

FOR OFFICIAL USE

--	--	--	--	--	--

Section B Total Marks

--

X012/10/02

NATIONAL THURSDAY, 28 MAY
QUALIFICATIONS 9.00 AM – 10.30 AM
2015

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 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 gas makes up about 80% of the air?
 - A Oxygen
 - B Nitrogen
 - C Chlorine
 - D Carbon dioxide

2. Marie Curie was a famous Polish chemist who discovered the elements radium and polonium. She died in 1934.

Which of the following elements would she **not** have known?
(You may wish to use page 2 of the data booklet to help you.)

 - A Curium
 - B Titanium
 - C Strontium
 - D Magnesium

3. Which of the following metals would be a solid at 1000 °C?
(You may wish to use page 3 of the data booklet to help you.)
 - A Aluminium
 - B Calcium
 - C Iron
 - D Magnesium

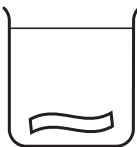
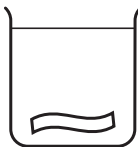

4. Which of the following compounds, when dissolved in water, will help to prevent tooth decay?
 - A Sodium bromide
 - B Sodium chloride
 - C Sodium fluoride
 - D Sodium iodide

[Turn over

5. Which line in the table shows what happens when 1 gram of catalyst is added to a reaction mixture?

	Speed of reaction	Mass of catalyst left at end in grams
A	unchanged	1
B	faster	1
C	unchanged	0
D	faster	0

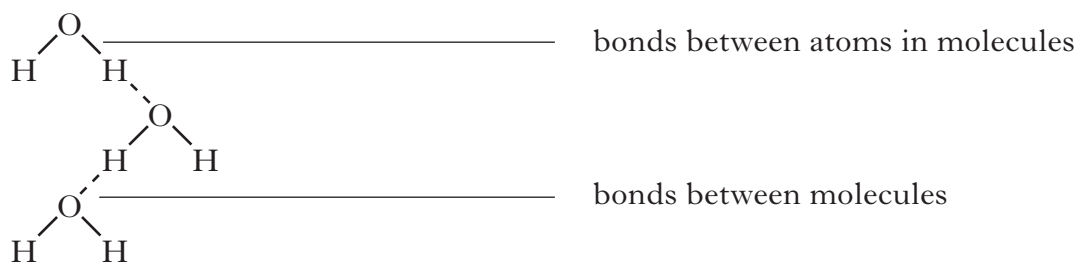
6. A student set up three experiments to investigate the speed of the reaction between magnesium and dilute acid.

Factor			
Mass of magnesium ribbon	1 g	1 g	1 g
Volume of the acid	50 cm ³	50 cm ³	50 cm ³
Concentration of the acid in moles per litre	2	1	0.5
Temperature of the acid	20 °C	20 °C	20 °C

Which factor was the student investigating?

- A Mass of magnesium ribbon in grams
- B Volume of the acid
- C The concentration of the acid
- D Temperature of the acid

7. The diagram shows two types of bonds in water, bonds between atoms in the molecules and bonds between molecules.



Which line in the table correctly shows how strong these bonds are?

	Bonds between atoms in molecules	Bonds between molecules
A	weak	weak
B	weak	strong
C	strong	strong
D	strong	weak

8. Which **one** of the following household substances is an alkali?

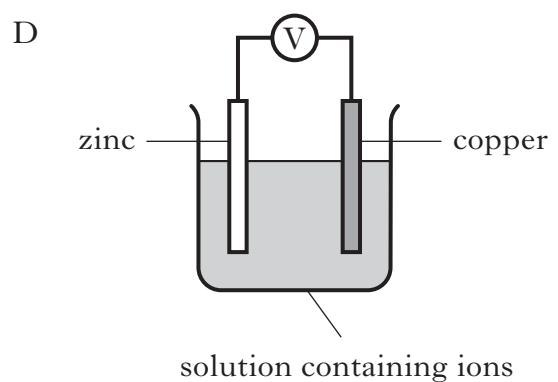
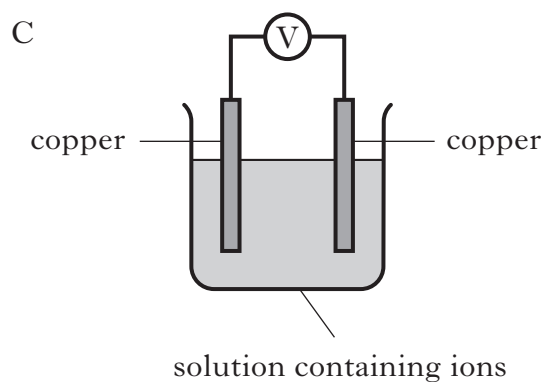
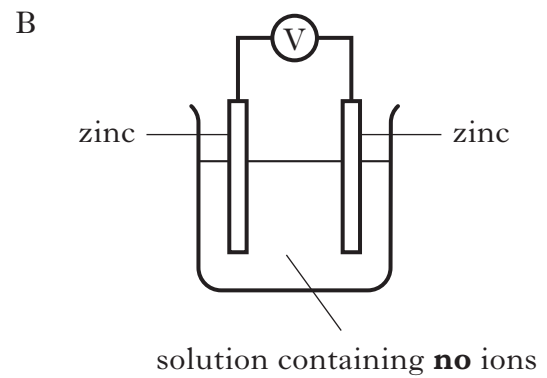
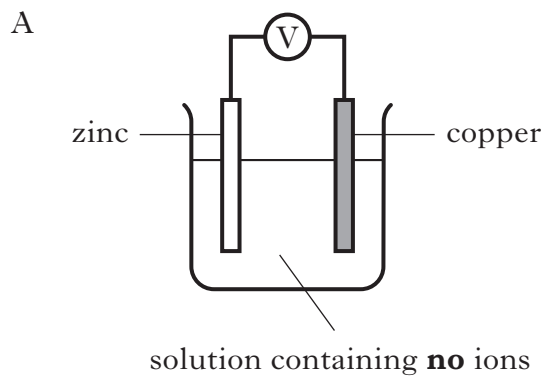
- A Baking soda
- B Coke
- C Lemonade
- D Vinegar

