OCR
RECOGNISING ACHIEVEMENT

SPECIMEN F

GENERAL CERTIFICATE OF SECONDARY EDUCATION

GATEWAY SCIENCE

BIOLOGY B

B731/01

Unit B731: Biology modules B1, B2, B3 (Foundation 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 15 minutes

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

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.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

INFORMATION FOR CANDIDATES

- Your quality of written communication is assessed in questions marked with a pencil (✎)**.**
- The number of marks for each question 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 **24** pages. Any blank pages are indicated.

Examiner's Use Only:			
1		9	
2		10	
3		11	
4		12	
5		13	
6		14	
7			
8			
Total			

Answer **all** the questions.

Section A – Module B1

1 Deb is thirteen years old.

Her doctor has told her that she must eat enough protein each day.

She can calculate her estimated average requirement (EAR) for protein in grams using the formula:

EAR in g = 0.6 × body mass in kg

Deb has a mass of 58 kg.

Look at the information about how much protein Deb eats in one day.

food	**protein content in grams**
breakfast cereal	5.0
salad sandwich	8.0
macaroni cheese pasta	13.9
rice pudding	3.0
tinned peaches	0.5

Using the formula for EAR, should Deb be concerned about the amount of protein she eats?

Explain why.

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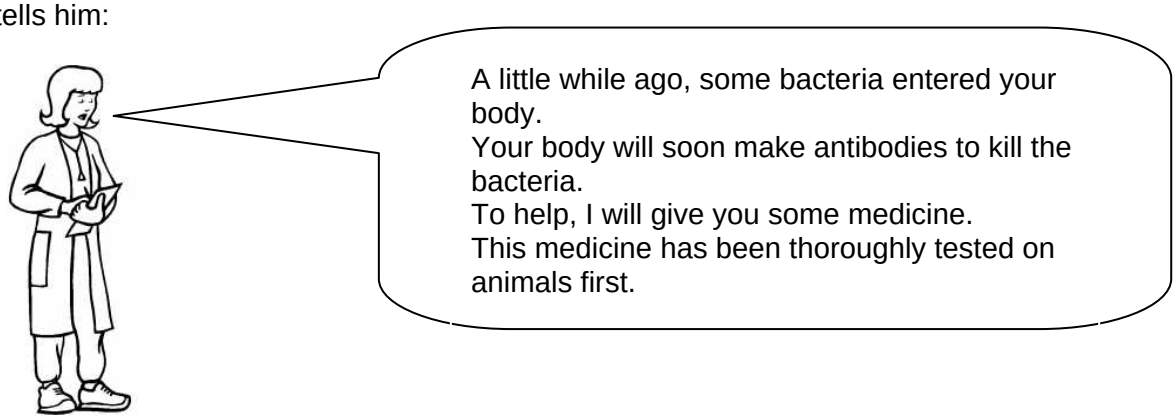
..... **[3]**

[Total: 3]

2 Chaminda visits the doctor because he feels ill.

The doctor tells him:



(a) Describe how Chaminda's body normally defends against bacteria.

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..... **[4]**

(b) Chaminda is concerned that the medicine had been tested on animals.

Suggest what his concerns might be.

