

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
TOTAL	



General Certificate of Secondary Education
Higher Tier
March 2013

Science B

SCB1HP

Unit 1 My World

H

Written Paper

Tuesday 5 March 2013 9.00 am to 10.00 am

For this paper you must have:

- a ruler.
- You may use a calculator.

Time allowed

- 1 hour

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.
- Question 3(b) should be answered in continuous prose. In this question you will be marked on your ability to:
 - use good English
 - organise information clearly
 - use specialist vocabulary where appropriate.

Advice

- In all calculations, show clearly how you work out your answer.



M A R 1 3 S C B 1 H P O 1

G/J91345 6/6/6/6/3/2

SCB1HP

Answer **all** questions in the spaces provided.

1 The 'Megaclean' company produce cleaning products for kitchens and bathrooms.

The cleaning products contain abrasives such as calcite (CaCO_3), silica (SiO_2) and silicon carbide (SiC).

1 (a) (i) The word equation below shows the manufacture of calcite.

calcium hydroxide + carbon dioxide \rightarrow calcite + water

Complete the symbol equation for this reaction.



1 (a) (ii) Give the chemical name of calcite
(1 mark)

1 (a) (iii) In the reaction the mass of the reactants is conserved.

A What does 'conservation of mass' mean?

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.....

B Why is mass conserved in a reaction?

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.....

(2 marks)

1 (a) (iv) When 'Megaclean' make calcite they react 111 g of calcium hydroxide with 66 g of carbon dioxide to complete the reaction.

27 g of water is produced in the reaction.

What is the mass of calcite produced?

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.....

..... g
(2 marks)



1 (a) (v) It is inefficient to add more carbon dioxide to 111 g of calcium hydroxide.

Suggest why.

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(2 marks)

1 (b) Many people have marble tiles in their kitchens.



People need to use cleaners that do **not** scratch the tiles.

The table shows some data about the hardness of abrasives in the cleaners.

Abrasive	Hardness scale
calcite	3
silica	7
silicon carbide	13

Marble has a hardness of 5 on the hardness scale.

Which product would you recommend to use on marble tiles? Explain why.

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.....

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(2 marks)



2 Many metals have to be extracted from compounds called ores.

2 (a) The table shows a reactivity series.

Reactivity	Material
Most reactive ↑ ↓ Least reactive	potassium
	sodium
	magnesium
	aluminium
	carbon
	zinc
	lead
	hydrogen
	copper
	gold

Use the information in the table to help you answer the questions.

2 (a) (i) Give the method used to extract sodium from its ore.

.....
(1 mark)

2 (a) (ii) Name **one** metal in the table that can be extracted by heating the ore with carbon.

.....
(1 mark)

2 (a) (iii) Copper can be extracted by heating the ore with hydrogen.

Use the table to explain why.

.....
.....
(1 mark)



2 (b) Iron is made by heating iron ore (iron oxide, Fe_2O_3) with carbon monoxide (CO) in a blast furnace.

2 (b) (i) Describe how the carbon monoxide is produced in the blast furnace.

.....
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.....
.....

(2 marks)

2 (b) (ii) Write a balanced symbol equation for the reaction between iron oxide and carbon monoxide.

.....

(3 marks)

2 (b) (iii) The production of iron from iron ore involves both oxidation reactions and reduction reactions. Explain why.

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(2 marks)

10

Turn over for the next question

Turn over ►



3 (a) Crude oil is a mixture of compounds. Some of these compounds are called alkanes.
Three examples of alkanes are pentane (C_5H_{12}), octane (C_8H_{18}) and decane ($C_{10}H_{22}$).

3 (a) (i) Name the atoms in alkanes.

.....
(1 mark)

3 (a) (ii) How many atoms are there in total in octane?

.....
(1 mark)

