

Centre Number						Candidate Number				
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For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
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6	
7	
8	
TOTAL	



General Certificate of Secondary Education
Higher Tier
January 2012

Additional Science
Unit Biology B2

BLY2H

Biology
Unit Biology B2

H

Written Paper

Tuesday 24 January 2012 9.00 am to 9.45 am

For this paper you must have:

- a ruler.

You may use a calculator.

Time allowed

- 45 minutes

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 45.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

Advice

- In all calculations, show clearly how you work out your answer.



J A N 1 2 B L Y 2 H 0 1

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

- 1** A group of students is going on an outdoor expedition.
The students need to keep warm in windy conditions.

The table shows the effect of wind speed on how quickly someone gets frostbite at different air temperatures.

Wind speed in metres per second	Air temperature in °C				
	10	0	-10	-20	-30
0					
5					
10					
15					
20					

Key

Time taken to get frostbite: No frostbite
 30 minutes
 10 minutes
 5 minutes

- 1 (a) (i)** Describe the effect of changing air temperature on the time taken to get frostbite.

.....

(1 mark)

- 1 (a) (ii)** What is the longest time it is safe to stay outside when the air temperature is -20°C and the wind speed is 10 metres per second?

..... minutes
 (1 mark)



1 (b) When core body temperature begins to fall, changes may happen in the body.

Which **two** changes will happen when core body temperature begins to fall?

Tick (✓) **two** boxes.

More blood flows through skin capillaries

Muscles 'shiver'

Blood vessels supplying the skin capillaries constrict

Sweat glands release more sweat

(2 marks)

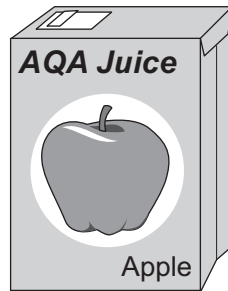
4

Turn over for the next question

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2 Fruit is crushed to release fruit juice.



More juice can be collected if the plant cell walls in the fruit are broken down.

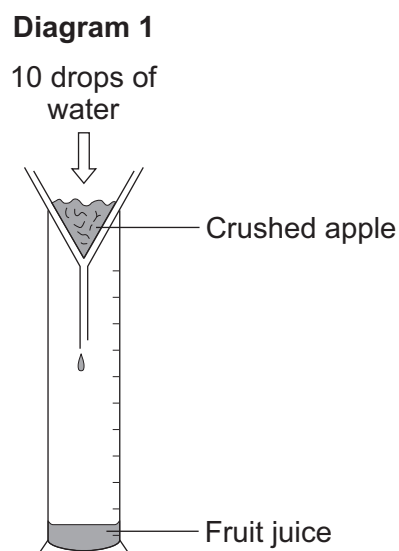
Some students tested the effect on the volume of fruit juice that they could collect of:

- **either** boiling the fruit
- **or** adding the enzyme pectinase to the fruit
- **or** adding the enzyme amylase to the fruit.

In their first experiment the students:

- crushed 20g of apple
- added 10 drops of water
- measured the volume of fruit juice that they collected.

Diagram 1 shows how they collected the fruit juice.



2 (c) The students' results are shown in the table.

What was added to the crushed apple	Was the apple boiled?	Volume of juice collected in cm³
10 drops of water	No	1.2
10 drops of amylase solution	No	1.2
10 drops of pectinase solution	No	11.3
10 drops of water	Yes	11.6

Explain as fully as you can the students' results shown in the table.

Use all the information given in question 2 to help you to answer this question.

.....

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.....

(3 marks)



2 (d) One student said:

'If we add 10 drops of pectinase solution to crushed apple *while it is boiling*, we should collect more juice than if we add 10 drops of water to boiled apple.'

This is **not** correct.

What volume of juice would you predict the students would collect if 10 drops of pectinase solution were added to crushed apple *while it was boiling*?

Draw a ring around **one** answer.

1.2 cm³

11.3 cm³

11.6 cm³

22.9 cm³

(1 mark)

Explain your answer.

.....

.....

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.....

(2 marks)

8

Turn over for the next question

Turn over ►



3 Diabetes is a disease in which a person's blood glucose concentration may rise.

Doctors give people drugs to treat diabetes.

The table shows some of the side effects on the body of four drugs, **A**, **B**, **C** and **insulin**, used to treat diabetes.