9. Which metal is extracted from its ores by heating with carbon?

- A Aluminium
- B Silver
- C Gold
- D Iron

[Turn over

10. Which of the following would produce electricity?



11. Which of the following is a natural fibre?

- A Nylon
- B Polythene
- C Silk
- D Terylene

12. Crude oil can be separated into fractions by

- A cracking
- B distillation
- C fermentation
- D filtration.

13. Which hydrocarbon will boil most easily?

Hydrocarbon	Molecular model
A	<pre> H H H H H H H H H — C — C — C — C — C — C — C — C — H H H H H H H H H </pre>
B	<pre> H H H H H H H H — C — C — C — C — C — C — C — H H H H H H H H </pre>
C	<pre> H H H H H H H — C — C — C — C — C — C — H H H H H H H </pre>
D	<pre> H H H H H H — C — C — C — C — C — H H H H H H </pre>

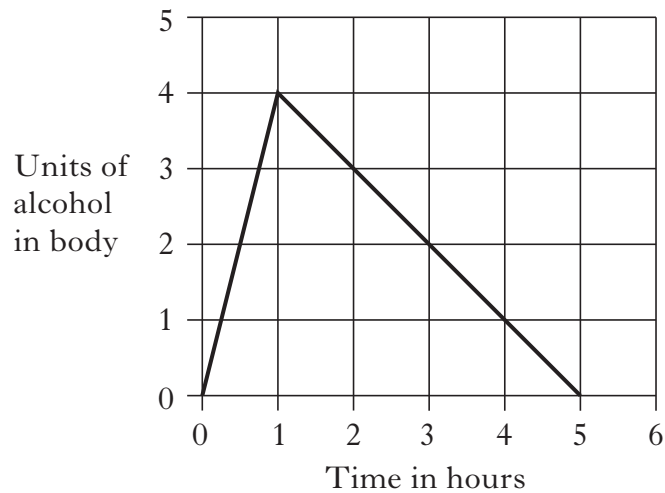
14. Which line in the table shows properties of a plastic which can be used for lemonade bottles?

	Weight	Effect of water
A	light	no effect
B	light	dissolves
C	heavy	no effect
D	heavy	dissolves

[Turn over

15. During respiration, oxygen reacts with glucose forming carbon dioxide and water. Which is the correct word equation for respiration?
- A glucose + oxygen \longrightarrow carbon dioxide + water
 - B glucose + carbon dioxide \longrightarrow oxygen + water
 - C carbon dioxide + water \longrightarrow glucose + oxygen
 - D oxygen + water \longrightarrow glucose + carbon dioxide
16. Which statement is correct?
- A Carbon dioxide in the air is not a cause of the greenhouse effect.
 - B Burning petrol decreases carbon dioxide levels in the atmosphere.
 - C Clearing forests causes the carbon dioxide levels in the air to increase.
 - D Increasing levels of carbon dioxide in the air are causing the atmosphere to cool down.
17. A fertiliser contains 40 g of nitrogen per 200 g of fertiliser. What percentage of the fertiliser is nitrogen?
- A 5%
 - B 20%
 - C 40%
 - D 80%
18. The body gets its calcium and iron from
- A fats
 - B proteins
 - C minerals
 - D carbohydrates.

19. The graph shows how the alcohol level in a man's body changes with time.



During the first hour, the man drank

- A 1 pint of beer
 - B 2 pints of beer
 - C 1 measure of spirit
 - D 2 measures of spirit.
20. Alcoholic drinks can be made by
- A fermentation of carbohydrates
 - B distillation of carbohydrates
 - C fermentation of proteins
 - D distillation of proteins.

