

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

B631/02

Unit 1 Modules B1 B2 B3
(Higher Tier)

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)

**Wednesday 20 May 2009
Afternoon**

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.

Answer **all** the questions.

Section A – Module B1

1 Nick and Phil are at a party.

(a) Nick accidentally knocks an empty glass off a table.

Phil reacts quickly. He sees the glass falling and catches it in his hand.



In Phil's reaction

- (i)** what is the stimulus? [1]
- (ii)** what is the receptor? [1]
- (iii)** what is the effector? [1]

(b) The table shows how many units of alcohol there are in different drinks.

drink	units of alcohol
1 glass of sherry	1
1 glass of wine	1
1 pint of beer	2
1 pint of cider	2
1 single whisky	1

Nick drinks 3 glasses of wine and 2 single whiskies.

Phil drinks 2 pints of beer and a single whisky.

(i) Nick and Phil have had different drinks.

However, they both had the **same** number of units of alcohol.

How many units have they each had?

answer [1]

(ii) Phil has drunk a greater volume of liquid than Nick.

However, they have both had the same number of units of alcohol.

Explain why.

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

(c) Alcohol is a depressant drug.

The list below shows other drugs.

Put a tick (✓) in the box next to the **one** drug that is also a depressant.

- aspirin
- cannabis
- ecstasy
- LSD
- nicotine
- temazepan

[1]

[Total: 6]

2 Matt is playing in a football match.

(a) As he runs, his breathing and pulse rates increase to supply extra oxygen to his muscles.

The oxygen is used in aerobic respiration.

Complete the word equation for aerobic respiration.

oxygen + → carbon dioxide + water + energy

[1]

(b) Matt suddenly sprints to get to the ball.

Now his muscles use anaerobic respiration to supply the extra energy they need.

(i) Why must Matt's muscles use anaerobic respiration to supply the extra energy?

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

(ii) If muscles use anaerobic respiration for too long they have to stop working.

Explain why.

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

(c) As Matt plays football **more** blood flows near the surface of his skin.

Explain why this happens.

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

(d) After the football match, Matt is very thirsty.

He drinks a lot of water.

Why is it important that he drinks a lot of water?

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

[Total: 7]

3 Fred has cystic fibrosis.

He finds it difficult to breathe because there is too much mucus in his lungs.

Cystic fibrosis is an inherited condition.

It is caused by a recessive allele.

(a) Neither of Fred's parents has cystic fibrosis.

Fred's parents would like to have more children but are worried about them also having the condition.

If they have another child, what is the probability that the child will have cystic fibrosis?

- Use a labelled genetic diagram to work out your answer.
- Use the symbol **f** for the allele causing cystic fibrosis.
- Use the symbol **F** for the normal allele.

probability of another child having cystic fibrosis [4]

(b) The allele causing cystic fibrosis is made from DNA.

(i) Write down the letters of the 4 bases found in DNA.

..... [1]

(ii) How are the bases in one allele different from the bases in another allele?

..... [1]

(c) Fred gets a lot of chest infections.

When he gets a bacterial infection, his doctor gives him antibiotics.

Fred's doctor could just give him antibiotics all the time as a precaution.

However, doctors are careful not to use antibiotics more than is necessary.

One reason for this is not to waste money.

Write down **one other** reason.

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

[Total: 7]

Section B – Module B2

4 Look at the picture of a zebra.



(a) The zebra is classified in the animal kingdom, not the plant kingdom.

Put a tick (✓) in the box next to **one** reason why it is classified in the animal kingdom.

- it cannot make its own food
- it needs to respire
- its cells divide by mitosis and meiosis
- its cells are specialised for different jobs

[1]

(b) The term zorse is used to describe the offspring of a male zebra and a female horse.

(i) A cross between a zebra and a horse does **not** produce fertile offspring.

Explain why.

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

(ii) Explain why it is difficult to classify the zorse.

..... [1]

[Total: 3]

5 Look at the picture of a sperm whale.



(a) Sperm whales are normally found far out to sea.

However, sperm whales are often seen near the coast of New Zealand.

Finding them close to land has become important to the people living nearby.

Suggest **one** reason why.

..... [1]

(b) Some whale species are endangered partly because they are hunted.

(i) Describe **two other** reasons why the whales have become endangered.