Drug	Side effects on the body
A	Weight loss Liver, kidney and heart damage Feeling of sickness
B	Weight gain Damage to some cells in pancreas
C	More water is kept in the body Weight gain Increased chance of bone breakage in women
Insulin	A little more water is kept in the body Weight gain Increased risk of lung damage

3 (a) Which drug, **A**, **B**, **C** or **insulin**, is most likely to result in an increase in blood sugar concentration in some people?

Explain your answer.

Drug

Explanation

.....
.....

(2 marks)



3 (b) (i) Drugs **A**, **B** and **C** can be taken as tablets.

The chemicals in the tablets are absorbed into the blood from the digestive system.

Insulin is a protein.

Insulin **cannot** be taken as a tablet.

Why?

.....
(1 mark)

3 (b) (ii) Other than using drugs, give **two** methods of treating diabetes.

1

2

(2 marks)

5

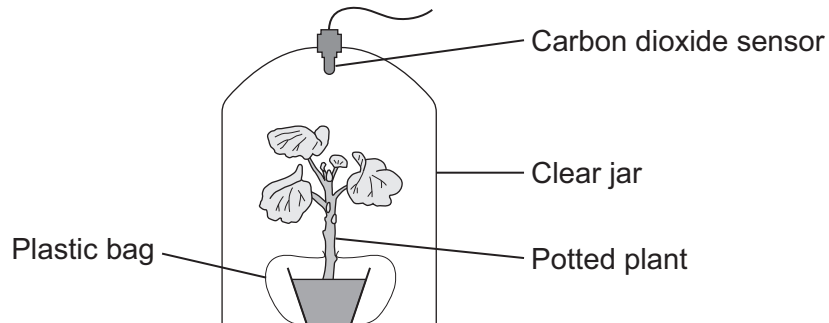
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- 4 A student measured the concentration of carbon dioxide in the air around a potted plant on two different days.

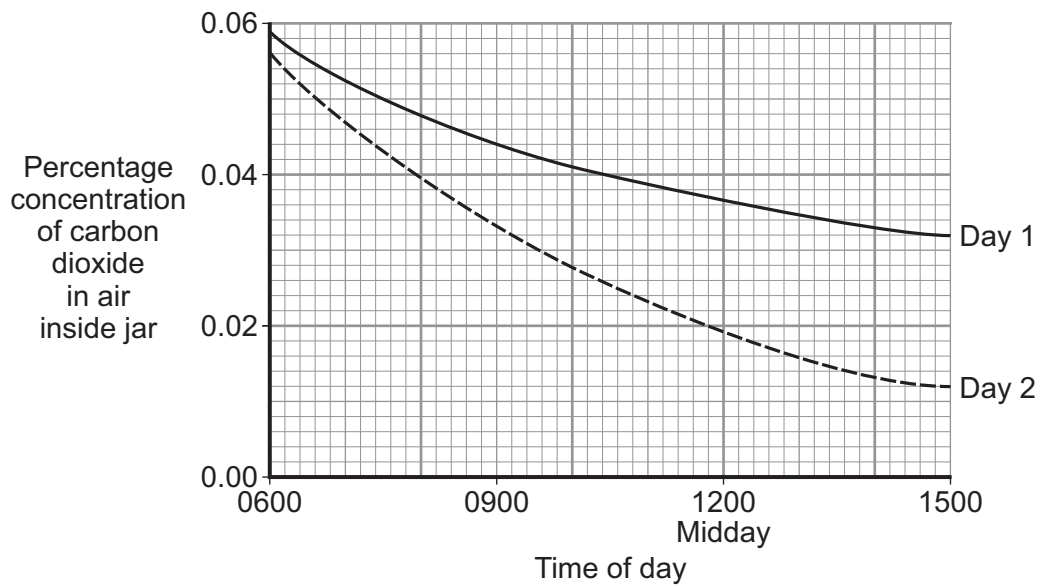
The diagram shows the student's apparatus.



There was a plastic bag round the plant pot to stop microorganisms in the soil affecting the concentration of gases in the air inside the jar.

The apparatus was put near a window.

The graph shows the results.



4 (a) Day 1 was cloudier than Day 2.

What evidence from the graph shows that Day 1 was cloudier?

Explain your answer.

