

GENERAL CERTIFICATE OF SECONDARY EDUCATION
APPLIED SCIENCE: DOUBLE AWARD

Unit 2: Science for the needs of society
 FOUNDATION TIER

FRIDAY 18 JANUARY 2008

Afternoon
 Time: 1 hour

Candidates answer on the question paper
Additional materials (enclosed): None

Additional materials (required):

- Pencil
- Ruler (cm/mm)
- Calculator



* C O P / T 4 5 3 2 0 *

Candidate Forename

Candidate Surname

Centre Number

Candidate Number

INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Do **not** write outside the box bordering each page.
- Write your answer to each question in the space provided.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **60**.
- The marks allocated and the spaces provided for your answers are a good indication of the length of answers required.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
1	10	
2	10	
3	10	
4	12	
5	8	
6	10	
TOTAL	60	

This document consists of **14** printed pages and **2** blank pages.

Answer **all** the questions.

- 1 Jo is a scientist who is interested in volcanoes.

She investigates the gases that come from a volcano in Hawaii.



This table shows the percentages of different gases coming from the volcano.

name of gas	percentage of gas	temperature
carbon dioxide	48%	1170 °C
water vapour	37%	
sulfur dioxide	12%	
other gases		

- (a) (i) What percentage of the volcano gas is **other gases**?

You must show your working.

..... % [2]

- (ii) Explain why the water coming from the volcano is a gas, not a liquid.

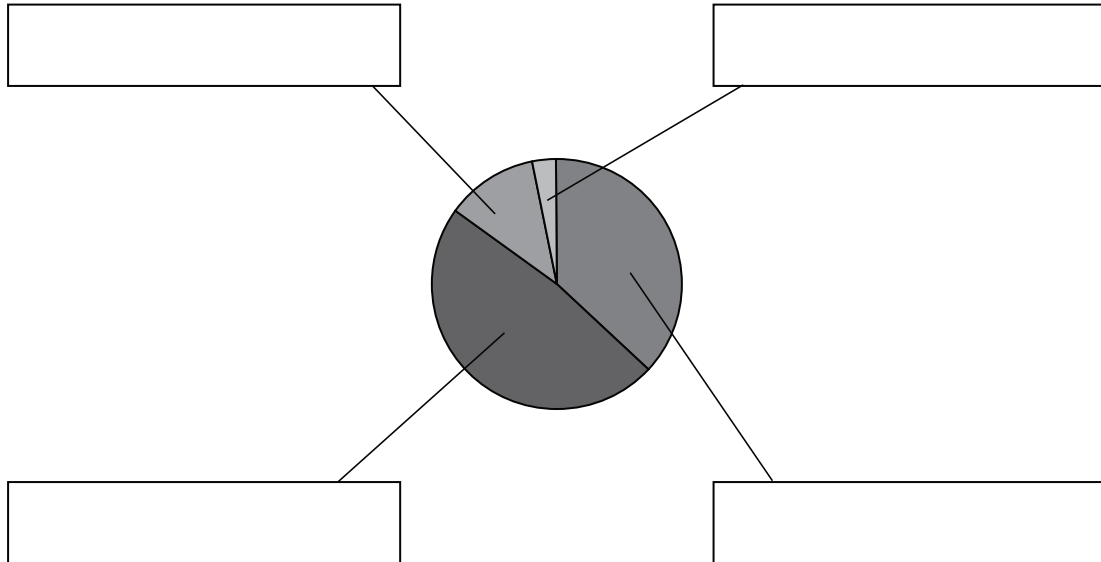
.....
 [2]

(iii) Jo draws a pie chart to show the percentages of gases in the table.

Label the pie chart to show the correct names of the gases.

Use these names.

carbon dioxide **water vapour** **sulfur dioxide** **other gases**



[2]

(b) Jo knows that the Earth's first atmosphere was formed thousands of millions of years ago. She thinks that the atmosphere was formed from gases that came out of volcanoes.

(i) The two most common gases in today's atmosphere are **not** produced by this volcano.

Name these **two** gases.

..... and [2]

(ii) Jo wears breathing apparatus when she is working near the volcano.

Explain why she would be in danger if she did not do this.