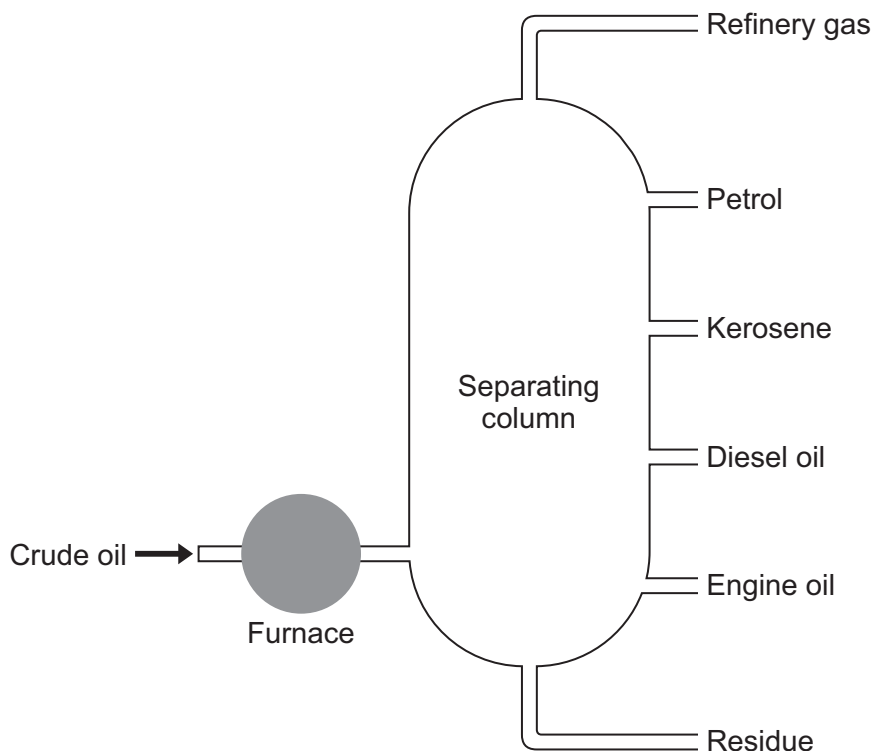
3 (a) (iii) Octane is a compound and crude oil is a mixture. Explain why.

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(2 marks)

3 (b) *In this question you will be assessed on using good English, organising information clearly and using scientific terms where appropriate.*

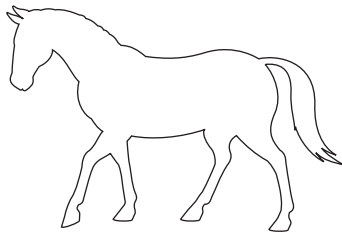
The diagram shows equipment used to separate the materials found in crude oil.

The separated materials are named on the diagram.

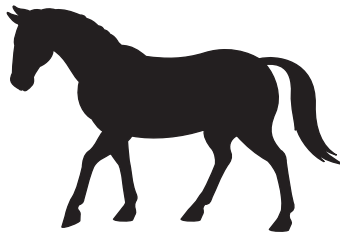


4 Horseflies are insects that feed on the blood of animals.
The animals may become weak because of blood loss.
Fatal infections may be passed to the animal by the insect's bite.
Scientists put three model horses in an area where lots of horseflies live.
The models had a sticky surface to trap the horseflies. The results are shown in the diagram.

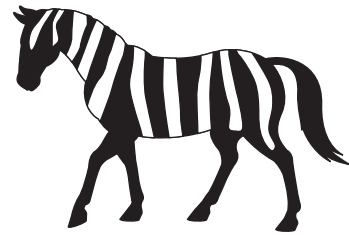
78 horseflies trapped



143 horseflies trapped



15 horseflies trapped



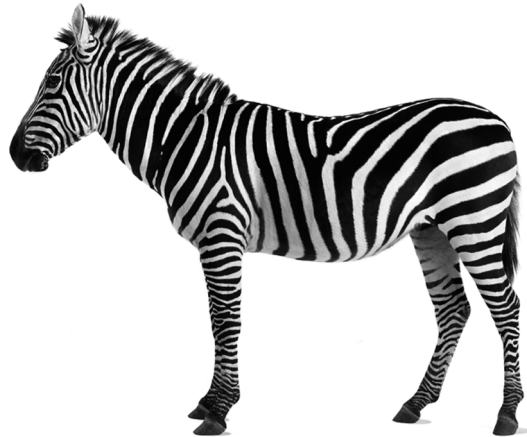
4 (a) Calculate the percentage of horseflies that were trapped on the striped model.

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.....

Answer %
(2 marks)



4 (b) The photograph shows a zebra, which has black and white stripes.



Use the information given and your knowledge to suggest how the zebra might have evolved from ancestors which had either black or white coats.

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(5 marks)

Question 4 continues on the next page

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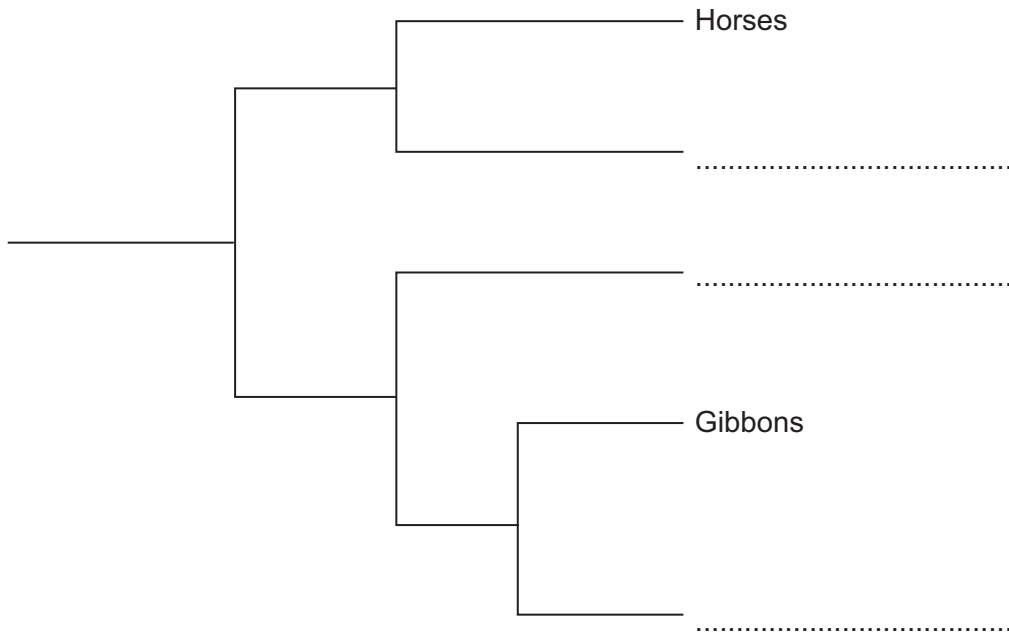