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(2 marks)

4 (b) A potted plant sometimes develops yellow leaves.
The development of yellow leaves could be due to the lack of a mineral ion.

Suggest the mineral ion that could be lacking.

.....

(1 mark)

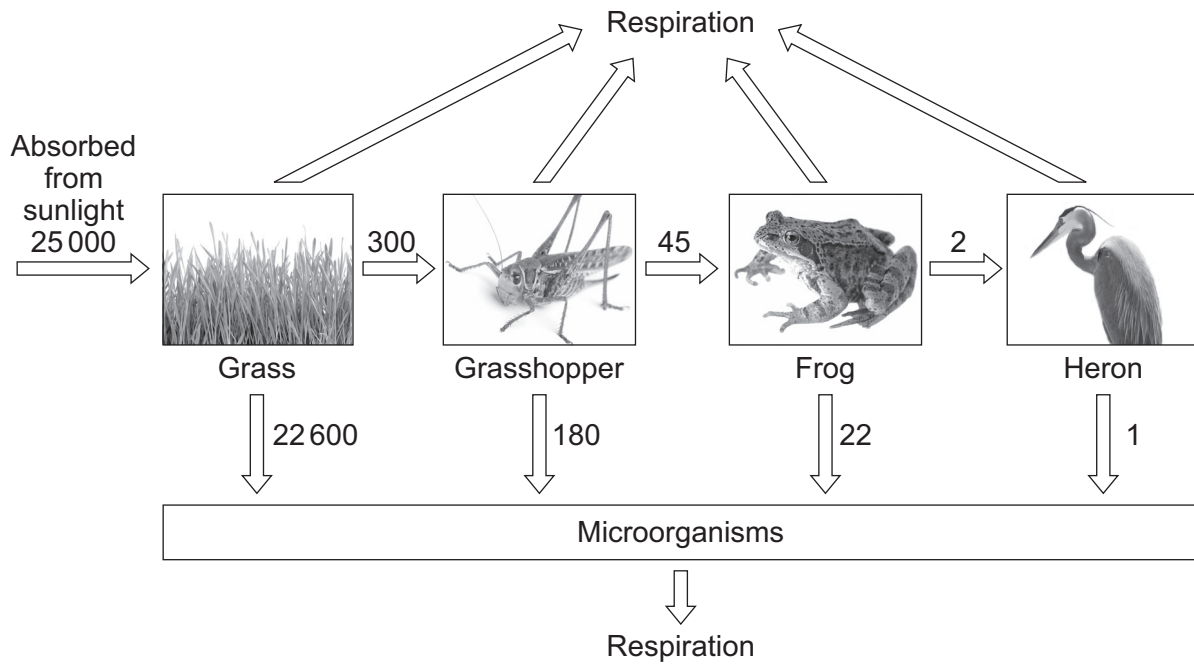
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5 The diagram shows the annual energy flow through 1 m² of a habitat.
The unit, in each case, is kJ per m² per year.



5 (a) Calculate the percentage of the energy absorbed by the grass from sunlight that is transferred to the frog.

Show clearly how you work out your answer.

.....

Answer %
 (2 marks)

5 (b) All of the energy the grass absorbs from the sun is eventually lost to the surroundings.
 In what form is this energy lost?

.....
 (1 mark)



5 (c) Food chains are usually **not** more than five organisms long.

Explain why.

To gain full marks you must use data from the diagram.

.....
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(2 marks)

5 (d) In this habitat microorganisms help to recycle materials.

Explain how.

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(3 marks)

8

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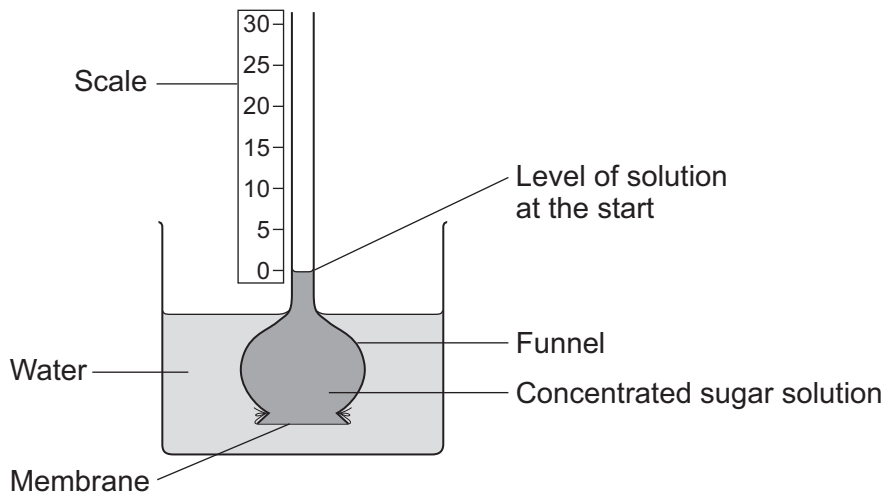
6 Some substances move through membranes.

