

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

B631/02

Unit 1 Modules B1 B2 B3 (Higher Tier)

**Friday 21 May 2010
Morning**

Duration: 1 hour

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)



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. Additional paper may be used if necessary but you must clearly show your Candidate Number, Centre Number and questions number(s).

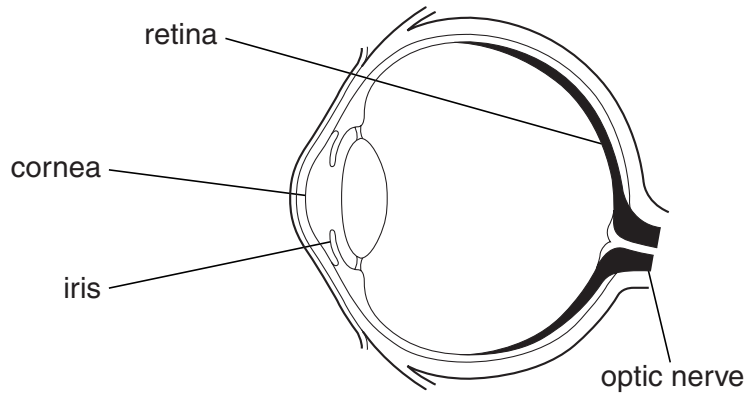
INFORMATION FOR CANDIDATES

- 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 **24** pages. Any blank pages are indicated.

Answer **all** the questions.

Section A – Module B1

1 This question is about how the eye works.



(a) The diagram shows the main parts of the eye.

Each part does a different job.

Draw a line to join each **part of the eye** with its correct **job**.

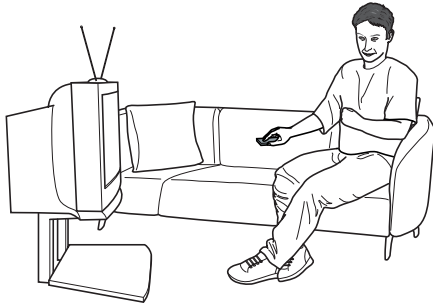
One line has been drawn for you.

part of the eye	job
optic nerve	refracts light
iris	contains light receptors
retina	controls how much light enters the pupil
cornea	carries impulses to the brain

[2]

(b) (i) The eye focuses light by changing the shape of the lens.

This is called **accommodation**.



Joe focusing on a distant television



Joe focusing on a close-up newspaper

Joe watches television.

He then reads his newspaper.

His lens changes shape when he looks at his newspaper.

Explain what happens in Joe's eye to change the shape of his lens.

.....

.....

.....

.....

[3]

(ii) Kevin wears glasses for correcting short-sight.



Write down the name of the type of lens needed to correct short-sight.

..... [1]

[Total: 6]

2 Neil is starting a new job.

His new company asks him to get a medical check up.

The doctor measures Neil's blood pressure and tells him it is too high.

(a) Different lifestyle factors can affect a person's blood pressure.

Look at the statements below.

Which **two** lifestyle factors could cause Neil to have **high** blood pressure?

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

- | | |
|-------------------------------|--------------------------|
| eating a low fat diet | <input type="checkbox"/> |
| exercising regularly | <input type="checkbox"/> |
| high amount of salt in diet | <input type="checkbox"/> |
| relaxation classes | <input type="checkbox"/> |
| excessive alcohol consumption | <input type="checkbox"/> |

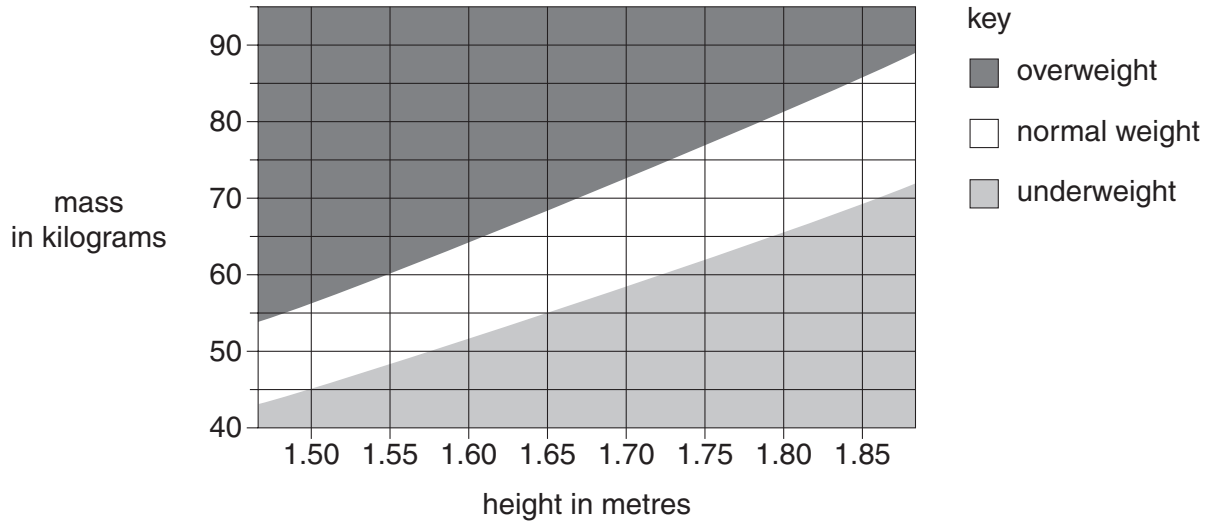
[1]

