

Centre Number						Candidate Number				
Surname										
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Candidate Signature										



General Certificate of Secondary Education
Higher Tier
June 2013

Science B

SCB3HP

Unit 3 Making My World a Better Place

Written Paper

Thursday 13 June 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 5 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.

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	



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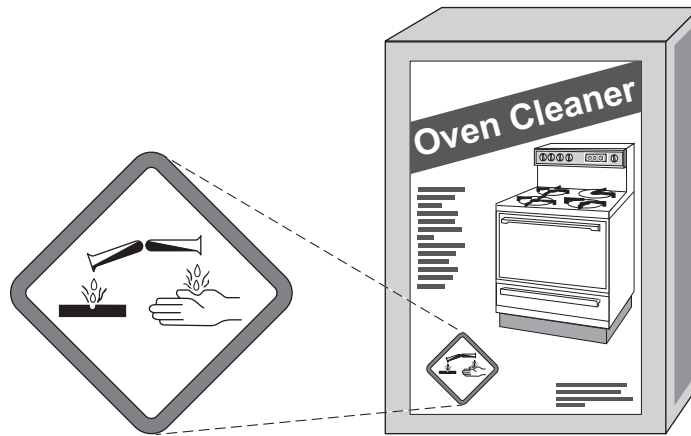
SCB3HP

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

1 (a) Many products used in the home can be hazardous.

A man buys some oven cleaner to use in his house.

The diagram shows the oven cleaner he buys.



1 (a) (i) What does the hazard symbol on the label mean?

.....
(1 mark)

1 (a) (ii) Give **two** symptoms the man may experience if he spills the oven cleaner on his hands.

1

2
(2 marks)

1 (b) The packaging of products can cause environmental problems.

1 (b) (i) The oven cleaner box is made of plastic which breaks down when exposed to light.

What type of plastic is the box made of?

.....
(1 mark)



- 1 (b) (ii)** In the box is a plastic bag containing the oven cleaner. The plastic bag is made of PVOH.

Give **two** properties of PVOH that make it suitable for disposal in landfill sites.

1

2
(2 marks)

- 1 (b) (iii)** Name **one** other type of plastic with the same properties as PVOH.

.....
(1 mark)

- 1 (c)** Some plastics only partially break down.

Give **one** problem partially broken down plastic can cause.

.....
(1 mark)

8

Turn over for the next question

Turn over ►



2 Many people are concerned about the effect we are having on our environment.

Making and using products can increase greenhouse gas emissions.

2 (a) (i) Name **one** greenhouse gas produced from combustion of fuels in power stations.

.....
(1 mark)

2 (a) (ii) Name a different greenhouse gas that is made during decomposition in landfill sites.

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(1 mark)

2 (a) (iii) In 2008, 37 countries agreed to reduce greenhouse gas emissions by 2012.

What was the name of this agreement?

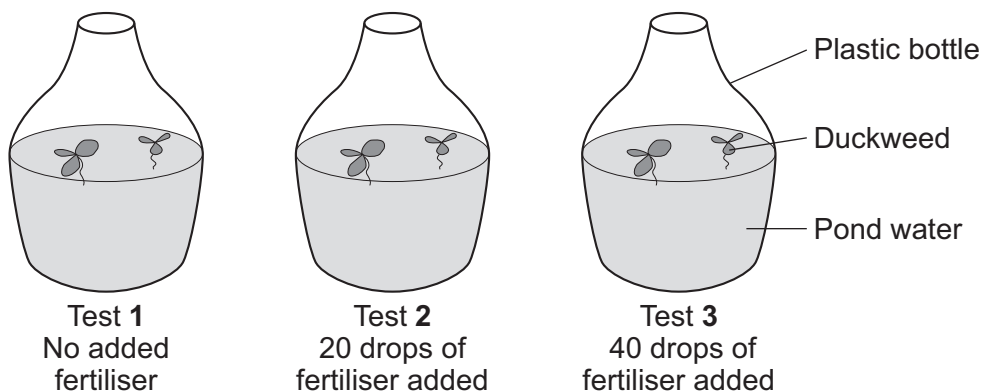
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(1 mark)

2 (b) Some greenhouse gases are released from the overuse of fertilisers.

