

**GENERAL CERTIFICATE OF SECONDARY EDUCATION**
**GATEWAY SCIENCE**
**BIOLOGY B**

 Unit 1 Modules B1 B2 B3  
 (Higher Tier)

**B631/02**

\* C U P / T 7 1 4 9 8 \*

 Candidates answer on the question paper  
 A calculator may be used for this paper

**OCR Supplied Materials:**

None

**Other Materials Required:**

- Pencil
- Ruler (cm/mm)

**Monday 12 January 2009**  
**Morning**
**Duration: 1 hour**


Candidate Forename						Candidate Surname					
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Centre Number						Candidate Number				
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**INSTRUCTIONS TO CANDIDATES**

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

**INFORMATION FOR CANDIDATES**

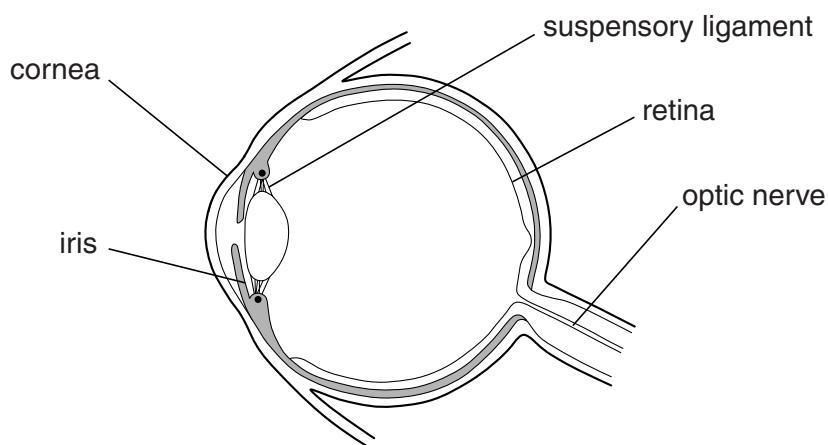
- The number of marks is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is **60**.
- This document consists of **20** pages. Any blank pages are indicated.

FOR EXAMINER'S USE		
Section	Max.	Mark
A	20	
B	20	
C	20	
<b>TOTAL</b>	<b>60</b>	

Answer **all** the questions.

**Section A – Module B1**

1 The diagram shows parts of a human eye.



(a) Finish the sentences about the eye.

Choose the correct answers from the diagram.

The part that controls the amount of light entering the eye is called the ..... .

The part that is involved in accommodation is called the ..... . [2]

(b) Describe the job of the **cornea**.

.....

..... [1]

(c) Humans have binocular vision.

Write down **one** advantage and **one** disadvantage of binocular vision.

advantage .....

.....

disadvantage .....

