

Centre Number						Candidate Number				
Surname										
Other Names										
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For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
TOTAL	



General Certificate of Secondary Education
Higher Tier
June 2015

Science B

SCB3HP

H

Unit 3 Making My World a Better Place

Friday 12 June 2015 1.30 pm to 2.30 pm

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 2(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.



J U N 1 5 S C B 3 H P 0 1

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

1 (a) Scientists develop new products. The new products are designed to be better than the traditional products.

1 (a) (i) One new product that scientists have developed is a smart paint. Smart paint can be used on cars.

Give **one** advantage of using a smart paint compared with using a traditional paint.

[1 mark]

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1 (a) (ii) Superconductors are a type of smart material.

Explain the advantage of using superconductors compared with traditional conductors.

[2 marks]

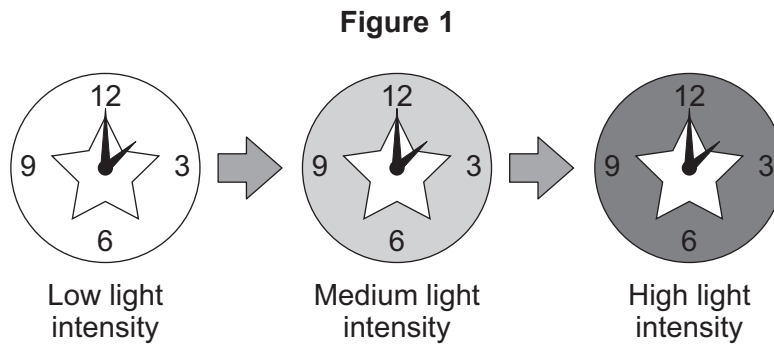
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1 (b) Skin cancer affects over 5000 people in the UK each year. Strong sunlight is one cause of skin cancer.

A company has developed a new watch for children to wear when they play outside in sunlight.

Figure 1 shows the watch face after it has been exposed to different intensities of sunlight.



1 (b) (i) What type of material is the watch face in **Figure 1** made from?

[1 mark]

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1 (b) (ii) Suggest **one** reason why wearing the new watch may reduce the risk of children getting skin cancer.

[1 mark]

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5

Turn over for the next question

Turn over ►



2 (a) (i) Pathogens are microorganisms. Pathogens cause disease.

Which disease is caused by a virus?

Draw a ring around the correct answer.

[1 mark]

cholera

measles

tuberculosis

typhoid

2 (a) (ii) Why do viruses make us feel ill?

[1 mark]

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3 Drugs are classified as legal or illegal.

3 (a) (i) Tobacco contains a legal drug called nicotine.

What is the effect of nicotine on the body?

[1 mark]

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3 (a) (ii) The smoke from burning tobacco contains carbon monoxide.

What harmful effect does carbon monoxide have on the blood?

[1 mark]

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3 (b) Some recreational drugs are illegal.

Table 1 shows the number of deaths from poisoning by recreational drugs between 2008 and 2012.

Table 1

Year	Number of deaths from poisoning by recreational drugs
2008	2920
2009	2830
2010	2750
2011	2650
2012	2570



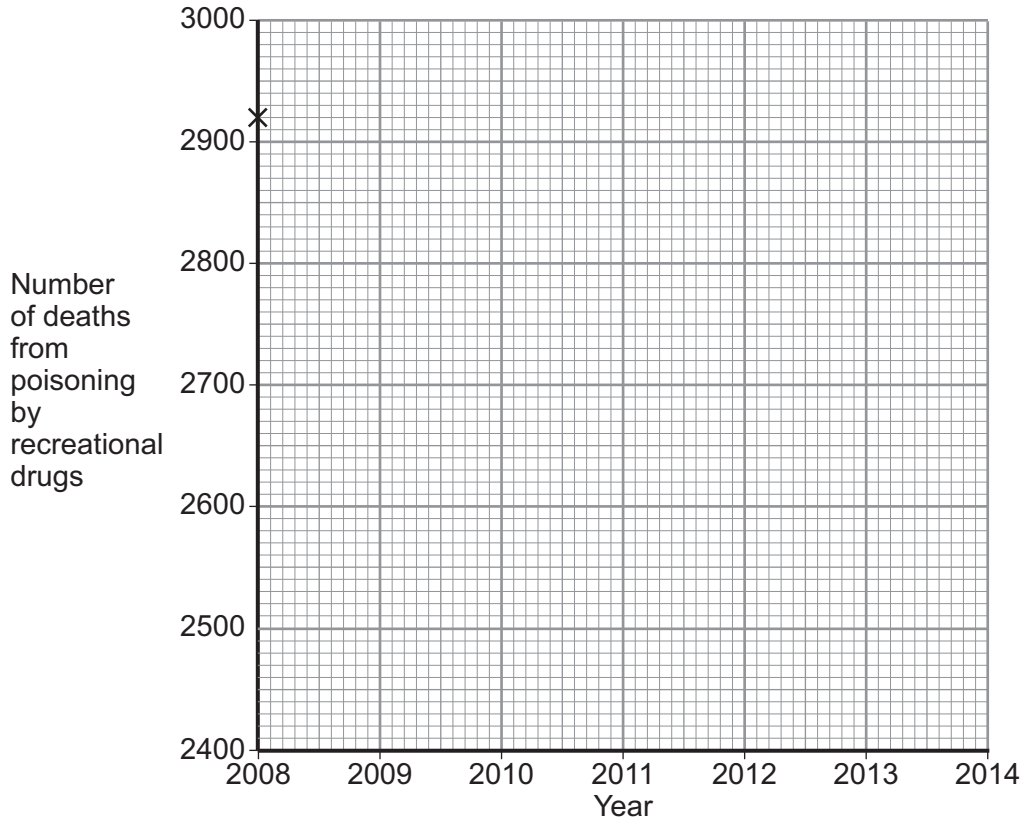
3 (b) (i) Use the data in **Table 1** to complete the graph in **Figure 2** to show how the number of deaths from poisoning by recreational drugs has changed between 2008 and 2012.

