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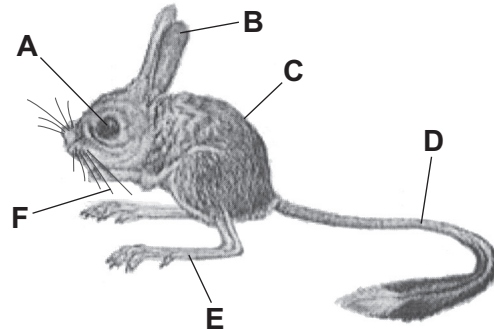
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Answer **all** questions in the spaces provided.

- 1 The drawing shows a jerboa. Jerboas live in sandy deserts.



Jerboas sleep in underground holes during the hot day and come out during the cold night.

The jerboa's main food is small insects which run across the surface of the sand.

For each question write the correct letter in the box.

Which structure, **A, B, C, D, E** or **F**:

- 1 (a) helps to insulate the jerboa

(1 mark)

- 1 (b) helps the jerboa to detect insects on a dark night

(1 mark)

- 1 (c) helps the jerboa to hop quickly to catch an insect

(1 mark)

- 1 (d) helps the jerboa to keep its balance when hopping

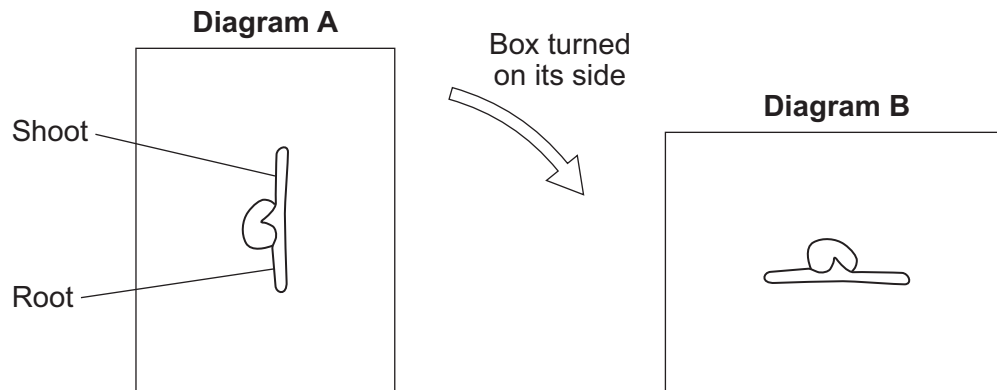
(1 mark)

- 1 (e) helps the jerboa to know the width of its underground hole in the dark?

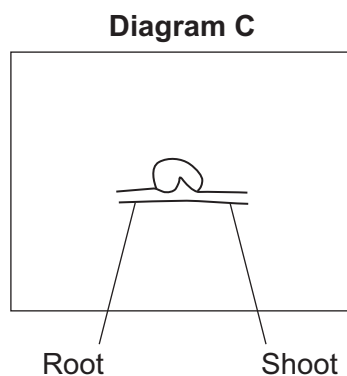
(1 mark)

2 A student investigated growth responses in plants.

The student grew a bean seed in a box filled with moist soil, as shown in **Diagram A**. After the seed had started to grow, the box was turned onto its side and placed in a dark room, as shown in **Diagram B**.



2 (a) Complete **Diagram C** to show what the root and shoot will look like three days later.



(2 marks)

2 (b) Draw a ring around the correct answer to complete the sentence.

The results of the investigation show that the root is sensitive to

light.  
moisture.  
gravity.

(1 mark)

**2 (c)** A hormone in the plant causes the growth responses.

What is the name of this hormone?

Tick (✓) **one** box.

Auxin

Statin

Steroid

(1 mark)

**2 (d)** Gardeners can use some plant hormones as weed killers.

**2 (d) (i)** Give **one different** use of plant hormones by gardeners.

.....  
.....

(1 mark)

**2 (d) (ii)** Selective weed killers only kill some plants in a garden.

Killing weeds in a garden reduces competition between plants.

Give **three** factors that plants compete for.

1 .....

2 .....

3 .....