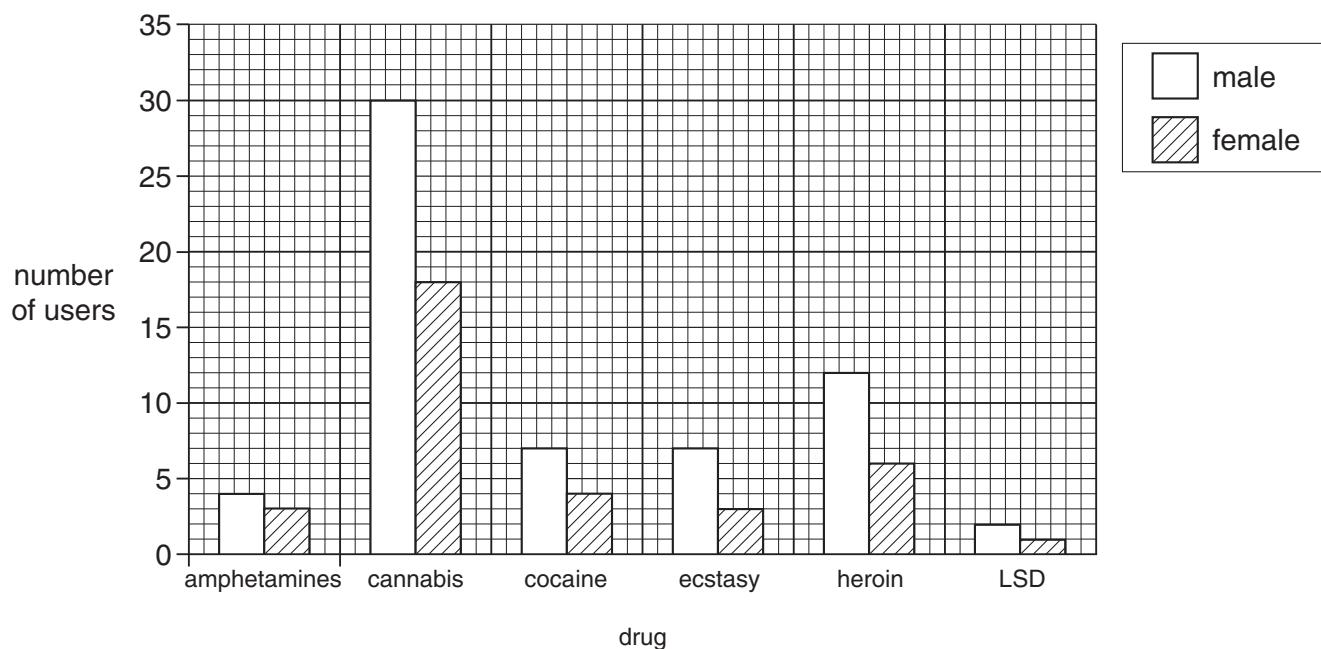
..... [2]

**[Total: 5]**

2 Some people use illegal drugs.

A sample of 16-24 year old drug users were asked to name one drug they use.

The bar chart shows how many named each drug.



(a) Calculate the total number of 16-24 year olds in the sample that named a hallucinogen.

answer .....

[2]

(b) Ecstasy is a **stimulant**.

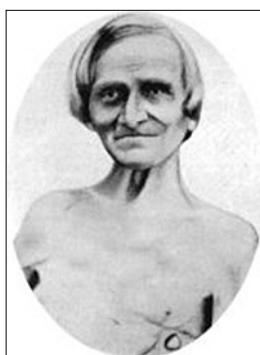
Describe the effect stimulants have on the synapses of the nervous system.

.....  
.....

[1]

[Total: 3]

3 Read the report about Alexis St Martin.



In 1822 Alexis St Martin was shot. He survived but was left with a hole in his stomach. A doctor by the name of Dr Beaumont used the hole to investigate digestion.

Dr Beaumont removed gastric juice from the stomach. He added a piece of meat to the juice. The gastric juice digested the meat.

He also put a piece of meat in the stomach. This meat digested faster.

(a) Gastric juice contains substances that help with chemical digestion.

Some of these substances are enzymes.

Write down the name of another substance which helps digestion in the stomach.

..... [1]

(b) Meat contains protein.

Write down the name of **one** enzyme that digests the protein in meat.

..... [1]

(c) Digestion in the stomach needs energy from respiration.

Finish the word equation for aerobic respiration.

glucose + .....  $\rightarrow$  ..... + ..... + energy  
[2]

**[Total: 4]**

4 Sarah is being immunised against tetanus with a harmless pathogen.



© Commercial Eye/Stone/Getty Images

(a) Explain how the immunisation will protect Sarah from the tetanus bacteria.

.....

.....

.....

[3]

(b) Immunisations are usually tested on human volunteers.

These tests involve placebos.

Why are placebos used in these tests?

Put ticks (✓) in the boxes next to the **two** correct reasons.

A placebo is used...

...to avoid harm to the volunteer.

...because the placebo can cause immunity.

...to compare the effects of the drug and the placebo.

...to avoid the thoughts of the patient affecting the test.