(b) The doctor measures Neil's height and weighs him.

Neil is **1.80 m** tall and has a mass of **91.0 kg**.

(i) The doctor uses a chart to decide how to describe Neil's weight.

Look at the chart below.



Use the chart to describe Neil's weight.

..... [1]

(ii) The doctor can also use Neil's height and mass to calculate his body mass index (BMI).

Calculate Neil's body mass index (BMI) using the formula

$$BMI = \frac{\text{mass in kg}}{(\text{height in m})^2}$$

Show your working.

Neil's BMI = [2]

(c) The doctor has to record if Neil is fit and healthy.

Explain the difference between fitness and health.

.....

 [2]

[Total: 6]

3 This question is about how the body stays in balance.

Look at the new born baby.



(a) The baby must maintain a constant internal environment to stay healthy.

Write down the word which best describes maintaining a constant internal environment.

Choose from the list.

- evaporation
- homeostasis
- homozygous
- hypothermia

answer [1]

(b) To stay healthy the baby must have a constant body temperature of about 37 °C.

The midwife notices the baby's skin becoming pale.

This is due to **vasoconstriction**.

Explain what happens during vasoconstriction to make the skin look pale.

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

[Total: 3]

4 This question is about diabetes.



Jessica has diabetes.

She cannot make insulin to control her blood sugar level.

To help control her blood sugar level she must inject herself with insulin every day.

(a) Jessica can also control her blood sugar level in other ways.

Write down **one other** way that she can control her blood sugar level.

..... [1]

(b) (i) Scientists know the genetic code for insulin.

The genetic code uses chemicals called **bases** found in DNA.

How many different **types** of base make up the genetic code for insulin?

..... [1]

(ii) Insulin is made in the pancreas.

The gene for insulin is in all the cells of the body.

Explain why all other body cells cannot make insulin.

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

[Total: 3]

5 During pregnancy, tests can be done to find out if an unborn baby has an inherited disorder.

Write down **one** advantage and **one** disadvantage of parents knowing that their unborn baby has an inherited disorder.

advantage

.....

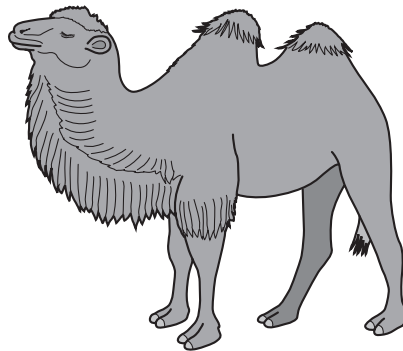
disadvantage

..... [2]

[Total: 2]

Section B – Module B2

6 Camels live in deserts which are hot and dry.



(a) The camel is a mammal.

Write down **one** characteristic of mammals that is **shown in the picture**.

..... [1]

(b) Camels can survive body temperatures of up to 41 °C without sweating.

Not sweating is an advantage to the camel in the desert.

Write down why.

..... [1]

(c) Camels eat mainly grass.

Grass is difficult to digest.

Camels have microorganisms in their gut that help them digest the grass.

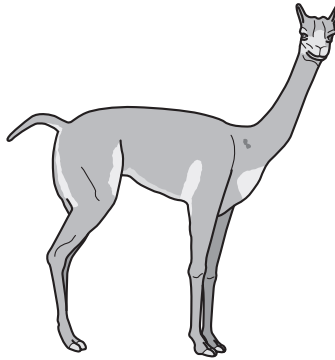
The microorganisms have somewhere warm to live with plenty of food.

What name is given to this type of relationship where both species benefit?