Overuse of fertilisers also causes eutrophication.

A farmer wanted to investigate the possible effect of fertilisers on the health of the animals and plants in his pond.

The apparatus the farmer used is shown in the diagram.



Duckweed is a plant found on the surface of ponds. The farmer set up three tests:

- Test 1 – no fertiliser added
- Test 2 – 20 drops of fertiliser added
- Test 3 – 40 drops of fertiliser added.

The farmer counted the number of duckweed leaves in each test at the start of the investigation (Day 0).

He counted the number of duckweed leaves every 2 days.

His results are shown in the table.

Day	Number of duckweed leaves		
	Test 1	Test 2	Test 3
0	19	18	19
2	30	34	40
4	42	50	59
6	58	69	81
8	78	92	108

2 (b) (i) Why did the farmer set up Test 1?

.....
(1 mark)

2 (b) (ii) Describe the patterns shown by the data in the table.

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 (2 marks)

Turn over ►



2 (b) (iii) There was an accident on the farm and fertiliser drained into the farmer's pond.

Describe the effect the fertiliser could have on the pond.

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(4 marks)

10



Turn over for the next question

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ANSWER IN THE SPACES PROVIDED**

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- 3** Energy consultants give home owners advice about the efficiency and cost-effectiveness of energy-saving measures.

U-values measure the rate of energy loss through a substance.

The U-value of a single glazed window is 5.0.

The table gives information about the U-value and cost of adding different energy-saving measures to a single glazed window.

Energy-saving measure	Combined U-value	Cost of energy-saving measure in £	Payback time in years
Thermal curtain lining	3.2	100	2
Insulated shutters	1.6	1200	16
Roller blind	3.0	360	

- 3 (a)** The roller blinds will save £40 each year.

Calculate the payback time for the roller blinds.

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..... years
(2 marks)



3 (b) Use data in the table and your answer to **3(a)** to answer the questions.

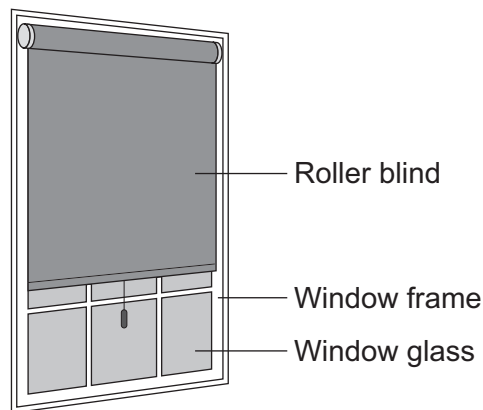
3 (b) (i) Which of the energy-saving measures is most efficient at reducing heat loss?

.....
(1 mark)

3 (b) (ii) Which of the energy-saving measures is most **cost-effective** over a 10-year period?

.....
(1 mark)

3 (c) The diagram shows a roller blind fitted to a window frame.



Suggest how the roller blind reduces heat loss through the window.

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

5

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- 4** A boy is taken to hospital with very bad burns to his arm.
- Antibiotics are normally given to treat any infection that might form in the burns.
- Doctors try to limit the use of antibiotics to prevent antibiotic resistance.

- 4 (a)** Explain how populations of antibiotic-resistant bacteria develop.

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(3 marks)



4 (b) New materials are developed to improve treatment in hospitals.

The doctors treat the boy's burns and cover the burns with a new smart material bandage.



The bandage has antibiotics trapped within it. The bandage will only release the antibiotics when it comes into contact with bacteria.

When the antibiotics are released a coloured dye is also released.

