

Monday 21 May 2012 – Morning**GCSE 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)

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, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- 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 question number(s).
- Do **not** write in the bar codes.

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** Charlotte and her friend Kamran are walking in the hills.
They are carrying all their camping equipment in rucksacks.



- (a)** Charlotte needs lots of energy to walk up the hills.

Glucose in Charlotte's muscles reacts with a gas to release energy.

This process is called aerobic respiration.

Finish the word equation for aerobic respiration.

glucose + → + water

[1]

- (b)** As Charlotte walks uphill her breathing rate and pulse rate increase.

At the top of the hill she sits down.

Her breathing rate and pulse rate stay high for a while.

Explain why.

.....

.....

.....

.....

..... **[3]**

3

- (c) Charlotte's body temperature also starts to increase.

To lose heat, more blood starts to flow near her skin surface.

- (i) Write down the name of this process.

..... [1]

- (ii) It is important that Charlotte's body does **not** get too hot.

Put a tick (✓) in the box next to the **one** correct statement about high body temperature.

High body temperature is called hypothermia.

☐

High body temperature is a result of homeostasis.

☐

High body temperature can cause dehydration.

☐

High body temperature can cause shivering.

☐

[1]

- (d) Kamran has diabetes. This means he has to take insulin with him on his walk.

- (i) Insulin controls the level of a chemical in the blood.

Write down the name of this chemical.

..... [1]

- (ii) During his walk Kamran thinks he will need to change his dosage of insulin.

Will Kamran need more or less insulin?

Explain your answer.

.....

..... [1]

[Total: 8]

2 Read these facts about fruit flies.

Fruit flies are used to study genes. They only have four pairs of chromosomes in each body cell. Some fruit flies hatch with smaller wings. This is caused by a gene mutation. When homozygous fruit flies that have normal wings are mated with homozygous fruit flies with smaller wings, all the offspring are heterozygous and have normal wings.	
---	--

(a) Finish the sentences about the fruit flies.

The sperm cell of a fruit fly will have chromosomes.

The offspring all have normal wings because having smaller wings

is a characteristic.

[2]

(b) The heterozygous offspring are mated with each other.

What is the probability that a fruit fly in the next generation will have smaller wings?

You may complete the diagram to help you.

	N	n

probability =

[2]

[Total: 4]

3 This question is about neurones.

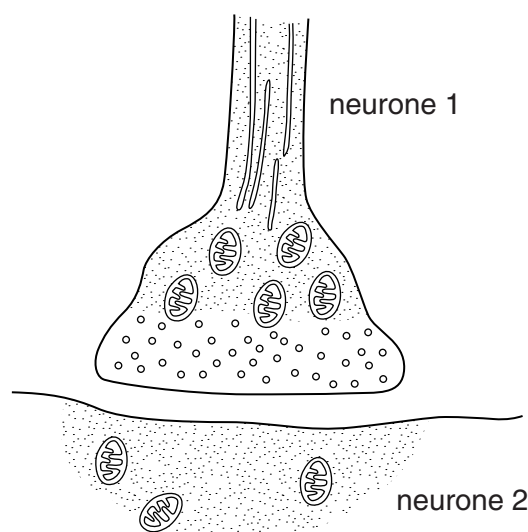
(a) Neurones are adapted to send electrical impulses around the body.

One adaptation is their length.

Describe **one other** way neurones are adapted to send electrical impulses.

.....
 [1]

(b) Look at the diagram. It shows parts of two neurones with a synapse between them.



When an impulse from neurone 1 arrives at the synapse, a transmitter substance is released.

Two processes then happen before an impulse can be sent along neurone 2.

Describe these two processes in the correct order.

1

 2
 [2]

[Total: 3]

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4 Read the information about three different people.

Hiten

Age: 14
Mass: 70 kg
Height: 1.80 m
Hiten plays squash
three times a week.

Clare

Age: 16
Mass: 70 kg
Height: 1.70 m
Clare plays hockey once
a week and swims for the
local club.

John

Age: 16
Mass: 105 kg
Height: 1.80 m
John is a smoker.
John plays on his
computer most days of
the week. He does not
like to play sport.

(a) Clare eats a high protein diet.

(i) Write down the name of the group of enzymes that digest proteins.

..... [1]

(ii) The recommended daily average (RDA) protein intake is calculated using the formula

$$\text{RDA in g} = 0.75 \times \text{body mass in kg}$$

Calculate Clare's RDA.

.....