..... [1]

(d) Camels are related to llamas that live in dry areas in South America.

The drawing shows a llama.



An animal similar to the llama and camel lived in North America about 11 million years ago.

One group of these animals moved into South America and evolved into llamas. Another group of these animals moved into Asia and evolved into camels.

There are some similarities between the appearance of a camel and a llama.

Write down **two** possible reasons why there are similarities.

- 1
-
- 2
- [2]

(e) The scientific name of a camel is *Camelus bactrianus*.

The llama is *Lama glama*.

(i) What do these scientific names tell you about the classification of the two animals?
..... [1]


(ii) The llama and camel have been interbred to produce a hybrid.
Why is it difficult to classify hybrids?
.....
.....
.....
..... [2]

[Total: 8]

7 Read the article.

Operation Bumblebee

Bumblebees are large insects that live on plants like clover.



Scientists are worried because the number of bumblebees has dropped by 70% in the last 30 years.

This is because the areas where they live are being destroyed.

The scientists are now asking farmers to grow clover by the side of their fields to try to save bumblebees.

(a) (i) Bumblebees are endangered because there is more demand for land to grow crops.

Why is this demand increasing?

..... [1]

(ii) The scientists are trying to save bumblebees by protecting where they live.

Write down **one other** way that endangered species can be helped.

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

(b) Farmers might benefit from insects such as bumblebees moving from flower to flower to feed.

(i) Suggest **one** reason why.

..... [1]

(ii) Clover has colourful petals to attract bumblebees.

Suggest **one other** way clover is adapted to attract insects.

..... [1]

(c) Clover contains nitrogen-fixing bacteria in nodules on its roots.

What does the clover plant gain from these bacteria?

..... [1]

[Total: 5]

8 Isle Royale is an island in Canada.

In 1949 the water around the island froze over and allowed a group of wolves to move onto the island.

The ice then melted, trapping the group of wolves on the island.



(a) What name is given to a group of animals like these wolves that live in the same habitat?

Put a **ring** around the word in this list.