The doctors believe one advantage of the new smart material bandage is that it will reduce the chance of antibiotic resistant bacteria evolving.

Suggest **two** other possible advantages of using the new smart material bandage compared to a traditional bandage.

1

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2

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(2 marks)

4 (c) Some patients who are in hospital with very bad burns are given morphine to treat the pain.

Morphine is a drug similar to heroin.

Give **two** reasons why doctors are concerned about patients taking morphine for a long period of time.

1

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(2 marks)



- 5 In this question you will be assessed on using good English, organising information *clearly and using specialist terms where appropriate*.

X-rays are used to treat **and** diagnose medical conditions, but they are also hazardous to people.



Explain how the properties of the X-rays allow treatment and diagnosis of medical conditions, and describe the possible disadvantages of the use of X-rays.

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(6 marks)



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6 Tuberculosis (TB) is a disease that affects the lungs. In 2010 more than 1.4 million people died from TB across the world.

6 (a) Suggest how the TB pathogens enter the human body.

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(1 mark)

6 (b) TB can be prevented by having the BCG vaccination.

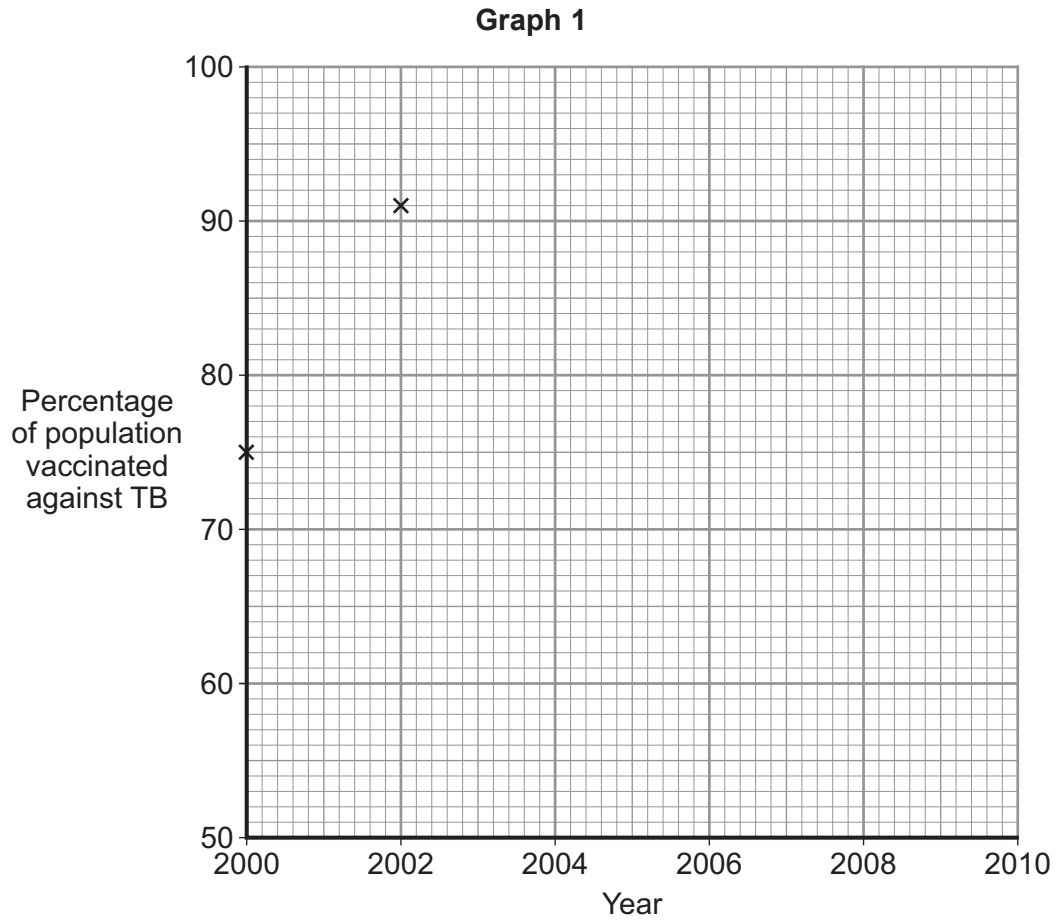
The BCG vaccination is used in Kenya. The table shows the total percentage of vaccinated people within the population of Kenya between 2000 and 2010.