A student set up an investigation.

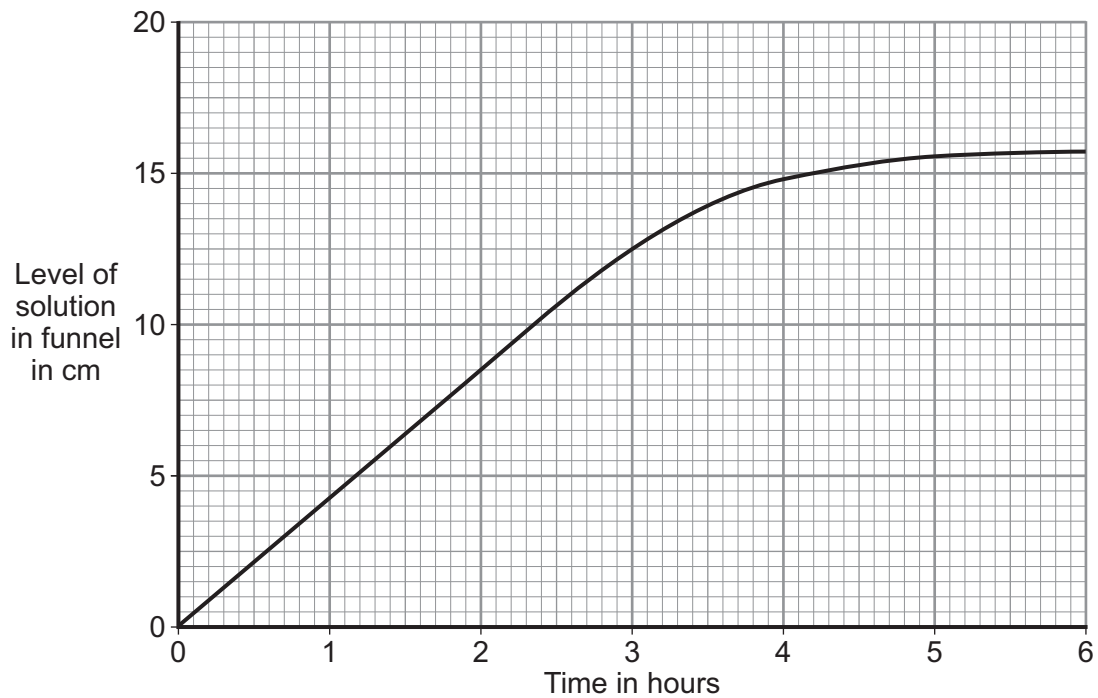
The student:

- tied a thin membrane across the end of a funnel
- put concentrated sugar solution in the funnel
- put the funnel in a beaker of water
- measured the level of the solution in the funnel every 30 minutes.

The diagram shows the apparatus.



The graph shows the results.



6 (a) After 3 hours, the level of the solution in the funnel is different from the level at the start.
Explain why, as fully as you can.

.....
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(3 marks)

6 (b) The student repeated the investigation using dilute sugar solution instead of concentrated sugar solution.

In what way would you expect the results using dilute sugar solution to be different from the results using concentrated sugar solution?

Give the reason for your answer.

