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	

AQA

**General Certificate of Secondary Education
Higher Tier
June 2014**

Biology
Unit Biology B3

BL3HP

H

Tuesday 13 May 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 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.

A

BL3HP

2

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

1 The number of fish in the oceans is decreasing.

Table 1 shows information about the mass of fish caught by UK fishermen between 2002 and 2010.

Table 1

Year	Mass of fish caught by UK fishermen from ALL SOURCES in thousands of tonnes	Mass of fish caught by UK fishermen from SUSTAINABLE SOURCES in thousands of tonnes	Percentage of fish caught from sustainable sources
2002	690.0	427.8	62.0
2004	655.0	396.6	60.5
2006	619.0	386.0	62.4
2008	589.0	436.1	74.0
2010	611.5	465.0	

1 (a) (i) Calculate the percentage of fish caught from sustainable sources in 2010.

[2 marks]

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1 (a) (ii) Describe the pattern in **Table 1** for the mass of fish caught from all sources.

Suggest reasons for this pattern.

[4 marks]

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1 (a) (iii) Suggest why the percentage of fish caught from sustainable sources is increasing.

[1 mark]

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1 (b) Give **two** methods of maintaining fish stocks at a sustainable level.

[2 marks]

1 ....

2 ....

Question 1 continues on the next page

Turn over ▶

1 (c) **Figure 1** shows a fish farm.

Figure 1

In a fish farm, large numbers of fish are grown in cages in the sea.

Why do fish in the cages grow faster than fish of the same species that are free in the sea?
You should refer to energy in your answer.

[4 marks]

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Turn over for the next question

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ANSWER IN THE SPACES PROVIDED**

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

Deforestation affects the environment.

Deforestation is causing a change in the amounts of different gases in the atmosphere. This change causes global warming and climate change.

Figure 2 shows an area of deforestation.

Figure 2

Give the reasons why deforestation is taking place.

Describe how deforestation is causing the change in the amounts of different gases in the atmosphere.

[6 marks]

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Extra space ....

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Turn over for the next question

Turn over ▶

3 Plant roots absorb water from the soil by osmosis.

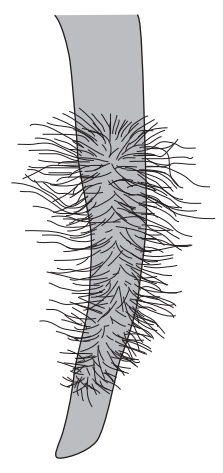**3 (a)** What is osmosis?

[3 marks]

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3 (b) **Figure 3** shows part of a plant root.

Figure 3

The plant root is adapted for absorbing water from the soil.

Use information from **Figure 3** to explain how this plant root is adapted for absorbing water.

[3 marks]

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4 Blood is part of the circulatory system.

4 (a) (i) Give **one** function of white blood cells.

[1 mark]

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4 (a) (ii) Which of the following is a feature of platelets?

Tick (✓) **one** box.

[1 mark]

They have a nucleus. ☐

They contain haemoglobin. ☐

They are small fragments of cells. ☐

4 (b) Urea is transported by the blood plasma from where it is made to where the urea is excreted.

Complete the following sentence.

[2 marks]

Blood plasma carries urea from where it is made in the ....

to the .... where the urea is removed from the blood.

Question 4 continues on the next page

Turn over ▶

PMT

Do not write outside the box

4 (c) **Figure 4** shows a section through the human heart.

