Centre Number						Candidate Number				
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For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
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TOTAL	

General Certificate of Secondary Education
Foundation Tier
November 2012

Science B SCB3FP

Unit 3 Making My World a Better Place

F

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 8 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.

There are no questions printed on this page

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ANSWER IN THE SPACES PROVIDED

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

1 (a) Pollution in the home can sometimes make people ill.

Which **three** of the following are common pollutants in the home?

Tick (✓) **three** answers.

Dust ☐

Carbon dioxide ☐

Steam ☐

Pollen ☐

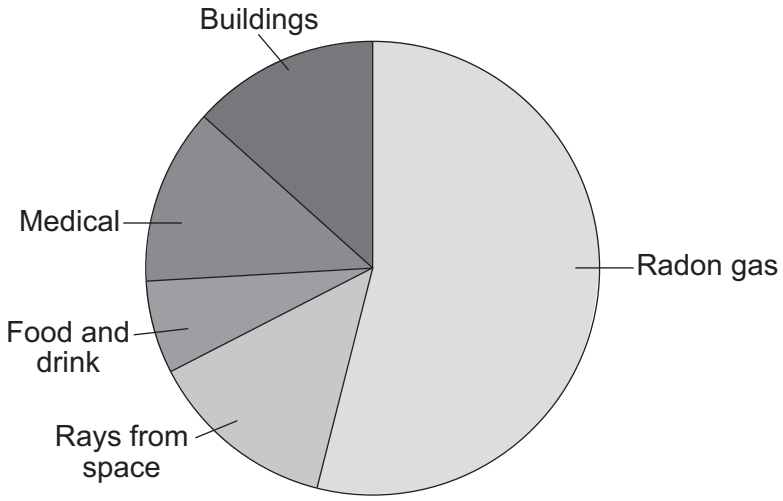
Mould ☐

Nitrogen ☐

(3 marks)

Question 1 continues on the next page

1 (b) Radiation is another form of pollution in the home. The pie chart shows some sources of this radiation.



1 (b) (i) What is the smallest source of radiation?

.....

(1 mark)

1 (b) (ii) Use the correct answers from the box to complete the sentence.

uranium	**radium**	**natural gas**	**trees**

Two sources of radon gas are ..... and

..... .

(2 marks)

1 (c) Pollution also occurs outside the home.

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

1 (c) (i) Eutrophication is caused by the leaching of

carbon dioxide
fertilisers
plastics

into lakes and rivers.

An indicator species for water pollution is

bloodworms.
earthworms.
lichen.

(2 marks)

1 (c) (ii) Many countries agreed on a plan to reduce greenhouse gases.

This agreement is called the

Greenhouse agreement.
Kyoto agreement.
United Nations agreement.

Increasing the levels of greenhouse gases in the Earth's atmosphere causes

more heat to be

kept in
lost from
produced in

the atmosphere.

(2 marks)

10

Turn over for the next question

2 (a) Blood has an important job in the human body.

Draw **one** line from the part of the blood to its role in the human body.

Part of the blood	**Role in the human body**
Phagocytes	Produce antibodies
Platelets	Carry oxygen around the body
Lymphocytes	Engulf and destroy pathogens
	Cause the blood to clot and stop pathogens entering the body

(3 marks)

2 (b) What is a pathogen?

.....

.....

.....

.....

(2 marks)

2 (c) The table shows some diseases microbes cause.

Complete the table.

Disease	**Type of microbe causing the disease**
Cholera	……
Polio	Virus
Measles	……

(2 marks)

7

Turn over for the next question

3 (a) Farmers want to produce more meat from their cows. They use selective breeding to produce cows with more meat.

Sentences **A**, **B**, **C** and **D** describe how cows can be bred selectively. The sentences are not in the correct order.

A The process is repeated over many generations.

B A cow and a bull with the desired characteristics are chosen as the parents.

C Offspring with the desired characteristics are chosen.

D The parents are bred with each other.

Put sentences **A**, **B**, **C** and **D** in the correct order. The first one has been done for you.

(2 marks)

3 (b) Farmers also selectively breed milk cows.

