Surname		Other Names	
Centre Number			Candidate Number	
Candidate Signature			

Leave blank

General Certificate of Secondary Education
June 2005

ASSESSMENT and QUALIFICATIONS ALLIANCE

BIOLOGY (SPECIFICATION B) 3411/F
FOUNDATION TIER

Monday 6 June 2005 1.30 pm to 3.45 pm

F

In addition to this paper you will require:
a ruler.
You may use a calculator.

Time allowed: 2 hours 15 minutes

Instructions
- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want marked.

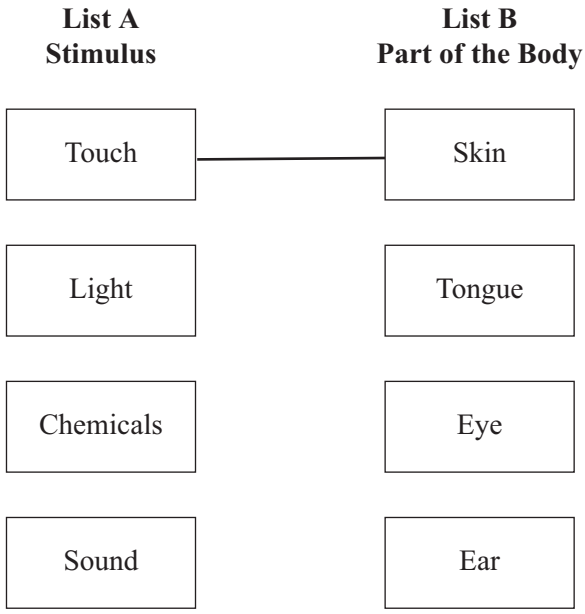
Information
- The maximum mark for this paper is 135.
- Mark allocations are shown in brackets.
- You are reminded of the need for good English and clear presentation in your answers.

For Examiner's Use			
Number	Mark	Number	Mark
1		13	
2		14	
3		15	
4		16	
5		17	
6		18	
7		19	
8		20	
9		21	
10			
11			
12			
Total (Column 1) →			
Total (Column 2) →			
TOTAL			
Examiner's Initials			

Answer **all** questions in the spaces provided.

1 (a) List **A** gives the names of four stimuli. List **B** gives four parts of the human body.

Draw a straight line from each stimulus in List **A** to the part of the body in List **B** which has receptors for that stimulus.
(One has been done for you.)



(3 marks)

(b) Complete the following sentence by choosing the correct words from the box.

brain	**glands**	**motor**	**sensory**

To make us aware of a stimulus, impulses are sent along a ..... neurone to the ..... .

(2 marks)

5

2 Complete the table by writing the correct process next to its description.

Choose your answers from the list in the box.

breathing	**diffusion**	**digestion**	**osmosis**	**respiration**

Description	**Process**
Moving air in and out of the lungs	
The movement of particles of a substance from high to low concentration	
The release of energy from glucose	

(3 marks)

3

TURN OVER FOR THE NEXT QUESTION

3 In recent years, trees have been cut down to create more farm land. More cattle are kept and more rice is grown.

(a) (i) Which gas has increased in the air as a result of trees being cut down?

Draw a ring around **one** answer.

carbon dioxide **oxygen** **sulphur dioxide**

(1 mark)

(ii) Which gas has increased in the air as a result of keeping more cattle and growing more rice?

Draw a ring around **one** answer.

carbon monoxide **hydrogen** **methane**

(1 mark)

(b) What effect may increases in these gases have on global temperatures?

Draw a ring around **one** answer.

decrease **increase** **stay the same**

(1 mark)

(c) List **three** ways in which humans have destroyed the habitats of other animals.
Do **not** include cutting down trees in your answer.

1 .....

.....

2 .....

.....

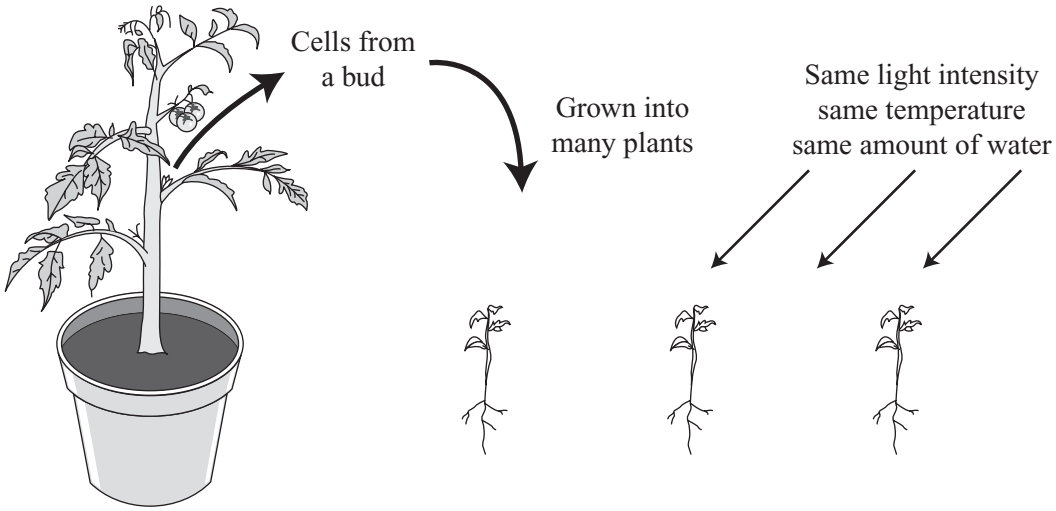
3 .....

.....

(3 marks)

6

4 The diagram shows a method of producing a large number of plants which all look the same. Cells taken from the bud can be split into many groups. Each group of cells is then grown under the same conditions.



