THIS IS A NEW SPECIFICATION

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Monday 14 January 2013 – Morning

GCSE GATEWAY SCIENCE
BIOLOGY B

B731/01 Biology modules B1 B2 B3 (Foundation Tier)

B72217011 3

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 15 minutes

B731 01

Candidate forename		Candidate surname	

Centre number						Candidate number				

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

- Your quality of written communication is assessed in questions marked with a pencil (✎).
- 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 **75**.
- This document consists of **20** pages. Any blank pages are indicated.

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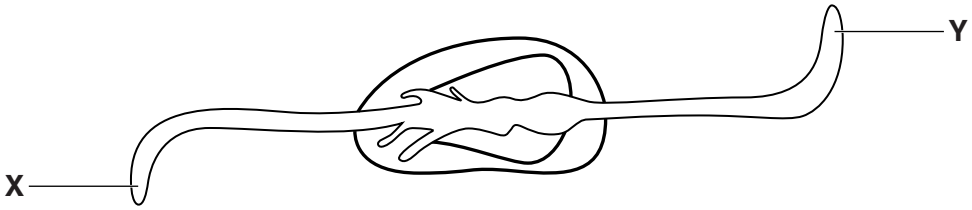
Answer **all** the questions.

SECTION A – Module B1

1 Jo grows a broad bean in a jar.

The bean starts to germinate.



(a) (i) What part of the seedling is part **X**?

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

(ii) Why is part **X** growing in this direction?

.....

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

(b) Explain why part **Y** grows upwards.

.....

.....

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

(c) As the broad bean germinates, each new cell has 12 chromosomes in its nucleus.

(i) Explain why a broad bean seedling needs chromosomes.

.....

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

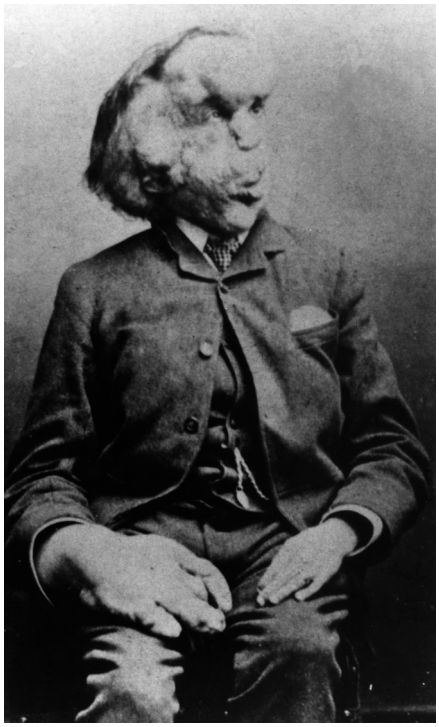
(ii) How many chromosomes will be in the nucleus of a broad bean gamete (sex cell)?

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

[Total: 7]

2 Joseph Merrick lived in England in Victorian times.

He was sometimes known as the Elephant Man because of his physical features.



(a) At the time, some people thought that Joseph's features were caused because his mother was frightened by an elephant while she was pregnant.

Is this a scientific explanation? .....

Explain your answer.

.....

.....

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

(b) Nowadays, scientists think Joseph's physical features might have been caused by a combination of several disorders, one of which is called neurofibromatosis.

One effect of neurofibromatosis is damage to the peripheral nervous system causing numbness (lack of feeling).

(i) Where in the body can the peripheral nervous system be found?

Put a (ring) around **each** correct answer.

brain **muscle** **skin** **spinal cord**

[1]

(ii) What type of neurone in the peripheral system would be damaged to cause numbness?

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

(c) In his later life, Joseph also suffered from bronchitis.

In bronchitis, extra mucus is produced in the lungs.

The extra mucus is removed by coughing.

(i) It is normal for some mucus to be produced.

What is the function of mucus in the lungs?

.....

.....

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

(ii) There are several causes of bronchitis, one of which is smoking cigarettes.

Draw straight lines to match up each **substance** in cigarette smoke with its **effect**.

substance	**effect**
carbon monoxide	addictive
nicotine	causes cancer
tar	lack of oxygen

[2]

[Total: 8]

3 Anya's dad, Bob, has a lot of salt and saturated fat in his diet and is very overweight (obese).

(a) Anya is worried about her dad's health.

She wants to explain to her dad why he should change his diet and lose weight.

What should she say?

The quality of written communication will be assessed in your answer to this question.

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..... **[6]**

(b) Look at the BMI chart.