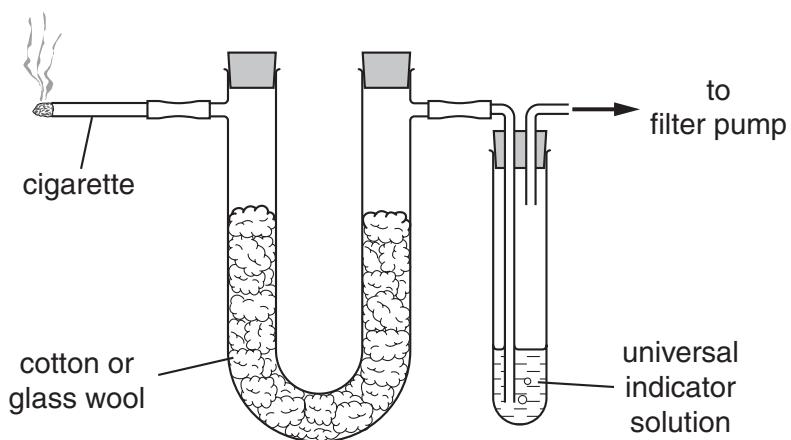
...because it will not interact with the drug.

...because it is cheaper than the actual drug.

[2]

[Total: 5]

5 Look at the diagram of a smoking machine.



(a) Tar collects on the inside of the tubes. Tar also collects in the lungs of a smoker.

Describe **two** problems this could cause the smoker.

1 .....

2 ..... [2]

(b) Cigarette smoke causes less oxygen to be carried in the blood.

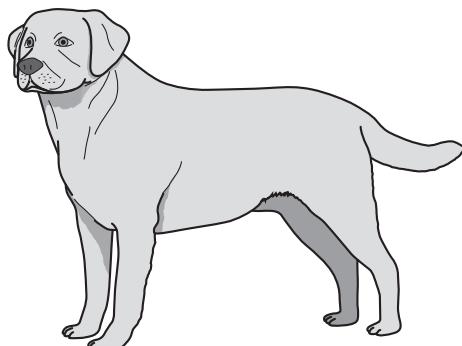
Which chemical in cigarette smoke causes this lack of oxygen?

..... [1]

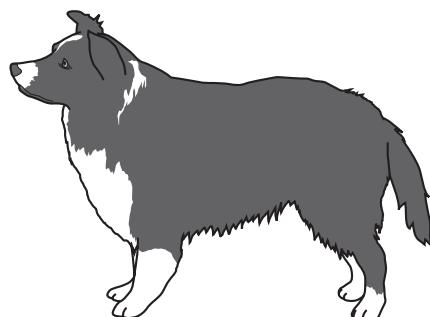
[Total: 3]

## Section B – Module B2

6 The pictures show two different breeds of dog.



labrador



border collie

(a) Look at the list.

amphibians

birds

fish

mammals

reptiles

(i) To which group of animals do dogs belong?

Choose your answer from the list.

answer ..... [1]

(ii) Give **one** reason for your choice.

..... [1]

(b) Although labradors and border collies are different breeds, they both belong to the same **species**.

How could you show that labradors and border collies both belong to the same species?

.....  
.....  
..... [2]

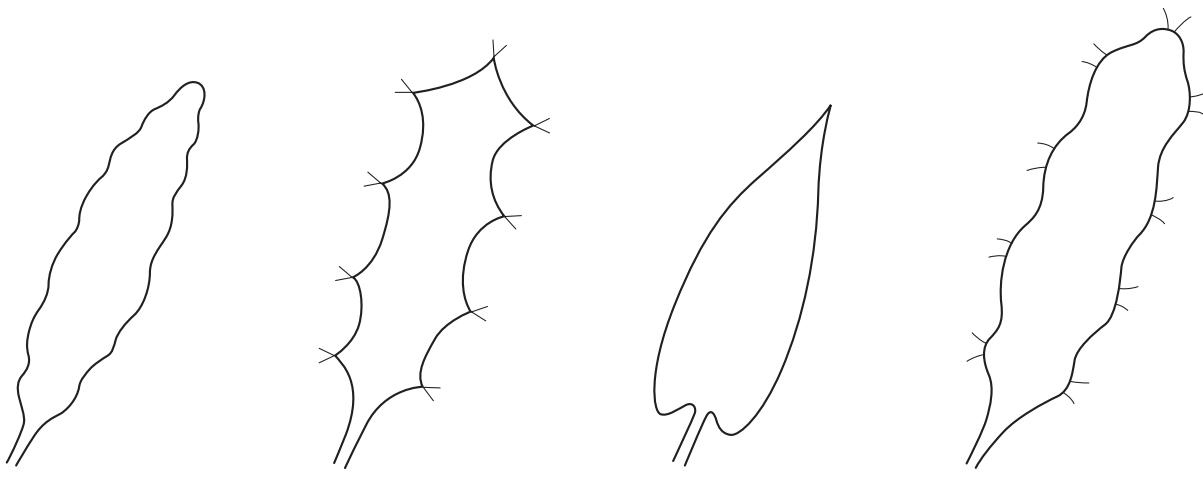
(c) Many dogs have fleas living on their skin. Fleas are parasites.