.....
..... [2]

[Total: 10]

2 Eve works for a water company.

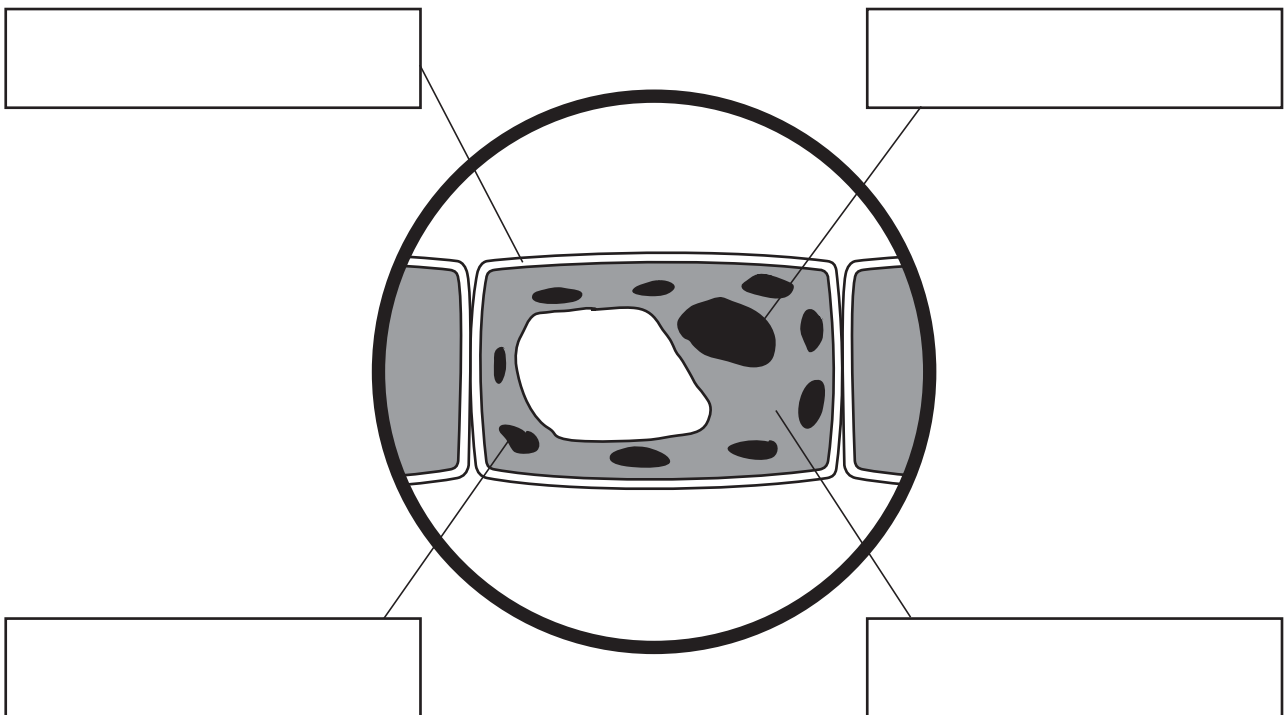
She investigates complaints that some dogs have become ill after swimming in a local reservoir.

The water in the reservoir contains a lot of plants called algae.

She collects samples of algae from around the edge of the reservoir.



(a) Eve looks at a sample of some green algae using a microscope.



(i) Complete the diagram by filling in the missing labels.

Choose from this list.

cell wall

chloroplast

cytoplasm

nucleus

vacuole

[3]

(ii) Draw straight lines to link each **cell part** with its **function**.

cell part	function
cell wall	contains genetic information
chloroplast	absorbs light for photosynthesis
nucleus	supports the cell

[2]

(b) Eve notices that there is a lot of **blue-green** algae floating on the water.

She uses the internet to find some information about blue-green algae.

A website has this information.

Blue-green algae are easy to spot because of their blue-green colour!
They carry out photosynthesis to make their own food.
Their cells have cell walls.
Their cells do not have chloroplasts.

(i) Give **two** ways that blue-green algae are **similar** to normal plants.

Use the information in the box to help you.

- 1.
- 2. [2]

(ii) How are blue-green algae **different** to normal plants?