community

ecosystem

hybrid

niche

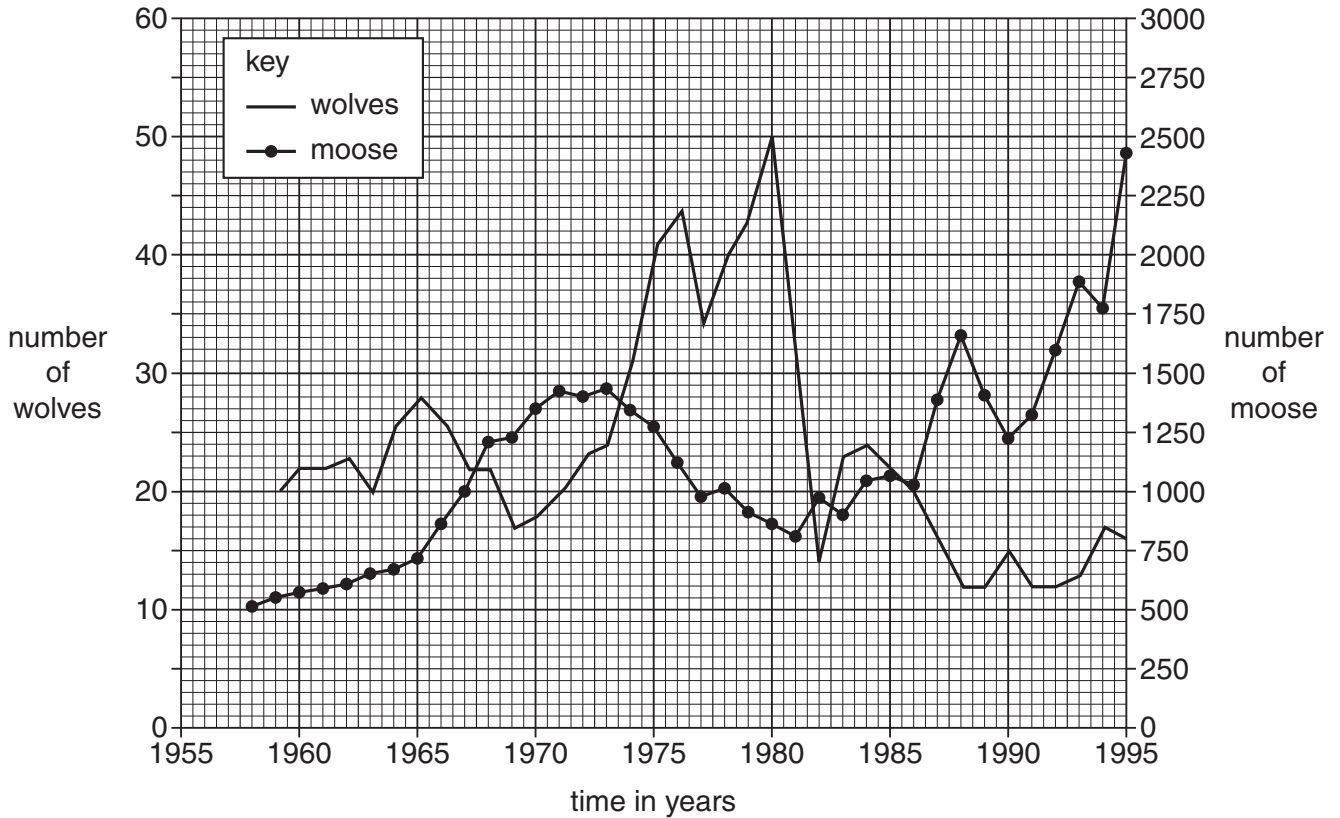
population

[1]

(b) There are also animals called moose living on the island.

The wolves prey on the moose.

The graph shows the numbers of wolves and moose on the island between 1958 and 1995.



(i) What is the **highest** number of wolves that have lived on the island between 1958 and 1995?

..... [1]

(ii) In 1980, visitors to the island are thought to have brought a disease onto the island.

Over the next two years this disease killed most of the wolves.

What effect did this disease have on the number of moose?

Explain why it had this effect.

effect

explanation

..... [2]

- (c) If this group of wolves stayed trapped on the island for thousands of years they could evolve into a new species.

Explain how this might happen.

.....

.....

.....

.....

.....

.....

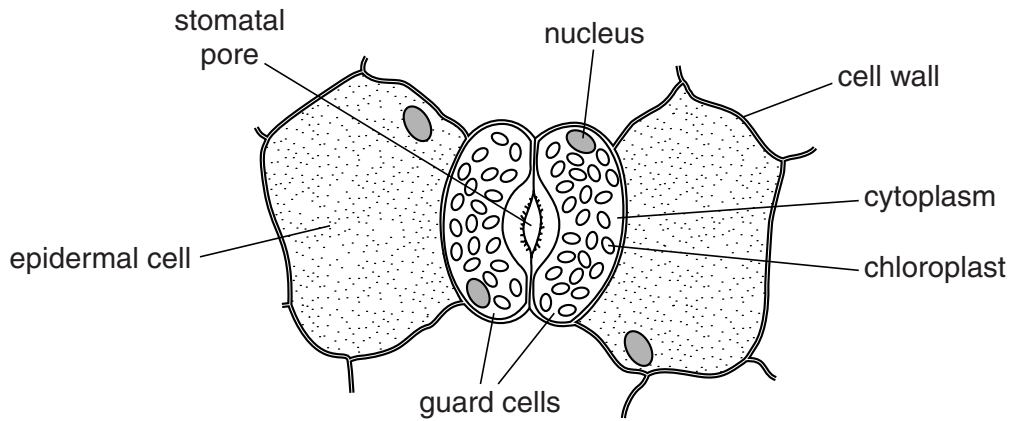
..... [3]

[Total: 7]

Section C – Module B3

9 Look at the diagram.

It shows some leaf cells.



(a) Describe **two** ways that plant cells are different from animal cells.

- 1
-
- 2
- [2]

(b) Water molecules leave through the stomata.

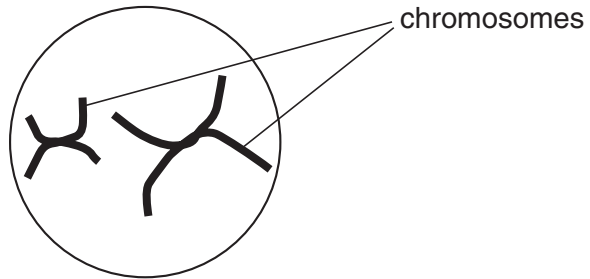
Write down the name of this process.

- [1]

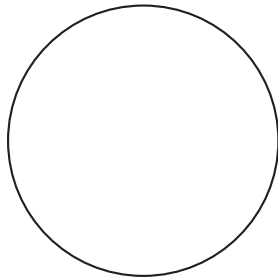
(c) As a leaf grows it makes new cells.

New cells are made by mitosis.