(a) (i) What do scientists call organisms which are all produced from one parent and which all look the same?

Draw a ring around **one** answer.

clones **communities** **populations**

(1 mark)

(ii) Give **two** reasons why plants produced by this method will all look the same.

1 .....

.....

2 .....

.....

(2 marks)

(b) Give **two** reasons why plants need roots.

1 .....

.....

2 .....

.....

(2 marks)

5

Turn over ▶

5 **Figure 1** shows a food chain containing three organisms.

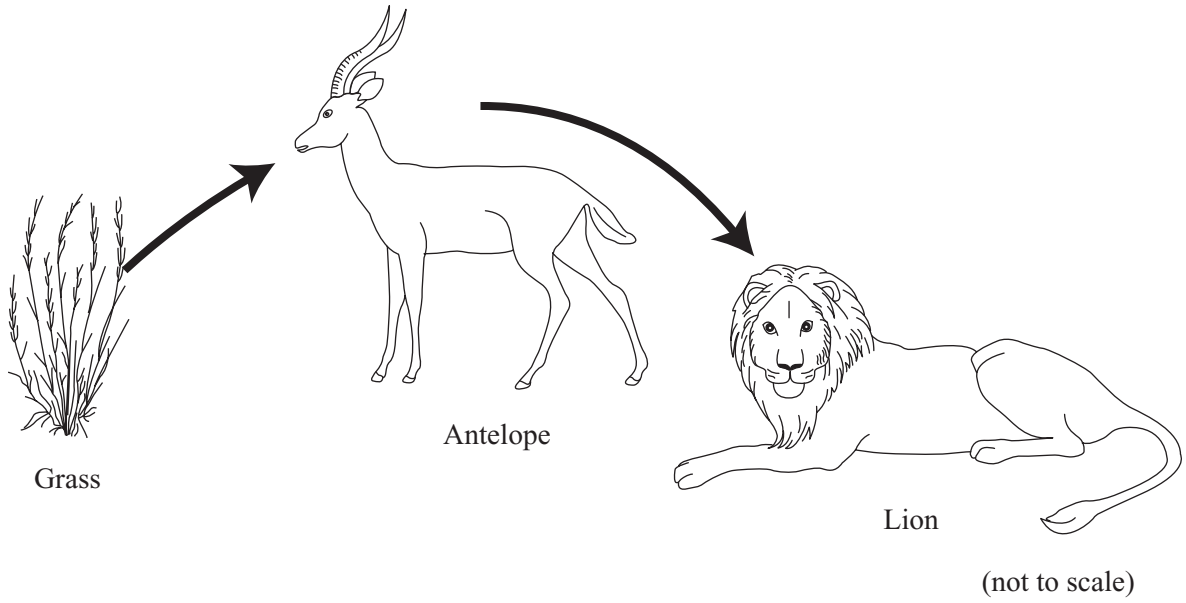


Figure 1

(a) (i) In this food chain, name:

the predator; .....

the prey. .....

(2 marks)

(ii) What is the source of energy for the grass?

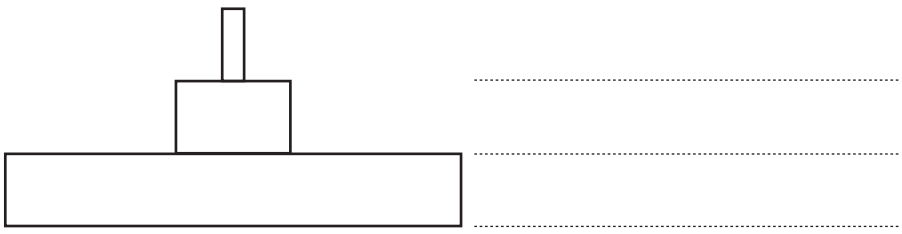
Draw a ring around **one** answer.

carbon dioxide **light** **nitrates** **water**

(1 mark)

(iii) **Figure 2** shows a pyramid of biomass for the organisms in **Figure 1**.

Write the names of the organisms on the correct lines in **Figure 2**.



.....

.....

.....

Figure 2

(1 mark)

(b) Waste materials, like faeces from the animals, will decay.

(i) What sort of organisms cause decay?

.....

(1 mark)

(ii) **Three** of the following conditions help decay to occur rapidly.

Which conditions do this?

Draw a ring around each of the **three** answers.

aerobic **anaerobic** **cold** **dry** **moist** **warm**

(3 marks)

(iii) The list below gives four substances. Two of these substances are produced by decay and can be used by the grass.

Which **two** substances are these?

Tick (✓) **two** boxes.

Carbon dioxide	☐
Mineral salts	☐
Oxygen	☐
Protein	☐

(2 marks)

10

TURN OVER FOR THE NEXT QUESTION

6 (a) Alleles are different forms of the same gene.

Why does a person usually inherit **two** alleles of each gene?

.....

(1 mark)

(b) Some humans are albino (they have white hair and pale skin). This condition is caused by a recessive allele, **n**. The other allele, **N**, causes a coloured pigment to be made.

There are three possible combinations of these alleles:

NN **Nn** **nn**

(i) Which **one** of these combinations will an albino person have?

.....

(1 mark)

(ii) Two non-albino parents can sometimes have an albino child.

Which **one** of the following combinations of alleles must these two parents have?

