

**GENERAL CERTIFICATE OF SECONDARY EDUCATION
APPLIED SCIENCE: DOUBLE AWARD**

**J649
B482/02**

Unit 2: Science for the needs of society
(Higher Tier)

Candidates answer on the Question Paper
A calculator may be used for this paper

OCR Supplied Materials:
None

Other Materials Required:

- Pencil
- Ruler (cm/mm)

**Wednesday 9 June 2010
Afternoon**

Duration: 1 hour



Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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INSTRUCTIONS TO CANDIDATES

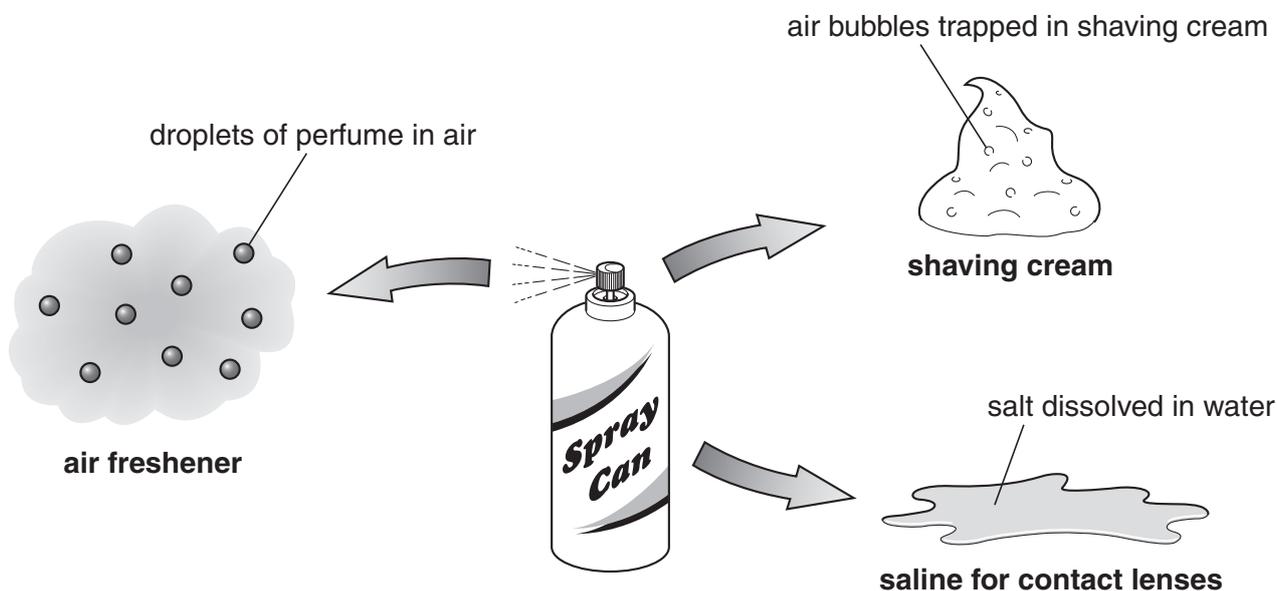
- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the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

INFORMATION FOR CANDIDATES

- The number of marks 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 are a good indication of the length of answers required.
- This document consists of **12** pages. Any blank pages are indicated.

Answer **all** the questions.

- 1 Some bathroom products are sold in spray cans.



- (a) What type of mixture is saline?

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

suspension solution solvent solvation emulsion

[1]

- (b) Complete the table to show the continuous and dispersed phases in shaving cream and air freshener.

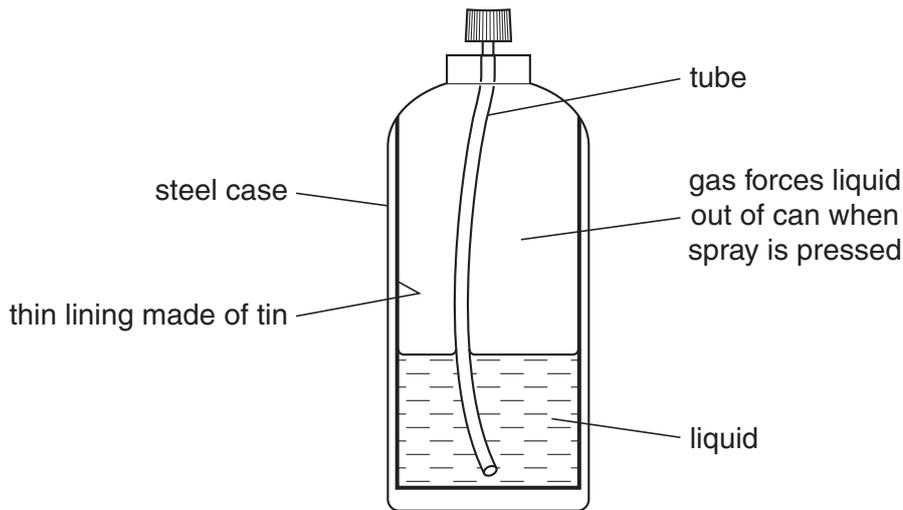
Use these words.