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

[Turn over for Section B on *Page ten*

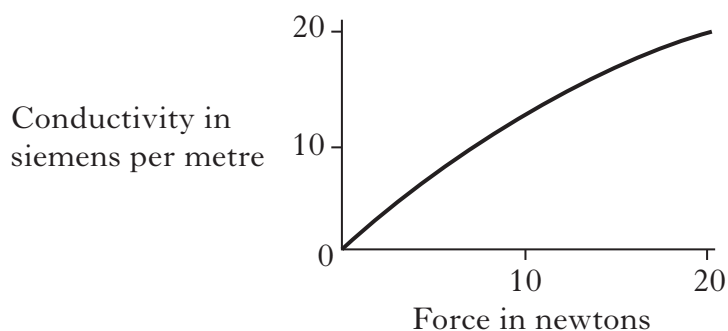
SECTION B

Marks

40 marks are available in this section of the paper.

All answers must be written clearly and legibly in ink.

1. Some smartphones contain materials called QTC's. QTC's are made by embedding nickel into a plastic. The conductivity of the QTC is affected by force as seen in the graph.



- (a) Use the graph to complete the sentence.

As the force increases the conductivity _____ . **1**

- (b) Nickel is an element with atomic number 28.

- (i) What type of element is nickel?

(You may wish to use page 8 of the data booklet to help you.)

_____ **1**

- (ii) Write the symbol for nickel.

(You may wish to use page 8 of the data booklet to help you.)

_____ **1**
(3)

Marks

2. Alpha hydroxy acids are used in the cosmetics industry and are claimed to reduce wrinkles and other visible signs of aging.

(a) Suggest a pH for alpha hydroxy acids.

_____ 1

(b) Cosmetic products contain different percentages of alpha hydroxy acids depending on their use.

Name of product	Use	Percentage of alpha hydroxy acids in product	Use
Strip Away	Chemical peels	10	Facial scrub
Nu-Skin	Treating acne scars	30	Chemical peels
Spot No More	Facial scrub	70	Treating acne scars

Name the product in which the alpha hydroxy acids are most concentrated.

_____ 1

(c) A bottle containing an alpha hydroxy acid would show the following hazard symbol.



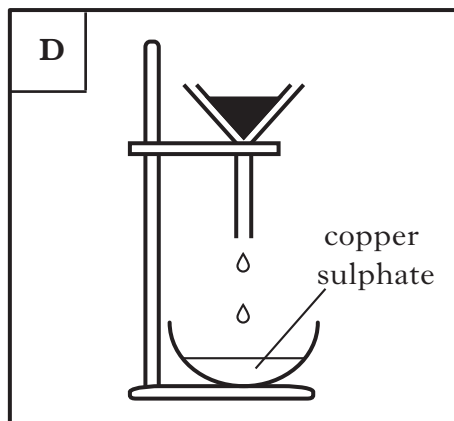
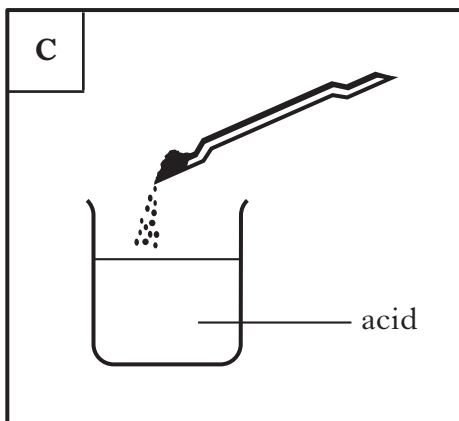
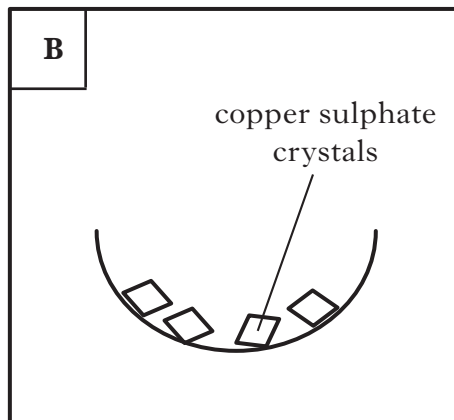
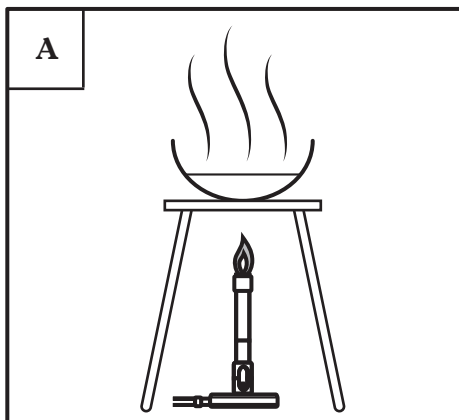
What does this hazard symbol mean?