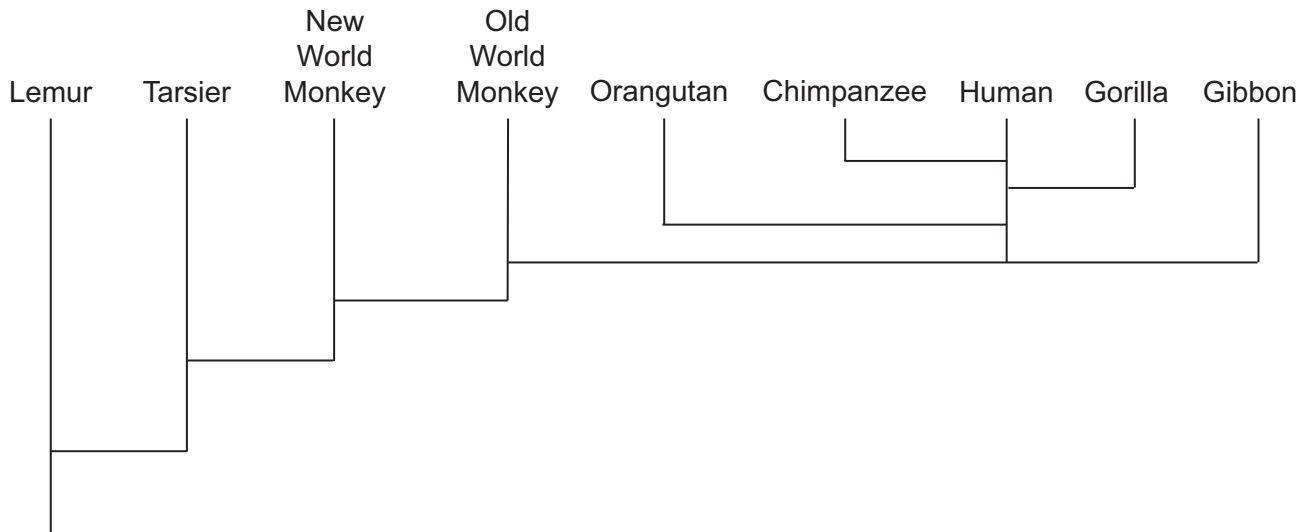
(3 marks)

**8**

**Turn over for the next question**

**Turn over ►**

**3** The diagram shows the evolution of a group called the primates.



**3 (a)** Which primate evolved first?

.....  
(1 mark)

**3 (b)** Name **two** primates that developed most recently from the same common ancestor as humans.

1 .....

2 .....

(2 marks)

**3 (c) (i)** The theory of evolution by natural selection was suggested in the 1800s.

Which scientist suggested this theory?

.....  
(1 mark)

**3 (c) (ii)** Use words from the box to complete the passage about natural selection.

<b>evolution</b>	<b>environment</b>	<b>generation</b>
<b>mutate</b>	<b>survive</b>	<b>variation</b>

Individual organisms of a species may show a wide range of

..... because of differences in their genes.

Individuals with characteristics most suited to the .....

are more likely to ..... and breed successfully.

The genes that have helped these individuals to survive are then passed on to the

next .....

(4 marks)

<b>8</b>

**Turn over for the next question**

**Turn over ►**

- 4 The table is from a packet of biscuits.

Average values	Per 100 g	Per biscuit	UK guideline daily amounts	
			Adults	Children (5–10 years)
Energy	1974 kJ	446 kJ	8500 kJ	7500 kJ
Protein	7.1 g	1.1 g	45 g	24 g
Carbohydrate	62.8 g	9.3 g	230 g	220 g
Fat	21.3 g	3.2 g	70 g	70 g
Sodium	3.6 g	0.5 g	2.4 g	1.4 g

One day a ten-year-old child ate a whole packet of the biscuits.  
The biscuits in the pack had a mass of 400 g.

- 4 (a) (i) How many grams of carbohydrate did the child eat?

.....  
.....

Number of grams .....  
(2 marks)

- 4 (a) (ii) The amount of carbohydrate you calculated in part (a)(i) was more than the UK guideline daily amount for the child.