Tick (✓) **two** possible advantages to the farmer of doing this.

The cows will produce more milk. ☐

The farmer will have a herd of cows that look the same. ☐

The farmer will make more money. ☐

The cows will eat more food. ☐

(2 marks)

3 (c) Give **two** risks of selective breeding.

1 .....

.....

2 .....

.....

(2 marks)

6

4 Scientists are developing new materials all the time.

4 (a) A girl wearing some new nail varnish goes outside during the day. The nail varnish changes colour.

What type of new material is the nail varnish made of?

.....

(1 mark)

4 (b) Another new material is used for making superconductors.

What is the advantage of using superconductors in Maglev trains?

.....

.....

(1 mark)

4 (c) A company wants to develop a new product for dog owners.

The new product will be a dog jacket that changes colour when its temperature changes.

Suggest what type of material the dog coat should be made of.

.....

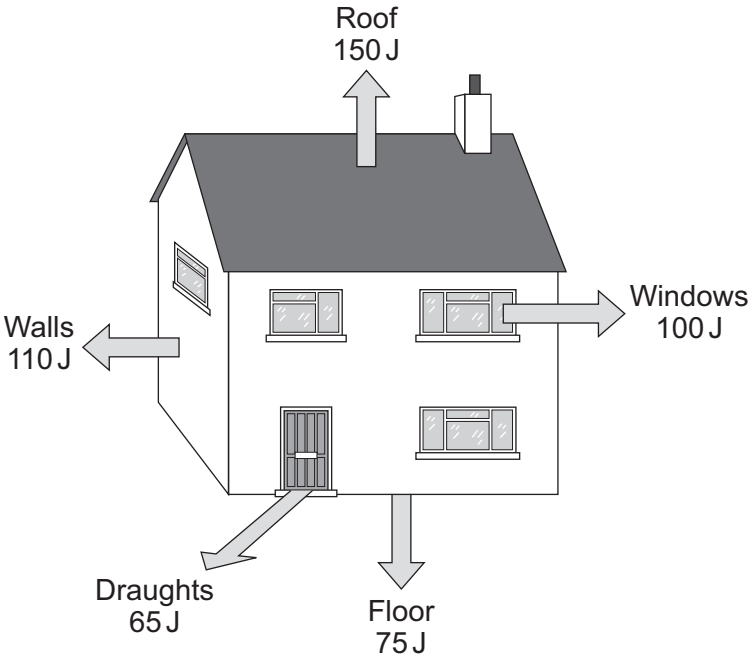
(1 mark)

3

Turn over for the next question

5 (a) People need to insulate their houses to save money.

The diagram shows how much heat is lost each second from the different parts of a house. The house in the diagram is **not** insulated.



5 (a) (i) Each year, the house costs £660 to heat.

20% of the total energy lost from the house is being lost through the windows.

How much money is being wasted because of heat lost through the windows?

.....

.....

Answer £ .....

(2 marks)

5 (a) (ii) The total energy lost from the house is 500 J per second.

What percentage of energy is lost through the walls?

.....

.....

.....

Energy lost ..... %

(2 marks)

5 (b) (i) The owners of the house want to install cavity wall insulation. This will save them £80 a year in energy bills.

Cavity wall insulation costs £240 to install.

Payback time can be calculated using the equation below.

$$\text{payback time} = \frac{\text{cost}}{\text{savings per year}}$$

Calculate the payback time for installing cavity wall insulation.

.....

.....

Answer = ...

(2 marks)

5 (b) (ii) If the owners installed roof insulation they would save £100 a year. The payback time for roof insulation is 1.5 years.

Should the owners install cavity wall insulation or roof insulation?

Explain your answer.

.....

.....

.....

.....

(1 mark)

5 (c) Heat is lost from the house through radiation.

Name **two** other ways heat is lost from the house.

1 .....

2 .....