Year	Percentage of population vaccinated against TB
2000	75
2002	91
2004	87
2006	92
2008	95
2010	99



6 (b) (i) Plot the data from the table on **Graph 1**.

The first **two** points have been done for you.



(2 marks)

6 (b) (ii) Describe the pattern shown in **Graph 1**.

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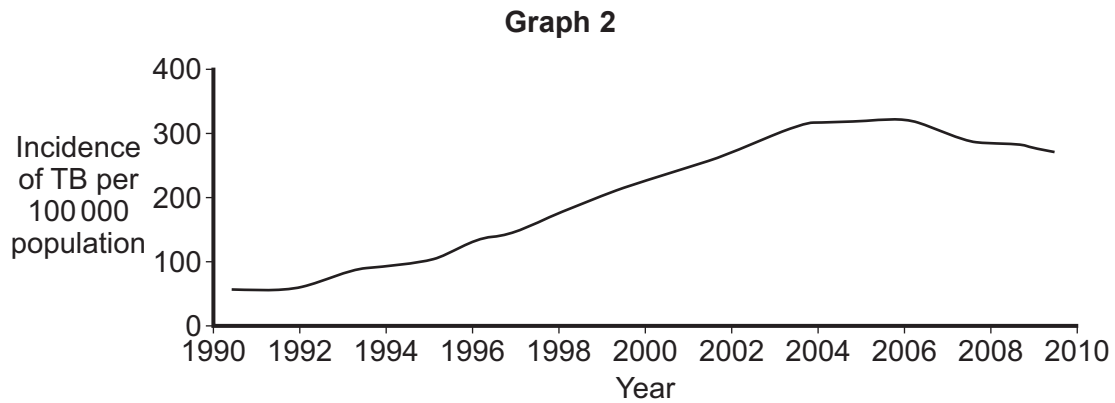
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(2 marks)

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6 (b) (iii) **Graph 2** shows the incidence of TB in Kenya from 1990 to 2010.



Use **Graph 1** and **Graph 2** to suggest how the data supports the conclusion that the TB vaccination programme has become more effective in Kenya in recent years.

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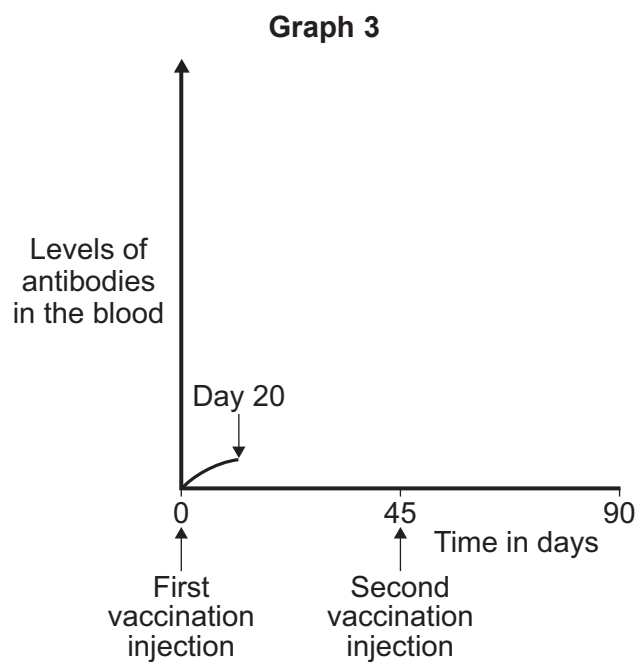
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(2 marks)

6 (c) Meningitis C is a disease that can be prevented by vaccination. Children have two doses of the vaccine, one month apart.