_____ 1
(3)

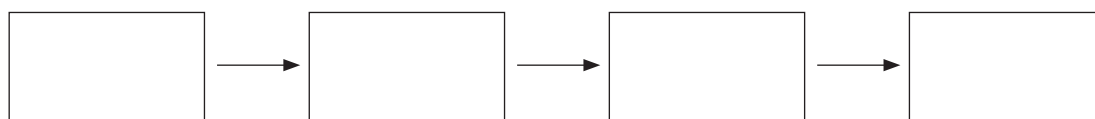
[Turn over

Marks

3. A student prepared a sample of copper sulphate crystals by reacting copper carbonate with acid. The solution was filtered to remove any unreacted copper carbonate and then heated to evaporate the water. The diagrams show the four steps involved.



- (a) Place a letter in each box to show the correct order in which this experiment would be carried out.



1

- (b) Name the acid used to make copper sulphate.

1

(2)

Marks

4. (a) Fruit in shipping containers can ripen too early if a chemical called ethene builds up in the container. Potassium permanganate is placed in the containers to prevent this. Purple potassium permanganate turns brown as it reacts with the ethene making potassium hydroxide and carbon dioxide.

From the information in the passage how can you tell that a chemical reaction takes place?

1

- (b) In Australia, potassium permanganate is used to prevent large bushfires spreading. It is mixed with other chemicals and dropped from aircraft. When the mixture hits the ground it starts a small fire and burns back some vegetation preventing the bushfire spreading.

- (i) Circle the part of the Fire Triangle which is removed when the vegetation is burned back.

**1**

- (ii) State another name for burning.

1**(3)****[Turn over**

Marks

5. To protect the Forth Rail Bridge from rusting it has been painted with a new type of paint. The painting involves applying three layers: a primer of zinc sulphate, a mid-layer of glass flake and a top coat.



- (a) How does painting protect the bridge from rusting?

1

- (b) Zinc sulphate is a compound containing the elements zinc and sulphur. Name the third element in zinc sulphate.

1

- (c) Glass in the glass flake layer can have the composition:

Substance	Percentage (%)
silica	72
sodium oxide	13
boric acid	4
aluminium oxide	

What is the percentage of aluminium oxide present in this glass?

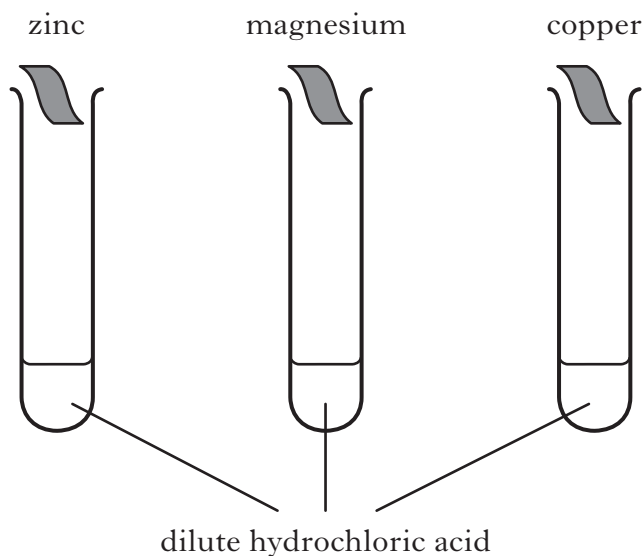
 %

1

(3)

Marks

6. In the PPA “Reactions of Metals with Acid” a student added different metals to dilute hydrochloric acid.



- (a) Complete the table to show the results that would be obtained when magnesium, zinc and copper are added to dilute hydrochloric acid.

Metal	Bubbles of gas produced?	Reaction speed
	yes	fast
copper		
	yes	medium

2

- (b) Name the gas produced when a metal reacts with dilute hydrochloric acid.

1

(3)

[Turn over

Marks

7. When marking a student's report on coal, the teacher circled two errors.
The marked report is shown.

Coal can be described as renewable.¹

It is a hydrocarbon and so it contains carbon and hydrogen.

When coal is burned it produces nitrogen dioxide² and water.

Give the correct answers for errors 1 and 2.

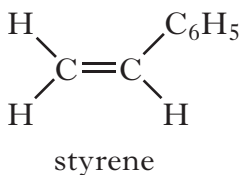
1 _____

2 _____

2
(2)

Marks

8. A polymer used to make some fast food containers is produced from the monomer styrene.



- (a) Name the polymer produced from styrene.