.....

Clare's RDA =g [1]

(b) Each person's Body Mass Index (BMI) can be calculated using the formula

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

Hiten has a BMI of 21.60.

Does Clare have a higher or lower BMI?

Explain your answer.

.....

.....

..... [2]

(c) John is a smoker.

The cells lining John's trachea, bronchi and bronchioles are different from those of a non-smoker.

Describe how they are different.

.....

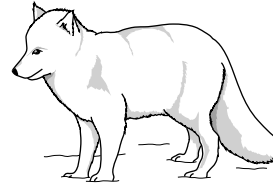
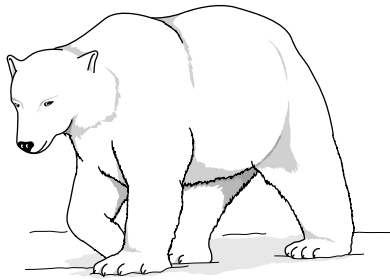
..... [1]

[Total: 5]

Turn over

Section B – Module B2

- 5 Look at the pictures of a polar bear and an Arctic fox.



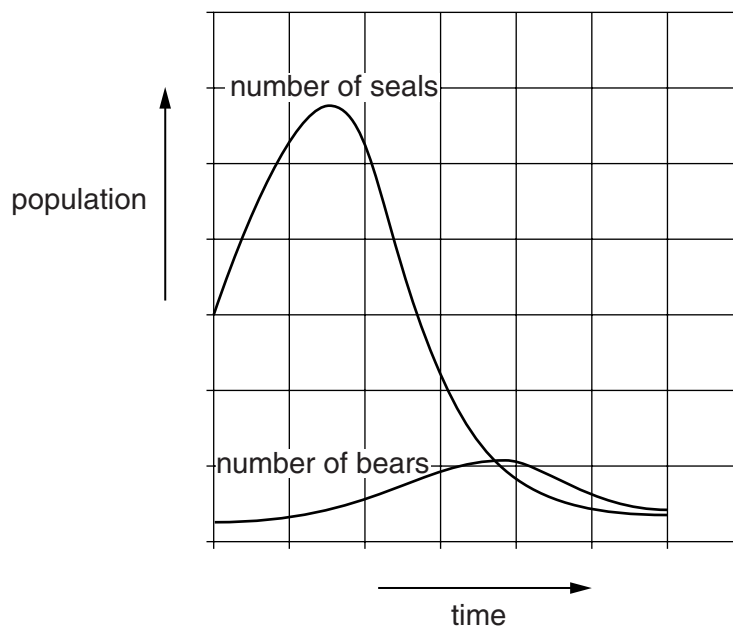
- (a) Both of these animals are adapted to survive in cold Arctic conditions.

Write down **two** ways the **Arctic fox** is adapted to cold conditions.

- 1
-
- 2
- [2]

(b) Look at the graph.

It shows the populations of polar bears and seals over a period of time.



Describe and explain the patterns shown by this data.

.....

.....

.....

.....

..... [3]

(c) (i) Global warming could soon make the polar bear an **endangered** species.

Efforts are being made to reduce global warming.

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

..... [1]

(ii) Pollution from an increasing human population is speeding up global warming.

Write down **one** pollutant that is causing global warming.

.....

..... [1]

[Total: 7]

10

- 6 Fatima catches insects in two different fields, **X** and **Y**.

- (a) Fatima collects leaf beetles in field **X**.

She collects them from areas marked by quadrats.

The table shows her results.

area of field X	3200 m ²
size of quadrat used	0.25 m ²
total number of leaf beetles in 10 quadrats	120
average number of leaf beetles in 1 m ²	

- (i) Calculate the average number of leaf beetles in **1 m²** of the field.

.....

answer [2]

- (ii) Use the results to estimate the number of leaf beetles in field **X**.

.....

answer [1]

- (b) Fatima's estimate for the number of leaf beetles in 1 m² of field **Y** is much higher than that for field **X**.

She is concerned that her estimate for field **X** is **not** accurate.

Give **two** reasons why her estimate for field **X** may **not** be accurate.

1

2

[2]

(c) Leaf beetles eat grass.

Grass flowers are pollinated by wind.

Write down **two** ways grass flowers are adapted for wind pollination.

- 1
-
- 2
- [2]

[Total: 7]

7 This question is about plants.

(a) Glucose is made during photosynthesis.

Glucose is used to make substances that can be used for different jobs.