How much more?

.....  
.....

Number of grams .....  
(1 mark)

- 4 (b) Give **two** possible health effects on the child of eating so many biscuits every day.

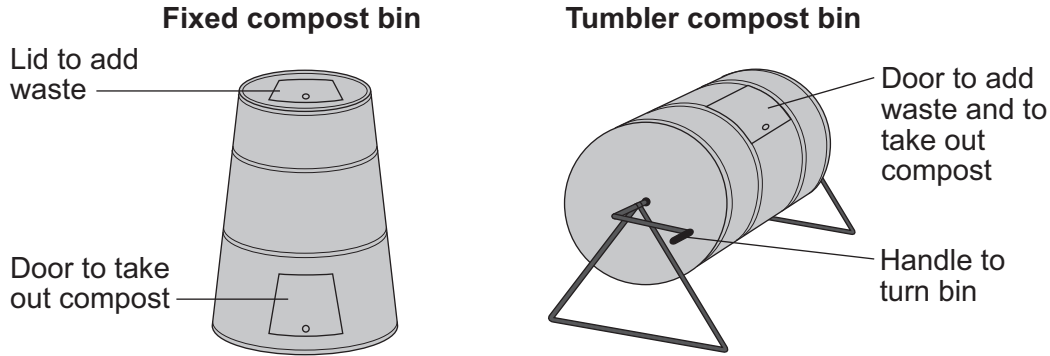
1 .....

2 .....

(2 marks)

**5** Garden waste can be recycled.  
One way of recycling garden waste is to use a compost bin.

The diagram shows two types of compost bin.  
Each bin can contain the same amount of waste.



Information about the compost bins is given below.

**Fixed compost bin**

- Compost can be taken out after two years.
- The bin costs about £40.
- The bin takes up an area of 1 m<sup>2</sup>.

**Tumbler compost bin**

- The bin is turned twice a day using the handle.
- Six weeks later compost can be taken out.
- The bin costs about £80.
- The bin takes up an area of 2 m<sup>2</sup>.

**5 (a)** A gardener is buying a compost bin.

**5 (a) (i)** Give **one** advantage to the gardener of buying a tumbler compost bin and not a fixed compost bin.

.....  
 .....

(1 mark)

**5 (a) (ii)** Give **two** advantages to the gardener of buying a fixed compost bin and not a tumbler compost bin.

1 .....

2 .....

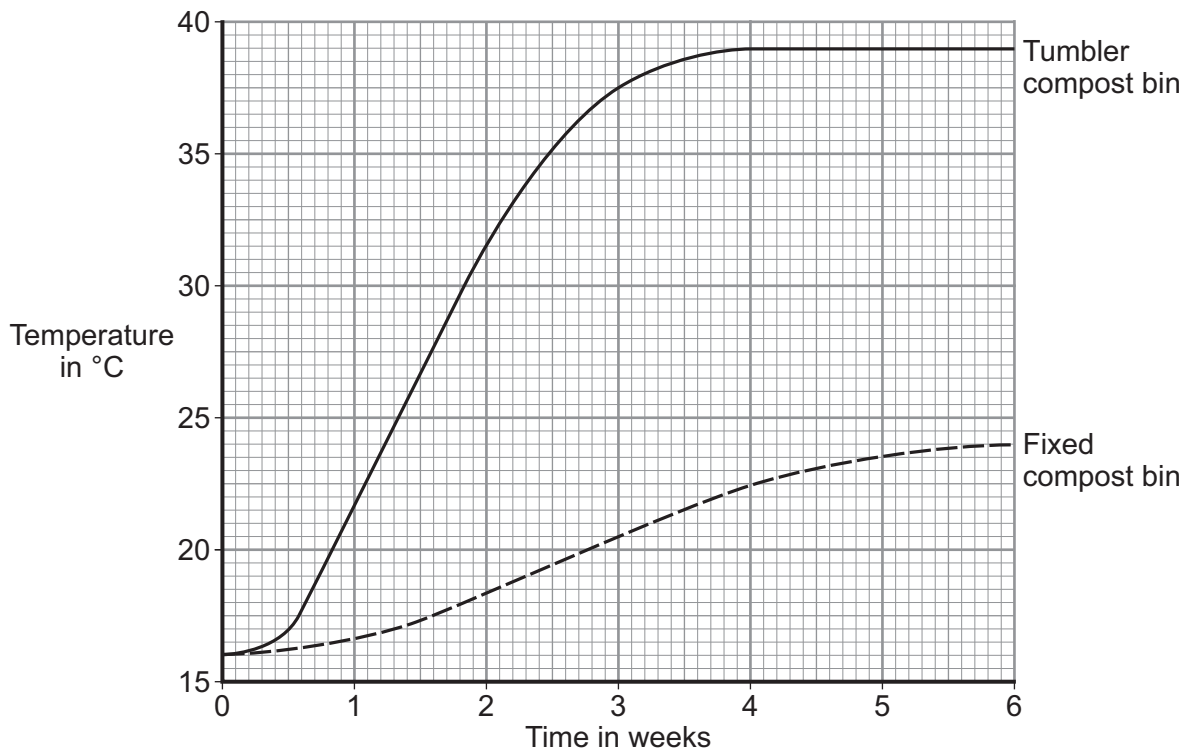
(2 marks)