1

2 [2]

(ii) Hunting for whales in the sea around New Zealand is now banned.

Describe **one other** way man can help prevent the extinction of whales.

..... [1]

(c) Whales produce milk for their young.

Write down the **class** of animals that feed their young on milk.

..... [1]

(d) Some areas of whale biology, such as the way they communicate are still not understood.

Write down **one other** area of whale biology scientists still do not fully understand.

..... [1]

[Total: 6]

6 Rose works for the council.

(a) She needs to find out how many rats are living in one area of town.

Rose set traps to catch the rats. The traps did not harm the rats.

Rats were collected from the traps, marked with harmless paint and released.

Rose then set the traps again a week later.

The results are shown in the table.

	number of rats
number caught first time	30
number caught second time	28
number of marked rats caught the second time	2

An estimate for the population of rats can be calculated using the formula:

$$\text{population} = \frac{\text{number caught first time} \times \text{number caught second time}}{\text{number of marked rats caught the second time}}$$

Use the formula to estimate the population of rats.

answer

[2]

(b) Rose tries to kill the rats using food containing the rat poison warfarin.

All of the rats eat the food.

Most rats die but some survive and breed.

Most of their offspring can also survive eating the poisoned food.

(i) Explain why some rats survive.

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

(ii) Two scientists, Darwin and Lamarck would have explained the survival of the rats in different ways.


Darwin's ideas are still accepted by most scientists but Lamarck's are not.

Explain why Lamarck's ideas are no longer accepted by scientists.

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

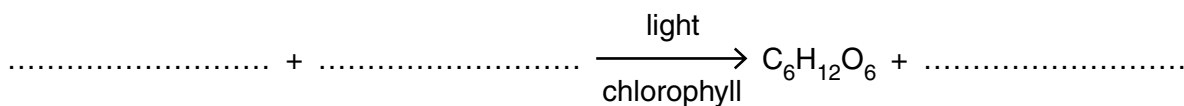
[Total: 5]

7 Read the report about rhododendron plants.

	<p>The rhododendron plant is responsible for the destruction of many habitats in Britain.</p>
	<p>The reason for this is simple. Where conditions are suitable, it will out compete most other plants.</p>
	<p>The rhododendrons become very large, allowing very little light to reach the ground.</p>

(a) Plants need light for photosynthesis to make glucose (C₆H₁₂O₆).

Finish the balanced symbol equation for photosynthesis.



[2]

(b) Plants then convert some of the glucose to starch for storage.

Explain why plants store energy in the form of starch instead of glucose.

.....
 [2]

(c) Rhododendron flowers are adapted for insect pollination.

Describe **one** adaptation for insect pollination.

..... [1]

(d) Rhododendrons remove large amounts of nitrates from the soil.

Legumes are plants that can survive in low nitrate soil.

This is because they gain nitrates from bacteria in their root nodules.

What do the bacteria get from the legumes?

..... [1]

[Total: 6]

Section C – Module B3

- 8 The enzyme carbohydrase breaks down starch into sugar.

John investigates the effect of different pH values on the time taken for carbohydrase to break down starch.

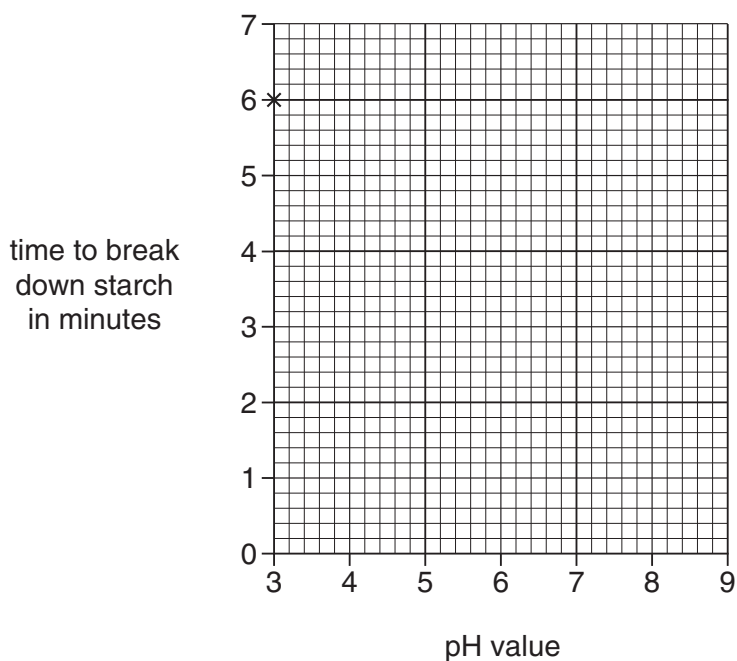
The table shows his results.