What is meant by the term **parasite**?

..... [1]

[Total: 5]

7 Tom and Elloise are studying some of the plants growing in the school playing field. Look at the drawings of leaves from four of these plants.



(drawings not to scale)

(a) Tom and Elloise use quadrats to count how many there are of plant A.

The table shows their results.

quadrat	number found of plant A
1st	0
2nd	1
3rd	0
4th	2

Each quadrat has an area of  $0.25\text{ m}^2$ .

The playing field has an area of  $2000\text{ m}^2$ .

Use this information to estimate the total number of plant **A** in the playing field.

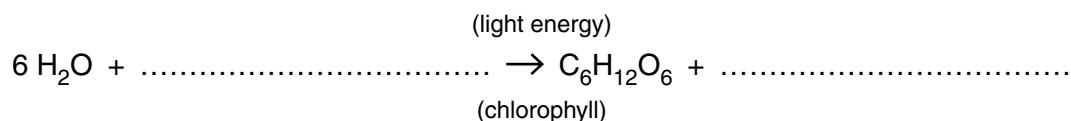
You should show how you work out your answer.

answer .....  
.....

[2]

**(b)** All plants photosynthesise.

Complete the balanced symbol equation for photosynthesis.



[2]

**(c)** The glucose plants make in photosynthesis is converted into other substances.

Each substance has a different function in the plant.

Complete the table to describe their functions. The first one has been done for you.

substance	function
protein	growth and repair
cellulose	
starch	

[2]

[Total: 6]

10

8 Anglesey is an island off the coast of Wales.

Before the 1960s the only squirrels living on the island were red squirrels.

In the 1960s the first grey squirrels arrived on the island.

By the 1980s red squirrels had disappeared from many parts of the island.

At the same time the number of grey squirrels had increased a lot.

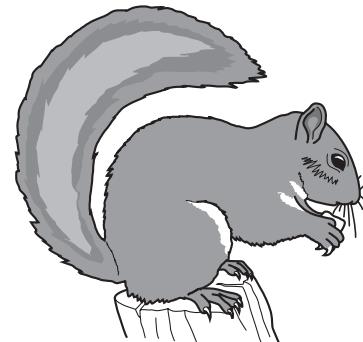
By 1998 there were about 3000 grey squirrels and only about 40 red squirrels on the island.

In 1998 a project started to protect the red squirrels.

This was done by removing grey squirrels from Anglesey.



red squirrel



grey squirrel

(a) Suggest **one other** way red squirrels could have been protected on Anglesey.

..... [1]

(b) Scientists think that the grey squirrels caused the red squirrel population to decrease because both types of squirrel share the same **ecological niche**.

(i) Explain what is meant by an ecological niche.

..... [1]

(ii) Why could sharing an ecological niche cause a decrease in the red squirrel population?

..... [1]

11

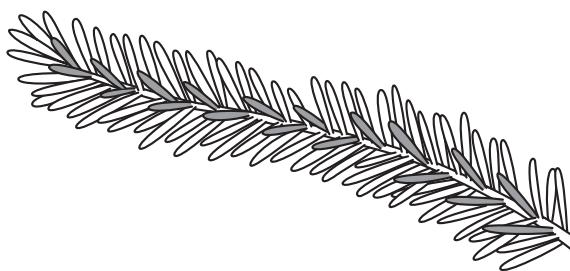
(c) Some red squirrels live in woodland that is managed as a **sustainable resource**.