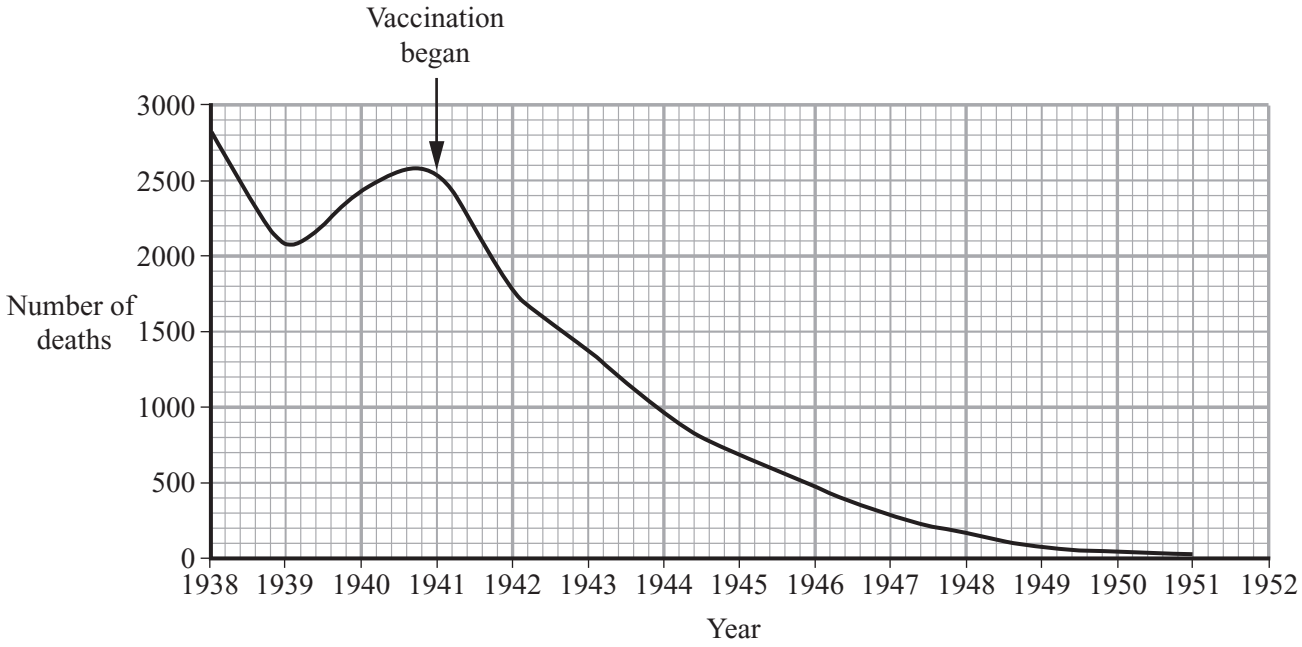
Tick (✓) the box next to the correct answer. Tick **one** box only.

Parent 1	**Parent 2**	
NN	NN	☐
NN	Nn	☐
Nn	Nn	☐
nn	nn	☐

(1 mark)

3

7 Diphtheria is a disease of the human breathing system. The graph shows the number of deaths from diphtheria in the United Kingdom between 1938 and 1951. Vaccination against diphtheria was begun in 1941.



(a) What evidence in the graph suggests that vaccination protects people from diphtheria?

.....

(1 mark)

(b) Complete the passage by choosing the correct words from the box.

antibodies	**bacteria**	**platelets**
red blood cells	**white blood cells**	

During vaccination, harmless ..... are injected into the body.

This causes ..... to make ..... which help to protect the body against diphtheria.

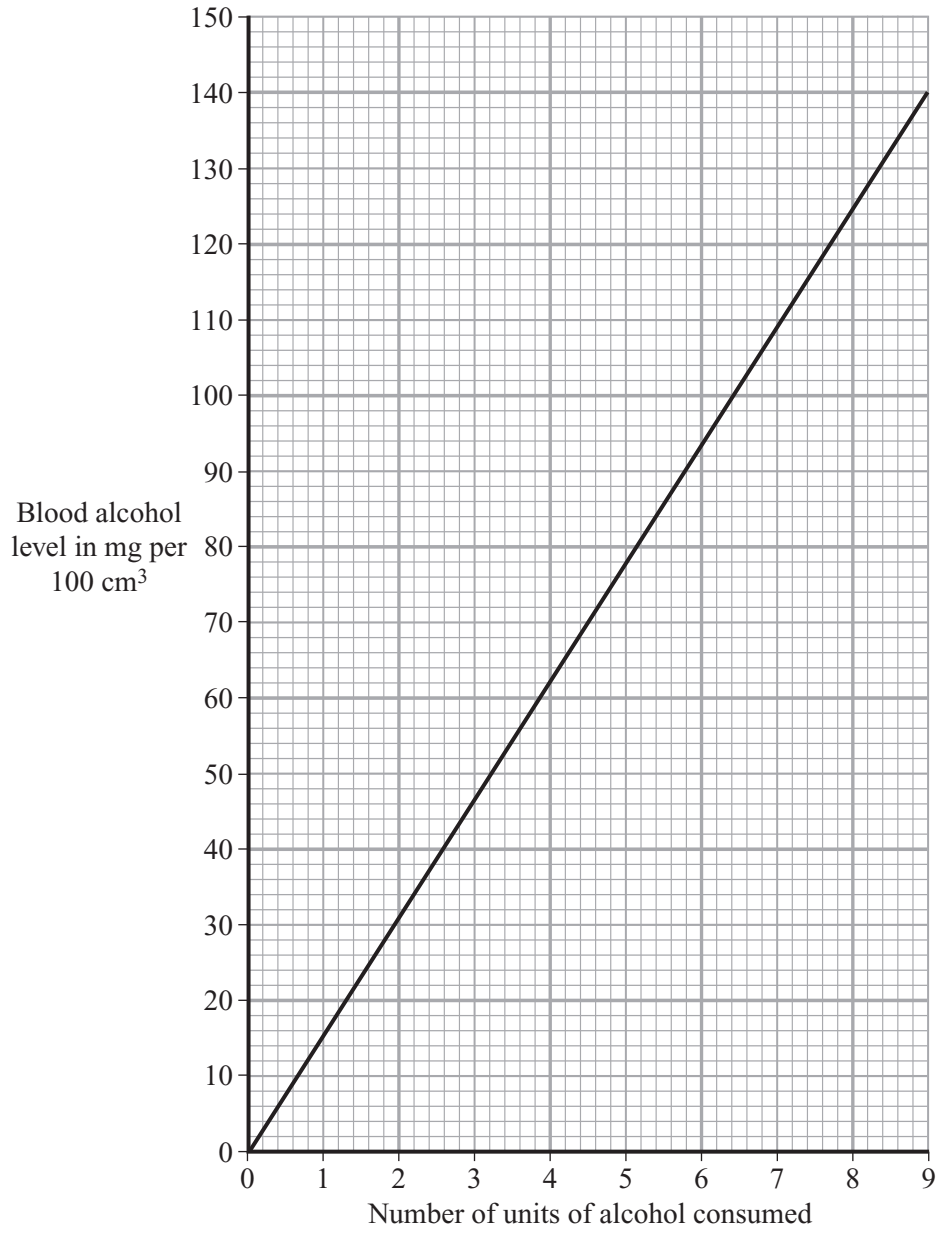
(3 marks)

