

Centre Number						Candidate Number				
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Other Names										
Candidate Signature										



General Certificate of Secondary Education
Foundation Tier
June 2014

Science B

SCB3FP

F

Unit 3 Making My World a Better Place

Thursday 12 June 2014 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 6 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	



J U N 1 4 S C B 3 F P O 1

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SCB3FP

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

1 (a) X-rays are used in hospitals.

Draw a ring around the correct answer to complete each sentence.

1 (a) (i) X-rays are used to detect

broken bones.

diabetes.

pregnancy.

[1 mark]

1 (a) (ii) X-rays are

longitudinal waves.

surface waves.

transverse waves.

[1 mark]

1 (a) (iii) X-rays are a form of

electromagnetic radiation.

gamma radiation.

thermal radiation.

[1 mark]

1 (b) Different materials stop different types of radiation.

1 (b) (i) Which of the following is used to stop gamma radiation?

Draw a ring around the correct answer.

[1 mark]

aluminium

lead

paper



1 (b) (ii) Which of the following is used to stop beta radiation?

Draw a ring around the correct answer.

[1 mark]

air

aluminium

paper

1 (c) Give **two** reasons why hospital workers who use X-rays wear lead-lined aprons.

[2 marks]

1

.....

2

.....

7

Turn over for the next question

Turn over ►



2 Bacteria and viruses can cause infection.

2 (a) (i) Complete the sentences about infections caused by bacteria and viruses.

Use the correct answer from the box to complete each sentence.

[3 marks]

antibodies	cells	die
reproduce	respire	toxins

Bacteria make people ill by producing

Viruses make people ill when they rapidly and
damage

2 (a) (ii) Doctors can give people antibiotics when they are ill.

Which type of microorganism can be killed by antibiotics?

Tick (✓) **one** box.

[1 mark]

Type of microorganism	Tick (✓)
bacteria	
fungi	
viruses	

2 (b) A young child has a painful throat infection.

She is taken to see the doctor.

2 (b) (i) Which drug should the doctor give the young child to treat the pain?

Draw a ring around the correct answer.

[1 mark]

cocaine

paracetamol

steroids



2 (b) (ii) Drugs can be kept in containers with child-proof lids.



Suggest **one** reason why it is important that a young child cannot open the container of drugs.

[1 mark]

.....

2 (c) Alcohol harms the body.

2 (c) (i) Give **two** harmful effects of alcohol on the human body.

[2 marks]

1

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2

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Question 2 continues on the next page

Turn over ►



2 (c) (ii) Table 1 shows the number of deaths linked to alcohol from 1996 to 2004.

Table 1

Year	Number of deaths linked to alcohol per 100 000 people	
	Male	Female
1996	12.0	6.0
1998	14.2	7.0
2000	15.0	8.0
2002	17.0	9.0
2004	17.8	9.5

Use the data in **Table 1** to complete the graph in **Figure 1**.