**Question 5 continues on the next page**

**Turn over ►**



**5 (b)** The same amounts of waste were added to the two types of bin. The graph shows the temperature in the bins in the first six weeks after the waste was added.



**5 (b) (i)** Give **two** differences between the results for the tumbler compost bin and the fixed compost bin.

- 1 .....
- .....
- 2 .....
- .....

(2 marks)

**5 (b) (ii)** Complete the sentences.

The waste is converted into compost by organisms

called .....

The conversion of waste into compost works best in warm, moist

and ..... conditions.

(2 marks)

**5 (b) (iii)** There was a big difference in the final temperatures in the two bins.

Suggest an explanation for this temperature difference.

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.....  
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(2 marks)

9

**Turn over for the next question**

**Turn over ►**

**6** Nicotine is a drug in tobacco smoke. Smoking tobacco is harmful.

**6 (a) (i)** Many smokers find it difficult to stop smoking.

Complete the sentence.

It is difficult to stop smoking because nicotine is very .....  
(1 mark)

**6 (a) (ii)** Nicotine affects synapses in the brain.

What is a synapse?

.....  
.....  
(1 mark)

**6 (b)** A drug company has developed a new drug, Drug **A**, to help people stop smoking.

Doctors tested the drug in a double-blind trial with over 2000 volunteers who were smokers.

The volunteers wanted to stop smoking.

The volunteers were divided into three groups. Each volunteer took a tablet once a day for 12 weeks:

- group 1 took Drug **A**
- group 2 took Drug **B** (a drug already in use to stop people smoking)
- group 3 took a placebo.

The smoking habits of each group were recorded for a year.

**6 (b) (i)** What is a placebo?

.....  
(1 mark)

**6 (b) (ii)** Why is a placebo group used in drug trials?

.....  
.....  
(1 mark)

**6 (b) (iii)** Which people knew what was in each tablet, in this trial?

Tick (✓) **one** box.

Both doctors and volunteers

Doctors but not volunteers

Neither doctors nor volunteers

(1 mark)

**6 (b) (iv)** It is important that the three groups of volunteers should be similar.

Give **two** factors that should be similar in the groups of volunteers.

1 .....

2 .....

(2 marks)

**6 (c)** The table shows the results of the trials.

Tablet	Percentage of volunteers who had stopped smoking	
	After 12 weeks	After 1 year
Drug A	44	23
Drug B	30	15
Placebo	18	10

A doctor looked at the results of the tests.

The doctor suggested that a smoker who wanted to give up smoking should use Drug A.

Why?

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.....