pH value	3	4	5	6	7	8	9
time to break down starch in minutes	6.0	5.0	4.0	3.0	2.5	2.5	3.0

- (a) (i) Plot a graph of John's results.

The first point has been plotted for you.

Complete the graph by drawing the best curve.



[3]

- (ii) Look at the graph. What is the optimum pH for carbohydrase?

..... [1]

(b) In the body, starch is broken down to sugar so it can be absorbed from the small intestine into the blood.

(i) Sugar moves from the small intestine into the blood.

Write down the name of the process by which it moves.

..... [1]

(ii) Which part of the blood transports sugar around the body?

..... [1]

[Total: 6]

9 (a) (i) Look at the list of the stages involved in cloning and implanting cow embryos.

Put the stages in the correct order by writing **2, 3, 4** and **5** in the boxes.

The first one has been done for you.

embryos are collected

embryos are implanted into surrogate cows

embryos are split, forming clones

sperm is collected from selected bulls

sperm is used to fertilise eggs from selected cows

[1]

(ii) Most calves are produced by allowing selected animals to breed naturally.

However, some farmers use the cloning method described in the stages above to produce calves from selected animals.

Suggest **one** advantage and **one** disadvantage of producing calves using this cloning method.

advantage

.....

disadvantage

..... [2]

(iii) This method for cloning animals is not the only one.

Dolly the sheep was produced using a different cloning method.

Describe **one** way the cloning method used to produce Dolly the sheep is different from the cloning method described in the stages above.

.....

..... [1]

(b) (i) When embryos grow, their cells divide.

Write down the name of this type of cell division.

..... [1]

(ii) Embryos are multi-cellular. They are made of many small cells.

What is the advantage of being made of many small cells, rather than fewer, larger cells?

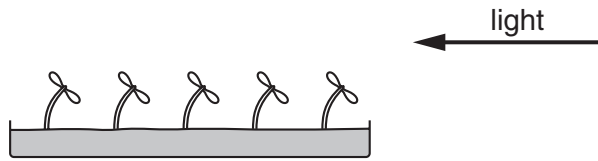
.....

..... [1]

[Total: 6]

10 The diagram shows some cress seedlings growing next to a window.

The seedlings are growing towards the light outside.



(a) The seedlings growing towards the light is an example of a tropism.

What sort of tropism is this?

Put a tick (✓) in **one** of the boxes to show your answer.

- positive geotropism
- positive phototropism
- negative geotropism
- negative phototropism

[1]

(b) The growth of cress seedlings towards light is controlled by the plant hormone auxin.

Explain how auxin causes the seedlings to grow this way.

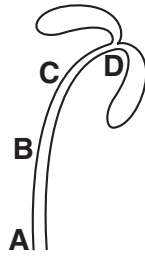
.....

.....

..... [2]

(c) As the seedlings grow, new cells are produced by cell division.

Look at the diagram.



Where does most cell division occur?

Choose your answer from **A**, **B**, **C** or **D**.

answer

[1]

[Total: 4]

11 (a) Race horses have been produced by selective breeding over many generations.

When horse breeders select horses to breed together they take care not to select horses that are closely related.

This is to avoid inbreeding.

What could be the consequences of inbreeding?

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

(b) Race horses need to get oxygen to their muscles as efficiently as possible.

(i) Like all mammals, horses' lungs have alveoli that are adapted for the efficient absorption of oxygen into their blood.

Describe **one** way that alveoli are adapted for the efficient absorption of oxygen.

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

(ii) Like all mammals, horses have a double circulatory system that transports oxygen in the blood quickly from the lungs to the muscles.

Why does a double circulatory system transport blood more quickly than a single circulatory system?

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

[Total: 4]

END OF QUESTION PAPER

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