

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

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



General Certificate of Secondary Education  
Higher Tier  
November 2012

## Science B

## SCB3HP

### Unit 3 Making My World a Better Place

# H

### Written Paper

Thursday 8 November 2012 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 2 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.



N 0 V 1 2 S C B 3 H P 0 1

- 1 (a)** A student investigated the effect of alcohol on the heart rate of a type of water flea called *Daphnia*.

The student's results are shown in the table.

Percentage alcohol concentration in surrounding water	Heart rate in beats per minute			
	Experiment 1	Experiment 2	Experiment 3	Mean
0	127	125	126	126
2	76	78	74	76
4	46	32	44	.....
6	33	39	36	.....
8	33	32	34	33
10	45	32	30	31

- 1 (a) (i)** The student decided that two of the results in the table were anomalous.

One of the anomalous results has been circled for you. Draw a ring around the other anomalous result in the table.

(1 mark)

- 1 (a) (ii)** The student calculated the mean for each alcohol concentration. Complete the table.

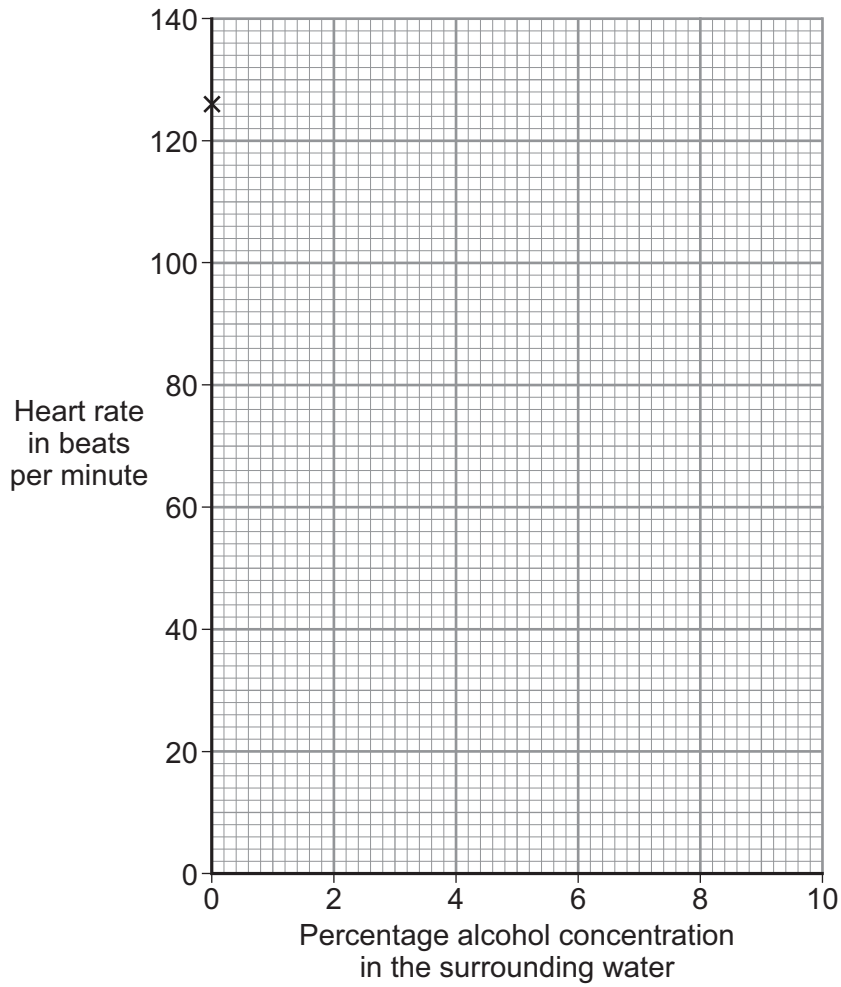
(2 marks)

- 1 (a) (iii)** Complete the graph on the page opposite to show how alcohol concentration affects heart rate in *Daphnia*.