4 (c) Biologists put animals into groups based upon characteristics the animals share. These groups can be organised into an evolutionary tree.

Gibbons are more closely related to chimpanzees than to gorillas.

Horses are more closely related to zebras than chimpanzees, gibbons or gorillas.

Use this information to complete the evolutionary tree.



(1 mark)

8



Turn over for the next question

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ANSWER IN THE SPACES PROVIDED**

Turn over ►



5 Living organisms on Earth are found in the biosphere. The organisms make up food chains which need a constant supply of energy so that the organisms stay alive.

5 (a) (i) Describe how energy enters the food chains in the biosphere.

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(3 marks)

5 (a) (ii) Describe how energy leaves the living organisms found in the biosphere.

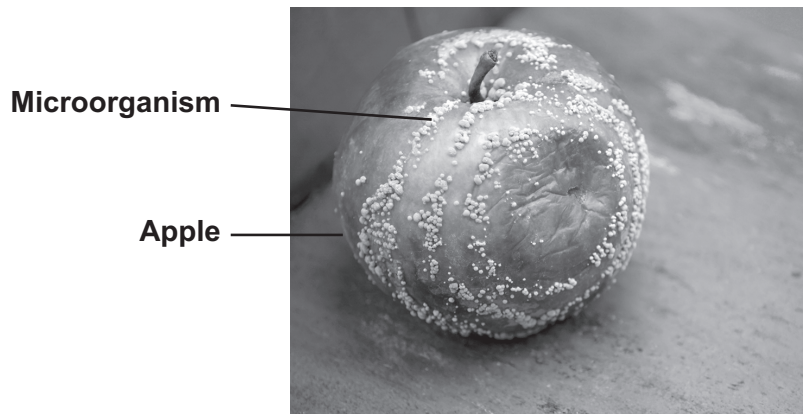
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(2 marks)

5 (b) The photograph shows a microorganism growing on an apple.



5 (b) (i) Name the process shown in the photograph, and suggest the type of microorganism responsible for the process.

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(2 marks)



5 (b) (ii) What does the microorganism get from this process?

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(2 marks)

5 (b) (iii) The process shown in the photograph is important for life on Earth to continue.

Explain why.

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(2 marks)

11

Turn over for the next question

Turn over ►



6 Astronomers have discovered a star 5.2 light years from Earth. The star is very similar to the Sun and is moving away from the Earth.

6 (a) Describe how astronomers could estimate the speed the star is moving away from the Earth.

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(3 marks)

6 (b) There are two planets, called P1 and P2, orbiting the star. The table shows some information about planets P1 and P2, and some planets in the solar system.

		Planets				
		Mercury	Venus	Planet P1	Earth	Planet P2
Relative distance of planet from star		0.4	0.7	0.8	1.0	1.1
Average surface temperature in °C		260	480	110	22	25
Percentage of gas in the atmosphere	Nitrogen	0	3.4	70.0	78.0	74.3
	Oxygen	0	0	0	20.9	23.0
	Carbon dioxide	0	96.5	1.2	0.4	0.7
	Water vapour	0	0	17.0	0.4	1.0
	Other gases	0	0.1	11.8	0.3	1.0



6 (b) (i) Venus does **not** fit the pattern for average surface temperature.

Use the data and your own knowledge and understanding to explain why Venus does **not** fit the pattern.

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(4 marks)

6 (b) (ii) The astronomers believe that there is life on planet P2 but **not** on P1.

Suggest why the astronomers think that planet P2 **could** support life but P1 could **not**.

Explain your answer.

.....

.....

.....

(2 marks)

6 (b) (iii) Suggest why the astronomers think that planet P2 **does** support life.

Explain your answer.

.....

.....

.....

(2 marks)

11

END OF QUESTIONS



There are no questions printed on this page

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