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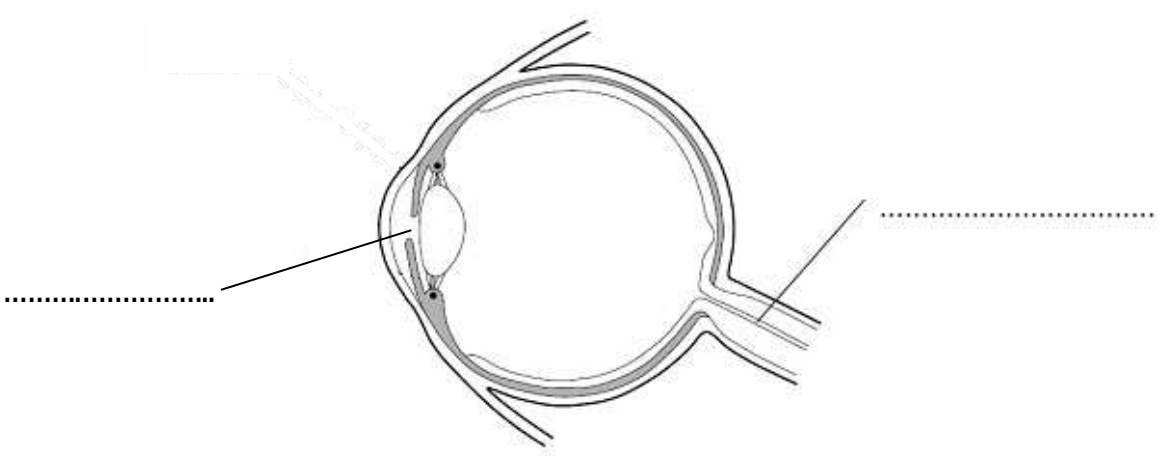
..... **[2]**

[Total: 6]

3 The diagram shows parts of a human eye.



(a) Finish labelling the diagram.

Choose the labels from this list.

blindspot **iris** **optic nerve** **pupil** **retina**

[2]

(b) (i) Look at the list of actions.

The eye is the receptor for all these actions.

Which of the actions are reflexes?

Put a tick (✓) in the box next to each reflex actions.

Put a cross (**X**) in the box next to each of the actions which are **not** reflex actions.

Automatically blinking when an object is thrown towards your face.	
Changing the shape of your pupil without thinking in bright light.	
Turning on the light when it gets dark.	

[1]

(ii) Some reflex actions slow down as people get older.

Why might this be a problem?

.....

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

[Total: 4]

4 Tobacco smoke contains chemicals and can affect the lungs.

(a) One of these chemicals is an addictive substance.

Write down the name of this chemical.

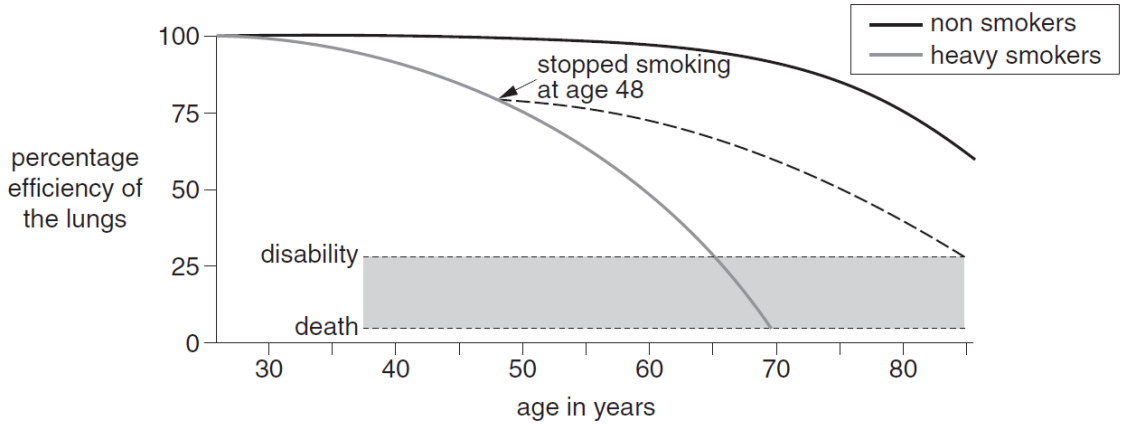
..... **[1]**

(b) The graph shows how well the lungs work at different ages.

This is shown for two groups of people.

One group is heavy smokers. The other group is non-smokers.

The dotted line shows the possible effect of stopping smoking at age 48.



Doug is a 48 year-old heavy smoker.

(i) Doug decides to give up smoking.

