AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

GCSE
SCIENCE B

H

Higher Tier Unit 3 Making My World a Better Place

Wednesday 25 May 2016 Afternoon Time allowed: 1 hour

Materials
For this paper you must have:
- A ruler.

You may use a calculator.

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 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.

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

1 Human activities can cause pollution and affect the amounts of different gases in our atmosphere.

1 (a) (i) Give **one** human activity that releases methane into the atmosphere.

[1 mark]

_____

1 (a) (ii) Give **one** source of pollution that releases nitrous oxide into the atmosphere.

[1 mark]

_____

1 (b) An increase in the amount of methane and nitrous oxide in our atmosphere causes global warming.

How does the increase in these gases cause global warming?

[1 mark]

Tick (✓) **one** box.

The gases absorb more long-wave radiation. ☐

The gases absorb more short-wave radiation. ☐

The gases reflect more long-wave radiation out into space. ☐

1 (c) Changes in the amount of pollution can be monitored using indicator species.

Name **one** indicator species that can be used to measure air pollution.

[1 mark]

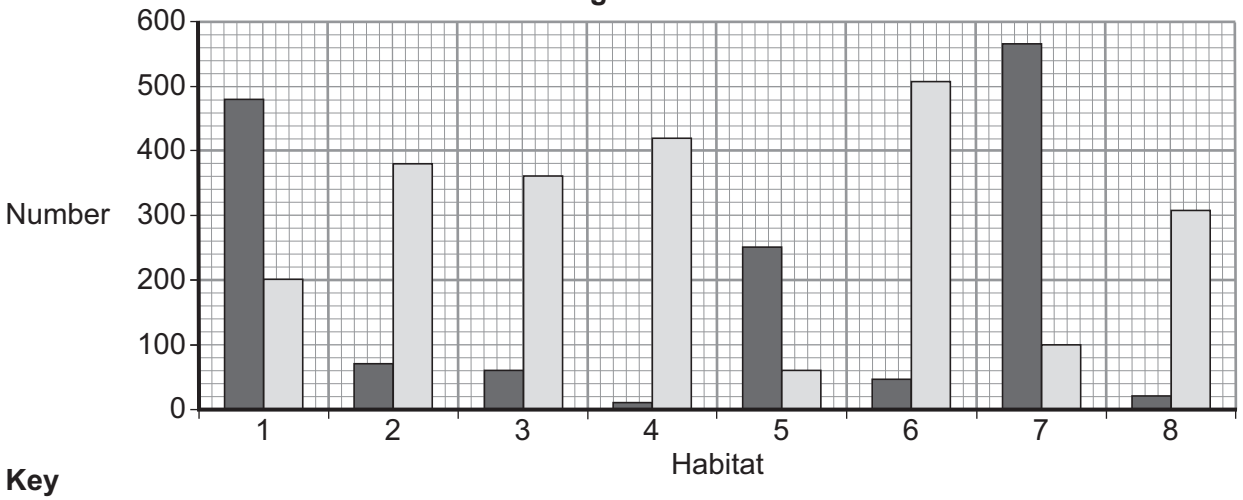
_____

1 (d) On **one** day some students:

- counted the number of one type of indicator species in eight different habitats
- counted the number of vehicles that passed close to each habitat.

Figure 1 shows their results.

Figure 1



1 (d) (i) Describe **one** trend shown in **Figure 1**.

[1 mark]

_____

_____

1 (d) (ii) Suggest **two** ways the students could improve their investigation.

[2 marks]

1 _____

_____

2 _____

_____

1 (e) The students decided to investigate water pollution.

Name **one** indicator species that can be used to measure water pollution.

[1 mark]

_____

8

2 Many household products are hazardous.

Figure 2 shows the label from a spray bottle of oven cleaner.

Figure 2

2 (a) (i) What do the hazard symbols on the oven cleaner label in **Figure 2** mean?

[2 marks]

_____

_____

2 (a) (ii) A man uses the oven cleaner shown in **Figure 2** in his kitchen.

Give **three** ways the man should protect himself when using the oven cleaner.

[3 marks]

1 _____

_____

2 _____

_____

3 _____

_____

2 (b) A few weeks later, when the man is using his gas cooker, the man's carbon monoxide alarm goes off.

Suggest what caused carbon monoxide to be produced by the gas cooker.

[1 mark]

_____

_____

6

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

Every year new smart materials are developed by scientists.

Smart materials include smart paints, superconductors and chromic materials.

Describe the features **and** uses of different smart materials.

[6 marks]

Extra space

6

4 Ketamine is one type of illegal drug.

4 (a) **Table 1** shows data about the percentage of the population that has used ketamine and the number of deaths involving ketamine.