Category	BMI
underweight	< 18.5
normal	18.5–24.9
overweight	25.0–30.0
obese	> 30.0

BMI is calculated using the formula:

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

This can be rearranged to give the formula:

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

Bob's height is 1.8 m, his mass is 120.0 kg and his BMI is 37.0.

Calculate the **least** mass he needs to **lose** to fall into the 'normal' category.

Show your working.

.....

.....

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.....

answer .....kg **[4]**

[Total: 10]

SECTION B – Module B2

4 Foxes are common predators in Britain.

(a) Why do predators like foxes have eyes on the front of their heads?

.....

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

(b) Tasmania is an island off the coast of Australia.

Until recently there were no foxes in Tasmania.

A rare animal called the quoll lives in Tasmania.

There are now foxes in Tasmania.

Scientists are worried that the foxes might cause the extinction of the quolls.

(i) The foxes might hunt and eat quolls.

Suggest **one other** way that they might cause the extinction of the quolls.

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

(ii) Scientists want to set up a conservation programme to save the quolls.

They want to remove foxes from Tasmania.

Suggest **one other** step that they can take to try and save the quolls.

.....

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

[Total: 3]

5 Plants contain carbon.

(a) **(i)** Explain why it is important that this carbon is released from plants after they die.

.....

.....

.....

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

(ii) Write down **one** type of organism that would cause dead plants to decompose.

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

(b) In wet areas such as marshes, dead plants are only **partly** decomposed when they die.

Over tens of thousands of years this makes a substance called peat.

Peat may be collected, dried and burned instead of fossil fuels.

Explain why the burning of fossil fuels and peat is **not** sustainable.

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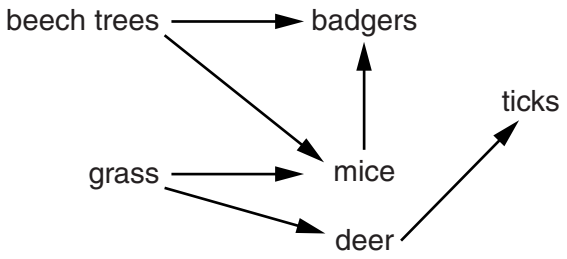
..... **[2]**

[Total: 5]

6 The diagram shows part of a food web from a woodland.



(a) Explain the term trophic level.

Use an example from the food web in your answer.

.....

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

(b) Some scientists think that badgers might pass the disease TB to cattle.

There are plans to kill many badgers.

This might have an effect on the population of mice in the woodland.

Give **reasons** why.

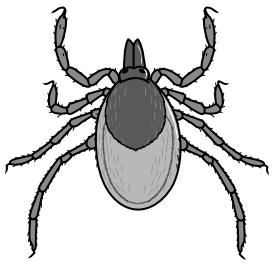
.....

.....

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

(c) Ticks live on the hair of animals such as deer and feed on their blood.

This is a drawing of a tick.



The tick is adapted to living on deer hair.

Describe **one** adaptation shown in the diagram and explain how it helps the tick to survive in this habitat.

.....

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

(d) Ticks can also feed on the blood of humans if they land on human skin.

People like to walk in forest areas where deer live.

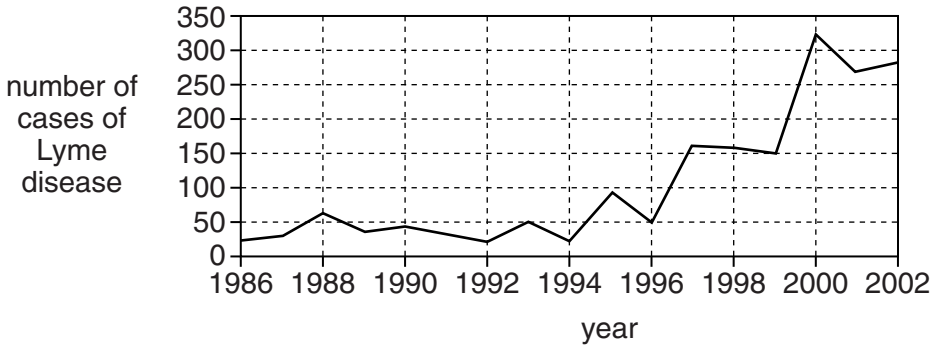
If people are bitten by ticks they can get a disease called Lyme disease.