You should:

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

[3 marks]

Figure 2



3 (b) (ii) Use your graph in **Figure 2** to predict the number of deaths in 2013 if the pattern from 2008 continued.

[1 mark]

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3 (b) (iii) The trend from 2008 may not continue in the same pattern after 2013.

Suggest **one** reason why the trend may change.

[1 mark]

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Turn over ►



4 Many objects are electroplated.

4 (a) (i) Complete **Table 2** to give **one** reason why each object is electroplated.

Give a different reason for each object.

[3 marks]

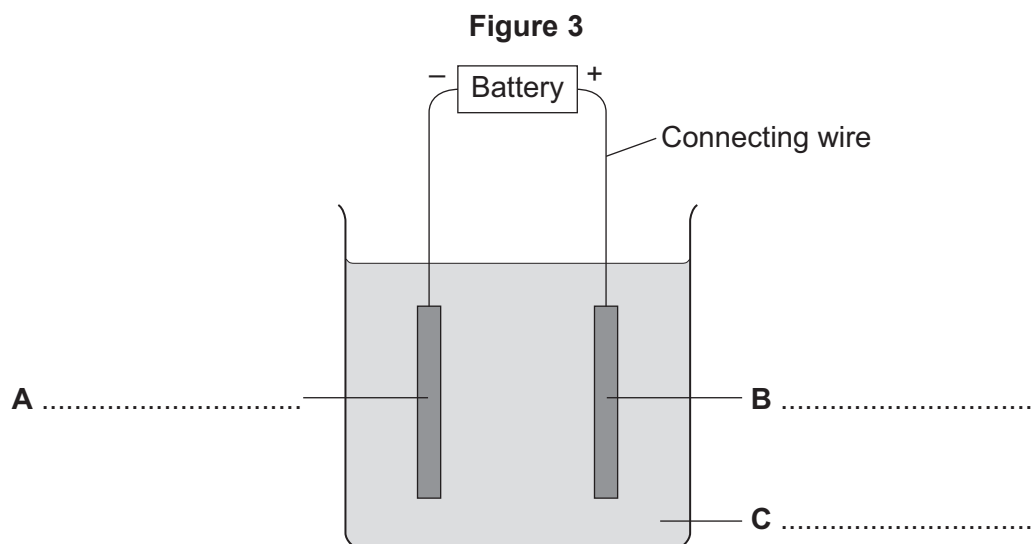
Table 2

Object	Reason why the object is electroplated
Water taps
Cupboard door handles
Nickel necklace

4 (a) (ii) **Figure 3** shows an electrolysis cell used for electroplating objects.

Label **A**, **B** and **C** on **Figure 3**.

[3 marks]



4 (a) (iii) Ions move through **C** in **Figure 3** during the process of electrolysis.

Explain the difference between an ion and an atom.

[2 marks]

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4 (a) (iv) Complete the equations to show what happens at **A** and at **B** in **Figure 3** during electroplating.

[2 marks]



10

Turn over for the next question

Turn over ►



- 5** Cystic Fibrosis (CF) is a genetic disorder affecting the lungs.
 CF affects more than 9000 people in the UK.
 Read the information in **Figure 4** about a new drug used to treat CF.

Figure 4

A new drug brings hope to Cystic Fibrosis patients

CF is caused by genetic mutations. CF causes a thick mucus to build up in the lungs and digestive system.

The new drug is effective only for CF patients with the G551D mutation. Only 4% of CF patients have this mutation.

Patients are screened for the G551D mutation before they can start treatment.

Clinical trials for the new drug show a significant improvement in symptoms for patients with the G551D mutation.

The yearly cost of the new drug is approximately £182 000 per patient.

- 5 (a) (i)** A newspaper suggested that **all** CF patients should receive the new drug.

Give **two** disadvantages of giving the new drug to **all** CF patients.

[2 marks]

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5 (a) (ii) When patients collect the new drug, they have to prove that they are the patient and sign for the drug.

Suggest **one** reason why.

[1 mark]

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5 (a) (iii) During the clinical trials, the new drug was tested on animals and humans.

What would the new drug have been tested on before it was tested on animals and humans?