You may use each word once, more than once or not at all.

	solid	liquid	gas
	continuous phase		dispersed phase
shaving cream			
air freshener			

[3]

(c) The diagram shows the structure of a spray can.



The metals from the spray can can be recycled.

(i) Give **two** advantages of recycling the metals from spray cans.

.....
 [2]

(ii) Give one reason why it is difficult to recycle the metals from spray cans.

..... [1]

(d) The spray can contains a gas to force the contents of the can to spray out.

The table shows some information about gases that were used in spray cans.

formula of gas	boiling point °C
$\text{CF}_3\text{CH}_2\text{F}$	16
CH_3OCH_3	19
CH_3CHF_2	19

(i) What elements do **all** these gases contain?

..... [1]

(ii) Spray cans that use these gases do not work as well if they are stored at 5 °C.

Explain why.

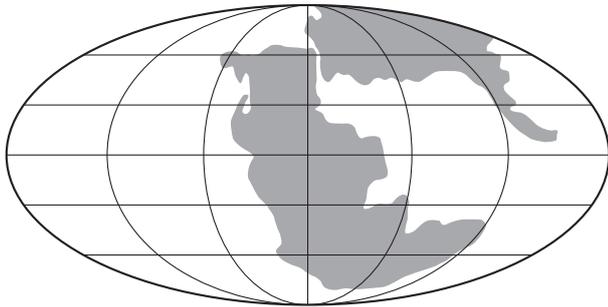
.....
 [2]

[Total: 10]

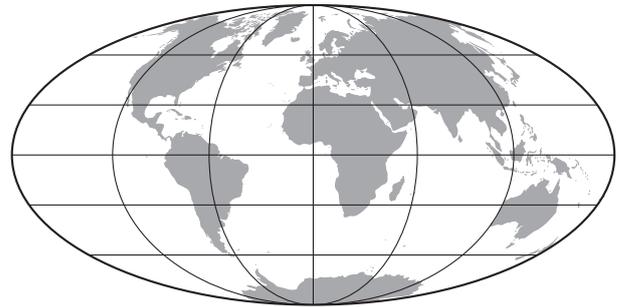
Turn over

2 Scientists think the Earth was very different in the past.

The diagrams show the Earth 190 million years ago and today.



190 million years ago



today

(a) (i) The arrangement of the continents has changed.

Explain how the change has happened.

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

(ii) The change in the continents is very slow.

Other changes to the Earth's surface are caused by the same process.

Write down one other change caused by this process that is also very slow.

..... [1]

(b) When life first developed on Earth the atmosphere was mostly carbon dioxide with very little oxygen.

Now there is very little carbon dioxide and about 20% oxygen.

What process carried out by living things could have brought about this change?

..... [1]

(c) We could not survive without both oxygen and carbon dioxide in the atmosphere.

(i) Explain why oxygen is necessary.

..... [1]

(ii) Without carbon dioxide in the atmosphere, the climate of the Earth would not be suitable for life.

Explain why.

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

(d) The Earth was formed about 5 000 million years ago.

The Earth is part of the Solar System.

(i) What does the Solar System contain?

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

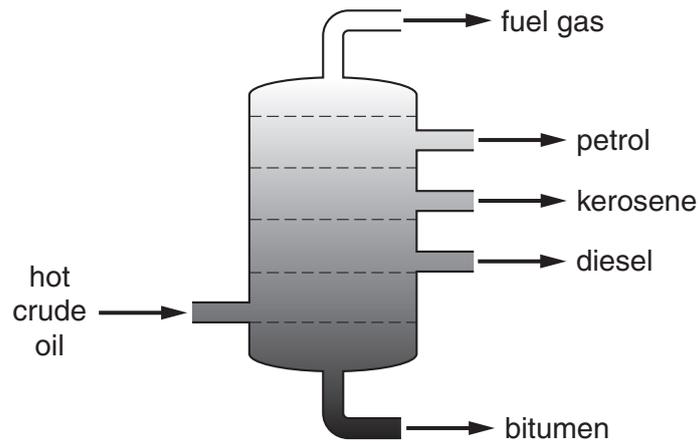
(ii) The Solar System is part of the Universe.