How is woodland maintained as a sustainable resource?

..... [1]

(d) Some squirrels live in woodlands of conifer trees.

The leaves of conifer trees are called needles.



Some of the features of the needles are adaptations to living in a dry environment.

The adaptations help to reduce water loss.

Explain how these adaptations help to reduce water loss.

needle shape .....

.....

thick cuticle .....

..... [2]

[Total: 6]

9 This question is about pollution.

(a) CFC gases are used in some aerosols and refrigerators.

What problem does CFC pollution cause?

.....  
.....

[1]

(b) Waste pollution is becoming much more of a problem as the human population increases exponentially.

What is meant by **exponential growth**?

You may sketch a graph to help you answer.

.....  
.....

[1]

(c) Increasing amounts of waste pollution is one consequence of the human population increase.

Describe **one other** possible consequence of the human population increase.

.....  
.....

[1]

**[Total: 3]**

13

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**Section C begins on page 14.**

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## Section C – Module B3

10 Zoe is expecting a baby and Gary is the father.



(a) Complete the sentences about Zoe's baby.

Zoe's baby grew from a single cell called a zygote.

The zygote has two copies of each chromosome.

A cell that has two copies of each chromosome is called ..... .

The zygote grows into a baby by a type of cell division called ..... .

[2]

(b) Zoe reads a book about how babies grow.

It shows how the average mass of baby boys changes during the first six months of life.

age of baby boy in months	average mass in kilograms
0	3.3
1	4.4
2	5.4
3	6.2
4	7.0
5	7.5
6	7.9