Draw a line of best fit.

The first point has been plotted for you.





(3 marks)

1 (a) (iv) Describe the pattern shown in the graph.

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(2 marks)

1 (b) (i) Calculate the percentage decrease in mean heart rate when *Daphnia* are moved from a solution containing 0% alcohol to a solution containing 10% alcohol.

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Percentage decrease ..... %  
(3 marks)

Turn over ►



1 (b) (ii) If a person's heart rate dropped by the same percentage, the person could die.

The alcohol content of wine is 12.5%.

The student concluded that drinking wine might cause a person to die.

Suggest **one** reason why this is **not** a valid conclusion.

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(1 mark)

12
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**Turn over for the next question**

**DO NOT WRITE ON THIS PAGE  
ANSWER IN THE SPACES PROVIDED**

**Turn over ►**



0 5

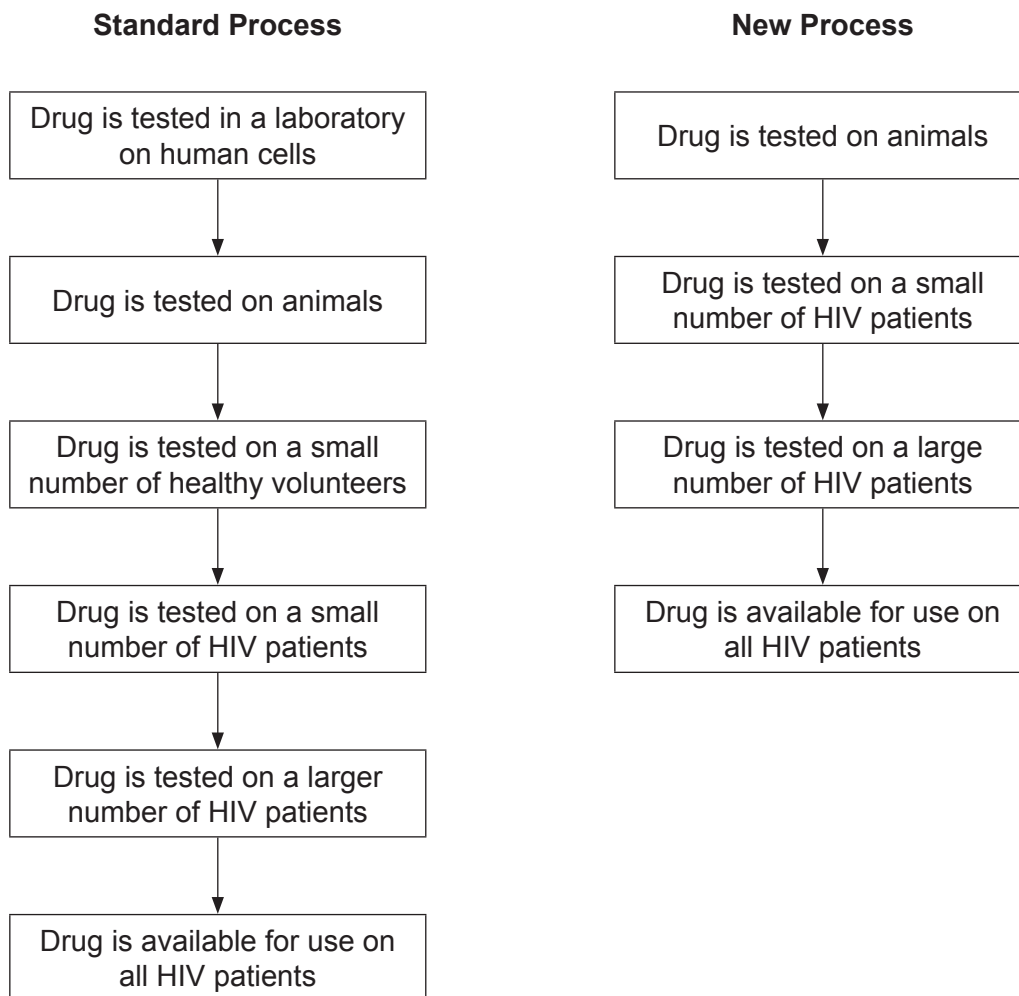
- 2 *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

More than 6000 people in the UK are diagnosed with HIV each year.