How do scientists think the Universe started?

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

[Total: 10]

3 The diagram shows how crude oil is separated into fractions.



(a) Why does the crude oil need to be heated before it enters the column?

..... [1]

(b) Which of the following statements about the process are true and which are false?

Put a tick (✓) in one of the boxes in each row.

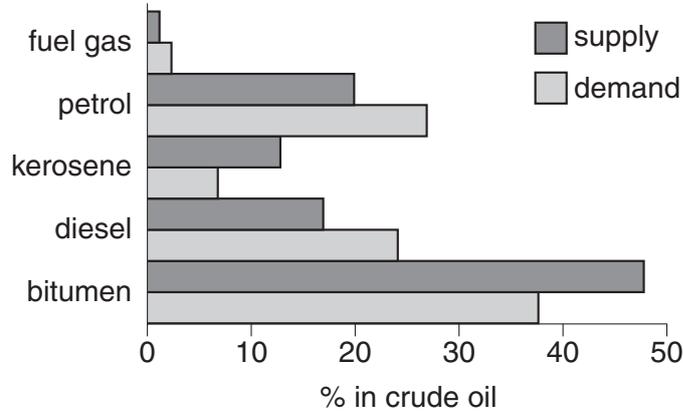
	true	false
The fractions that contain the smallest molecules come out of the top of the column.		
The largest molecules have the lowest boiling points.		
The process involves distillation.		
The fractions produced are speciality chemicals.		
The compounds in the fractions are organic chemicals.		

[3]

(c) The bar chart shows the supply and demand for the oil fractions.

Supply is the percentage of each fraction that comes out of the column.

Demand is the percentage that people want to buy.



(i) Which fractions have a higher demand than supply?

..... [1]

(ii) If the company sells enough petrol to meet demand, the supplies of kerosene and bitumen build up.

Explain why.

.....
 [2]

(iii) The company uses a cracking process to help supply meet demand.

Large molecules in oil fractions are cracked to make smaller molecules.

Explain why this helps the supply meet demand.

.....
 [2]

(d) Most of the oil fractions are sold for use as fuels.

Give one **other** use of oil fractions.

..... [1]

[Total: 10]

4 Iain is a gamekeeper on a Scottish moorland.

His job is to make sure there are plenty of grouse for shooting.

He has written a short article for a local newspaper about grouse shooting.

Grouse Shooting – A Big Business

Northern Scotland has lots of moorlands. These are large areas of heather and grass which provide food for grouse and small animals such as voles.

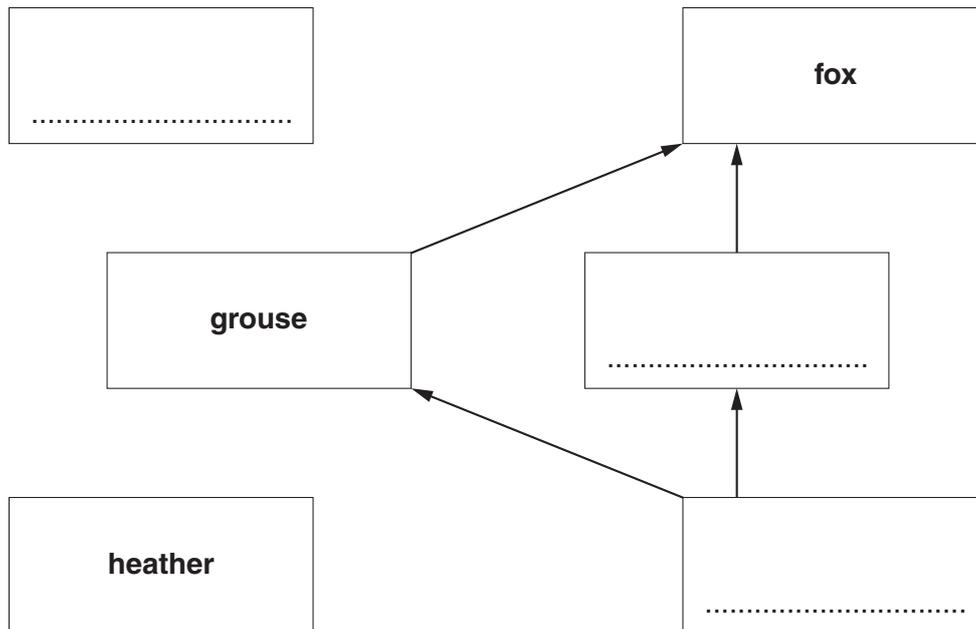
The main predators are foxes which feed on the voles and the grouse.

