Biology

Unit 1
Higher Tier

[GBY12] *GBY12*

FRIDAY 9 JUNE, MORNING

TIME
1 hour 30 minutes.

INSTRUCTIONS TO CANDIDATES
Write your Centre Number and Candidate Number in the spaces provided at the top of this page.
You must answer the questions in the spaces provided.
Do not write outside the boxed area on each page or on blank pages.
Complete in black ink only. Do not write with a gel pen.
Answer all twelve questions.

INFORMATION FOR CANDIDATES
The total mark for this paper is 100.
Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.
Quality of written communication will be assessed in Questions 4 and 11(a).
1. The table gives information about food molecules.

Complete the table.

<table>
<thead>
<tr>
<th>Food molecules</th>
<th>Smaller molecules they are made from</th>
<th>Main function in the body</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fats</td>
<td></td>
<td>Energy store</td>
</tr>
<tr>
<td>Proteins</td>
<td></td>
<td>Growth and repair</td>
</tr>
</tbody>
</table>

[4]
The diagram shows part of a food web found in a woodland.
(a) Describe the role of plants in this food web.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

In this woodland, disease killed many red squirrels.

(b) Explain how this would affect the number of field mice.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
3 The photograph shows how a plant responds to light from one direction.

Look at the photograph.

(a) Name the plant’s response to light.

________________________________ [1]

(b) The hormone auxin causes the plant to bend.

Explain how.

________________________________

________________________________

________________________________

________________________________ [2]
(c) Suggest why this response may benefit the plant.

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

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__________________________________________________________________________

__________________________________________________________________________ [2]
A class of students set up an investigation into the effect of amylase and lipase enzymes on starch solution.

They set up two test tubes each containing 5 cm³ of starch solution.

They added 2 cm³ of amylase solution to tube A.

They added 2 cm³ of lipase solution to tube B.

The students then placed tubes A and B in a water bath at 35 °C for 30 minutes.

After 30 minutes the students added 5 drops of iodine to each tube.

The colour of the solution in each tube was recorded.

The table shows their results.

<table>
<thead>
<tr>
<th>Tube</th>
<th>Enzyme present</th>
<th>Colour of starch solution after 30 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>amylase</td>
<td>yellow/brown</td>
</tr>
<tr>
<td>B</td>
<td>lipase</td>
<td>blue/black</td>
</tr>
</tbody>
</table>
Explain the results for amylase and lipase.

Use your knowledge of enzyme structure and action to support your answer.

In this question you will be assessed on your written communication skills, including the use of specialist scientific terms.
5 The table shows the mass of some gases released into the atmosphere between 2009 and 2013 in the UK.

<table>
<thead>
<tr>
<th>Gas</th>
<th>Mass of gas released/thousand tonnes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2009</td>
</tr>
<tr>
<td>Sulfur dioxide</td>
<td>1042</td>
</tr>
<tr>
<td>Nitrogen oxides</td>
<td>563</td>
</tr>
</tbody>
</table>


(a) Give one similarity and one difference in the trend in mass of sulfur dioxide and nitrogen oxides between 2009 and 2013.

Similarity __________________________________________________________

____________________________________________________________________

Difference __________________________________________________________

____________________________________________________________________

____________________________________________________________________ [2]

(b) Factories and power stations release large masses of sulfur dioxide into the atmosphere.

Describe how this sulfur dioxide is produced.

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________ [2]
(c) Describe how sulfur dioxide in the atmosphere can lead to acid rain.

______________________________________________________________

______________________________________________________________

______________________________________________________________

______________________________________________________________ [2]

(d) Describe and explain how acid rain affects the biodiversity of a forest ecosystem.

______________________________________________________________

______________________________________________________________

______________________________________________________________

______________________________________________________________ [2]
6 Classification is used to identify different species of organisms.

(a) What is a species?
_______________________________________________________________
_______________________________________________________________
_____________________________________________________________ [2]

(b) This key can be used to classify organisms into five kingdoms.