On **Graph 3**, sketch a graph to show how the level of antibodies against Meningitis C in the blood varies between day 20 and day 90.

The graph has been started for you.



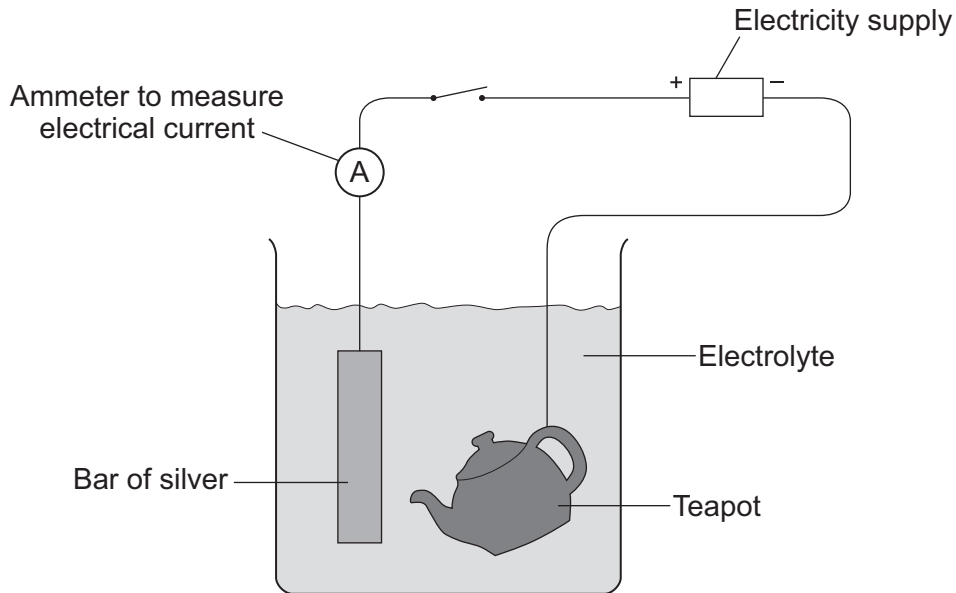
(3 marks)

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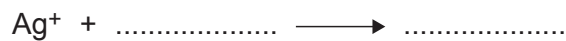


- 7 A company sells teapots. The company electroplates the teapots with silver before they are sold.

The equipment used in the electroplating process is shown in the diagram.



- 7 (a) Complete the equation below to show what happens when the teapot is electroplated with silver.



(2 marks)

- 7 (b) Describe how the teapot becomes electroplated with silver.

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(4 marks)



8 (a) There are many breeds of dog.

Dogs have been bred from the wolf.



Wolf – common ancestor of
domesticated dogs

Can run at 30 miles per hour.



Racing greyhound

Can run at nearly 40 miles per hour.

Explain how selective breeding of the wolf can produce racing greyhounds.

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(4 marks)



8 (b) Scientists use many different methods to select the genetics of individuals.

Since 2004 families in the UK have been legally allowed to pre-select embryos which could save their brothers or sisters with medical conditions.

Many embryos are produced by in-vitro fertilisation (IVF). In IVF an egg is removed from the mother and a sperm is added to it in a test tube. The eggs that have been fertilised by the sperm are screened to find a healthy embryo with compatible tissues to the diseased child.

This embryo is implanted in the mother's womb.

Use the information, and your own knowledge, to give the advantages and disadvantages of selecting embryos to save the life of another child.

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(4 marks)

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END OF QUESTIONS



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Question 5: Radiation warning sign, X-ray © Thinkstock

Question 8: Wolf, Greyhound © Thinkstock

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