What difference will this make to the age at which lung damage is likely to make him disabled?

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

(ii) Explain this difference in the age at which Doug would become disabled.

Use your knowledge of the effect of smoking on the lungs in your answer.

.....

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

[Total: 5]

5 Basil is a gardener.

He keeps a diary of the work that he does in his garden.

Here is part of his diary.

27th September

Today I decided to grow some new geranium plants.

I cut small shoots off the plants and dipped them into a powder to make them grow roots.

I then planted the shoots in some soil.

(a) Basil dips the geranium shoots into a powder containing plant hormones before planting them.

Explain why.

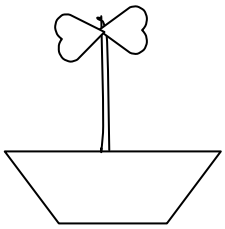
..... **[1]**

(b) Basil thinks that his geranium shoots grow towards light.

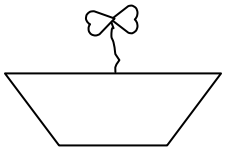
He does an experiment to test this.

> *Method*
>
> I left one plant locked in a dark cupboard for one week.
>
> I left another plant on my desk in a classroom for two weeks and watered it every day.

Look at the diagrams of the plants at the end of the experiment.



light



dark

Based on his evidence Basil concludes that geranium shoots do grow towards the light, because the plant in the light grew better.

Is Basil right to draw this conclusion?

Evaluate his method and his conclusion.

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

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

[Total: 7]

Section B – Module B2

6 Look at the pictures of four organisms.

organism **W**

organism **X**

organism **Y**

organism **Z**

(a) Which organisms are classified in the same class of arthropod?

Explain your answer.

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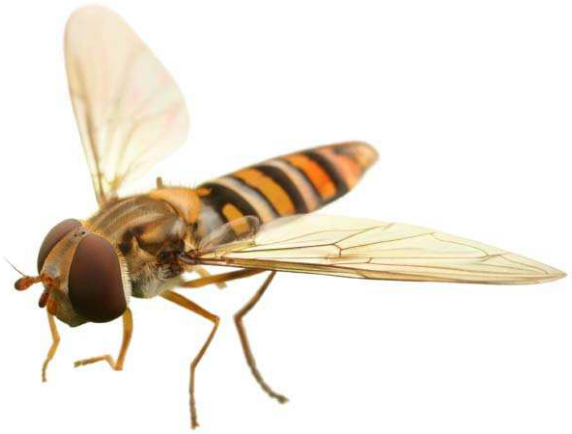
..... **[2]**

(b) Organism **X** is a hover fly. It is a prey species. It has wings which help it to escape predators.



Explain how **two other** adaptations of this organism help it to avoid being caught as prey.

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

[Total: 4]

7 Banana plants are grown in large fields called plantations.

(a) The banana plants grow very close together.

One advantage of this is that it reduces the growth of weeds.

Explain how.

.....