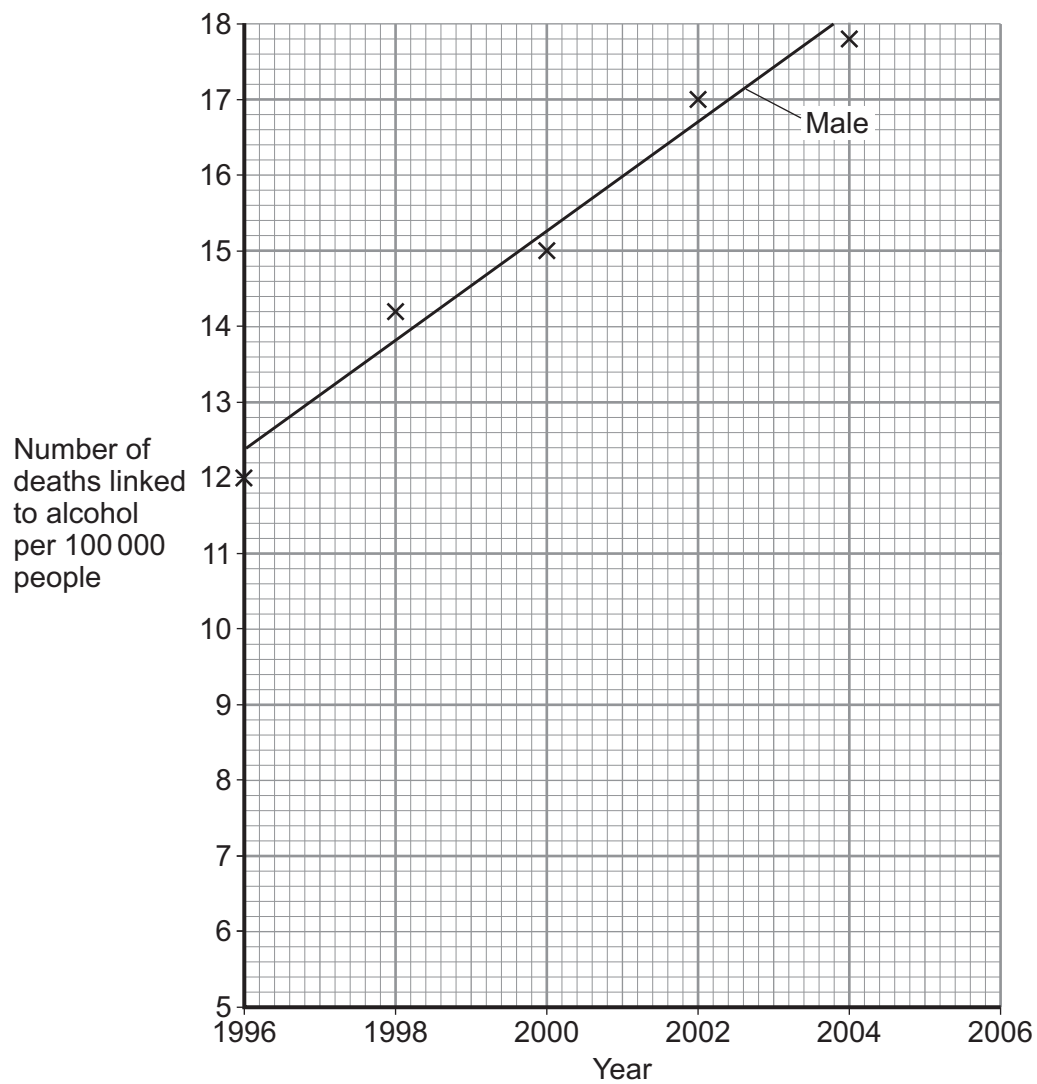
You should:

- plot the female data
- draw the line of best fit.

The plots and the line of best fit for the male data have been completed for you.

[3 marks]



Figure 1

2 (c) (iii) Use **Figure 1** to describe the patterns in the number of deaths linked to alcohol of males and females from 1996 to 2004.

[2 marks]

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.....

Question 2 continues on the next page

Turn over ►



2 (c) (iv) Tick (✓) **two** possible reasons for the patterns in the graph (**Figure 1**).

[2 marks]

People are drinking more.

☐

Smoking in pubs has been banned.

☐

The cost of alcohol has increased.

☐

The alcohol content of drinks has increased.

☐

15



Turn over for the next question

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ANSWER IN THE SPACES PROVIDED**

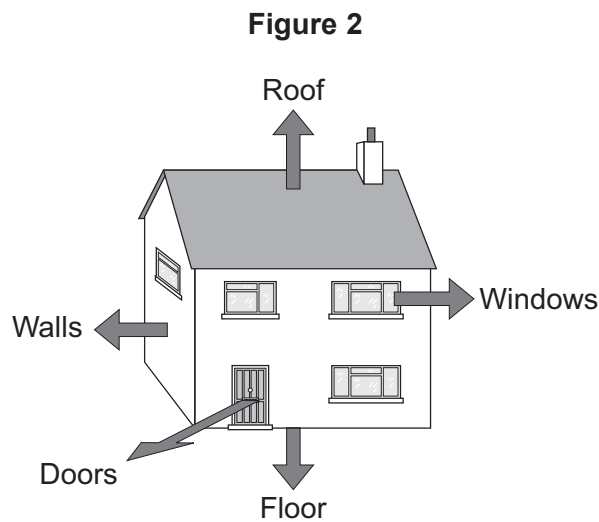
Turn over ►



3 (a) A homeowner wants to reduce the energy losses from her house.