4

8 In the United Kingdom, the legal limit for alcohol in the blood of a person driving a car is 80 milligrams per 100 cm^3. The table shows the number of 'units' of alcohol in different drinks.

Drink	Units of alcohol
One can of strong lager	4
One pint of bitter beer	2
One glass of wine	1
One single measure of whisky	1

The graph shows how much alcohol would be found in the blood when a person drinks different amounts of alcohol.



(a) A person drinks two cans of strong lager.

(i) How many units of alcohol are there in two cans of strong lager?

..... units
(1 mark)

(ii) What would this person's blood alcohol level be?

..... mg per 100 cm^3
(1 mark)

(b) It is dangerous to drive a car after drinking two cans of strong lager. Explain why.

.....

.....

.....

.....

.....

.....
(3 marks)

(c) Alcohol is transported round the body in the same way as the products of digestion.

Complete the passage, by choosing the correct words from the box, to explain how a person who has drunk too much alcohol would give a positive result in a police 'breathalyser' test.

blood plasma	**diffusion**	**lungs**	**osmosis**
red blood cells	**stomach**	**white blood cells**	

Alcohol is absorbed from the digestive system into the ..... by the process of ..... .

The alcohol is carried to the ..... where it is then breathed out.
(3 marks)

(d) Give **one** effect on the body of drinking a lot of alcohol over many years.

.....

.....
(1 mark)

9

9 The table gives information about a geranium plant and a cactus plant.

The geranium grows in gardens in the UK. The cactus grows in hot deserts.

Feature	Geranium	Cactus
Thickness of waxy cuticle in micrometres	5	15
Total leaf surface area in cm^2	1800	150
Percentage of water storage tissue in stem	50	85
Number of stomata per mm^2	59	13
Time of day when stomata open	daylight	at night
Horizontal spread of roots in metres	0.2	5

Using only information in the table, explain how the cactus is better adapted for living in hot, dry conditions.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

.....

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(5 marks)

5

10 Paula is training for a marathon. When she runs, her heart beats faster than it does when she is resting.

(a) Complete the sentences, using words from the box.

blood	**breathe**	**carbon dioxide**	**glucose**
heat	**nitrogen**	**oxygen**	**respire**

When she is running, Paula's muscle activity increases. To do this, her muscle cells ..... at a faster rate to give her more energy. Her muscles need to be supplied with ..... and ..... more quickly. Her heart beats faster to increase the flow of ..... which carries the products ..... and ..... away from her muscles.

(6 marks)

(b) During a run Paula slips and falls over. She cuts her knee. The doctor thinks that she may have tetanus bacteria in the cut. He gives her an injection of tetanus antibodies.

(i) Explain why she needs to have an injection of antibodies, rather than a small quantity of dead tetanus bacteria.

.....

.....

.....

(2 marks)

(ii) Suggest **one** other drug that she might need to take after her fall.

.....

(1 mark)

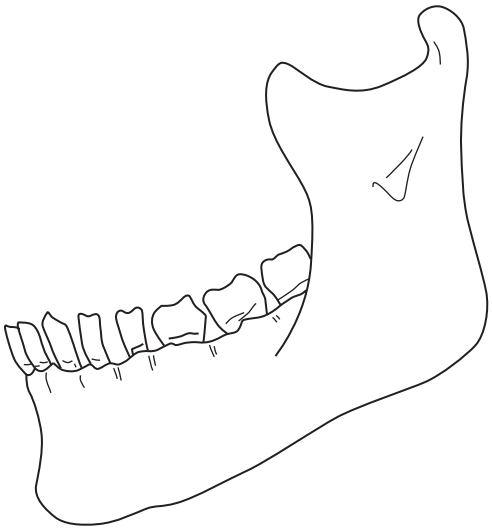
9

11 The diagram shows the arrangement of teeth in a human jaw.

The jaw contains four types of teeth.

(a) Draw **one** line from each box to an example of that tooth in the diagram.

Canine	**Incisor**	**Molar**	**Pre-molar**



(not to scale)

(4 marks)

(b) (i) Give the function of molar teeth.

.....

(1 mark)

(ii) Explain how molar teeth are suited to this function in humans.

.....

.....

(1 mark)

(c) Dogs' teeth are arranged like human teeth. The shapes of dogs' teeth are different from those of human teeth.

(i) Describe the diet of dogs.