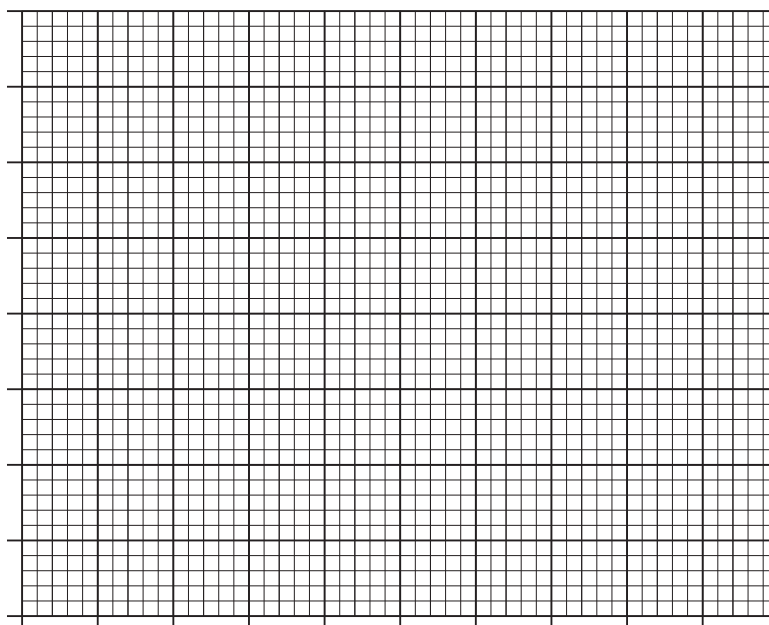
1

- (b) The polymer has a number of uses.

Use	% of Production
Packaging	36
Electronics	13
Appliances	13
Building materials	11
Other	27

Draw a bar graph to show this information.

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

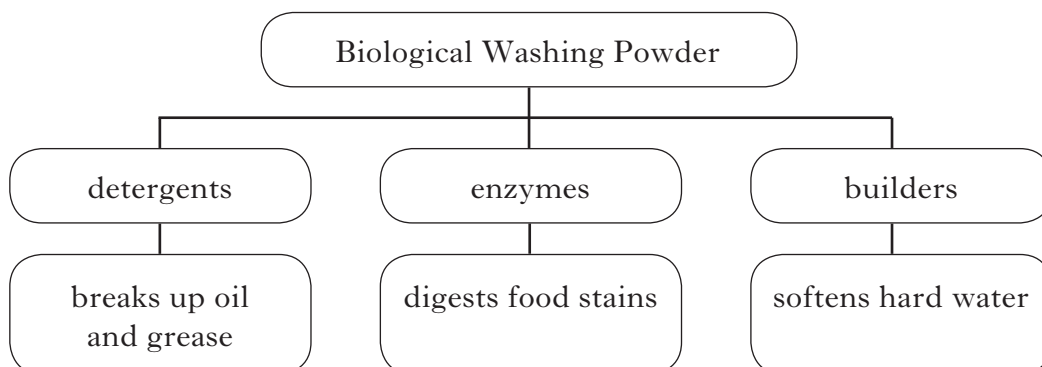


2

(3)

Marks

9. Biological washing powders, containing different types of chemicals, are used to clean clothes. The types of chemicals and their uses are shown in the chart.



- (a) Why are detergents able to break up grease and oil?

1

- (b) Suggest what could form if a washing powder with no builder present was used with hard water.

1

- (c) Why should high temperatures not be used with washing powders containing enzymes?

1

- (d) Proteases are enzymes which “digest” food stains by breaking down the proteins in the food.

What are formed when proteins are broken down?

1

(4)

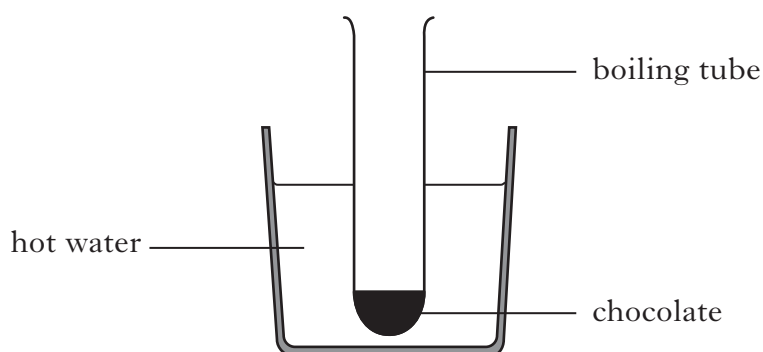
Marks

10. One of the main ingredients in chocolate is the fat, cocoa butter.

Cocoa butter can have six different crystal structures which are listed in order of increasing melting points.

Type of cocoa butter crystals	Melting point in °C
I	17.3
II	23.3
III	25.5
IV	27.3
V	33.8
VI	36.3

To find out what type of cocoa butter crystals are in a bar of chocolate, a student determined the melting point of the chocolate using the following experiment.