Figure 4

Right atrium

X

Left ventricle
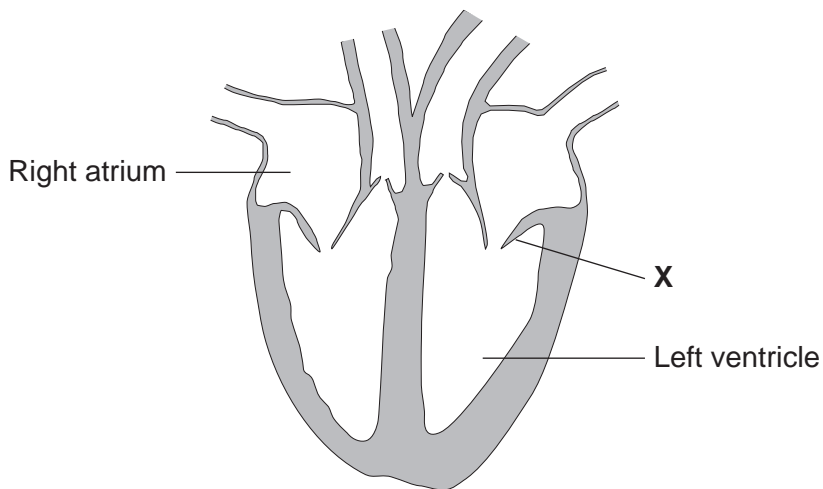
Structure **X** is a valve. If valve **X** stops working, it may need to be replaced.

A scientist is designing a new heart valve. The scientist knows that the valve must be the correct size to fit in the heart.

Suggest **two** other factors the scientist needs to consider so that the newly designed valve works effectively in the heart.

[2 marks]

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G/Jun14/BL3HP

5 The leaves of most plants have stomata.

5 (a) (i) Name the cells which control the size of the stomata.

[1 mark]

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5 (a) (ii) Give **one** function of stomata.

[1 mark]

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5 (b) **Figure 5** shows part of the surface of a leaf.

Figure 5
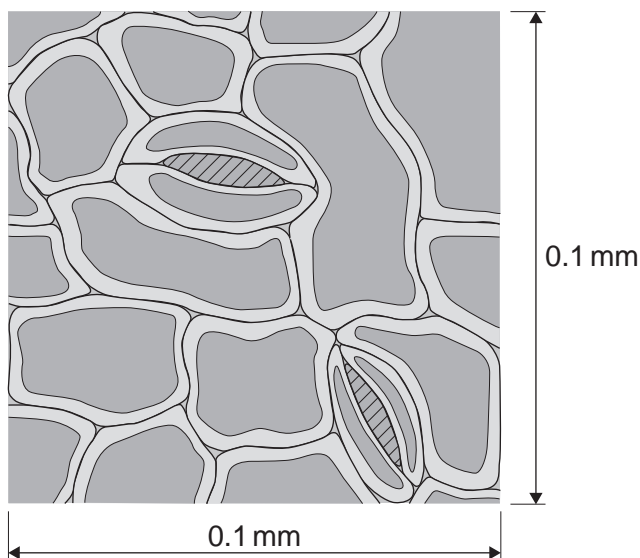
0.1 mm

0.1 mm

The length and width of this piece of leaf surface are both 0.1 mm.

5 (b) (i) Calculate the number of stomata per mm^2 of this leaf surface.

[2 marks]

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.... per mm^2

Turn over ▶

5 (b) (ii) A different plant species has 400 stomata per mm^2 of leaf surface.

Having a large number of stomata per mm^2 of leaf surface can be a disadvantage to a plant.

Give **one** disadvantage.

[1 mark]

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5 (c) A student investigated the loss of water from plant leaves.

The student did the following:

- Step 1: took ten leaves from a plant
- Step 2: weighed all ten leaves
- Step 3: hung the leaves up in a classroom for 4 days
- Step 4: weighed all ten leaves again
- Step 5: calculated the mass of water lost by the leaves
- Step 6: repeated steps **1** to **5** with grease spread on the upper surfaces of the leaves
- Step 7: repeated steps **1** to **5** with grease spread on both the upper and lower surfaces of the leaves.

All the leaves were taken from the same type of plant.

Table 2 shows the student's results.

Table 2

Treatment of leaves	Mass of water the leaves lost in g
No grease was used on the leaves	0.98
Grease on upper surfaces of the leaves	0.86
Grease on upper and lower surfaces of the leaves	0.01

5 (c) (i) What mass of water was lost in 4 days through the upper surfaces of the leaves?

[1 mark]

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Mass = ... g

5 (c) (ii) Very little water was lost when the lower surfaces of the leaves were covered in grease.