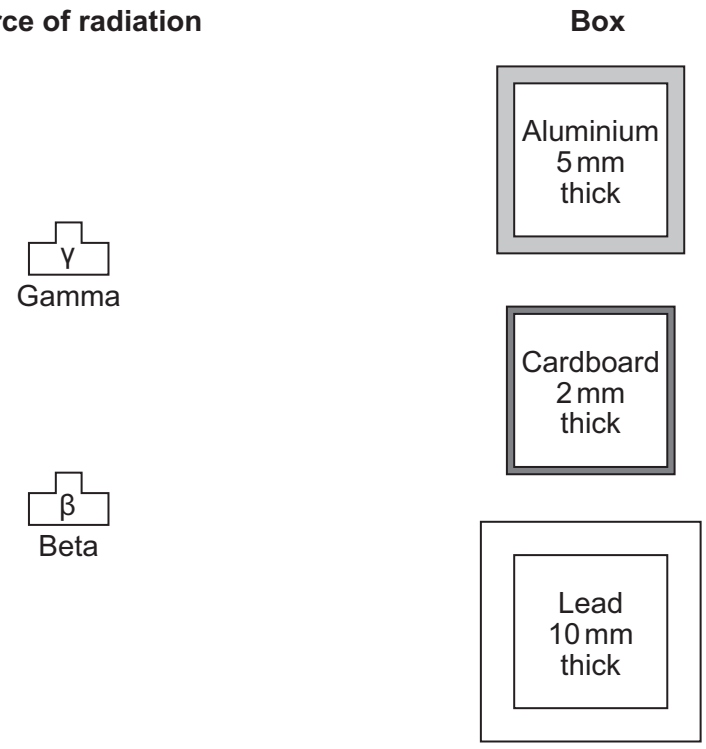
(2 marks)

9

6 (a) Radioactive sources need to be stored in boxes to stop the radiation leaking out.

The boxes need to be made from different materials.

Draw **one** line from each source of radiation to the box the radioactive source must be stored in.



(2 marks)

6 (b) X-rays and gamma rays are both used in hospitals.

Tick (✓) the **two** statements that are true.

X-rays can easily pass through bones. ☐

X-rays are transverse waves. ☐

Gamma rays are **not** a type of electromagnetic radiation. ☐

Gamma rays can be used in medical imaging. ☐

(2 marks)

6 (c) Radiotherapy uses gamma radiation to treat some cancers.

Suggest **three** ethical factors a doctor would need to consider before starting radiotherapy with a cancer patient.

1 .....

.....

2 .....

.....

3 .....

.....

(3 marks)

7

Turn over for the next question

7 (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

7 (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)

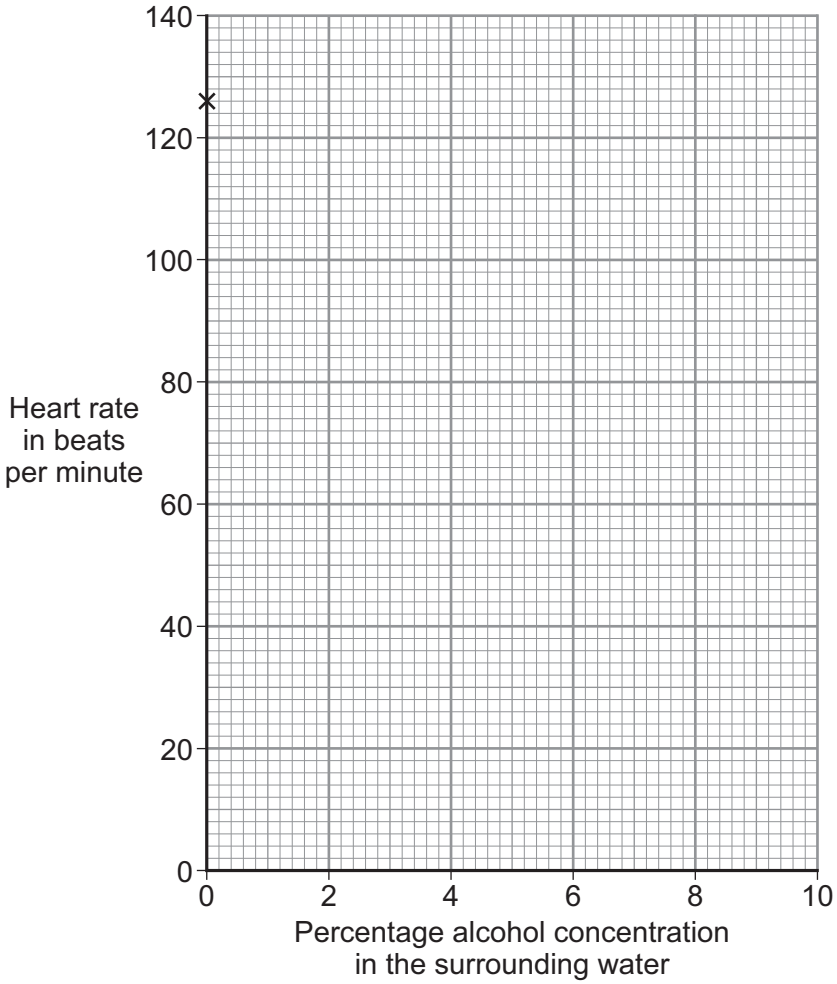
7 (a) (ii) The student calculated the mean for each alcohol concentration. Complete the table.

