oxide, copper oxide and manganese oxide.

(a) What is the purpose of a catalyst?

1

- (b) The student added 2 grams of each powdered catalyst into a measuring cylinder containing 20 cm^3 of hydrogen peroxide and detergent. A lather was produced which rose up the measuring cylinder. After 30 seconds, the volume of lather was measured.



(i) Which catalyst worked best on the reaction?

1

(ii) State **two ways** in which the student made sure the investigation was fair.

1 _____

2 _____

1

(iii) The lather formed as oxygen gas was produced.

What is the test for oxygen gas?

1

(4)

[Turn over]

Marks

3. In vineyards, strips of copper are covered with the skins of fermented grapes. The brown copper reacts with chemicals from the grape skins to form green copper ethanoate, which is known as verdigris.



- (a) How can you tell that a chemical reaction has taken place?

1

- (b) Copper ethanoate contains copper, carbon and hydrogen.

The ending -ate indicates that another element is also present in this compound.

Name this element.

1

- (c) A solution of copper ethanoate can be sprayed on plants as a fungicide.
What is a fungicide?

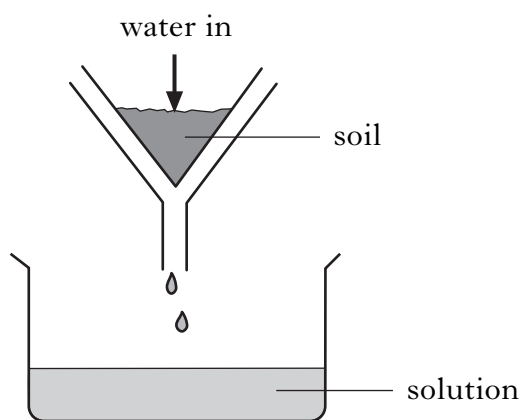
1

(3)

Marks

4. A student carried out an experiment to find the pH values of different garden soils.

Water was slowly poured through a sample of soil and a solution was collected.



- (a) How would the student find out the pH of the solution using pH paper and a colour chart?

1

- (b) The pH values of the garden soils are shown.

Garden	pH of soil
A	5.0
B	6.5
C	7.0
D	8.0
E	9.5

- (i) Which garden has the most alkaline soil?

Garden _____

1

- (ii) **Circle** the correct word to complete the sentence.

The pH of soil in garden B can be increased by adding

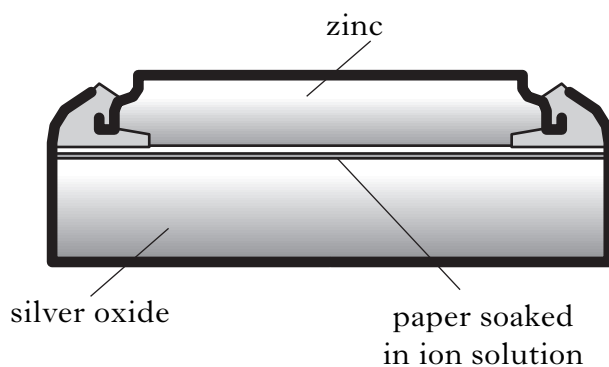
{	acid	}
	salt	
	alkali	
	alcohol	

.

1
(3)

Marks

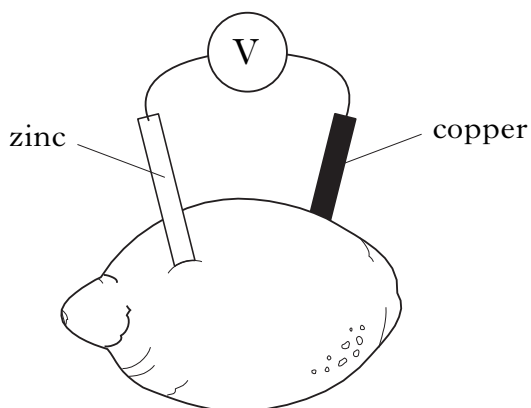
5. (a) Some calculators use batteries which contain the chemicals zinc and silver oxide.



What is the purpose of the ion solution?

1

- (b) A student made a battery from a lemon and two strips of metal. The voltage produced was measured.



Voltage produced = 1.1 V

The student changed the strip of zinc to a strip of magnesium.

How would the voltage of the lemon battery change?

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

1

- (c) Batteries eventually stop working.

Why does this happen?

1

(3)

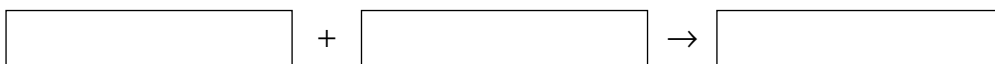
Marks

6. A car has been developed that is fuelled by hydrogen. Hydrogen is being marketed as an alternative to petrol as it is a clean source of energy.



- (a) **Water** is formed when **hydrogen** burns in **oxygen**.

Write a word equation for this reaction.



1

- (b) State **one** safety concern when using hydrogen gas as an alternative fuel to petrol.

1

- (c) Using the following information and formula, calculate the distance a hydrogen-fuelled car can travel on a full fuel tank.

INFORMATION	
Fuel consumption	= 2.5 miles per litre
Fuel tank capacity	= 50 litres

Distance travelled = **fuel consumption** × **fuel tank capacity**

= _____ × _____

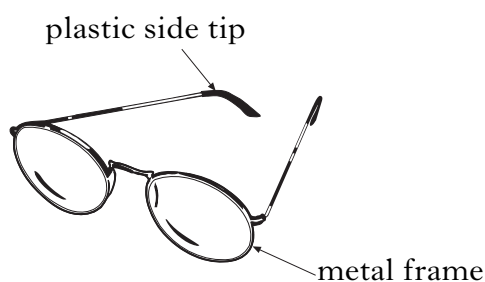
= _____ **miles**

1
(3)

[Turn over]

Marks

7. Metal spectacle frames have plastic side tips.



- (a) The frame is made from “German silver”, which is a mixture of three metals.

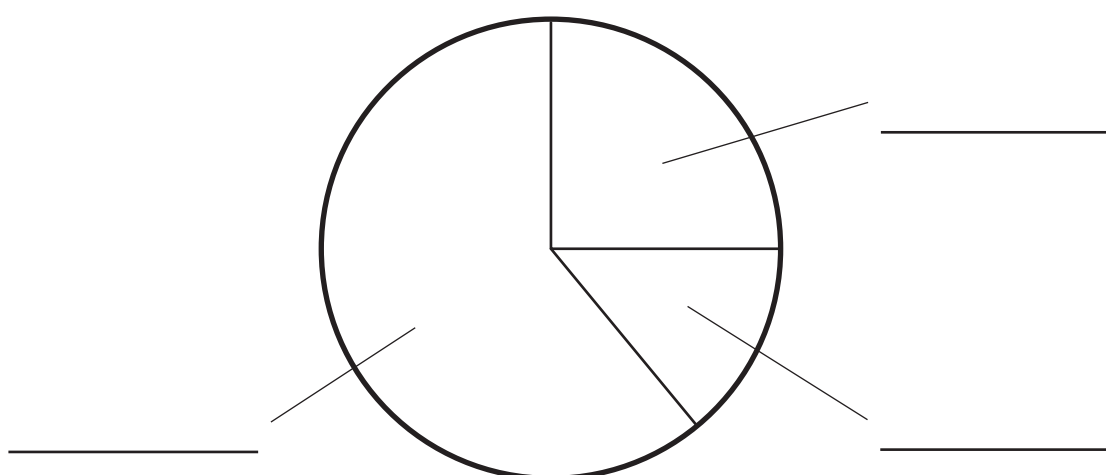
- (i) What name is given to a mixture of metals?

1

- (ii) The table gives information about the percentage of each metal in “German silver”.

Metal in German silver	Percentage (%)
copper	60
nickel	15
zinc	25

Use this information to label the pie chart.



1

- (b) In order to make the spectacle frame fit around the ear, the plastic side tips are reshaped after heating.

What name is given to this type of plastic?

1

(3)

Marks

8. (a) Peat is found in many parts of Scotland. It is an example of a fossil fuel.



- (i) What is peat made from?

1

- (ii) Some countries, such as Finland, burn peat in power stations to provide energy.

There is concern about using peat in this way as it is a finite resource.

What is meant by a finite resource?

1

- (b) Information about some fuels is shown in the tables.

Number of carbon atoms	Energy released in kilojoules
1	891
2	1560
3	2220
4	2877

Name of fuel	Number of carbon atoms
methane	1
ethane	2
propane	3
butane	4

- (i) Complete the sentence.

As the number of carbon atoms increases, the energy released

_____.

1

- (ii) Name the fuel which releases 1560 kilojoules of energy.

1

(4)

Marks

9. The following is an extract from a poem which won the Royal Society of Chemistry Bill Bryson prize for science communication.

Once upon a time the world was sad
Its atmosphere was feeling bad
There was too much CO₂
(Carbon dioxide to me and you)
It made it hotter and hotter still
And all the fishes it did kill
Rachel Farnsworth

- (a) An increase in the level of carbon dioxide causes the atmosphere to retain more of the sun's energy as heat.

Name this process.

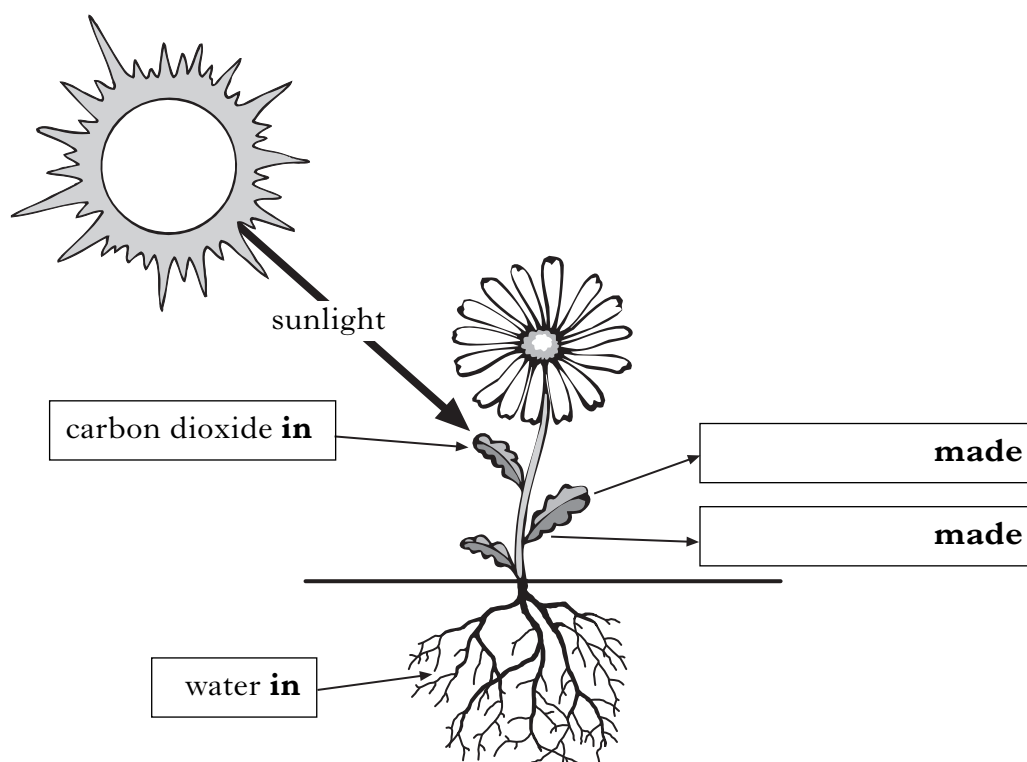
1

- (b) State **one** reason why the level of carbon dioxide in the atmosphere has increased.

1

- (c) Plants use up carbon dioxide and water in photosynthesis.

Complete the labelled diagram to show what is made in this process.



1

(3)

[Turn over for Question 10 on *Page eighteen*

Marks

10. Treacle tart is a popular dessert.



The pastry case is made using butter and the filling is made using breadcrumbs and syrup.

- (a) Butter is a fat.

- (i) What does fat provide in our diet?

1

- (ii) Fats can be described as saturated.

What effect do saturated fats have on cholesterol levels in the blood?

1

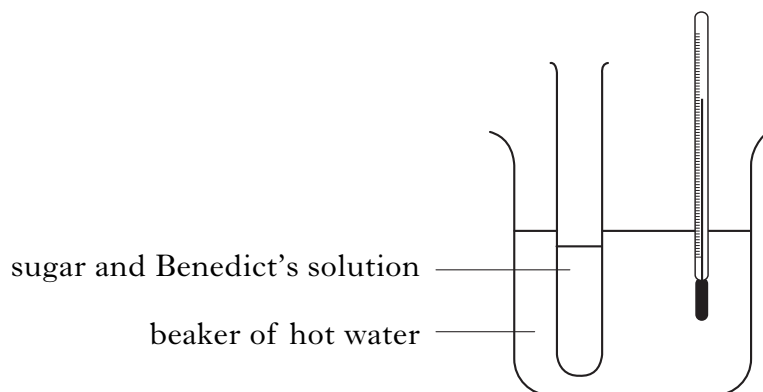
- (b) What indicator could be used to show that breadcrumbs contain starch?

1

Marks

10. (continued)

- (c) A student carried out an investigation to show how temperature affects the speed of the reaction between a sugar, found in syrup, and Benedict's solution.



The results are shown.

Temperature of water in °C	Time for reaction to take place in seconds
50	118
60	64
70	37
80	18

- (i) How does increasing the temperature affect the speed of the reaction?

1

- (ii) Predict how long the reaction would take at 65 °C.

_____ seconds

1

- (iii) The Benedict's solution changed colour showing that a reaction had taken place.

The colour change was _____ to _____.

1**(6)****[Turn over]**

Marks

11. (a) The government publishes guidelines on the recommended maximum units of alcohol that can be drunk in one day.

The units of alcohol can be calculated using the formula:

$$\text{units of alcohol} = \frac{\text{volume in cm}^3 \times \text{percentage alcohol (\%)}}{1000}$$

Calculate the units of alcohol in a 175 cm³ glass of wine which contains 12% alcohol.

_____ units **1**

- (b) A man drank a pint of beer containing 3 units of alcohol.

How long will it take for his body to break down the alcohol?

_____ hours **1**

Marks

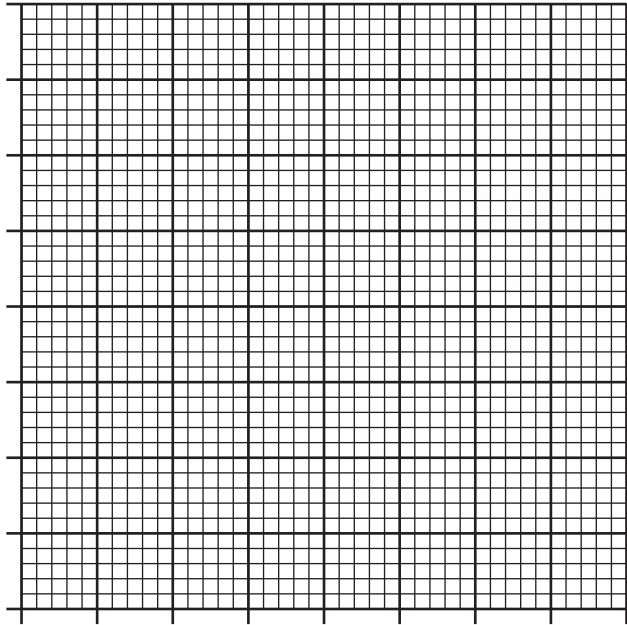
11. (continued)

(c) The table gives information on the alcohol content of some beers.

Beer	Alcohol by volume (%)
Hawley's Best	3·8
Spier's Special	5·4
Dobson's Delight	6·2
Munro's Magic	7·6

Draw a bar graph to show this information.

(Additional graph paper, if required, can be found on *Page twenty-two*.)



2

(d) Preservatives, added to beers to improve the keeping qualities, are examples of food additives.

Give another **use** of food additives.

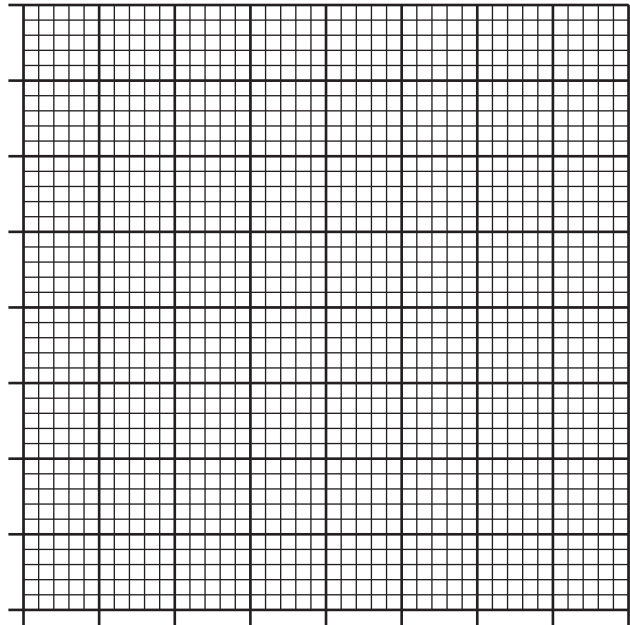
1

(5)

[END OF QUESTION PAPER]

ADDITIONAL SPACE FOR ANSWERS

ADDITIONAL GRAPH PAPER FOR QUESTION 11(c).



ADDITIONAL SPACE FOR ANSWERS

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ADDITIONAL SPACE FOR ANSWERS

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ACKNOWLEDGEMENT

Question 6—Photograph of a BMW car is reproduced by kind permission of BMW Group UK.