Table 1

Year	Percentage (%) of the population that has used ketamine		Number of deaths involving ketamine
	16–59 year olds	16–24 year olds	
2007	1.3	2.3	2
2008	1.4	2.2	6
2009	1.8	3.6	8
2010	2.0	4.0	15

4 (a) (i) Calculate the percentage change in the use of ketamine by 16–24 year olds between **2007** and **2010**.

[2 marks]

Percentage change = _____

4 (a) (ii) Illegal drugs are classified into groups, class **A**, class **B** and class **C**.

Class **A** drugs are the most harmful. Class **C** drugs are the least harmful.

In 2007, ketamine was a class **C** drug. After 2010 ketamine was changed to a class **B** drug.

Use information given in **Table 1** to suggest **two** reasons why ketamine was changed to a class **B** drug.

[2 marks]

1 _____

2 _____

4 (b) (i) Legal drugs are used to treat infections and diseases.

A child with influenza is taken to the doctor. The doctor **does not** give the child antibiotics.

Explain why antibiotics will not work to treat influenza.

[2 marks]

4 (b) (ii) If doctors give antibiotics to people for non-serious infections such as mild throat infections, antibiotic-resistant strains of bacteria could develop.

Explain how antibiotic-resistant strains of bacteria develop.

[4 marks]

10

Turn over for the next question

5 Energy-saving advisors help homeowners reduce the cost of their energy bills by improving the energy efficiency of their homes.

5 (a) One way energy-saving advisors can do this is by considering the U-value of materials.

What is meant by the term U-value?

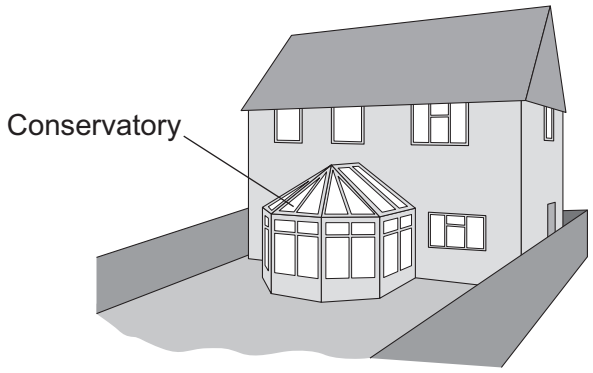
[1 mark]

_____

_____

5 (b) A man buys a new house with a conservatory, as shown in **Figure 3**.

Figure 3



The man wants to improve the energy efficiency of the conservatory.

Table 2 shows information about conservatory roofs and roof blinds.

Table 2

	Cost in £	**U-value**	**Saving per year in £**	**Payback time in years**
Polycarbonate (plastic) roof	1500	2.2	120	
Double glazed glass roof	2200	1.7	160	13.75
Insulated roof blinds	1800	2.4	100	18.00

5 (b) (i) Calculate the payback time for a polycarbonate roof.

Use the data in **Table 2** to help you.

[1 mark]

Payback time = _____ Years

5 (b) (ii) The man wants to reduce his energy bills.

An energy-saving advisor tells the man to have insulated roof blinds put in.

The man decides to have a double glazed glass roof **instead of** insulated roof blinds.

Using the data in **Table 2**, do you agree with the man's decision?

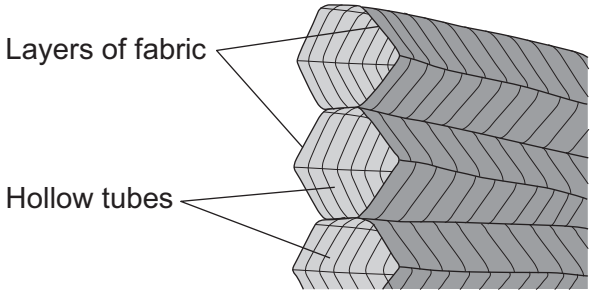
Give reasons for your answer.

[3 marks]

Question 5 continues on the next page

5 (c) **Figure 4** shows the structure of the insulated roof blinds.

Figure 4



Suggest how the structure of the insulated roof blind reduces heat loss through the window.

