Surname

Other Names

Candidate Signature

AQA

General Certificate of Secondary Education
Higher Tier
March 2012

Science B

Unit 3   Making My World a Better Place

Written Paper

Thursday 8 March 2012   9.00 am to 10.00 am

SCB3HP

H

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 reminded of the need for good English and clear presentation in your answers.
● Question 4(a) 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.
● You are expected to use a calculator where appropriate.

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

SCB3HP

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ANSWER IN THE SPACES PROVIDED

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

1 (a) Alcohol is a recreational drug. Drinking alcohol can harm the body.

State **two** harmful effects that drinking alcohol can have on the body.

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(2 marks)

1 (b) Some drugs are very addictive. Cocaine is an example of an addictive drug.

If someone takes an addictive drug over a long period of time, they will suffer from symptoms when they stop taking the drug.

What is the name given to these symptoms?

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(1 mark)

Turn over for the next question

3

Turn over ▶

2 (a) Pathogens are organisms that can cause disease when they enter the body.

Give **four** ways that pathogens can enter the human body.

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(4 marks)

2 (b) Vaccinations are used to prevent humans becoming infected by bacteria and viruses.
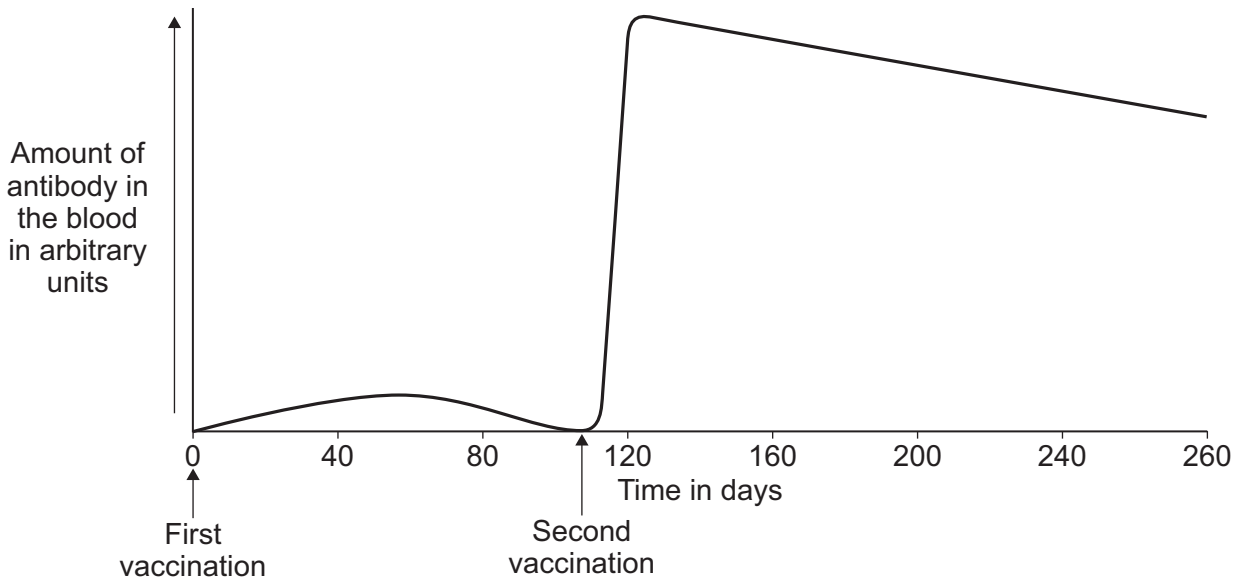
2 (b) (i) Describe the trends shown on the graph.

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(3 marks)

2 (b) (ii) Explain how resistant strains of bacteria develop.

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(2 marks)

9

Turn over for the next question

Turn over ▶

0 5

3 (a) Methane is a greenhouse gas. Methane contributes to global warming.

The data in the table shows emissions caused by non-agricultural sources (eg landfill sites) in the UK between 1999 and 2009.

	Year					
	1999	**2001**	**2003**	**2005**	**2007**	**2009**
Methane production in thousand tonnes	2348	1980	1600	1400	1280	1220

3 (a) (i) Use the data to plot a graph to show how the production of methane from non-agricultural sources changed between 1999 and 2009.