[1 mark]

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5 (b) Patients are monitored all the time that they are using new drugs.

Suggest **two** reasons why patients are monitored.

[2 marks]

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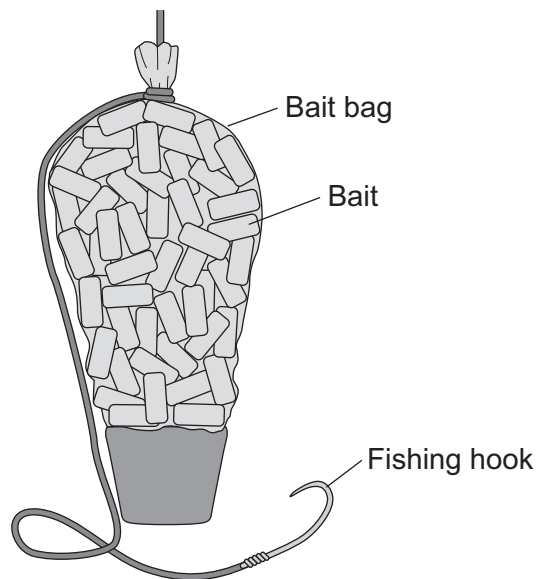
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- 6 When fishermen fish in lakes, they can use plastic bait bags, as shown in **Figure 5**.

Figure 5



- 6 (a) (i) When the plastic bait bags are dropped into the water, the bags slowly dissolve and release the bait.

Suggest what **type** of plastic the bait bag in **Figure 5** is made of.

[1 mark]

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- 6 (a) (ii) The type of plastic used to make the bait bag in **Figure 5** is water soluble.

Give **one** other property of this type of plastic.

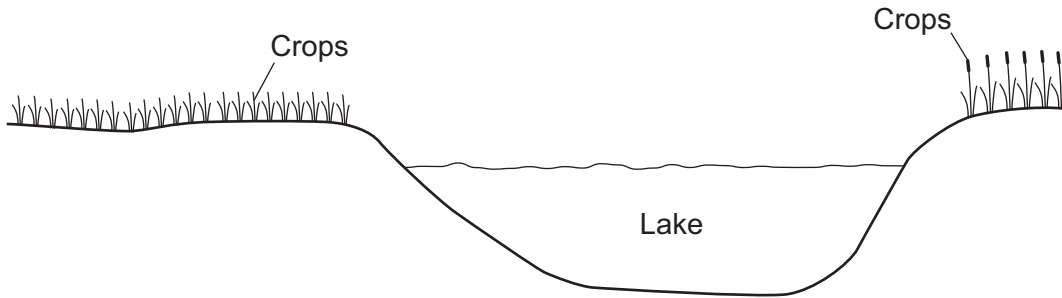
[1 mark]

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6 (b) Figure 6 shows a farmer's crops next to a lake.

Figure 6



Over time, animals in the lake die.

The local fishermen blame the farmer for using fertiliser, which has caused eutrophication in the lake.

Describe the process of eutrophication.

[6 marks]

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7 Homeowners try to improve the energy efficiency of their houses to save money on energy bills.

One way to improve the energy efficiency is to add loft insulation.

Table 3 shows some information about different types of roofing and loft insulation.

Table 3

Type of roofing or loft insulation	U value	Cost in £	Saving in energy costs per year compared with an uninsulated slate roof in £	Payback time in years	Total saving over 25 years in £
Mineral wool		1300	195	6.7	3575
Recycled newspaper	0.15	780	200		4220
Sheep's wool	0.18	1150	188	6.1	
Thatched roof	0.14	10 000	205	48.8	-4875

7 (a) (i) Which type of roofing or loft insulation is the most energy efficient?

Give a reason for your answer.

[2 marks]

Type of roofing or loft insulation

Reason

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7 (a) (ii) Calculate the payback time for the recycled newspaper.

[2 marks]

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7 (a) (iii) A man wants to insulate his loft. He plans to live in the house for at least 25 years.

The man chooses to insulate his loft with mineral wool instead of sheep's wool.

Use data from **Table 3** to suggest **one** reason for the man's choice.

[1 mark]

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7 (a) (iv) Suggest the U value for mineral wool.

Use the data in **Table 3** to explain your answer.

[2 marks]

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7 (b) Homeowners can save energy by having new gas fires installed, because new gas fires are more energy efficient.

A man plans to install a new gas fire in his living room. He is advised to add ventilation to the room where the new gas fire will be.

Explain why ventilation is important for the new gas fire to work efficiently and safely.

[4 marks]

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Turn over ►




8 Mercury is a poisonous metal that leaches into lakes and rivers.

Figure 7 gives some information about genetically modified bacteria designed to remove mercury from lakes and rivers.

Figure 7

GM bacteria remove mercury



Scientists have developed genetically modified bacteria to remove mercury from lakes and rivers.

The genetically modified bacteria contain a gene from a mouse. This gene produces a chemical to remove the mercury.

Describe the process of genetic modification of the bacteria in **Figure 7**.

Use information from **Figure 7** and your own knowledge in your answer.

[5 marks]

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END OF QUESTIONS



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