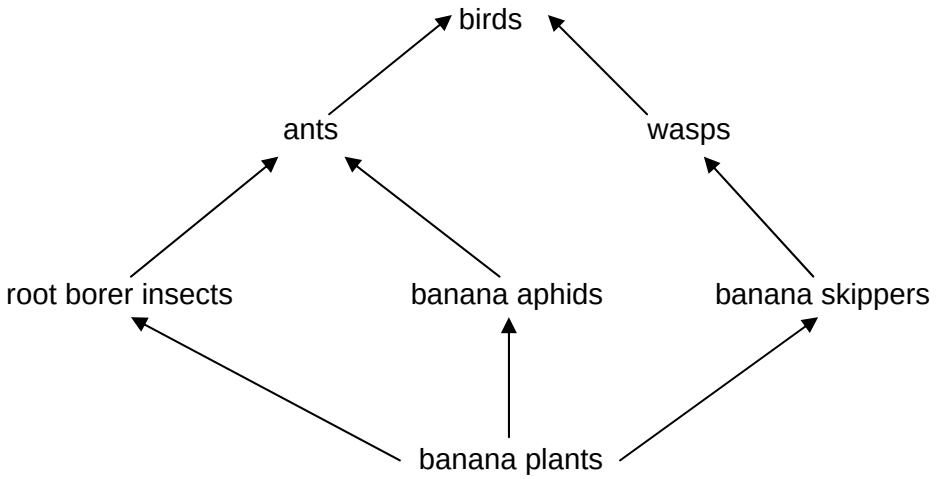
..... **[2]**

(b) The plants also need carbon and nitrogen to survive. These are recycled in nature when plants and animals decay.

In what form is carbon taken up by plants?

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

(c) Banana plants are part of a food web.



(i) How many trophic levels are there in this food web?

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

(ii) One year there are fewer ants in the plantation.

The crop of bananas decreases.

Use the food web to suggest why this happens.

.....

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

(iii) Energy **enters** this food web and **passes** from organism to organism. Some energy is **lost** from the food web.

Write about how these transfers of energy happen in this food web.

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

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

[Total: 12]

8 This article about the Great Bustard appeared in a newspaper.

© iStockphoto.com/Steven Cooper

Welcome back Big Bird

The Great Bustard was a giant among British birds.

It had a wingspan of nearly two metres and used to be a great sight as it flew over the countryside. Great Bustards needs a lot of space around them to breed. In the 1870s they became extinct in Britain.

The Great Bustard has now been reintroduced into Britain.

(a) The Great Bustard is not extinct in Turkey.

A group of scientists looked at Great Bustards in three different regions in Turkey.

They measured the area of each region and counted the number of Great Bustards living there.

Their results are shown in the table.

region	area of the region in km^2	number of birds		male:female ratio	total number of birds
		male	female		
1	898	10	14	5:7	24
2	383	1	30	1:30	31
3	754	14	21	……..	35

(i) Finish the table.

Write the missing male:female ratio in the empty box.

[1]

(ii) Use this data and your own knowledge to suggest in which region the Great Bustard is most likely to become extinct. Explain why.

.....

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

(b) What steps could be taken to help the Great Bustard to survive in Britain now it has been reintroduced?

.....

.....

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

[Total: 6]

9 Alexandra is worried about the amount of air pollution in her village.

She wants to find out whether the level of air pollution in her village is higher than in another village 20 miles away.

She could measure the level of air pollution in the two villages using two different methods.

Describe the methods she could use and how she would know where the air pollution is higher.

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

[Total: 3]

Section C – Module B3

10 This question is about blood and the heart.

(a) Which **one** is a true statement about the heart?

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

It is the largest organ in the body.	☐
The right side pumps blood to the lungs.	☐
The left side pumps blood to the lungs.	☐
Arteries take blood back to the heart.	☐

[1]

(b) Blood contains different types of cells.

One type of cell is the red blood cell.

Describe the **jobs** of **two** other components of the blood.

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

(c) Red blood cells contain haemoglobin.

Some people have mutations in the genes for haemoglobin.

These mutations stop the haemoglobin working properly.

Suggest what effect this has on the people with the mutations.

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

[Total: 5]

11 The table shows some of the structures found in cheek cells.

It also shows the width of these structures.

structure	**width in mm**
ribosomes	0.00002
nucleus	0.005
mitochondria	0.001
chromosomes	0.00001

(a) Write down the function of the mitochondria.

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

(b) **(i)** A light microscope allows a person to see objects as small as 0.001mm.

Which of the structures shown in the table can be seen with a light microscope?

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

(ii) In 1953, Watson and Crick worked out the structure of DNA.

To do this, they needed to use X-ray data obtained by other scientists.

They could not use a light microscope to work out the structure of DNA.

Explain how the information in the table shows that they could not use a light microscope to study DNA.