Draw a smooth line of best fit on your graph.

The first two points have been plotted for you.
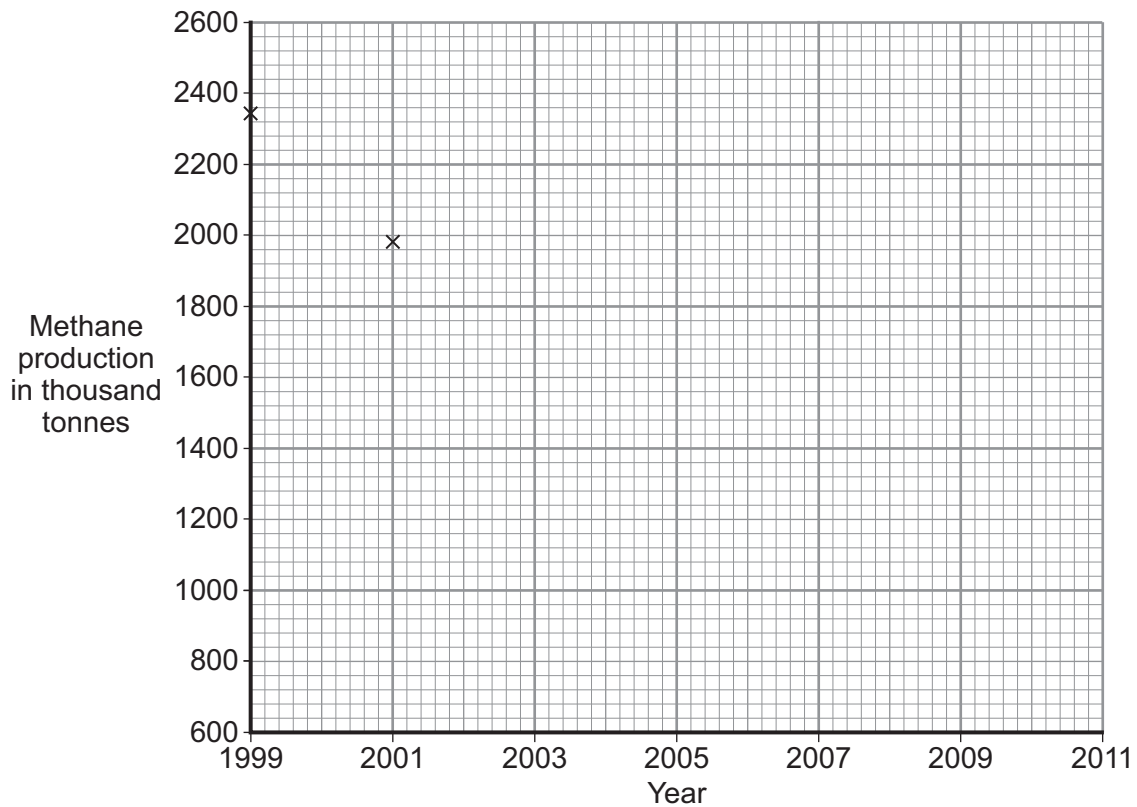
(3 marks)

3 (a) (ii) Describe the pattern shown in the graph.

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(2 marks)

3 (b) (i) Calculate the percentage decrease in methane emissions from non-agricultural sources between 1999 and 2009.

Show clearly how you work out your answer.

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Percentage decrease = ... %

(2 marks)

3 (b) (ii) The percentage decrease in methane emissions from agricultural sources between 1999 and 2009 was 14.5%.

Compare the effectiveness of methane-reduction schemes in agriculture and non-agriculture between 1999 and 2009.

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(2 marks)

3 (c) Methane, carbon dioxide and water vapour are greenhouse gases.

3 (c) (i) Name **one** other greenhouse gas.

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(1 mark)

3 (c) (ii) Give **one** way in which the gas you named in **3(c)(i)** is produced.

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(1 mark)

11

Turn over ▶

4 (a) *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

Objects can be electroplated, for example to make silver-plated jewellery.

The diagram shows the apparatus used for electroplating a nickel ring with silver.