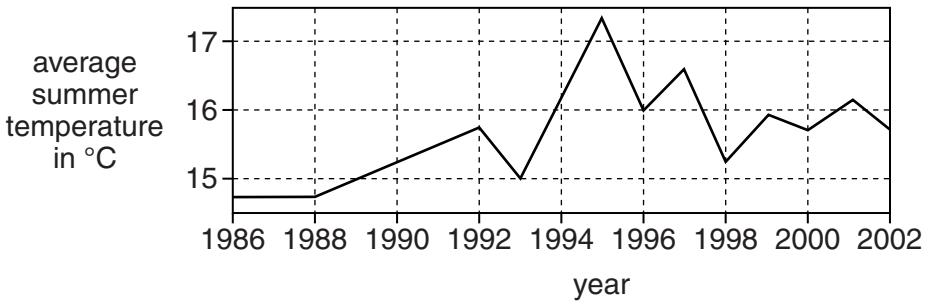
The number of people getting Lyme disease seems to be increasing.

Some people think that this is because global warming is making the ticks more active.

One graph shows the number of cases of Lyme disease from 1986 to 2002.

The other graph shows the average summer temperature during those years.





(i) How strong is the evidence in the graphs for a link between global warming and the number of people getting Lyme disease? Explain your answer.

.....

.....

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

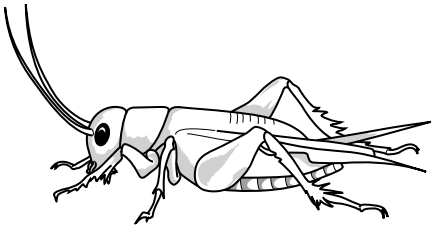
(ii) Suggest **another** explanation for a link between the weather data and the number of people getting Lyme disease.

.....

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

[Total: 9]

7 Crickets are small arthropods that look like grasshoppers.



(a) Put a (ring) around the class that crickets belong to.

arachnid **crustacean** **insect** **myriapod**

[1]

(b) One type of cricket lives on the island of Kauai in Hawaii.

The crickets make a noise or 'sing' by rubbing their wings together.

This attracts a mate.

Unfortunately, the noise also attracts a type of fly.

The fly lays eggs on the cricket.

The eggs hatch and maggots burrow into the cricket and feed on it, eventually killing it.

(i) What word is used to describe the maggots in this feeding relationship?

Choose your answer from this list.

competitor **host** **parasite** **partner** **prey**

answer ..... **[1]**

(ii) Scientists observed that some crickets on the island were silent.

The scientists found that after a few years most crickets on the island were silent.

Use ideas about variation, adaptation and evolution to write about how these changes in the crickets might have happened.

The quality of written communication will be assessed in your answer to this question.

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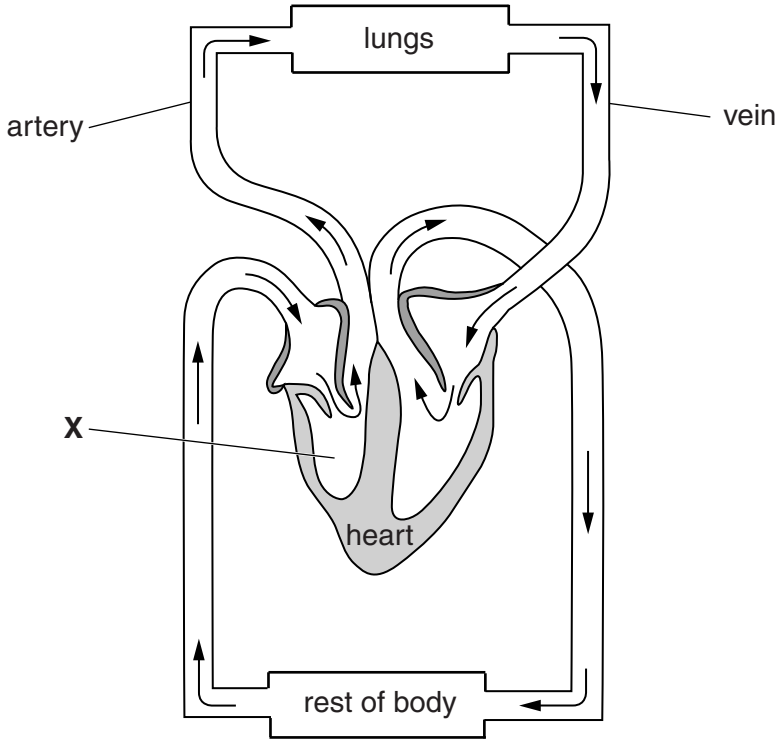
..... **[6]**

[Total: 8]

SECTION C – Module B3

8 Look at the diagram of the human circulatory system.



(a) Complete the sentences.

Blood at **X** is travelling through the ..... side of the heart.

Blood in arteries is under higher ..... than it is in veins.

[2]

(b) Blood contains cells.