Energy can be lost from different parts of the house.

Figure 2 shows where energy is lost.



For each of the following parts of the house, name **one** method of reducing the heat loss from the house.

You must give a different method for each part of the house.

3 (a) (i) Roof

[1 mark]

.....

3 (a) (ii) Windows

[1 mark]

.....

3 (a) (iii) Doors

[1 mark]

.....



3 (b) Heat is transferred through substances in different ways.

Draw **one** line from each type of heat transfer to the correct description.

[2 marks]

Type of heat transfer

Description

Conduction

Heat energy is emitted
from a hot object

Convection

The transfer of heat energy
by a gas moving

The transfer of heat energy
through a substance without
the substance moving

3 (c) A homeowner has cavity-wall insulation put in to reduce heat loss through the walls.

Cavity-wall insulation is made of polystyrene balls.

3 (c) (i) Polystyrene is a plastic.

Newspaper and sheep's wool can also be used for insulation.

Tick (✓) **two** possible advantages of using newspaper for insulation instead of polystyrene balls.

[2 marks]

It can burn.

☐

It is not put into landfill.

☐

It is easier to put in the cavity walls.

☐

It is recycled.

☐

3 (c) (ii) Give **two** reasons why cavity-wall insulation reduces heat loss through the walls.

[2 marks]

1

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2

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- 4 **Figure 3** contains information about a new type of tomato.

Figure 3



- 4 (a) The new tomatoes in **Figure 3** may have been produced through selective breeding.

- 4 (a) (i) Draw a ring around the correct answer to complete each sentence.

[2 marks]

Step 1: Tomatoes with the best characteristics are selected and

cloned.
crossed.
mixed.

Step 2: The scientists select the

individual
offspring
parents

with the best characteristics.



4 (a) (ii) Give **one** risk of selective breeding.

Tick (✓) **one** box.

[1 mark]

The tomatoes will be genetically identical.

☐

There will be more food to feed the growing population of humans.

☐

Unfavourable characteristics may develop.

☐

4 (b) Suggest **two** advantages to the supermarket of using the new tomatoes in **Figure 3**.

[2 marks]

1

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5

Turn over for the next question

Turn over ►



5 (a) Pollution can enter houses.

Give **two** symptoms that a family might have when indoor pollution is high.

[2 marks]

1

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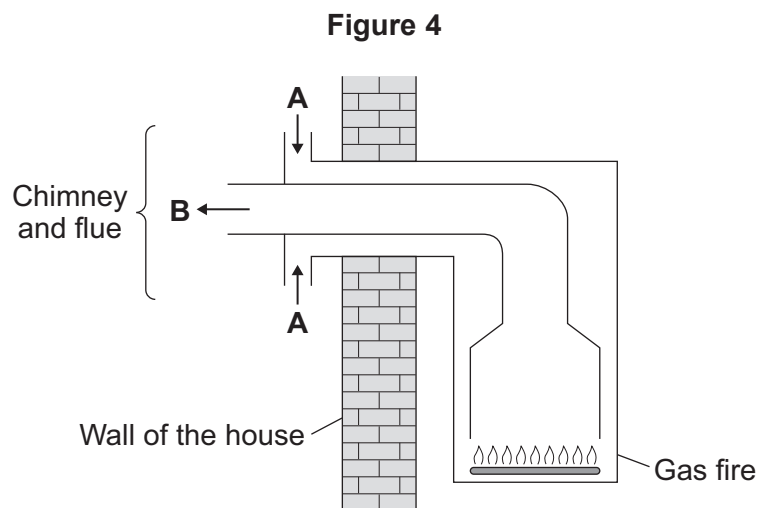
2

.....

5 (b) Gas fires and boilers can cause pollution.

In a gas fire, any gases produced leave the house through a chimney (flue).

Figure 4 shows a fire and its flue.



5 (b) (i) Name the gas that enters at **A**.

[1 mark]

.....

5 (b) (ii) The fire has a good supply of gas entering at **A**.

Use the correct answer from the box to complete the sentence.

[1 mark]

carbon dioxide

methane

nitrous oxide

The gas produced during combustion that leaves at **B** is

5 (b) (iii) Part **A** becomes partially blocked with leaves.