(a) Name the other piece of apparatus that the student would need to determine the melting point of the chocolate.

_____ 1

(b) The student found that the chocolate melted at 34 °C.

What type of cocoa butter crystals did the chocolate contain?

Type _____ 1
(2)

[Turn over

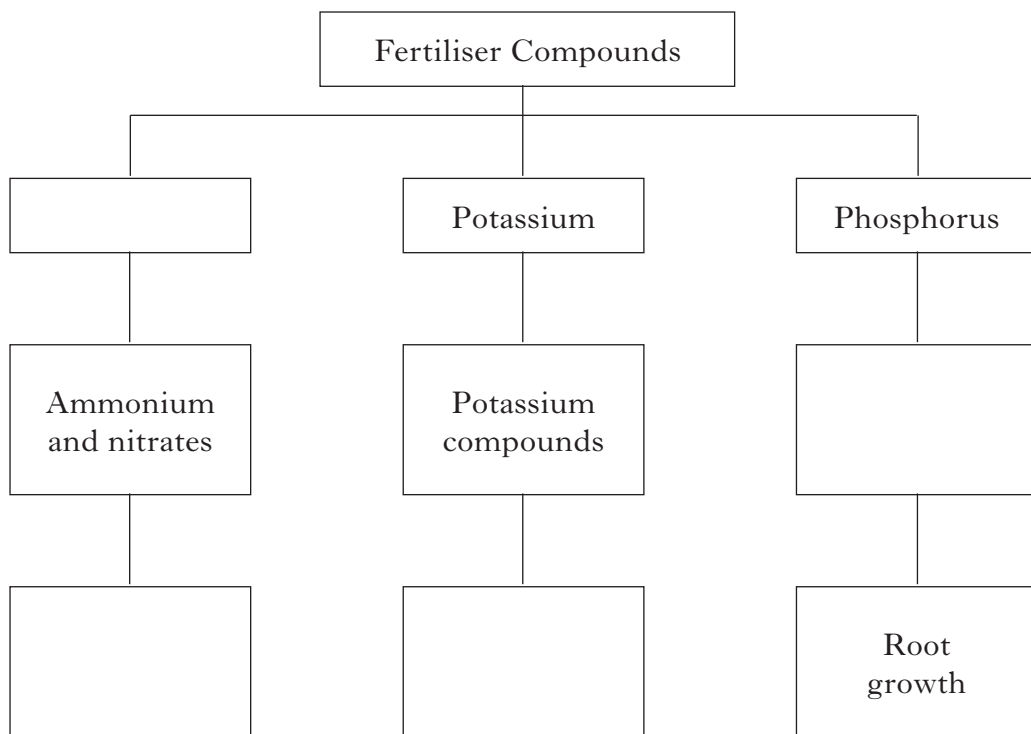
11. Fertilisers are added to the soil to restore essential elements.

Marks

- (a) Nitrogen is required for leaf growth. Phosphorus helps roots grow and potassium is needed for fruit growth.

The major artificial fertilisers are ammonium, nitrate, phosphate and potassium compounds.

Use this information to complete the key below.

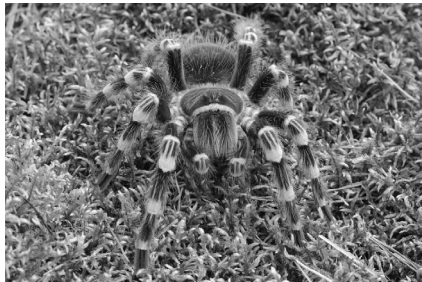


2

(b)

Spider venom could be plant saviour!

Scientists are trying to develop chemicals from spider venom that can be used to protect crops from pests without harming people or animals.



What type of chemicals are scientists trying to develop from spider venom?

1

(3)

Marks

12. Cupcakes are small cakes with a sponge base and an icing top.



- (a) The sponge is made from flour which contains the carbohydrate starch.

- (i) What are carbohydrates used for in the body?

_____ 1

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

Starch is identified using $\left\{ \begin{array}{l} \text{Benedict's} \\ \text{iodine} \end{array} \right\}$ solution which will turn

$\left\{ \begin{array}{l} \text{black} \\ \text{orange} \end{array} \right\}$.

1

- (b) The icing contains food additives.

State **one** reason why food additives are used in the icing.