Battery

Ring to be electroplated

Silver used for electroplating

Silver nitrate solution
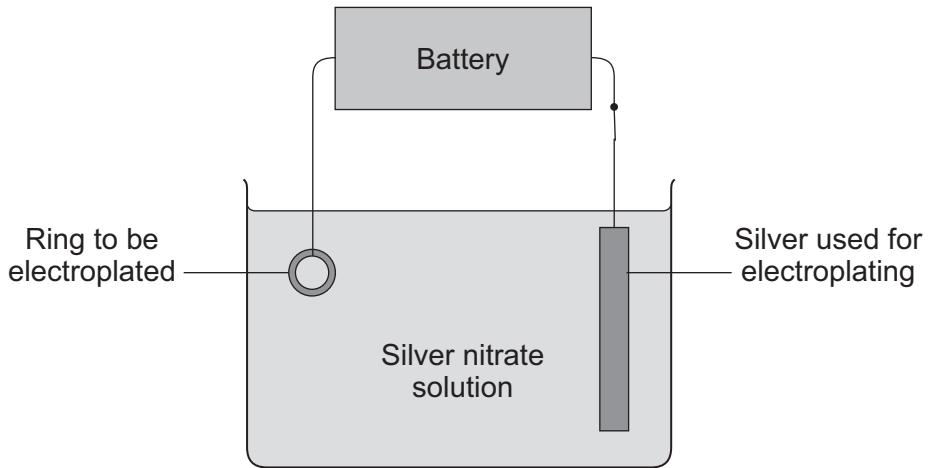
The nickel ring becomes electroplated with silver. Why?

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(6 marks)

4 (b) Give **two** reasons why nickel jewellery is often plated with silver.

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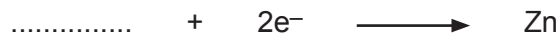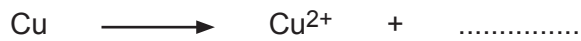
(2 marks)

4 (c) Copper can be plated with zinc using electrolysis.

The equations below show this reaction.

Complete the equations.

$$Cu \longrightarrow Cu^{2+} + \text{..............}$$

$$\text{..............} + 2e^- \longrightarrow Zn$$

(2 marks)
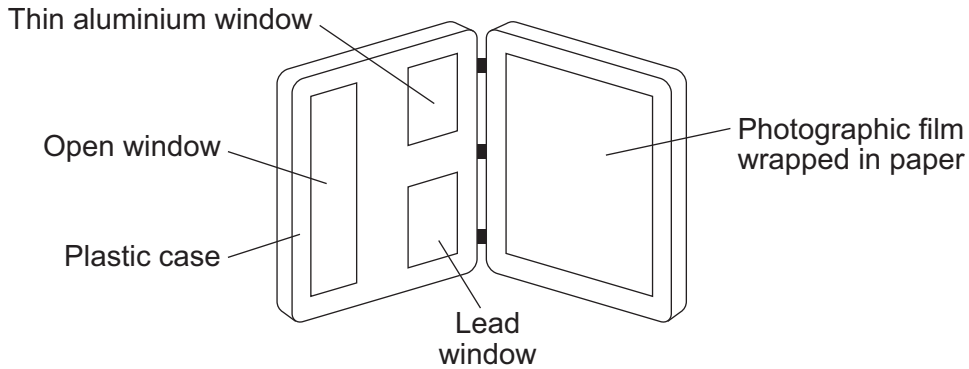
10

Turn over for the next question

Turn over ▶

5 The diagram shows a film badge that is worn by people who work with radioactive materials.

The badge has been opened.

The badge is used to detect the type of radiation to which the workers have been exposed.

Thin aluminium window

Open window

Plastic case

Lead window

Photographic film wrapped in paper

5 (a) Use the diagram to describe how the badge is designed to detect different types of radiation.

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(3 marks)

5 (b) X-rays are commonly used in hospitals to diagnose broken bones.

Explain how the properties of X-rays enable them to be used to diagnose broken bones.

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(3 marks)

6

6 Plastics are used widely for packaging goods.

Many of these plastics are non-biodegradable.