Use the information in the box to help you.

.....
..... [1]

(c) The website also says that many blue-green algae contain toxins.

Contact with toxins can make animals and humans very ill.

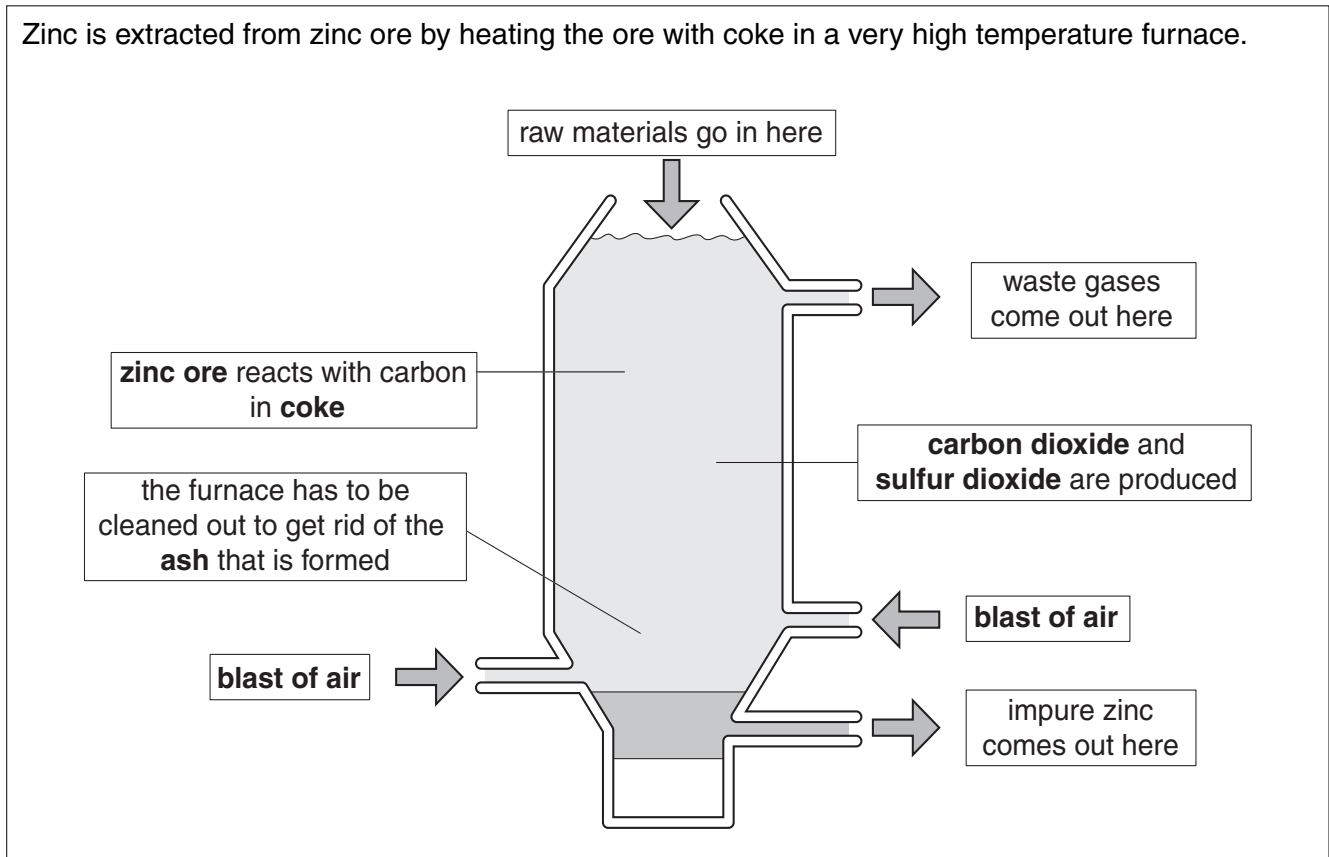
The water in the reservoir is used as a drinking water supply for a nearby town.

One way to kill the algae would be to add large amounts of herbicides to the reservoir.

Explain why this would **not** be a good idea.