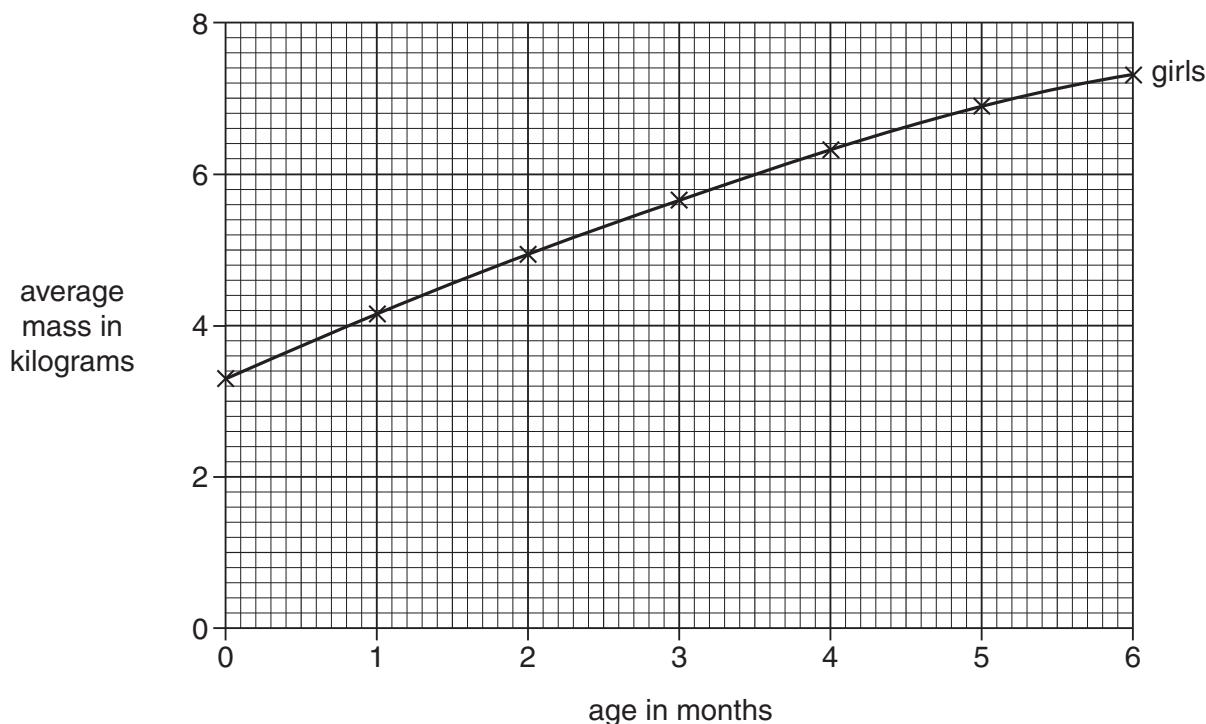
15

(i) The graph shows the average mass of baby girls.

Plot the information in the table about baby boys on this graph.

Finish the graph by drawing the best curve.

[3]



(ii) What is the difference between the average mass of baby boys and baby girls at 3.5 months?

Use your graph.

[1]

(iii) Explain why Zoe might use a graph like this once her baby is born.

[1]

[Total: 7]

11 HHT is a genetic disorder.

It makes people have bad nose bleeds.



(a) HHT causes problems with blood vessels.

There are three main types of blood vessel.

Arteries carry blood under high pressure out to the body from the heart.

Veins normally carry blood under low pressure back to the heart.

Usually there are very small blood vessels that connect arteries to veins.

(i) Write down the name of these small blood vessels.

..... [1]

(ii) These small blood vessels do an important job in the body.

Put a tick (✓) in the box next to their correct job.

act as a store of cholesterol for the body

allow exchange of materials with tissues

contain muscle cells to pump the blood

contain valves to stop the blood flowing backwards

[1]

(b) In a person with HHT, some of the vessels that join arteries to veins are missing.

This means that blood under high pressure flows directly into a vein from an artery.

This often causes the vein to break and cause bleeding.

Veins often break when blood enters under high pressure but arteries do not.

Why is this?

.....  
.....  
.....

[1]

(c) HHT is caused by a mutation which changes the DNA of a gene.

This stops the protein that is needed for blood vessel growth being made correctly.

(i) What change might occur in the DNA of a gene?

.....

[1]

(ii) Why could this change stop the protein being made correctly?

.....  
.....

[1]

(iii) Scientists hope to be able to change a person's genes so that they do not develop HHT.

Write down **one** reason why some people are worried about scientists being able to change a person's genes.

.....  
.....

[1]

**[Total: 6]**

## 18

12 Scientists have discovered that cells make special proteins if they get too hot.

These proteins are called heat shock proteins and they do many jobs such as repairing damaged enzymes.

(a) Explain why enzymes may be damaged if a cell becomes too hot.

.....  
.....  
.....

[2]

(b) The heat shock proteins are coded for by genes.

Put a tick (✓) in the box next to the way that a gene codes for a protein.

The amino acids in DNA code for the order of bases in the protein.

The DNA codes for proteins by unzipping and making new strands.

Each of the four bases in DNA codes for a different amino acid in the protein.

The bases in DNA code for the order of amino acids in the protein.

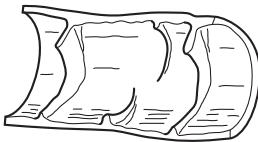
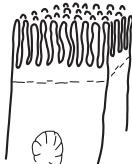
[1]

[Total: 3]

13 The small intestine has a large surface area.

The table shows three of the adaptations that give it such a large area.

The name of the second adaptation is missing.

name of adaptation	diagram of adaptation	total surface area of small intestine including adaptation in $\text{cm}^2$
folds		10 000
		100 000
microvilli		2 000 000

(a) What is the name given to the second adaptation?

..... [1]

(b) Why is it important that the small intestine has such a large surface area?

.....  
.....  
..... [2]

(c) Write down **one other** adaptation that the small intestine has that helps it to do its job.

.....  
..... [1]

[Total: 4]

**END OF QUESTION PAPER**

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*Copyright Acknowledgements:*

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Section A, Q. 5. Image, Geoff Jones, Mary Jones, Biology GCSE Edition, December 1986, ISBN 0521338697, Cambridge University Press

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