<table>
<thead>
<tr>
<th>Organisms</th>
<th>Nucleus present</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Multicellular</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Cell wall present</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Saprophytic</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Kingdom A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kingdom B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kingdom C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kingdom D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plant kingdom</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Use the key to identify the kingdoms A, B, C, and D.

Kingdom A

Kingdom B

Kingdom C

Kingdom D

[4]
(c) Give **two other** uses for classification.

1. _____________________________________________________________ [1]
2. _____________________________________________________________ [1]
7 (a) An experiment was set up to investigate the growth of two crops of a plant of the same species under different conditions.

Artificial fertiliser was applied to one and manure to the other.

The table shows the results.

<table>
<thead>
<tr>
<th>Time/weeks</th>
<th>Average mass of plants/g</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Artificial fertiliser</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>110</td>
</tr>
<tr>
<td>8</td>
<td>320</td>
</tr>
<tr>
<td>12</td>
<td>450</td>
</tr>
<tr>
<td>16</td>
<td>470</td>
</tr>
</tbody>
</table>

(i) **Complete the graph** by plotting the results for manure.

![Graph of plant growth](image-url)
The plants must reach an average mass of 400g before they can be harvested.

(ii) How long does it take the plants to reach this mass?

Artificial fertiliser ___________________ weeks [1]

Manure ____________________________ weeks [1]

(iii) Explain why the plants grow slower when manure is applied.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________ [2]

(b) Suggest why adding manure is beneficial to the soil.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________ [1]

(c) Give two advantages to the grower of using artificial fertiliser.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________ [2]
(d) The overuse of fertilisers may result in mineral enrichment of lakes.

(i) Describe how the minerals in the fertilisers reach the lakes.

________________________________________________________________________ [1]
________________________________________________________________________

(ii) Describe and explain the effect of mineral enrichment on the living organisms in the lakes.

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________________________________________________________________________

________________________________________________________________________ [4]
8 When the blood glucose concentration rises the pancreas helps return it to its normal concentration.

(a) Describe the role of the pancreas in lowering the blood glucose concentration.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________ [2]

(b) Describe how the liver helps lower the blood glucose concentration.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________ [3]

(c) Name the hormone which helps correct the blood glucose concentration when it falls too low.

________________________________________________________________________ [1]
Doctors use Body Mass Index (BMI) to check if a person has a healthy weight.

(a) Complete the equation for the calculation of BMI by writing in the box.

\[
\text{BMI} = \frac{\text{Mass/g}}{\text{}}
\]

(b) The graph shows the range of BMI values for boys aged 2 years to 20 years in a population.

The 50\textsuperscript{th} percentile shows the average BMI for the population.

Boys with a BMI on or above the 95\textsuperscript{th} percentile are described as obese.
(i) What is the average BMI of a 10-year-old boy?

__________________________________ [1]

(ii) Describe the trend in the BMI for boys between 2 and 20 years.

___________________________________________________________

___________________________________________________________

_________________________________________________________ [2]

(iii) From what age would a boy with a BMI of 20 or above be described as obese?

__________________________________ [1]

(iv) Describe how an energy imbalance can lead to obesity.

___________________________________________________________

___________________________________________________________

_________________________________________________________ [1]

(v) Explain why obesity is a problem to both the individual and to society.

Individual ________________________________________________

________________________________________________________________

Society _______________________________________________________

________________________________________________________________ [2]
10 The image shows a junction between two neurones A and B.

(a) (i) Name this junction.

_________________________  [1]

(ii) Describe how a nerve impulse travels from neurone A to neurone B.

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________  [4]
(b) The diagram shows a normal neurone and a damaged neurone from a person suffering from multiple sclerosis.

Normal neurone

- branching ends
- cell body
- neurone fibre
- insulating sheath

Damaged neurone

(i) Describe how these neurones are adapted to make connections with other neurones.