Draw **three** straight lines to join each **substance** to its **use in the plant**.

substance	use in the plant
cellulose	storage
glucose	cell wall
oil	to make starch

[2]

(b) (i) Plants can be used as a **sustainable resource**.

Explain why wood can be used as a source of fuel for heating yet still be sustainable.

.....
 [1]

(ii) Some forests are managed sustainably but others are not.

Why is it sometimes difficult to manage forests sustainably?

.....

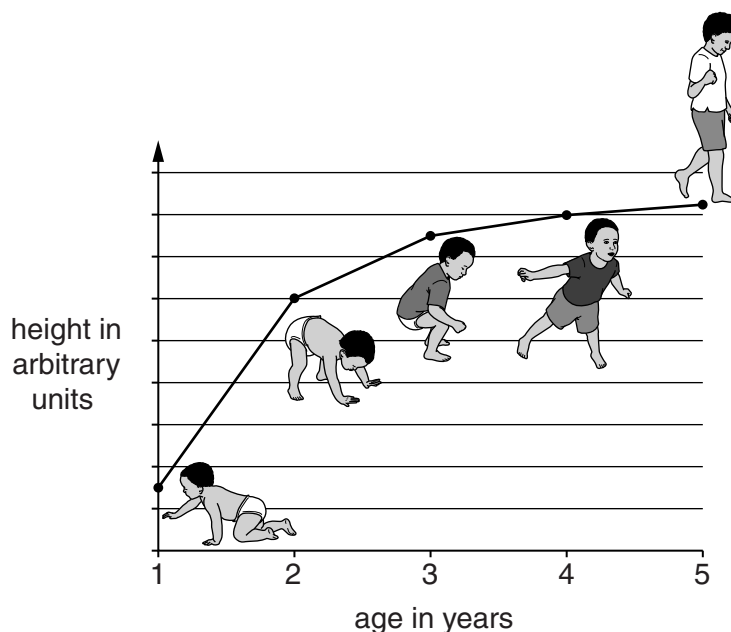
 [3]

[Total: 6]

Section C – Module B3

- 8 Look at the chart.

It shows a human growth curve for the first two phases of human growth.



- (a) Use the graph to finish the sentence.

Growth is fastest between and years. [1]

- (b) When humans grow they make different types of cells.

Undifferentiated cells in bone marrow can turn into red blood cells.

- (i) Write down the term that describes undifferentiated cells.

..... [1]

- (ii) Red blood cells have no nucleus.

This means there is more room to carry oxygen.

Describe **one other** feature of a red blood cell and explain how this helps it to do its job.

feature

explanation

..... [2]

[Total: 4]

- 9 Fernando grows raspberry plants in his garden.



- (a) The shoots of his plants grow towards light.

Finish the sentences.

Shoots respond to light because they are positively

The shoots bend because the hormone auxin causes cells to [2]

- (b) Fernando uses tissue culture to clone his raspberry plants.

Describe the method he should use.

In your answer describe

- the precautions taken
- the conditions needed.

.....

.....

.....

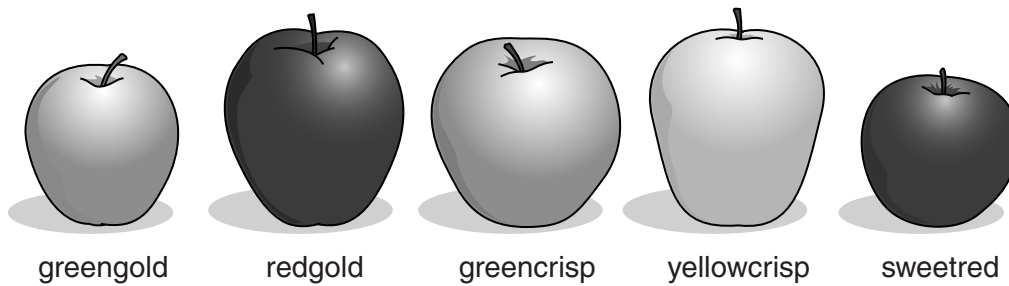
.....

..... [3]

15

(c) Fernando also grows different varieties of apples.

Read the information about Fernando's apples.



- Greengold are small, green and have little taste.
- Redgold are large, red and have little taste.
- Greencrisp are large, green and taste sour.
- Yellowcrisp are large, yellow and taste sour.
- Sweetred are small, red and taste sweet.

Fernando uses selective breeding to grow large, sweet, red apples.