Explain why.
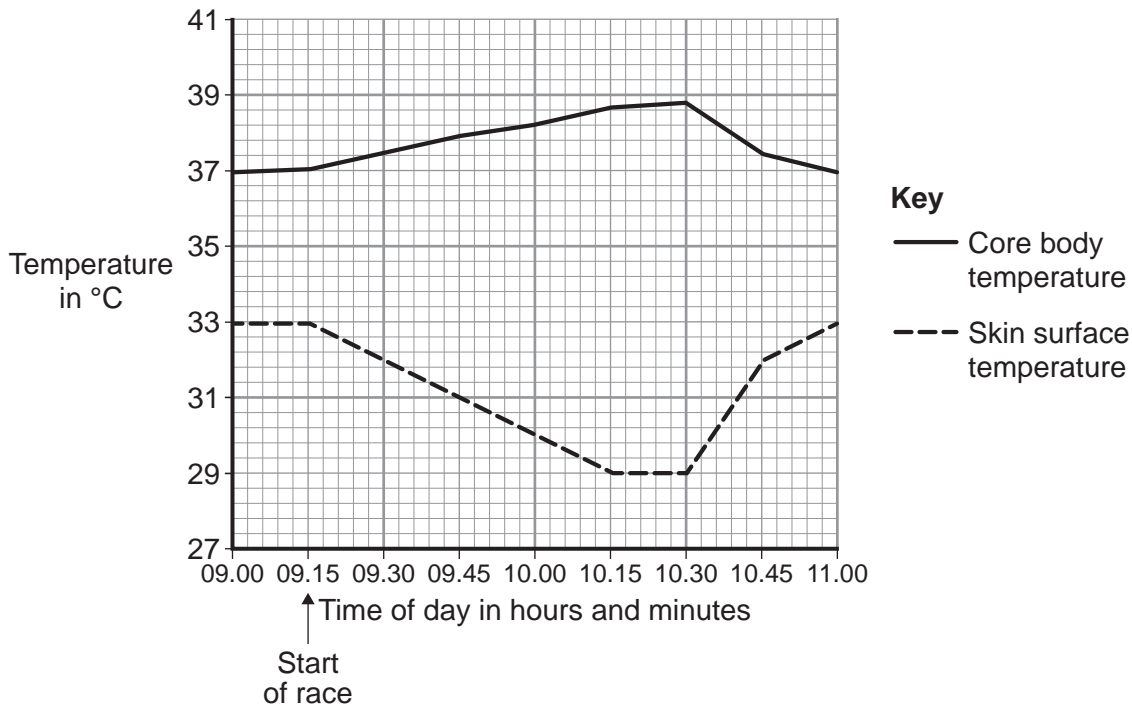
[3 marks]

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Turn over for the next question

Turn over ▶

6 **Figure 6** shows the core body temperature and the skin surface temperature of a cyclist before, during and after a race.

Figure 6

6 (a) (i) When the cyclist finished the race, his core body temperature started to decrease.

How long did the race last?

[1 mark]

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6 (a) (ii) Describe and explain the different patterns shown in the core body temperature and skin surface temperature between 09.15 and 10.15.

[6 marks]

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6 (a) (iii) After 10.30, the core body temperature decreased.

Explain how changes in the blood vessels supplying the skin caused the skin surface
temperature to increase.

[2 marks]

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6 (b) During the race, the cyclist's blood glucose concentration began to decrease.