[2 marks]

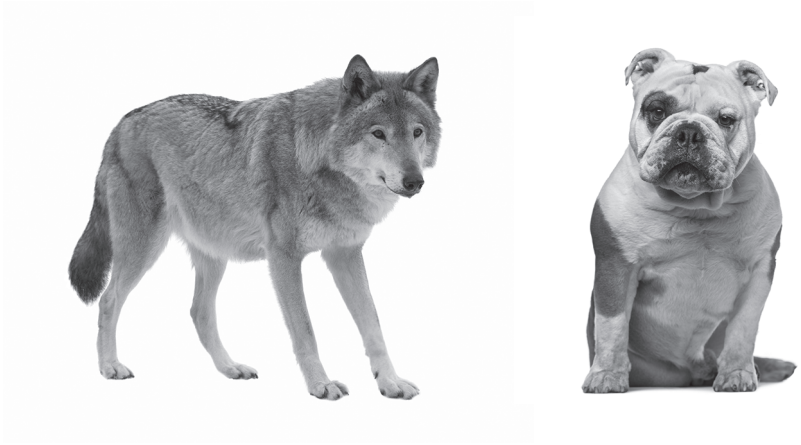
7

6 (a) Dogs have been selectively bred from wolves over many years.

Figure 5 shows a wolf and a Bulldog.

Figure 5

Wolf **Bulldog**



6 (a) (i) Describe how the Bulldog has been produced using selective breeding.

[3 marks]

6 (a) (ii) Selective breeding does have risks.

Suggest **one** possible risk of using selective breeding to produce dogs.

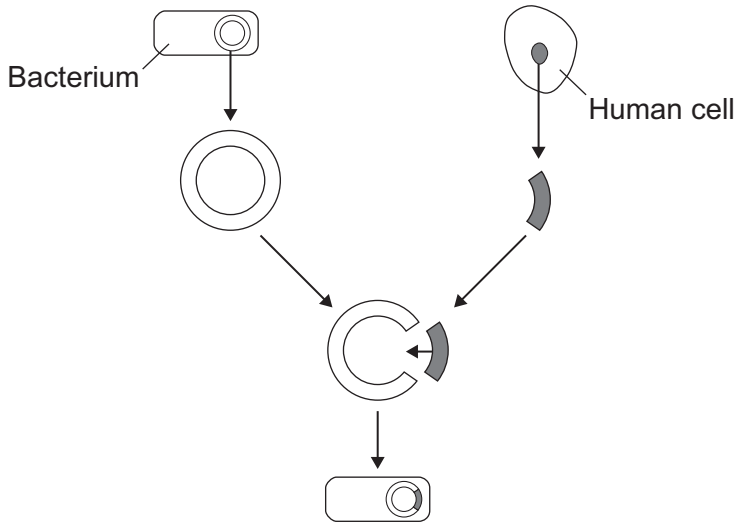
[1 mark]

Question 6 continues on the next page

6 (b) Human insulin is used to treat diabetes.

Figure 6 shows the stages of genetically modifying bacteria to produce insulin.

Figure 6



Describe how bacteria are genetically modified to produce insulin.

[6 marks]

10

7 This question is about infectious diseases.

7 (a) (i) Tuberculosis is a disease caused by a bacterium. Tuberculosis affects the lungs.

Suggest how the tuberculosis bacterium enters the body.

[1 mark]

7 (a) (ii) AIDS is a dangerous disease. A virus called HIV causes AIDS.

Name **two** different diseases caused by viruses.

[2 marks]

7 (b) Scientists have been developing a new vaccine to protect humans from HIV.

The new vaccine will contain a weakened form of the whole virus.

7 (b) (i) Describe how a person's immune system should respond to the new vaccine to give the person immunity to HIV.

[3 marks]

7 (b) (ii) Suggest how scientists could monitor the effectiveness of the new vaccine.

[2 marks]

Question 7 continues on the next page

7 (b) (iii) The vaccine could also be made using **only** a small part of the virus, rather than a weakened form of the whole virus.

There would be **no** whole virus in the vaccine.

Suggest **one** advantage of using this type of vaccine.

[1 mark]

7 (c) **Table 3** shows the number of AIDS related deaths in the world from 2001 to 2011 and the number of people living with HIV.

Table 3

Year	Number of AIDS related deaths in the world in millions	Number of people living with HIV in millions
2001	1.9	30.0
2003	2.2	31.7
2005	2.3	32.5
2007	2.2	33.2
2009	2.0	34.0
2011	1.8	34.9

7 (c) (i) Some people can live with HIV for many years before AIDS develops.

Use **Table 3** to describe the difference between the number of AIDS related deaths and the number of people living with HIV between 2001 and 2011.

[2 marks]

7 (c) (ii) Suggest **two** possible reasons for the pattern shown in **Table 3** for the number of AIDS related deaths between 2005 and 2011.

[2 marks]

_____

_____

_____

_____

13

END OF QUESTIONS

There are no questions printed on this page

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