6 (a) Non-biodegradable plastics used for packaging are often put into landfill.

Give **two** disadvantages of disposing of non-biodegradable plastics in landfill.

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(2 marks)

6 (b) Name **two** types of modern degradable plastics, and describe how each one is designed to degrade.

Plastic 1 ....

Description ....

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Plastic 2 ....

Description ....

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(4 marks)

Turn over for the next question

6

7 Energy consultants give advice on improving the energy efficiency of buildings.

7 (a) Most houses lose a significant amount of heat energy through their windows.

Table 1 shows the *U-values* of different types of window glazing.

Table 1

Type of window glazing	Typical U-value
Single glazing	4.8
Triple glazing	2.4

7 (a) (i) What is meant by a *U-value*?

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(1 mark)

7 (a) (ii) Use the data in **Table 1** to compare the efficiency of single glazing and triple glazing.

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(2 marks)

7 (b) When considering what improvements to make in order to be energy efficient and save money, the payback time needs to be considered.

Table 2 shows typical payback times for some different types of insulation.

Table 2

Insulation	Cost in £	Saving per year in £	Payback time in years
Loft insulation	200	50	4.0
Cavity wall insulation	490	70	7.0
Double glazing	3000	60	
Draught proofing	50	50	1.0

7 (b) (i) Calculate the payback time for installing double glazing.

Show clearly how you work out your answer.

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Payback time .... years

(2 marks)

7 (b) (ii) John buys a house and plans to live in the house for 5 years.

He wants to install loft insulation to save money.

An energy consultant advises John to install double glazing instead.

Using your answer to **7(b)(i)** and the data in **Table 2**, do you agree with this advice?

Give reasons for your answer.

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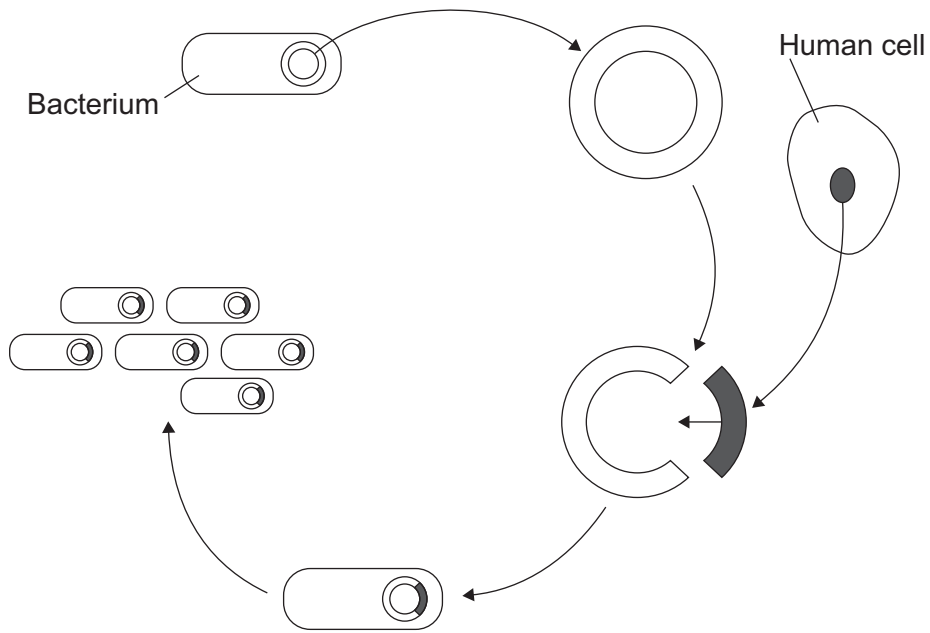
(3 marks)

8

Turn over for the next question

8 Human insulin is made using genetically modified bacteria.

The diagram shows the stages in modifying bacteria.

8 (a) Describe how bacteria are modified to produce human insulin.

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(5 marks)

8 (b) In a similar process, rye grass can be genetically engineered to have a high sugar content.

Some people might object to growing genetically engineered high-sugar rye grass for feeding cattle.

Suggest **two** reasons why.

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(2 marks)

7

END OF QUESTIONS

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