.....

(1 mark)

(ii) Describe the incisor and canine teeth in dogs. Explain how these teeth are adapted to a dog's diet.

Incisor

Description and explanation .....

.....

.....

.....

Canine

Description and explanation .....

.....

.....

.....

(4 marks)

11

TURN OVER FOR THE NEXT QUESTION

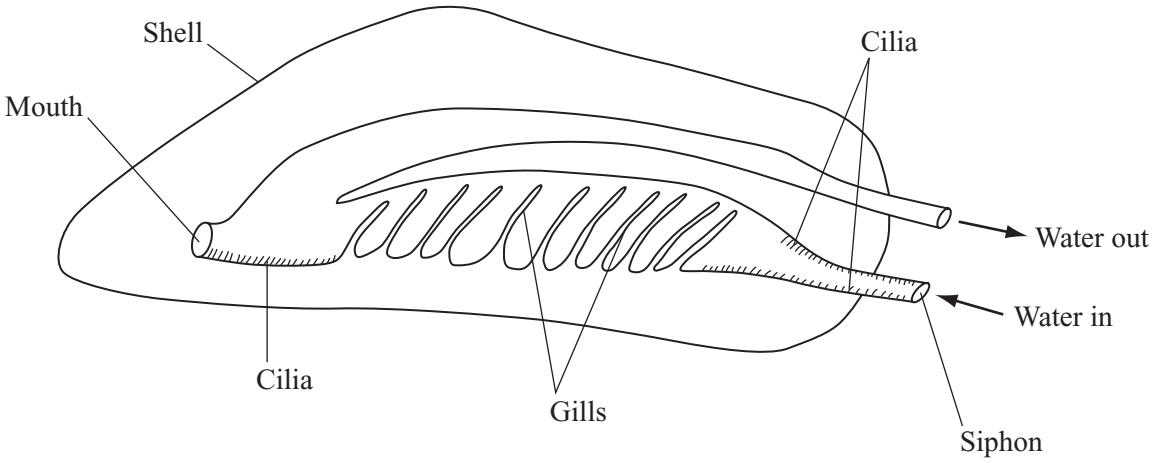
12 Mussels live in water. They are filter feeders.

(a) What do mussels feed on?

.....

(1 mark)

(b) The diagram shows some of the parts inside a mussel.



Describe how food is brought to the mouth of the mussel.

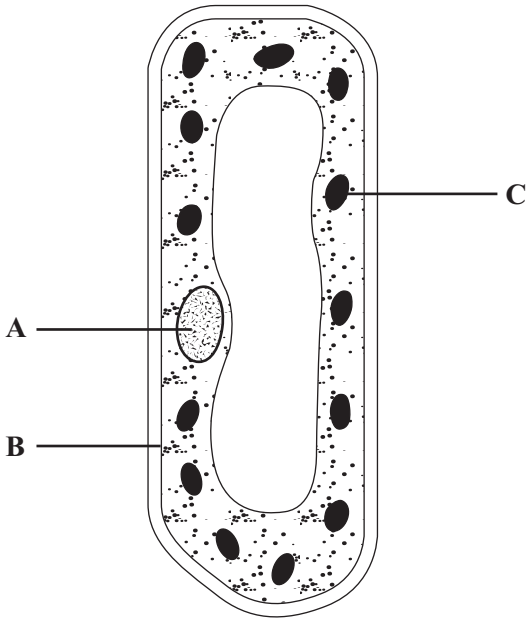
Use labels from the diagram to complete the sentences.

The ..... contains cilia which draw a current of water through the body. The ..... act like a sieve to trap food particles. Other ..... move trapped food to the mouth.

(3 marks)

4

13 The diagram shows a cell from a plant leaf.



(a) Name structures **A** and **B**.

A .....

B .....

(2 marks)

(b) Structure **C** is a chloroplast. What is the function of a chloroplast?

.....

(1 mark)

(c) The table gives one difference between a plant cell and an animal cell.

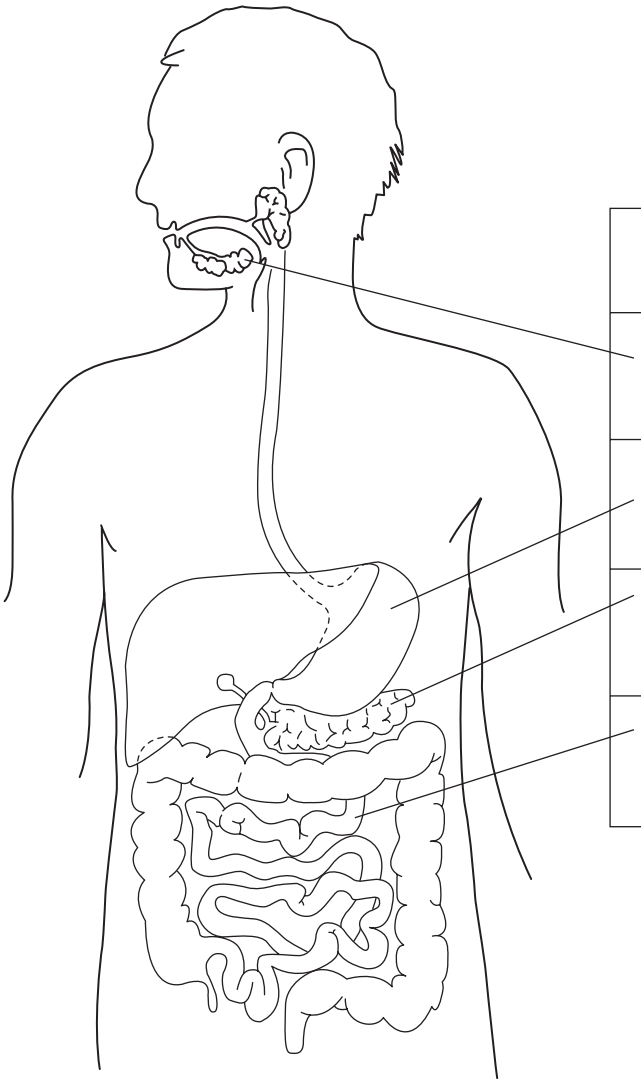
Complete the table to give **two** more differences.