1

(3)

[Turn over

Marks

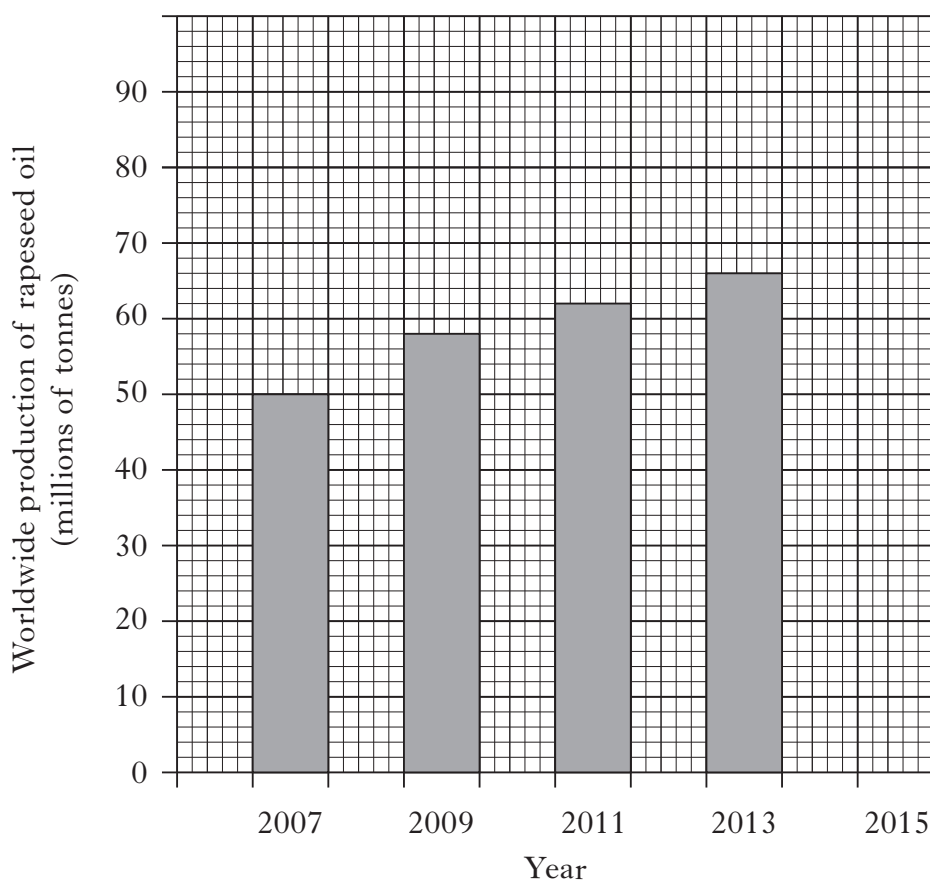
13. (a) People are encouraged to eat less saturated fats as they are thought to increase cholesterol.

What health problem can be caused by high levels of cholesterol in the blood stream?

1

- (b) Rapeseed oil is used as an alternative to olive oil as it contains half the saturated fat.

- (i) The graph shows the worldwide production of rapeseed oil since 2007.



Predict the worldwide production of rapeseed oil for 2015.

_____ millions of tonnes

1

Marks

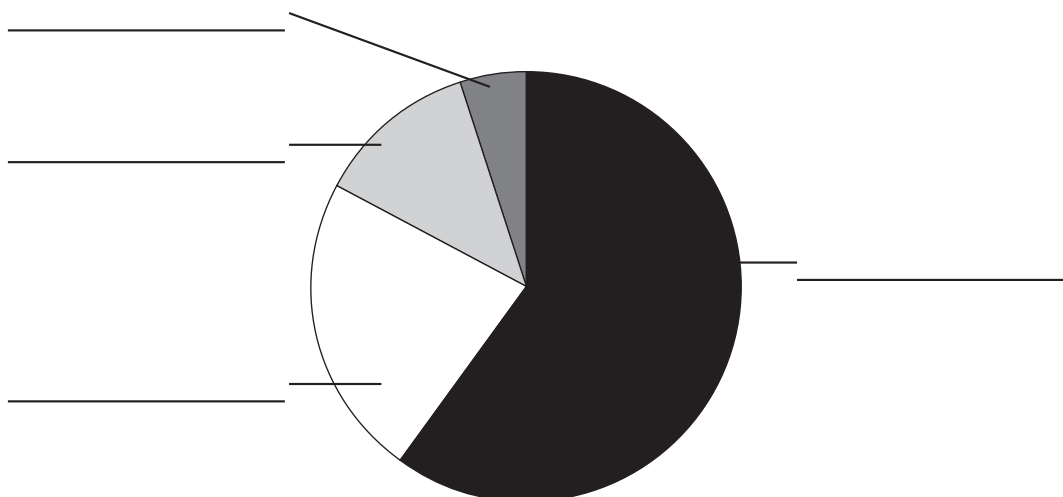
13. (b) (continued)

(ii) Rapeseed oil contains different fats and oils.

Fats and oils	Percentage (%)
Omega 9 oil	60
Omega 6 oil	23
Omega 3 oil	12
Saturated fat	5

Use the information in the table to label the pie chart.