____________________________________________________________________________________

____________________________________________________________________________________ [1]
(ii) Describe **two** ways multiple sclerosis damages the structure of a neurone.

1. __________________________________________________________
   ___________________________________________________________
   __________________________________________________________

2. __________________________________________________________
   ___________________________________________________________
   __________________________________________________________   [2]

(iii) Suggest **one** effect of multiple sclerosis on the function of the nervous system.

   __________________________________________________________
   __________________________________________________________
   __________________________________________________________   [1]
11 Sand dunes are found at the top of many beaches.

Students carried out an investigation to measure the percentage cover of three plant species, marram grass, heather and gorse growing on five sand dunes.

The graph shows the results.
(a) Describe the trends in the distribution of the three plant species from sand dune 1 to sand dune 5.

Explain which of the five dunes had the most competition.

Use evidence from the graphs to support your answer.

In this question you will be assessed on your written communication skills, including the use of specialist scientific terms.
(b) The students also measured some abiotic factors on each sand dune. The table shows the results.

<table>
<thead>
<tr>
<th>Sand dune</th>
<th>Abiotic factor/arbitrary units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Soil water</td>
</tr>
<tr>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>4</td>
<td>28</td>
</tr>
<tr>
<td>5</td>
<td>42</td>
</tr>
</tbody>
</table>

(i) Use information from the graph and the table to suggest which of the abiotic factors affect the growth of heather and gorse.

Place a tick in the appropriate boxes.

- Soil water
- Soil humus
- Wind speed
- Light intensity

(ii) Suggest an explanation for the change in the humus content of the soil on sand dunes 3, 4 and 5.

Use evidence from the graph and the table to support your answer.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

[2]
12 (a) Plants use nitrates for growth.

(i) Describe how plants absorb nitrates.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

(ii) Describe how plants are adapted to absorb nitrates.

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
[2]

(b) A student set up an experiment to investigate the effect of waterlogging on some of the processes in the nitrogen cycle.

He set up two beakers as shown in the diagrams.
The student measured the concentration of ions in each beaker at the start and after 24 hours.

The table shows the results.

<table>
<thead>
<tr>
<th>Beaker</th>
<th>Ion</th>
<th>Concentration of ions/arb. units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>at start</td>
</tr>
<tr>
<td>1</td>
<td>ammonium</td>
<td>600</td>
</tr>
<tr>
<td></td>
<td>nitrates</td>
<td>90</td>
</tr>
<tr>
<td>2</td>
<td>ammonium</td>
<td>600</td>
</tr>
<tr>
<td></td>
<td>nitrates</td>
<td>90</td>
</tr>
</tbody>
</table>

In beaker 1 the ammonium compounds are being converted to nitrates.

(i) Name this process.

__________________________________________________________________________ [1]

(ii) Use the results for beakers 1 and 2 to describe and explain the effect of waterlogging on this process.

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________ [3]
The student set up two more beakers as shown in the diagrams.

The student measured the concentration of ions in each of these beakers at the start and after 24 hours.

The table shows the results.

<table>
<thead>
<tr>
<th>Beaker</th>
<th>Ion</th>
<th>Concentration of ions/arbitrary units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>at start</td>
<td>after 24 hours</td>
</tr>
<tr>
<td>3</td>
<td>ammonium</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>nitrates</td>
<td>90</td>
</tr>
<tr>
<td>4</td>
<td>ammonium</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>nitrates</td>
<td>200</td>
</tr>
</tbody>
</table>
(iii) Explain the results for beakers 3 and 4, and name the process occurring in each beaker.

Use data from the table to support your answer.

Beaker 3

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________ [3]

Beaker 4

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________ [3]

THIS IS THE END OF THE QUESTION PAPER
<table>
<thead>
<tr>
<th>Question Number</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
</tr>
</tbody>
</table>

Total Marks

Examiner Number

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