Plant cell	Animal cell
1. Has chloroplasts	1. No chloroplasts
2.	2.
3.	3.

(2 marks)

5

14 The diagram gives information about some parts of the human digestive system.



Organ	pH of digestive juice	Enzymes produced
Salivary gland	7	Amylase
Stomach	2	Protease
Pancreas	8.5	Amylase Lipase Protease
Small intestine	8.5	Amylase Lipase Protease

(a) (i) Name the organ which **makes** bile.

.....

(1 mark)

(ii) Label this organ with the letter **X** on the diagram. *(1 mark)*

Information in the table may help you to answer parts (b) and (c).

(b) Name **two** parts of the digestive system where protein is digested.

1 .....

2 .....

(2 marks)

(c) Suggest **two** reasons why starch is not digested in the stomach.

1 .....

.....

2 .....

.....

(2 marks)

(d) The contents of the small intestine are liquid but the faeces are much more solid.

Explain what causes this to happen.

.....

.....

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(3 marks)

9

TURN OVER FOR THE NEXT QUESTION

15 The table shows the effects that two different concentrations of sulphur dioxide in the air had on the growth of rye grass plants.

Sulphur dioxide concentration in the air in micrograms per m^3	**9.0**	**191.0**
Number of leaves per plant	85.6	47.3
Total leaf area in cm^2	417.2	203.6
Dry mass of stubble in grams	0.48	0.22

(a) What human activity releases sulphur dioxide into the air?

.....

(1 mark)

(b) (i) What effect does sulphur dioxide have on rainwater?

.....

.....

(1 mark)

(ii) Use information from the table to describe **one** effect of sulphur dioxide on the leaves of the grass plants.

.....

.....

(1 mark)

(c) The stubble consists of the bases of the stems of the plants and the roots left in the soil after harvesting.

Use your answer to part (b) to explain why the dry mass of the stubble was less at the higher concentration of sulphur dioxide.

.....

.....

.....

.....

(2 marks)

5

16 (a) Fossils provide evidence for evolution.

(i) What is a fossil?

.....

(1 mark)

(ii) How do fossils provide evidence for evolution?

.....

.....

.....

.....

(2 marks)

(b) Doctors give antibiotics to patients to kill bacteria in their bodies.

Explain how the overuse of antibiotics has led to the evolution of antibiotic-resistant bacteria.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

.....

.....

.....

.....

.....

.....

(3 marks)

6

TURN OVER FOR THE NEXT QUESTION

17 Auxin is a hormone made by the tips of plant shoots.

Figure 1 shows the movement of auxin in two young shoots, **A** and **B**, which were treated in different ways. '**X**' shows where auxin was made.
Both shoots were kept in the dark.

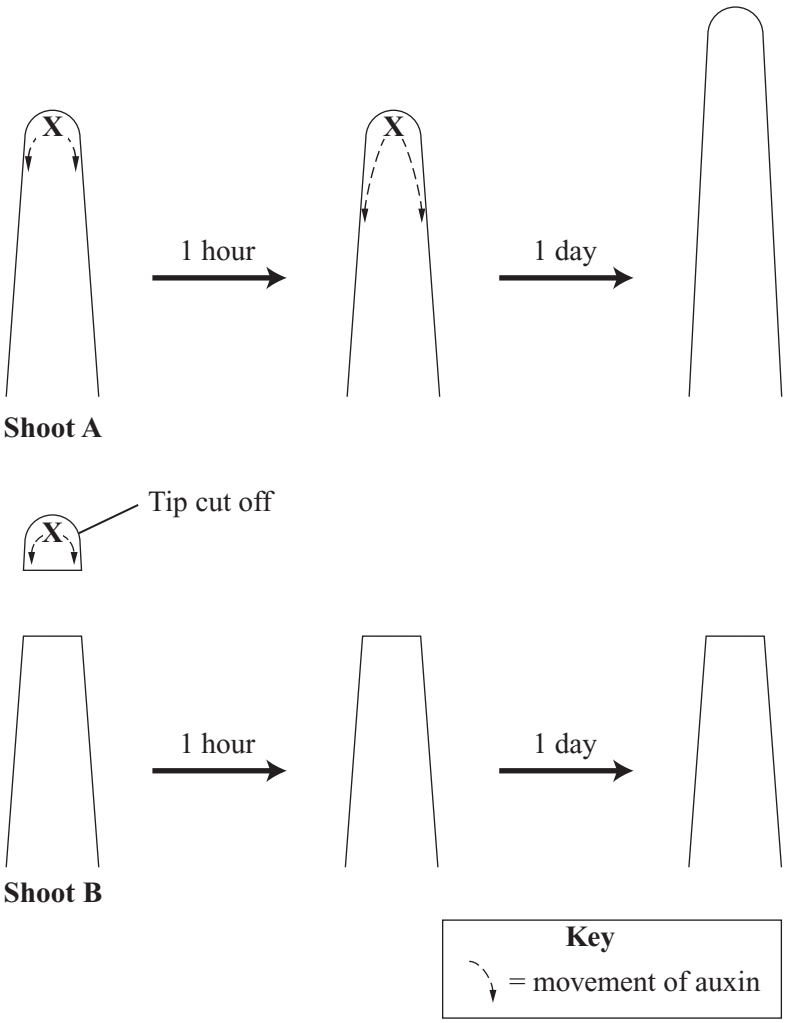


Figure 1

(a) Explain the difference in the growth of shoot **A** and shoot **B** at the end of one day.