(2 marks)

7 (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)

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

.....

.....

.....

(2 marks)

7 (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.

.....

.....

.....

Percentage decrease ..... %

(3 marks)

Turn over ▶

7 (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.

.....

.....

(1 mark)

12

Turn over for the next question

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

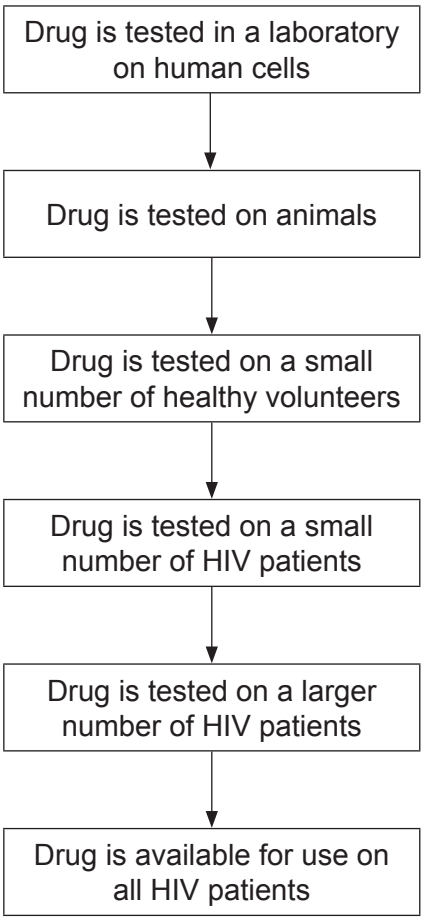
More than 6000 people in the UK are diagnosed with HIV each year.

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

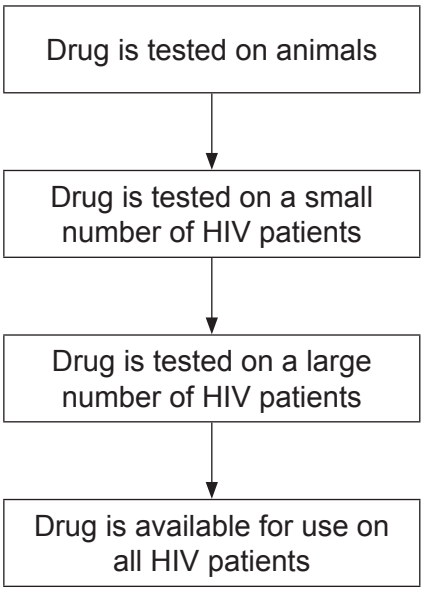
The standard process takes 6 years and the new process would take 4 years.

Both processes are shown below.

Standard Process



New Process



Do you think the drug company should use the new process?

To gain marks you should compare the two processes, and clearly identify the advantages and disadvantages of using the new process.

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(6 marks)

6

END OF QUESTIONS

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