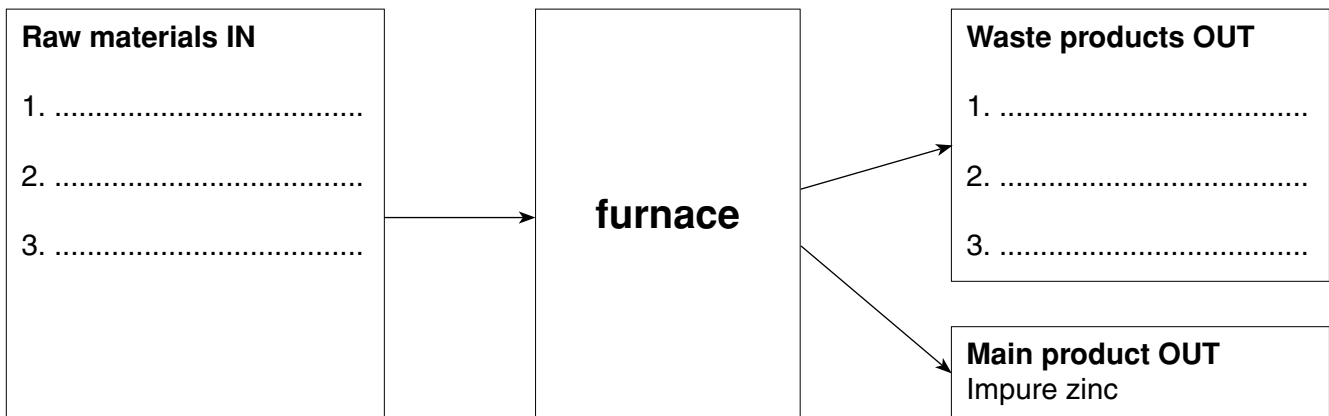
.....
..... [2]

3 This information comes from a book about the extraction of zinc from zinc ore.



(a) Complete the flow chart by filling in the boxes.

Use the words in **bold** on the diagram.



[3]

(b) Other metals can be extracted from metal ores by heating with carbon.

Name **one other metal** that can be extracted this way.

..... [1]

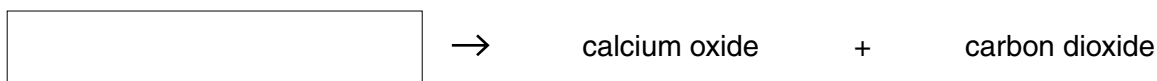
- (c) One type of zinc ore contains small amounts of zinc.

The rest of the ore is mainly calcium carbonate.

In the furnace, calcium carbonate breaks down to form calcium oxide and carbon dioxide.

Complete the equations for the reaction by filling in the empty boxes.

WORD EQUATION



SYMBOL EQUATION



[3]

- (d) Rubbish bins used to be made from iron coated with zinc.

Today, most rubbish bins are made from a polymer called polypropene.

The table shows some information about iron, zinc and polypropene.

	properties			
	strength	density (g/cm ³)	effect of heat	useful life
iron	very strong	7.1	melts at 1535 °C	20 years
zinc	very strong	7.9	melts at 420 °C	20 years
polypropene	strong	0.9	softens at 110 °C	10 years

- (i) State **two** properties that show why **all** of the materials are good for making rubbish bins.

1.

2. [2]

- (ii) Polypropene bins are cheaper to make.

Use the table to give one **other** advantage of using polypropene.

.....

..... [1]

[Total: 10]

4 Billy is Rose's grandad.

He catches a very severe dose of flu and is taken to hospital.



(a) Billy thinks he caught the flu from his friend.

State **two** ways that viruses, such as the flu virus, are passed between people.

- 1.
- 2. [2]

(b) Rose is pregnant. The doctor says it is very important that she does not catch flu from Billy.

Rose wants to visit Billy.

Suggest **two** precautions that Rose can take when she visits to make sure she does not catch flu.

- 1.
- 2. [2]

(c) The doctor tells Billy that he needs to make sure he does not catch flu again.

The doctor advises Billy to have a flu jab next year to immunise him against flu.

Complete the sentences to show what happens when Billy has a flu jab.

Choose from these words.