.....

.....

.....

.....

.....

(4 marks)

(b) A third shoot, **C**, was grown in a box so that light shone onto it from only one side. **Figure 2** shows movement of auxin in this shoot and the result of the experiment.

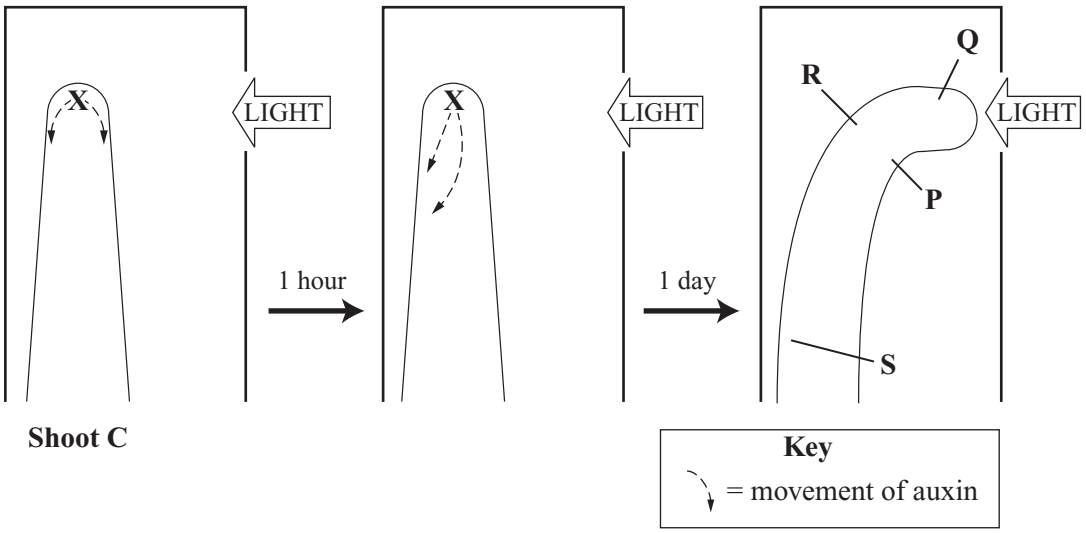


Figure 2

(i) Describe the movement of auxin in shoot **C** after one hour.

.....

(1 mark)

(ii) Auxin causes plant cells to elongate (grow longer).

At which point, **P**, **Q**, **R** or **S**, would cells have elongated the most?
Draw a ring around **one** answer.

P **Q** **R** **S**

(1 mark)

(c) Plant hormones are sometimes used by humans to control plant growth. Give **two** examples of this.

1 .....

.....

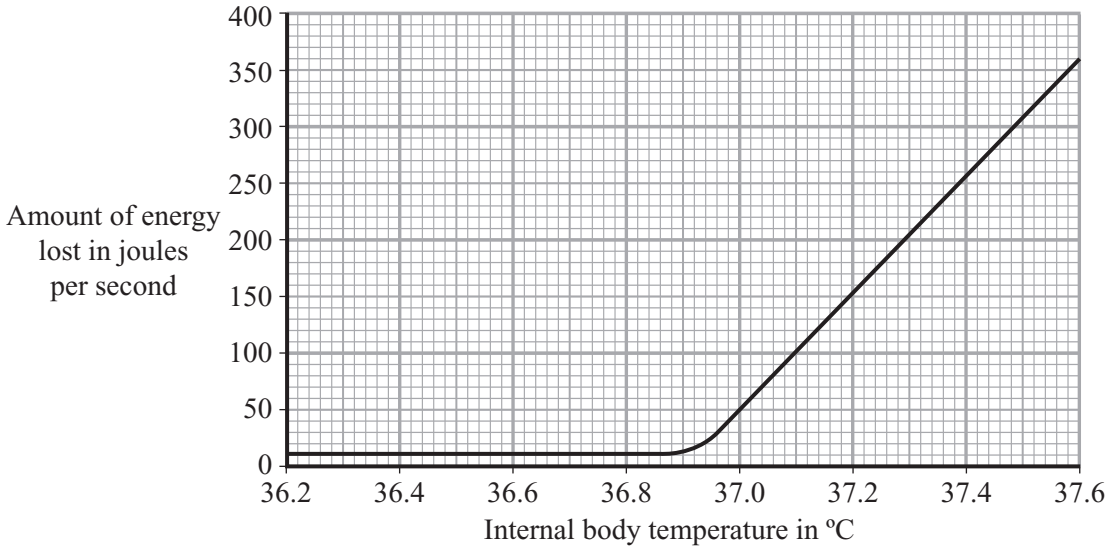
2 .....

.....

(2 marks)

8

18 The internal body temperature determines how much a person sweats. The graph shows the effect of different internal body temperatures on a person's rate of energy loss by sweating.



(a) How much more energy was lost from the body each second by sweating when the body temperature was 37.6 ºC than when it was 36.6 ºC? Show clearly how you work out your final answer.

.....

.....

Amount of energy = ... joules per second
(2 marks)

(b) Explain why a person would feel more thirsty when the body temperature was 37.6 ºC than when it was 36.6 ºC.

.....

.....

.....

.....
(2 marks)

(c) Explain how sweating helps to control body temperature.

.....

.....

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.....

.....
(3 marks)

7

19 Yoghurt can be made by adding bacteria to warm milk. Sometimes cheese is made when bacteria are added to warm milk.

(a) (i) Suggest why the milk should be warm when the bacteria are added.