Describe how the body responds when the blood glucose concentration begins to
decrease.
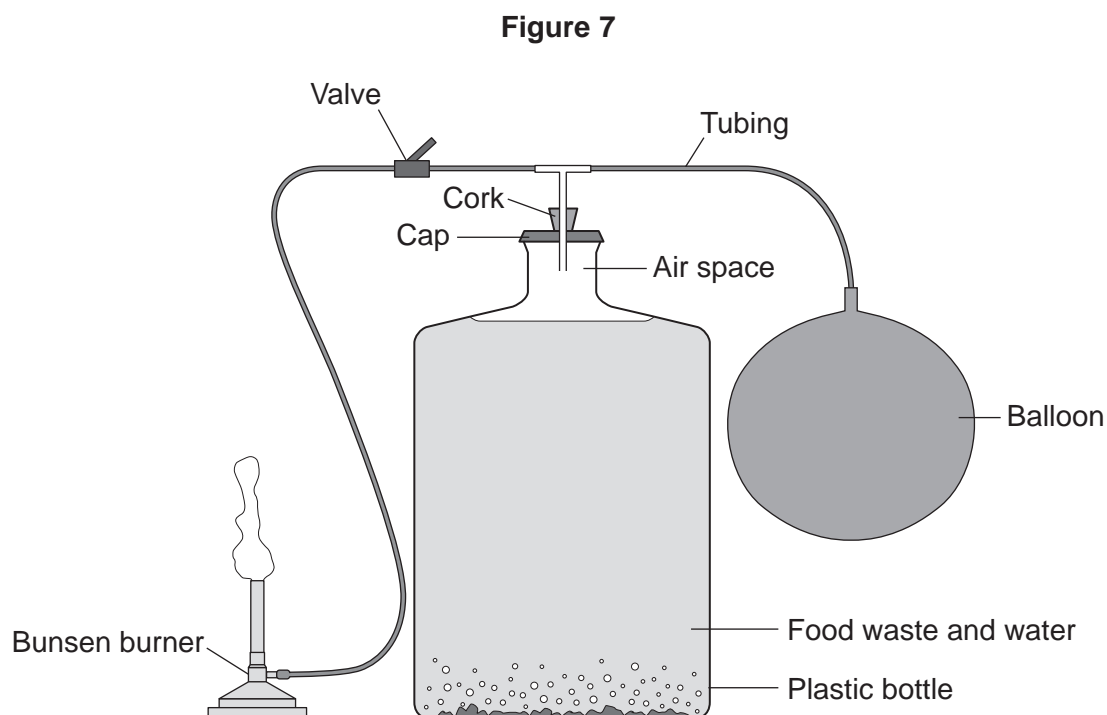
[3 marks]

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12

Turn over ▶

7 **Figure 7** shows a model biogas generator.

Figure 7

Students used the model biogas generator to investigate which type of food waste produces the greatest yield of biogas.

Gas collects in the balloon. The gas is then released through the valve and is burned at the Bunsen burner.

The students:

- put 500 g of potato peelings in the plastic bottle with some water and sealed the apparatus
- released the gas from the balloon after day two and timed how long the gas burned for
- released the gas that had collected in the balloon from day two to day four and timed how long the gas burned for
- repeated the investigation using 500 g of cooked rice, then 500 g of cabbage leaves and then 500 g of cooked pasta.

7 (a) **Table 3** shows the students' results.

Table 3

Type of food waste	Length of time the gas burned in seconds	
	After day two	**From day two to day four**
Potato peelings	0	175
Cooked rice	0	100
Cabbage leaves	0	150
Cooked pasta	0	160

7 (a) (i) Suggest why the gas collected in the balloon and released after day two did not burn.

[3 marks]

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7 (a) (ii) Suggest why potato peelings produced the most biogas.

[1 mark]

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Question 7 continues on the next page

Turn over ▶

7 (b) Scientists investigated the production of biogas from different types of animal manure.

Table 4 shows the scientists' results.

Table 4

Type of manure	Volume of biogas produced in m³ per kg of manure	Methane in the biogas as % of total volume
Cow	0.34	65
Pig	0.58	68
Hen	0.62	60
Horse	0.30	66
Sheep	0.61	67

7 (b) (i) Calculate the volume of methane produced from 1 kg of cow manure.

[2 marks]

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Volume of methane = ... m³

7 (b) (ii) One scientist concluded that it would be better to use sheep manure in a biogas generator than to use cow manure.

What is the evidence for this conclusion?

Use information from **Table 4** in your answer.

[2 marks]

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END OF QUESTIONS

8

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