(An additional pie chart, if required, can be found on *Page twenty-five.*)



1
(3)

[Turn over

Marks

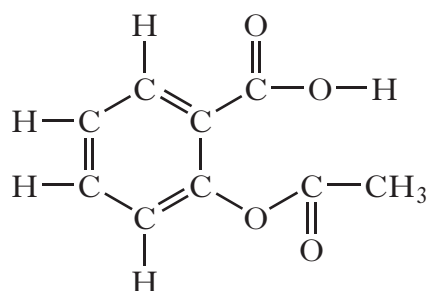
14. Aspirin is a widely used drug which can be taken to relieve minor aches and pains.



- (a) Complete the following sentence.

A **drug** is a substance which _____ . 1

- (b) The diagram represents a molecule of aspirin.



Complete the chemical formula for aspirin.

C₉ H ___ O ___ 1

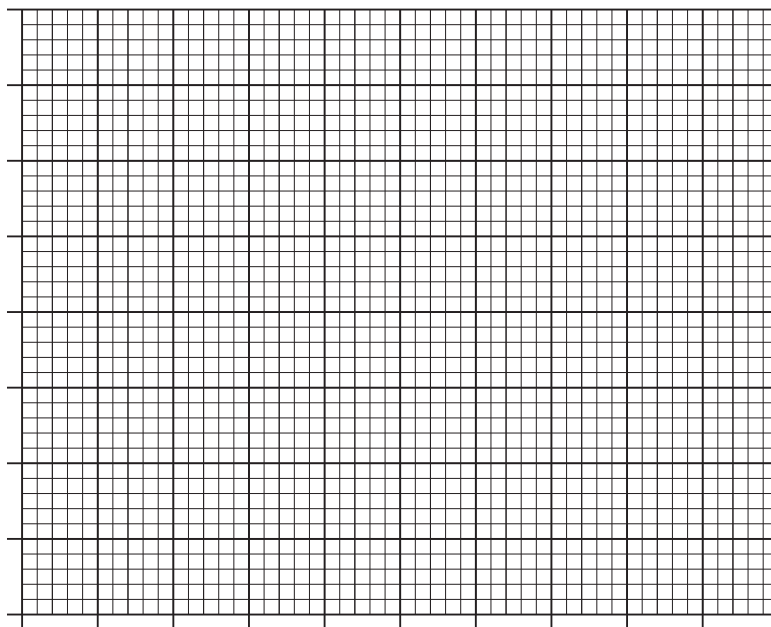
- (c) Aspirin is an example of a legal drug.
Give an example of an **illegal** drug.

1
(3)

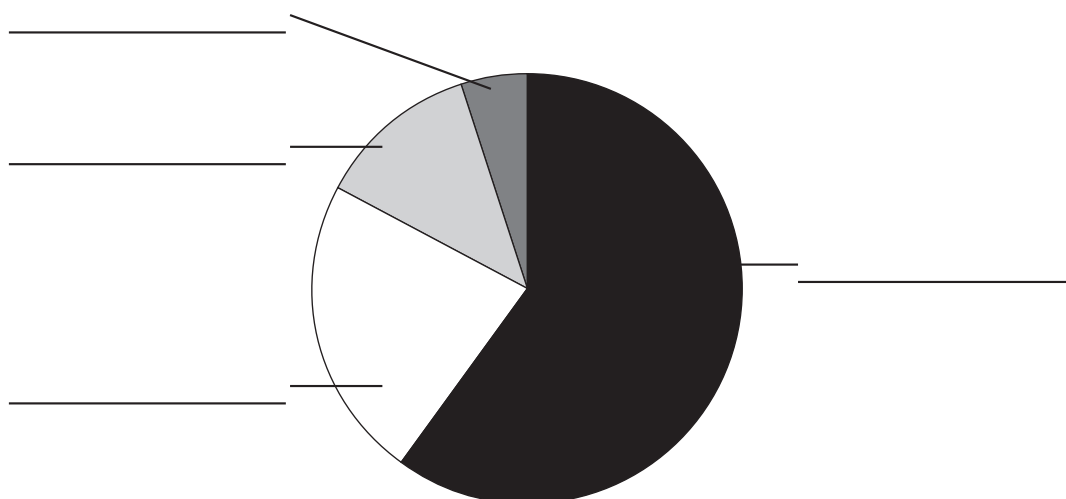
[END OF QUESTION PAPER]

ADDITIONAL SPACE FOR ANSWERS

ADDITIONAL GRAPH PAPER FOR QUESTION 8(b).



ADDITIONAL PIE CHART FOR QUESTION 13(b)(ii).



ADDITIONAL SPACE FOR ANSWERS

--	--

ADDITIONAL SPACE FOR ANSWERS

--	--

ACKNOWLEDGEMENT

Section B Question 5 – Ross Strachan/Shutterstock.com

Question Q11(*b*) – D. Kucharski K. Kucharska/Shutterstock.com

Question 12 – Pinkcandy/Shutterstock.com

Question 14 – Shane Maritch/Shutterstock.com