.....

(1 mark)

(ii) Yoghurt can be made in school. Suggest a safe temperature for this to be done. Choose from the list. Put a ring around your answer.

0 °C **25 °C** **37 °C** **50 °C** **100 °C**

(1 mark)

(b) In yoghurt manufacture it is important that oxygen should be kept out of the mixture.

(i) Explain why it is important that the mixture should **not** contain oxygen.

.....

(1 mark)

(ii) Explain how bacteria cause milk to clot to form yoghurt.

.....

.....

.....

(2 marks)

(c) In the manufacture of cheese, the bacteria produce curds and whey from the milk.

(i) Describe how the appearance of curds is different from that of whey.

.....

.....

(1 mark)

(ii) Suggest how curds could be separated from the whey.

.....

(1 mark)

(iii) How are the curds changed into cheese?

.....

.....

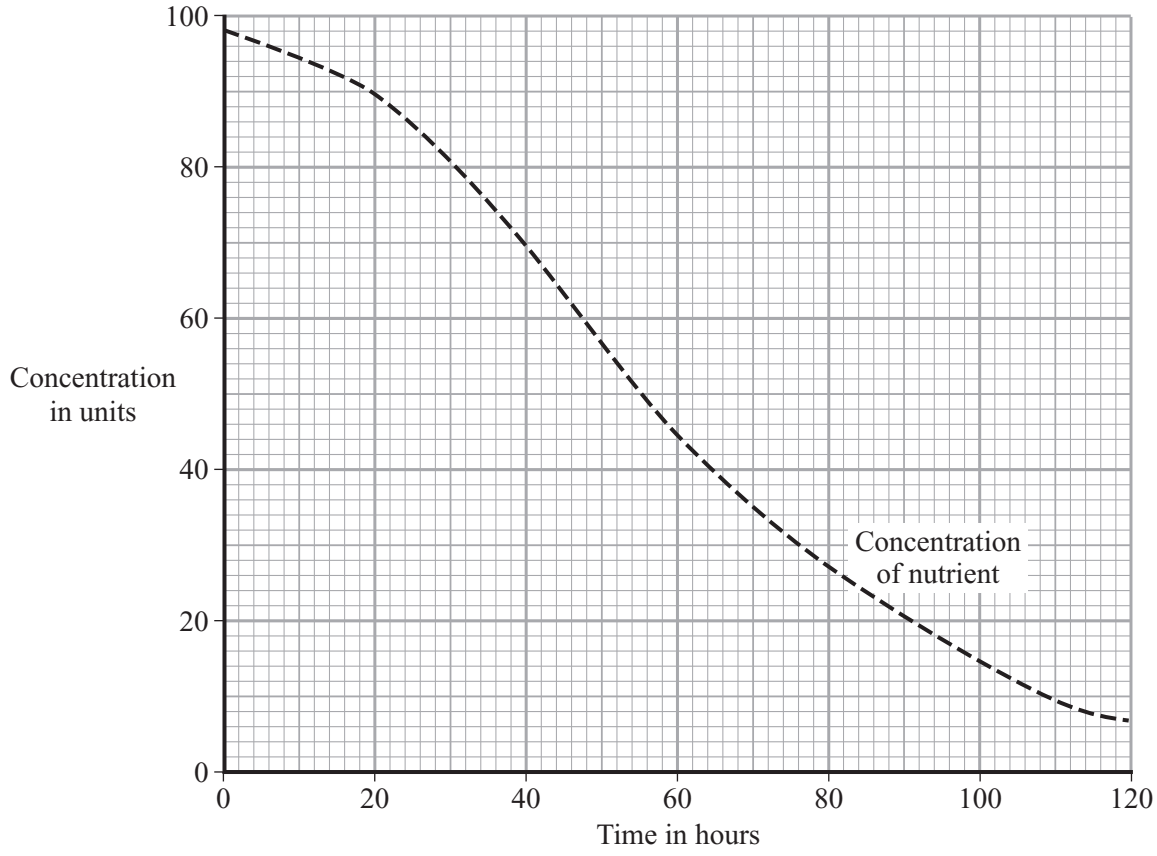
.....

(2 marks)

9

20 Antibiotics are useful drugs. The antibiotic, amoxycillin, can be manufactured by growing a mould in a nutrient solution in a fermenter.

The graph shows how the concentration of the nutrient changes over time, in a fermenter.



(a) The table shows how the concentration of amoxycillin changes in the fermenter.

Time, in hours	0	20	40	60	80	100	120
Concentration of amoxycillin, in units	0	1	57	86	93	98	99

On the grid above, draw the graph for amoxycillin production.

(2 marks)

(b) Explain why the nutrient concentration in the fermenter changes over time.

.....

.....

(1 mark)

(c) Describe the relationship between the concentration of nutrient and the concentration of amoxycillin.

.....

.....

.....

.....

(2 marks)

(d) Why do doctors give their patients antibiotics?

.....

.....

(1 mark)

6

TURN OVER FOR THE NEXT QUESTION

21 Read the passage.

> MMR is a triple vaccine used to protect against three viral diseases. Weakened strains of the three viruses are injected together. The weakened strains cause the body to become immune to the diseases. The vaccine is usually given to children between one and two years old.
>
> Some people believe that the vaccine can trigger a response called autism in children. Autism damages the mental and social development of the child. The vaccine can also lead to problems in the large intestine.

(a) What are the **three** diseases that the MMR vaccine protects against?

.....

(1 mark)

(b) Use the information in the passage and your own knowledge to evaluate whether a parent should or should not have their child vaccinated.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

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(5 marks)

6

END OF QUESTIONS