What changes to the gases leaving the fire at **B** would you expect if **A** were blocked?

[1 mark]

.....

.....

5

Turn over for the next question

Turn over ►



Global warming affects the environment.



In your answer you should include names of greenhouse gases.

[6 marks]

[illegible]

Extra space



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6

Turn over for the next question

Turn over ►



7 (a) **Figure 5** shows a spring made of nitinol.

Figure 5



Nitinol is a memory shape metal.

At low temperatures you can straighten a nitinol spring.

When the nitinol spring is heated above a certain temperature, it goes back to its original shape.

This temperature is called the **transition temperature**.

Some students investigated the **transition temperature** of a nitinol spring.

The students:

- 1 cooled and then straightened the nitinol spring
- 2 put the straightened nitinol spring into a beaker of water at 10 °C for five minutes
- 3 recorded if the nitinol spring returned to its original shape
- 4 repeated steps 1–3 at different temperatures.

Table 2 shows the students' results.

Table 2

Temperature of water in the beaker in °C	Did the shape of the nitinol spring return to normal?
10	No
20	No
30	No
40	No
50	Yes
60	Yes



- 7 (a) (i) Suggest why the students left the nitinol spring in the water for five minutes before recording their results.

[1 mark]

.....

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- 7 (a) (ii) Suggest what conclusion can be made about the **transition temperature** of the nitinol spring.

[1 mark]

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- 7 (a) (iii) Suggest what the students could do to improve the accuracy of the conclusion.

[1 mark]

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Question 7 continues on the next page

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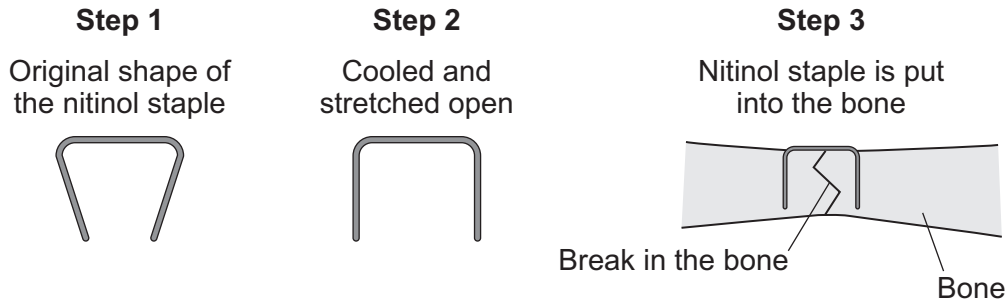


- 7 (b) Nitinol is also used in staples for bones.

Sometimes, bones have to be stapled together to help the bones repair correctly.

Figure 6 shows how a nitinol staple is used.

Figure 6



- 7 (b) (i) Suggest what will happen to the two pieces of bone when the nitinol staple warms up to its **transition temperature**.

[1 mark]

.....

- 7 (b) (ii) The nitinol used in bone staples has a different **transition temperature** from that of the nitinol spring in part (a).

Average human body temperature is 37 °C.

Suggest what the **transition temperature** of the nitinol staple will be. Give a reason for your answer.

[2 marks]

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- 7 (b) (iii) Suggest **one** advantage of using a nitinol bone staple compared with a traditional stainless steel bone staple in a broken bone.

[1 mark]

.....

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- 8 (a)** People with asthma have difficulty breathing and are treated with drugs delivered by inhalers.

Treating asthma costs the NHS one billion pounds each year.



A genetic mutation in some people means that some of the drugs delivered by inhalers will not work very well.

A new genetic screening test could be the first step in personalised drug treatment for people with asthma.

The genetic screening will identify patients who have a specific mutation.

Suggest **three** potential advantages of the new screening test.

[3 marks]

- 1
-
- 2
-
- 3
-



8 (b) Scientists have been developing a new drug to treat deafness.

The new drug has been tested on mice.

After taking the new drug, some deaf mice recovered some of their hearing.



The new drug cannot yet be given to people who have lost their hearing.

Describe what would happen next before this new drug could be given to people who have lost their hearing.

[3 marks]

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6

END OF QUESTIONS



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