The moorlands are being developed for business. At certain times of the year groups of hunters visit the moorlands to shoot the grouse. The hunters bring a lot of money into the area. The hunting business also provides jobs for people. The grouse are cooked and eaten by the human hunters.

(a) Complete the food web for the moorland habitat.

Use information from the article.

You should complete the boxes and add the correct arrows.



[2]

(b) One of Iain’s jobs as gamekeeper is to kill the foxes.

Explain the benefit of killing foxes.

Use the information above to help you.

.....

.....

[2]

(c) Some people say that shooting grouse and foxes is wrong and should be stopped.

(i) What effect would a ban on shooting **foxes** have on the number of voles?

You must explain your answer.

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

(ii) What effect would a ban on shooting **grouse** have on the number of voles?

You must explain your answer.

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

(d) When grouse fly high they are easier to shoot.

Iain is trying to breed grouse that will fly higher.

Explain how Iain could use **selective breeding** to do this.

.....
.....
.....
..... [3]

[Total: 10]

5 Sam is an adviser on energy efficiency in the home.

He tells people how they can cut down on energy wastage in their homes.

(a) Sam explains that energy is lost from houses by conduction, convection and radiation.

(i) Each diagram shows one of the processes by which energy is lost from a house.

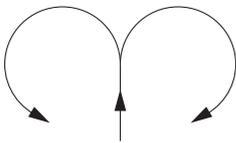
Complete the labels for the diagrams with the name of the process it shows.

((○)) ((○)) ((○))

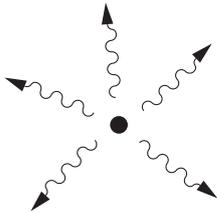
((○)) ((○)) ((○))

((○)) ((○)) ((○))

..... involves vibrating particles



..... involves air moving



..... involves electromagnetic waves

[3]

- (ii) Explain how energy is **transferred** from hot areas to cold areas by conduction and by convection.

Use ideas about particles.

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

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

- (iii) Double glazing is an insulation method which reduces heat transfer.

Explain how double glazing reduces the heat transfer.

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

- (b) Sam calculates the energy efficiency of a house.

He works out that the total energy coming into the house is 250 000 MJ.

150 000 MJ of this energy is used usefully.

Calculate the percentage efficiency of the house.

You must show your working.

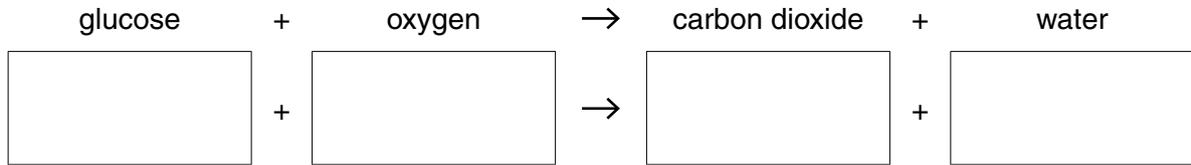
efficiency = % [3]

[Total: 12]

6 Sports scientists are very interested in respiration.

Respiration is the chemical reaction that provides energy to muscles.

(a) Fill in the boxes to complete the **balanced** chemical equation for **aerobic** respiration.



[3]

(b) During exercise the body can use up its available oxygen.

Muscle cells then respire anaerobically.

(i) What is the advantage of aerobic respiration over anaerobic respiration?

..... [1]

(ii) During anaerobic respiration lactic acid is produced.

Explain why the presence of lactic acid results in an 'oxygen debt'.

.....
 [2]

(c) When the body is short of oxygen the breathing rate increases.

However, it is **not** the shortage of oxygen that brings about the increase in the breathing rate.

Explain what brings about the increase in the breathing rate.

.....

 [2]

[Total: 8]

END OF QUESTION PAPER



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