He starts by choosing the two varieties of apples he needs and breeding them.

Describe what he would need to do as part of his breeding program to produce trees that provide large, sweet, red apples.

.....

.....

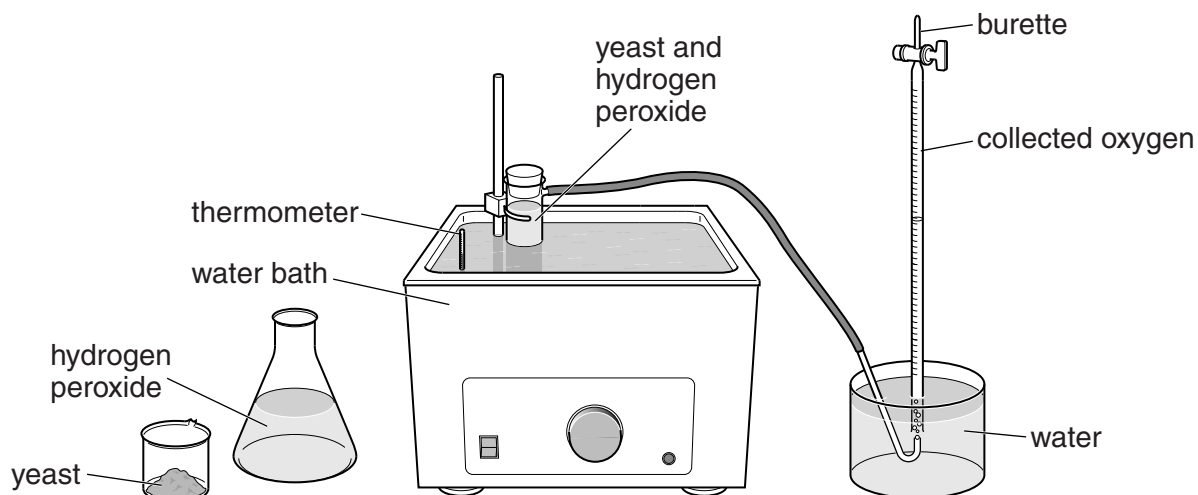
.....

..... [2]

[Total: 7]

10 Catherine and Ben investigate an enzyme in yeast.

The picture shows their apparatus.



The enzyme in the yeast breaks down hydrogen peroxide to make oxygen and water.

Catherine and Ben collect the oxygen in the burette for 5 minutes.

They repeat the investigation using different temperatures.

The table shows their results.

temperature in °C	volume of oxygen collected in cm ³			
	first attempt	second attempt	third attempt	average
10	0.3	0.2	0.1	0.2
20	6.1	6.0	6.4	6.2
30	35.1	34.7	34.0	34.6
40	39.6	40.9	38.6	39.7
50	13.9	13.2	2.9	10.0
60	0.8	0.5	0.5	

17

(a) Calculate the average volume collected at 60°C.

(i) Show your working.

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

answercm³ [1]

(ii) Write down the **optimum** temperature for the enzyme.

optimum temperature =°C [1]

(b) Ben tells Catherine they have recorded an anomalous result.

(i) Write down their anomalous result.

..... [1]

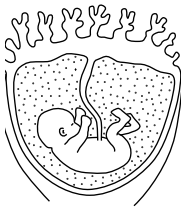
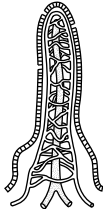
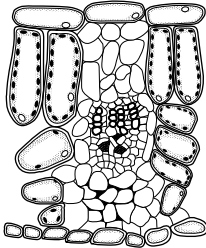
(ii) Ben knows they recorded the amount of oxygen that was in the burette accurately.

Suggest **one** reason why the amount was not what they expected.

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

[Total: 4]

11 Look at the diagrams of different structures that are adapted for diffusion.

name	diagram
alveoli	
placenta	
part of small intestine	
leaf	

(a) Write down what is meant by the term **diffusion**.

.....
 [1]

(b) (i) Which structure has its surface area increased by having microvilli?

..... [1]

(ii) Increasing the surface area is one way to increase the rate of diffusion.

Write down **one other** way to increase the rate of diffusion.

..... [1]

19

(c) Look at the leaf diagram.

When a leaf grows the cells divide by mitosis.

During mitosis chromosomes are copied before they line up on the equator of the cell.

Describe **two other** things that happen to chromosomes during mitosis.

1

2 [2]

[Total: 5]

END OF QUESTION PAPER

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