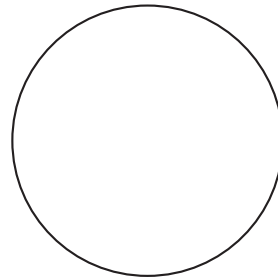
The diagram shows two chromosomes in a nucleus during mitosis.



Complete the diagram below by drawing the chromosomes at the end of mitosis.



nucleus of new cell 1



nucleus of new cell 2

[1]

[Total: 4]

10 Look at the picture.

It shows an elephant foetus in its mother's uterus.



umbilical cord

(a) The umbilical cord of the foetus is attached to the placenta.

Look at the statements about features of the placenta.

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

It has a large surface area to decrease the rate of exchange of materials.

It has a thin wall to allow the mother's blood to mix with that of the foetus.

It has a thin wall to increase the rate of exchange of materials.

It has a small surface area to increase the rate of exchange of materials.

[1]

(b) The heart of the foetus pumps blood through blood vessels in the umbilical cord.

(i) One type of blood vessel takes blood **from** the heart of the foetus **to** the umbilical cord.

Write down the name of this type of blood vessel.

..... [1]

(ii) The heart contains valves.

What is the job of the valves in the heart?

..... [1]

(c) Blood contains red blood cells.

Red blood cells transport oxygen.

Describe **two** features of a red blood cell that help it to do its job.

1

2 [2]

[Total: 5]

11 Paula and James are investigating how light affects the growth of shoots.

First they cut a hole in a box so that light only enters from one side.

They then put damp cotton wool into two dishes and sprinkle seeds onto them.

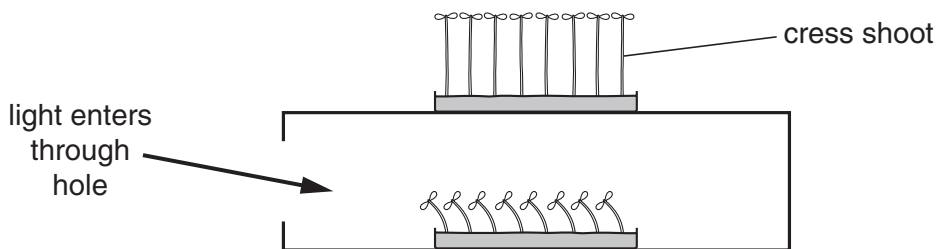
They put one dish inside the box and the other dish on top of the box.

Paula and James then leave the dishes for one week.

The dish on top of the box gets light from **all** directions.

The dish inside the box gets light from only **one** direction.

The diagram shows their results.



(a) James tells Paula that the results provide evidence that cress shoots are positively geotropic.

Is James correct?

Explain your answer.

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

(b) A hormone controls the growth of the shoot.

(i) Write down the name of this hormone.

..... [1]

(ii) Explain how the hormone causes the shoot to bend.

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

[Total: 4]

12 Rennin is an enzyme found in the stomach of young mammals.

It is used to clot milk and make it easier to digest.

Look at the table.

It shows the time taken for rennin to clot milk at different temperatures.

temperature in °C	time for milk to clot in seconds
20	1428
30	503
40	335
50	926
60	2778
70	no reaction

(a) Describe the pattern in the results.

.....

 [1]

(b) What is the optimum temperature for rennin?

answer °C [1]

(c) The enzyme stopped working at 70°C.

Explain why.

..... [1]

[Total: 3]

- 13** Humans need an enzyme called alpha-1-antitrypsin (AAT) to protect their lungs from damage during an infection.

The human gene for AAT can be transferred into sheep.

The sheep then make AAT in their milk.

The table shows the main stages used to transfer the gene.

stage	description
1	The gene for milk production in sheep and the human gene for AAT are joined.
2	The two genes are put into bacterial DNA.
3	The bacterial DNA is placed into the fertilised egg of a sheep.
4	The fertilised egg is placed into a surrogate sheep to grow into a lamb.
5	When the lamb becomes an adult it produces human AAT in its milk.

- (a)** Which principle of genetic engineering is described by stage 2?

Choose from the list.

insertion isolation selection replication

answer [1]

- (b)** The human gene for AAT must be joined to the milk production gene in sheep before it is placed into the fertilised egg.

Suggest why.

..... [1]

(c) Cloning can be used to produce lots of sheep that carry the human AAT gene.

The **first** stage of cloning involves taking the nucleus from an udder cell of a genetically engineered sheep.

The **final** stage involves putting an embryo inside a surrogate sheep.

Describe **two other** stages that happen **between** the first and final stages of cloning.

1

.....

2

..... [2]

[Total: 4]

END OF QUESTION PAPER

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