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(2 marks)

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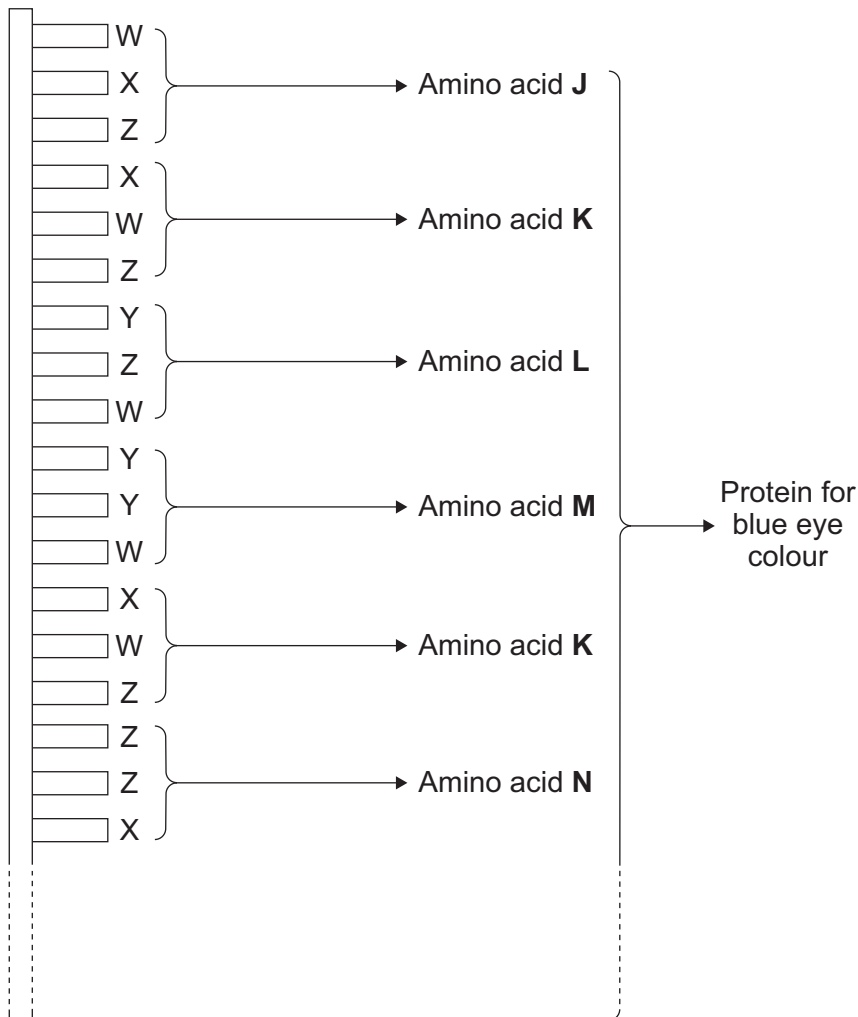
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- 7 A molecule of DNA contains four different bases, **W**, **X**, **Y** and **Z**.
The four bases are arranged in a long chain.
The chain of bases controls the synthesis of a protein.

The diagram shows a small section of a DNA molecule.
This section is responsible for synthesising the protein for blue eye colour.



- 7 (a) What word is used to describe 'a small section of a DNA molecule that controls the synthesis of a protein'?

.....
(1 mark)

- 7 (b) In the cell, where are proteins synthesised?

.....
(1 mark)



7 (c) Describe how the protein for blue eye colour is synthesised.

To gain full marks you must use information from the diagram.

.....

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(3 marks)

7 (d) Mistakes sometimes occur when DNA molecules are copied during cell division.

Suppose that one of the **W** bases shown in the diagram was substituted by an **X** base.

7 (d) (i) What would happen to the structure of the protein synthesised by this part of the DNA molecule?

.....

.....

(1 mark)

7 (d) (ii) What might be the effect of this change in structure of the protein?

.....

.....

(1 mark)

7

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8 Read the information about stem cells.

Stem cells are used to treat some human diseases.

Stem cells can be collected from early embryos. These stem cells have not begun to differentiate, so they could be used to produce any kind of cell, tissue or organ. The use of embryonic stem cells to treat human diseases is new and, for some diseases, trials on patients are happening now.

Stem cells can also be collected from adult bone marrow. The operation is simple but may be painful. Stem cells in bone marrow mainly differentiate to form blood cells. These stem cells have been used successfully for many years to treat some kinds of blood disease. Recently there have been trials of other types of stem cell from bone marrow. These stem cells are used to treat diseases such as heart disease.

Evaluate the use of stem cells from embryos or from adult bone marrow for treating human diseases.

You should give a conclusion to your evaluation.

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(5 marks)

5

END OF QUESTIONS



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