A drug company proposes a new process for the development of new drugs to treat HIV.

The standard process takes 6 years and the new process would take 4 years.

Both processes are shown below.





**3 (a)** A woman is buying a new house. A surveyor visits the new house and warns the woman that the levels of radon gas are high.

Radon is a radioactive gas that can cause cancer.

Suggest why the levels of radon gas in the house are high.

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*(2 marks)*

**3 (b)** A woman is told by her doctor she has cancer. The doctor wants to treat her with radiotherapy. Radiotherapy uses gamma radiation to kill cancer cells.

Suggest what questions the woman would want to ask the doctor before she agrees to the treatment.

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*(3 marks)*





**3 (c)** A man goes into hospital for tests because his doctor thinks the man has a blockage in one of his blood vessels.

The man is injected with a radioactive tracer to examine the blood flow in his body.

Describe how a radioactive tracer is used to show whether there is a blockage in the man's blood vessel.

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(4 marks)

**3 (d)** Doctors who work with radiation in hospitals have to wear film radiation badges.  
Explain why.

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(2 marks)

11

**Turn over for the next question**

**Turn over ►**



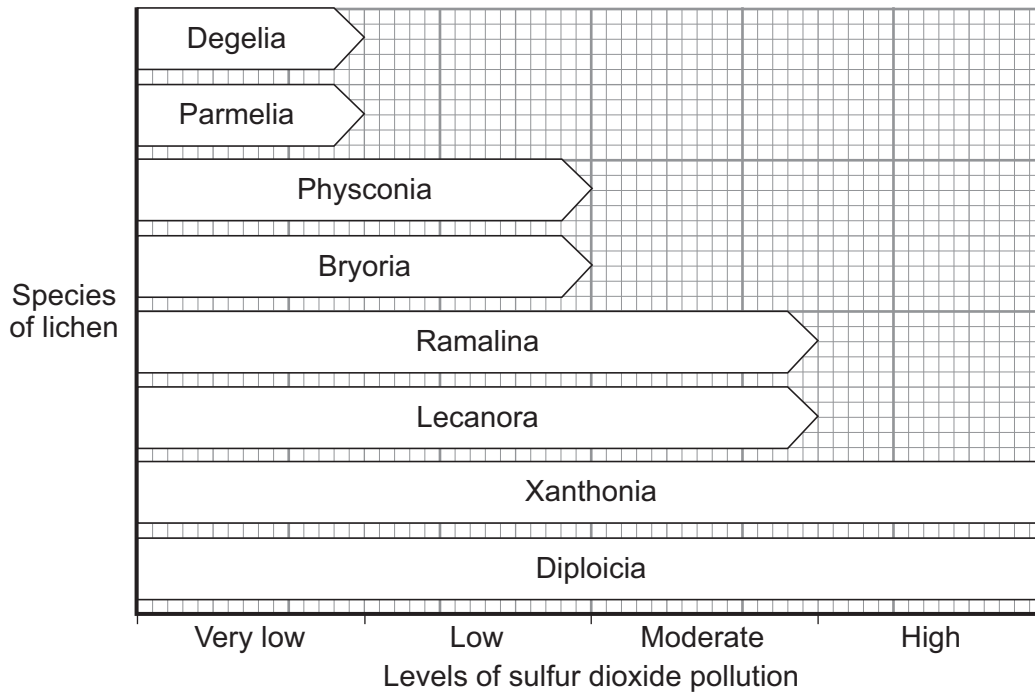
4 Environmental scientists use indicator species to measure the levels of pollution in the air and in rivers.