One type of cell is a red blood cell.

(i) What is the job of a red blood cell?

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

(ii) Haemoglobin is found in red blood cells.

Which chemical codes for the production of haemoglobin?

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

(c) Blood also contains white blood cells.

White blood cells are made in bone marrow.

How can bone marrow cells make lots of white blood cells?

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.....

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

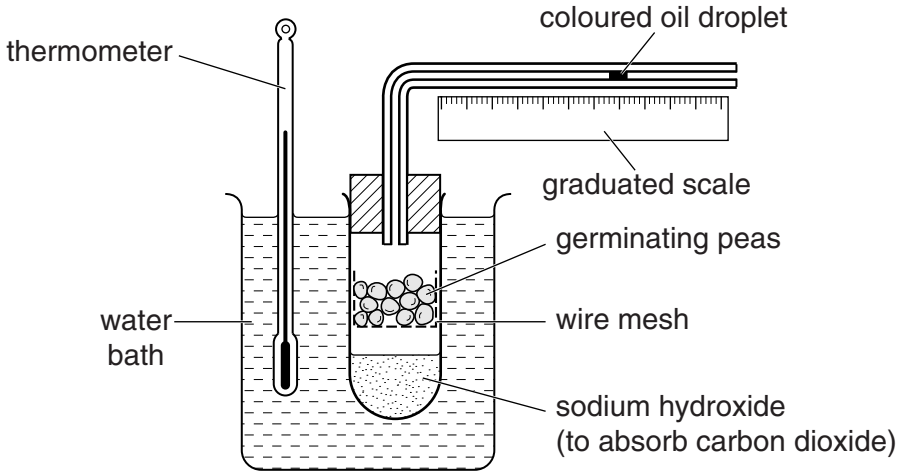
[Total: 6]

Question 9 begins on page 16

9 This question is about respiration.

Look at the diagram of a respirometer.

It can be used to investigate the gases involved in aerobic respiration.



(a) Complete the **word equation** for aerobic respiration.

glucose + ... → ..... + ... **[1]**

(b) Look at the tables.

The first table shows the respiratory quotient (RQ) of three food types.

Food type	Respiratory quotient (RQ)
carbohydrate	1.0
fat	0.7
protein	0.9

The second table shows the results from an experiment investigating aerobic respiration in two types of seed.

Type of seed	Volume of oxygen absorbed in cm^3	Volume of carbon dioxide produced in cm^3	Respiratory quotient (RQ)
Pea	0.6	0.6	.....
Peanut	16.3	13.0	.....

Respiratory quotient (RQ) is calculated using the formula:

$$RQ = \frac{\text{volume of carbon dioxide produced}}{\text{volume of oxygen used}}$$

Calculate the RQ for the two types of seed and use your answers to **suggest** how the food type used is different for the two types of seed.

The quality of written communication will be assessed in your answer to this question.

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..... **[6]**

(c) During respiration, food is broken down by enzymes.

What are enzymes?

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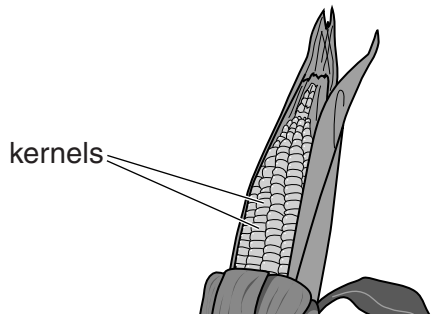
..... **[2]**

[Total: 9]

10 Look at the picture of a corn cob.



There are many different varieties of corn.

A farmer grows four different varieties.

Look at the table showing characteristics of the four different varieties.

Variety	Time taken to ripen in days	Number of rows of kernels on each cob	Average number of kernels per row	Average number of kernels on each cob
Bon appetit	70	16	22	352
Fleet	59	12	15	.....
Miracle	75	20	25	500
Polka	62	14	18	252

(a) (i) Calculate the average number of kernels on each cob of Fleet corn.

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

(ii) Which variety has the highest average number of kernels per cob?

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

(iii) The farmer wants to grow corn that is both fast growing and has lots of kernels.

Describe how the farmer could do this by selectively breeding using two of his varieties.

.....

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

(b) (i) Biologists have also used **genetic engineering** to improve corn.

What is genetic engineering?

.....

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

(ii) During the genetic engineering process, biologists need to identify **genes**.

Why?

.....

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

(c) Some people are concerned that there may be harmful effects from genetically engineered corn.

Suggest what these harmful effects might be.

.....

.....

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

[Total: 10]

END OF QUESTION PAPER

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