- | | | | |
|-------------------|--------------|-----------------|--------------|
| antibodies | atoms | diabetes | mumps |
| | red | viruses | white |

The flu jab contains dead

Billy's body reacts against them by making

These are made by the blood cells.

The same method can be used to protect against [4]

(d) Billy's doctor warns Billy that the flu may have weakened his heart, which will cause him to get tired quickly.

She says that a weak heart leads to less energy being produced in his muscles.

(i) Explain how this happens.

.....
..... [2]

(ii) The doctor tells Billy he needs to look after his heart.

She tells him not to smoke or drink alcohol and that he should keep active by going for a walk every day.

Explain how smoking, drinking and exercise can affect your heart.

.....
..... [2]

[Total: 12]

- 5 An advert for a new type of non-drip ice lolly says that the lolly does not drip when it melts.



The ice lolly is made from a gel made from locust bean gum (a solid) and sugar solution.

- (a) Which of the following words best describes a gel?

Put a **ring** around the correct answer.

element composite compound mixture

[1]

- (b) (i) Complete the table to show the structure of the gel in the non-drip ice lolly.

Choose from these words.

gas liquid solid solvent sugar

	continuous phase	dispersed phase
gel		

[2]

- (ii) Ice cream is made by freezing a colloid with the following structure.

continuous phase	dispersed phase
liquid	gas

What is the name for this type of colloid?

Put a **ring** around the correct answer.

aerosol foam sol suspension

[1]

(c) The ice lolly contains sugar solution.

What does the word **solution** mean?

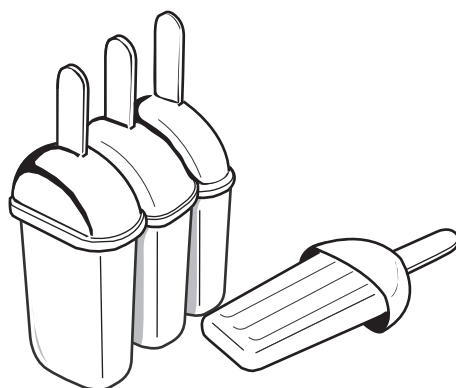
.....
..... [1]

(d) The company that makes the lollies wants to make a new version that would be suitable for diabetics.

How could the ingredients in the lolly be changed to make it more suitable for diabetics?

..... [1]

(e) The gel lollies are made by freezing the gel in moulds made from poly(ethene).



(i) One reason for using poly(ethene) to make ice lolly moulds is that it is easily shaped.

State **one other** property that makes poly(ethene) a good material for making ice lolly moulds.

..... [1]

(ii) Suggest a reason why poly(ethene) is **not** suitable to use as a container for **hot** foods.

..... [1]

[Total: 8]

6 John has received a report about the cost of home improvements and how they could save him money.

The home improvements all result in less energy being used.

improvement	cost (£)	annual saving (£)	payback time (years)
double glaze all windows	4000.00	69.34	20+
fit low energy light bulbs	100.00	35.79	3
put a thermostat on the hot water tank	114.00	19.95	6
install thick layers of fibreglass in loft	274.00	17.32	16
fit draught proofing	20.00	13.26	2

(a) (i) Give **two** improvements that involve insulation.

1.
2. [1]

(ii) Explain what is meant by insulation.

.....
 [1]

(b) Energy can be transferred by conduction, convection and radiation.

The layers of fibreglass in the loft reduce energy transfer by conduction and convection.

Complete the following sentences.

Choose words from the list.

Each word can be used once, more than once or not at all.

- gases foam heat liquids solids**

Conduction transfers heat through

The spaces in the fibreglass are filled with which reduces conduction.

Above the fibreglass, heat is transferred by convection currents in [3]

(c) (i) Explain what is meant by the final column 'payback time'.

.....
..... [1]

(ii) Another way for John to reduce his costs is to fit a timer to the heater in his hot water tank.

This would cost £115.50 to fit.

It would give John a saving of £10.50 each year.

Calculate the payback time.

You must show your working.

payback time = years [2]

(d) After looking at the information in the table, John decides not to double glaze his windows.

Suggest **two** reasons why John did **not** double glaze his windows.

reason 1
.....
reason 2
..... [2]

[Total: 10]

END OF QUESTION PAPER

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