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

[Total: 4]

12 The table shows information about four varieties of blueberries.

variety	part of the season when fruit is ready	fruit	can be harvested by machine
Spartan	early	large with tangy flavour	yes
Toro	midseason	medium size and sweet	no
Bluecrop	midseason	large but bitter	yes
Northblue	midseason	small with wild blueberry taste	no

Sandra is a commercial grower.

She grows all four blueberry varieties to sell to supermarkets.

(a) Sandra wants to grow a new variety of blueberry.

She uses selective breeding to produce blueberries that are large and sweet.

Write down **two** varieties she could use in her breeding program.

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

(b) A supermarket has asked Sandra to produce large blueberries with a wild blueberry taste for early in the season.

Sandra would like to be able to harvest the blueberries using machines.

Sandra is deciding between two methods to produce the new variety:

- genetic engineering
- cloning.

Which method would be most appropriate for her to use to produce the new variety?

Explain your answer.

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

(c) Some people are worried about genetic engineering.

Describe **one** possible reason why they are worried.

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

[Total: 5]

13 This question is about human reproduction.

The diagram shows a sperm cell.

Sperm cells are adapted to join with an egg cell. One example of an adaptation is that they have a tail for swimming.

Body cells, like cheek cells, are not adapted to join with an egg cell.

Write about the differences between a sperm cell and a body cell and how these differences make a sperm cell adapted to join with an egg.

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

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

[Total: 6]

14 Gary wants to measure his pulse rate.

(a) Describe how he can measure his pulse rate.

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

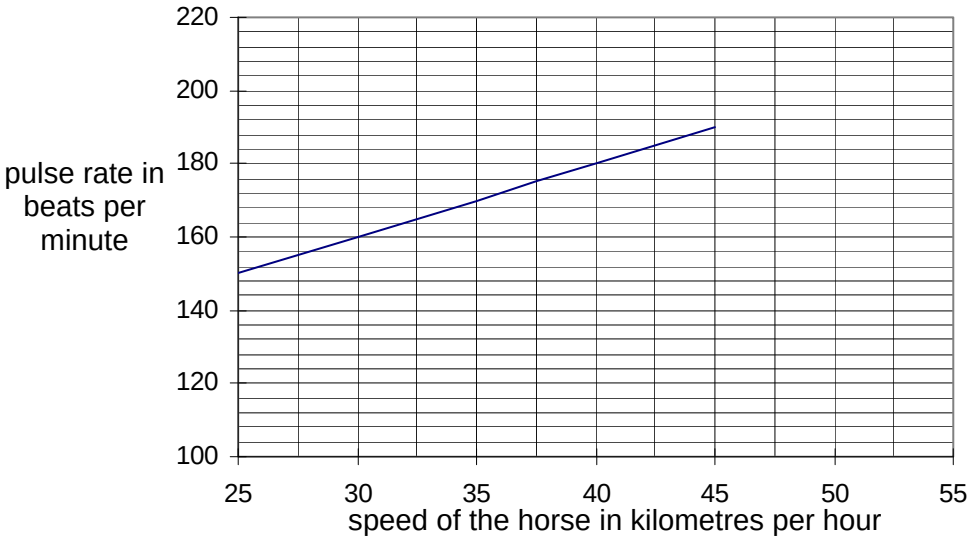
(b) Racehorses are bred and trained to run in races.

Trainers measure each horse's pulse rate to find out how fit the horse is.

They measure the pulse rate when the horse is running at different speeds.

This tells them how fast the horse can get oxygen to its muscles.

Some results for a horse are shown on the graph.



(i) Describe how the pulse rate changes as the horse runs faster.

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

(ii) Trainers know that a horse runs best when its muscles are receiving enough oxygen.

Above 200 heart beats per minute, a horse starts to rely on **anaerobic** respiration.

Use the graph to estimate the maximum speed at which this horse can run without relying on anaerobic respiration.

Show on the graph how you work out your answer.

Answer = ... km per hour **[2]**

[Total: 5]

[Paper Total: 75]

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE