GCSE BIOLOGY
Foundation Tier  Unit Biology B3

Friday 9 June 2017
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 7 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.
1 Large areas of the Amazon rainforest have been cut down.

**Figure 1** shows the area of forest cut down each year between 2008 and 2013 in the Amazon.

**1 (a) (i)** How many more thousand square kilometres of forest were cut down in 2008 than in 2013?

Tick (✓) one box.

- 6.0  
- 6.5  
- 7.0  
- 8.0
1 (a) (ii) Give two reasons why forests are cut down.  
Tick (✓) two boxes.  
To decrease global warming
To decrease the amount of sulfur dioxide released
To increase biodiversity
To provide land to grow crops
To provide space for building

1 (b) Deforestation changes the concentration of gases in the atmosphere. 
The changes contribute to global warming. 
Which two gases contribute to global warming?  
Tick (✓) two boxes.
Carbon dioxide
Hydrogen
Methane
Nitrogen
Oxygen
2 Substances travel from the soil into plant roots by different processes.

2 (a) One of these processes is osmosis.

What is the definition of osmosis? [1 mark]

Tick (✓) one box.

- The movement of water from a concentrated solution to a more dilute solution through a partially permeable membrane.
- The movement of water from a dilute solution to a more concentrated solution through a partially permeable membrane.
- The movement of water through a partially permeable membrane using energy.

2 (b) Figure 2 shows a cross-section through a plant stem.

![Figure 2]

Parts A and B in Figure 2 contain tubes that transport materials in plants.

A student collected fluid from parts A and B.

The fluid from A contained a lot of sugar.

The fluid from B contained a lot of mineral ions.
What are the names of parts A and B in Figure 2?

Use the correct answers from the box.

<table>
<thead>
<tr>
<th>guard cells</th>
<th>phloem</th>
<th>stomata</th>
<th>storage organ</th>
<th>xylem</th>
</tr>
</thead>
</table>

A ________________________________________
B ________________________________________

2 (c) In plants water moves from the roots, up through the stem and out of the leaves.

What is the name of this movement of water? [1 mark]

Complete the sentence.

The ___________________________ stream.

Question 2 continues on the next page
2 (d) The student investigated the rate of water loss from leaves.

The student:
- took four leaves, A, B, C and D, from the same plant
- measured the mass of each leaf
- kept the leaves in the same room for 3 hours
- measured the mass of each leaf again.

Figure 3 shows the four leaves she used.

2 (d) (i) How could the student calculate the mass of water lost for each leaf?

Tick (✓) one box.

- mass after + mass before
- mass after × mass before
- mass before + mass after
- mass before − mass after

[1 mark]
2 (d) (ii) Suggest which leaf, A, B, C or D, lost the most water.

Give a reason for your answer. [2 marks]

Leaf ____________

Reason _____________________________________________________________________________
_____________________________________________________________________________________

2 (d) (iii) The student changed the conditions in the room.

Suggest two conditions that would increase the rate of water loss from the leaves. [2 marks]

1 ___________________________________________________________________________________

2 ___________________________________________________________________________________

Turn over for the next question
3 Blood is a tissue.

**Figure 4** is a diagram of the parts of the blood.

![Figure 4]

3 (a) A and B are different types of blood cell.

Label cells A and B in **Figure 4**.

[2 marks]

3 (b) A man has a bad cut on his arm that continues to bleed.

The man goes to hospital and has a blood test.

**Table 1** shows the results of the man’s blood test.

<table>
<thead>
<tr>
<th>Test</th>
<th>Normal range</th>
<th>Result</th>
<th>Healthy</th>
<th>Abnormal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Platelets</td>
<td>140–400</td>
<td>98</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>112–328</td>
<td>297</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Iron</td>
<td>12–300</td>
<td>120</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>
3 (b) (i) Use information from Table 1 and your own knowledge to explain why the man’s cut does not stop bleeding.  

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_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________
_____________________________________________________________________________________

3 (b) (ii) The doctor gives the man a blood transfusion.

Suggest why the blood needs to be the same blood group as the man.  

Tick (✔) one box.

So the donor is not harmed

to prevent rejection of the new blood cells
To reduce the number of blood cells
To suppress the immune system

3 (c) Blood plasma carries substances around the body.

Use the correct answers from the box to complete the sentences.  

Blood plasma carries ______________________________________ from the organs to the lungs.  

Blood plasma carries the soluble products of digestion from  
the ___________________________ to other organs.  

Blood plasma carries urea from the liver to the ___________________________ to be removed.
4 Biogas is produced when bacteria break down some plant or animal materials.

4 (a) What is the main useful gas found in biogas? [1 mark]

_____________________________________________________________________________________

4 (b) Some students investigated which of four types of material produced the most biogas.

The students:
- chopped the material into small pieces
- placed 200 g of each material into a different flask with 100 cm³ of water
- set up the apparatus as shown in Figure 5 to collect the biogas produced
- left each set of apparatus at 25 °C for 7 days
- repeated the investigation twice more.

Figure 5

Give two variables the students controlled in their investigation. [2 marks]

1  ___________________________________________________________________________________
_____________________________________________________________________________________

2  ___________________________________________________________________________________
_____________________________________________________________________________________

Give two variables the students controlled in their investigation.
4 (c) **Table 2** shows the students’ results.

<table>
<thead>
<tr>
<th>Type of material</th>
<th>Volume of biogas collected in 7 days in cm³</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Test 1</td>
</tr>
<tr>
<td>Beans</td>
<td>12.0</td>
</tr>
<tr>
<td>Manure</td>
<td>15.0</td>
</tr>
<tr>
<td>Manure and beans</td>
<td>18.6</td>
</tr>
<tr>
<td>Sweet potato</td>
<td>14.3</td>
</tr>
</tbody>
</table>

4 (c) (i) One of the results in **Table 2** is anomalous.

Draw a ring around the anomalous result shown in **Table 2**.  

[1 mark]

4 (c) (ii) Calculate the mean volume of biogas collected, in 7 days, for sweet potato in **Table 2**.  

[1 mark]

_____________________________________________________________________________________

_____________________________________________________________________________________

4 (c) (iii) Which type of material in **Table 2** would be the most effective to use in a biogas generator?

Give a reason for your answer.  

[2 marks]

_____________________________________________________________________________________

_____________________________________________________________________________________

_____________________________________________________________________________________

_____________________________________________________________________________________

**Question 4 continues on the next page**
4 (d) A farmer built a biogas generator on his cow farm.

Suggest one advantage and one disadvantage of having a biogas generator. [2 marks]

Advantage
__________________________________________________________________________
__________________________________________________________________________

Disadvantage
__________________________________________________________________________
__________________________________________________________________________
5 Some organs in the human body are adapted to exchange materials.

5 (a) Figure 6 shows the human breathing system and heart.

5 (a) (i) Label part A in Figure 6.

5 (a) (ii) Complete the sentences about breathing in.

To make air move into the lungs the ribs move up and ________________

and the diaphragm moves ________________.

These movements are caused when muscles between the ribs and muscles in the
diaphragm ________________.

The increase in volume in the thorax causes the pressure in the thorax to
______________.

5 (a) (iii) In the lungs, which type of blood vessel does oxygen pass into?

______________

Question 5 continues on the next page
5 (b) The small intestine is adapted to absorb digested food.

Figure 7 shows the lining of the small intestine.

5 (b) (i) Name part B shown in Figure 7.

[1 mark]

_______________________________

5 (b) (ii) Give two ways that part B in Figure 7 is adapted to help the small intestine absorb digested food quickly.

[2 marks]

1  ___________________________________________________________________________________
   ___________________________________________________________________________________

2  ___________________________________________________________________________________
   ___________________________________________________________________________________
6 Each year people need to have treatment for heart problems.

**Figure 8** shows a human heart.

**Figure 8**

6 (a) (i) Name part X in Figure 8. 

______________  

6 (a) (ii) Name part Y in Figure 8. 

______________  

6 (a) (iii) There are valves inside the heart. What is the function of these valves? 

_______________________________  

_______________________________  

**Question 6 continues on the next page**
Some patients need to have their heart valves replaced.

Table 3 shows the percentage of patients who died from different causes after having heart valve replacements.

Two types of heart valve were used:
- mechanical – made of metal and plastic
- pig tissue – made from pig heart tissue on a metal frame.

The data was collected over 15 years and 400 patients were involved.

<table>
<thead>
<tr>
<th>Cause of death</th>
<th>Percentage of patients who died</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mechanical valve</td>
</tr>
<tr>
<td>Blood clots blocking coronary arteries</td>
<td>9</td>
</tr>
<tr>
<td>Bleeding</td>
<td>26</td>
</tr>
<tr>
<td>Second operation</td>
<td>5</td>
</tr>
<tr>
<td>Bacterial heart infection</td>
<td>4</td>
</tr>
<tr>
<td>Heart valves stopped working</td>
<td>0</td>
</tr>
</tbody>
</table>

Use information from Table 3 and your own knowledge to answer the following question.

A patient decides to have a mechanical valve replacement rather than a pig tissue valve replacement.

Suggest reasons for and against choosing a mechanical valve. [4 marks]
6 (c) Some people have narrowed arteries. Describe how stents can be used to prevent a heart attack in a person with narrowed arteries. [2 marks]

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Turn over for the next question
There are no questions printed on this page
In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

Humans need to remove (excrete) waste products from the bloodstream.

Describe the processes that produce waste products and how the products are removed from the body.

In your answer you should include the names of the organs involved in producing waste products and those involved in removing the waste products.

You should not refer to faeces in your answer.

[6 marks]
Human activities pollute the air with smoke and gases. One of these gases is sulfur dioxide.

8 (a) What effect does sulfur dioxide have on our environment? [1 mark]

Tick (✓) one box.

- Causes acid rain
- Causes global warming
- Causes more carbon sequestering
- Causes sea levels to rise

8 (b) Figure 9 shows how the mass of sulfur dioxide produced from UK sources changed from 2001 to 2013.
8 (b) (i) The mass of sulfur dioxide produced from all UK sources has decreased.

Use information from Figure 9 to complete the following calculation of the percentage decrease in the mass of sulfur dioxide produced.

[2 marks]

Total mass of sulfur dioxide produced in 2001 = _______________ thousand tonnes

Total mass of sulfur dioxide produced in 2013 = _______________ thousand tonnes

Decrease in mass of sulfur dioxide produced = _______________ thousand tonnes

Percentage decrease working out: ____________________________________________________

_____________________________________________________________________________________

_____________________________________________________________________________________

Percentage decrease = _________________

8 (b) (ii) Use data from Figure 9 to describe the pattern in the mass of sulfur dioxide produced from the UK transport industry from 2001 to 2013.

[2 marks]

_____________________________________________________________________________________

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END OF QUESTIONS
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