4 (a) Name **one** indicator species for water pollution.

.....  
(1 mark)

4 (b) Lichens are indicators of air pollution.

The chart shows the level of sulfur dioxide pollution different lichens can survive in.



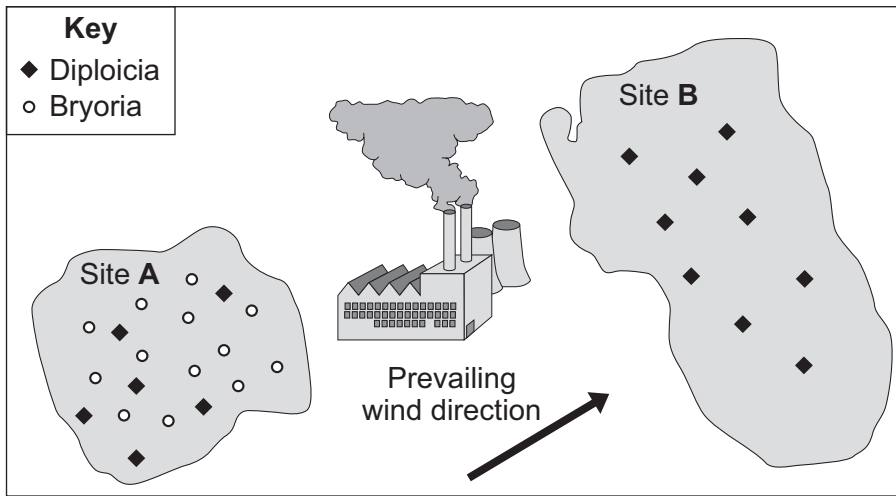
4 (b) (i) An environmental scientist is investigating pollution in a forest near a factory. Describe how the scientist would use the chart to find the level of pollution in the forest.

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(4 marks)



4 (b) (ii) The diagram shows the position of the factory and the lichens found near the factory.



What is the evidence that the factory is causing the pollution?

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(2 marks)

Question 4 continues on the next page

Turn over ►



4 (c) Some types of pollution are also greenhouse gases.

4 (c) (i) Describe the human activities that are leading to increased levels of each of the **three** main greenhouse gases listed below.

Carbon dioxide .....

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Methane .....

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Nitrous oxide .....

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(3 marks)

4 (c) (ii) Explain how greenhouse gases are causing an increase in the temperature of the Earth.

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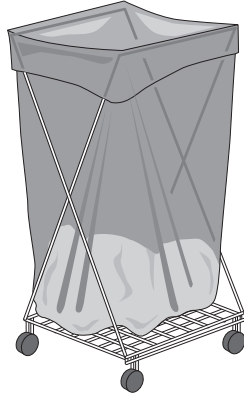
(2 marks)

12



**5** Materials scientists develop new materials. New materials are developed to have less impact on our environment.

The diagram shows a laundry bag used in a hospital. The bag is made from PVOH.



**5 (a)** The dirty laundry from a hospital has to be handled carefully to make sure infections are not spread.

Suggest why hospitals use PVOH laundry bags.

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(3 marks)

**5 (b)** Name a different type of plastic, with similar properties to PVOH, that could be used to make hospital laundry bags.

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(1 mark)

4

Turn over ►





7 Some people in hospitals become infected with MRSA.  
MRSA is a type of bacteria that is resistant to penicillin.

7 (a) Explain how penicillin-resistant bacteria develop.

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(4 marks)

7 (b) The number of infections with MRSA was lower in the year 2010 than in the year 2000.  
Suggest **one** reason for the decrease in infections with MRSA between 2000 and 2010.

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(1 mark)

**Question 7 continues on the next page**

**Turn over ►**



**7 (c)** Some diseases, for example flu, can be prevented by vaccinations.

Describe how.

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(3 marks)

8

**END OF QUESTIONS**

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