(1 mark)

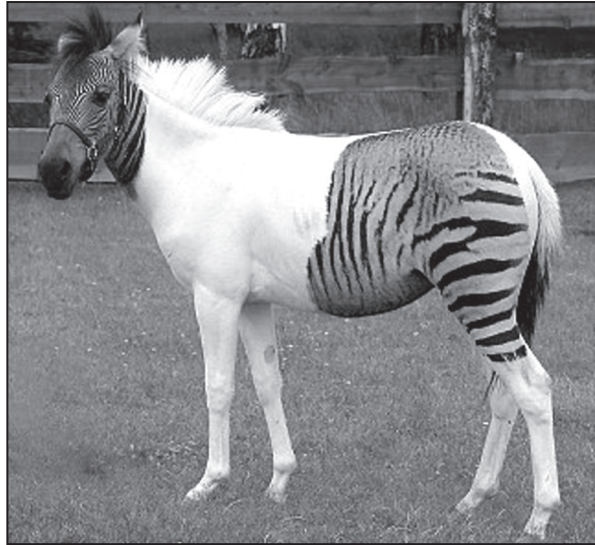
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Turn over ►

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ANSWER IN THE SPACES PROVIDED**

7 The photograph shows a zorse.



A zorse is a cross between a male zebra and a female horse. The zorse has characteristics of both parents.

7 (a) The zorse was produced by *sexual reproduction*.

7 (a) (i) What is *sexual reproduction*?

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.....

(1 mark)

7 (a) (ii) The zorse has characteristics of a zebra and a horse.

Why?

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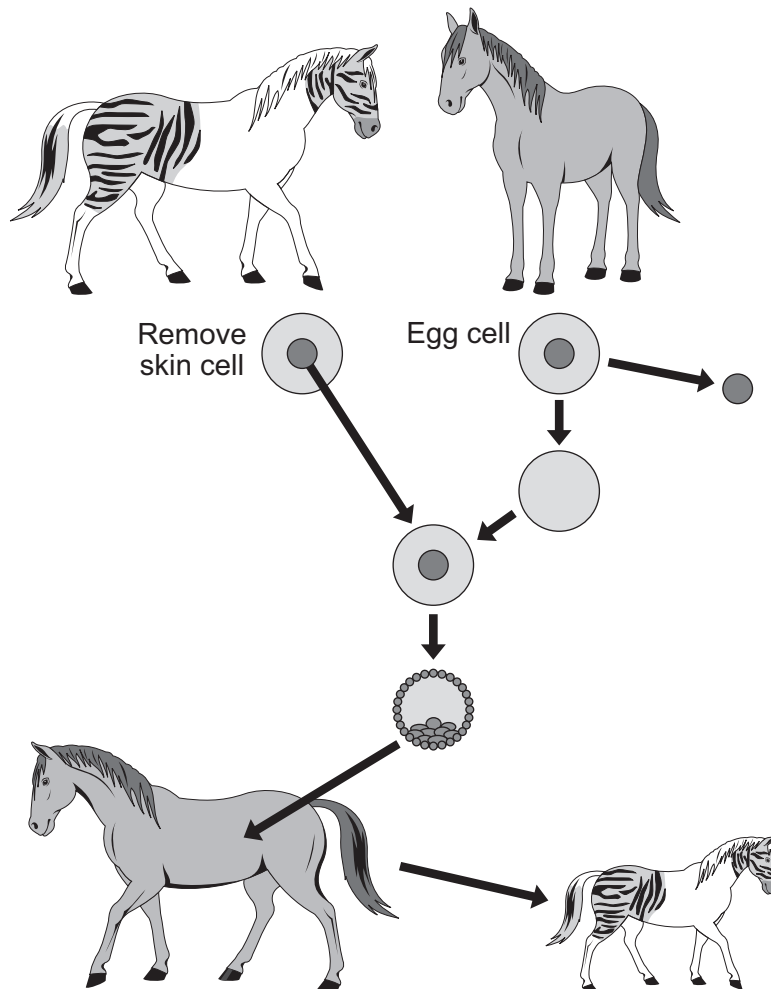
(2 marks)

Question 7 continues on the next page

Turn over ►

- 7 (b) Zorses are **not** able to breed.  
Scientists could produce more zorses from this zorse by adult cell cloning.

The diagram shows how the scientists might clone a zorse.



*In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

Use information from the diagram and your own knowledge to describe how adult cell cloning could be used to clone a zorse.

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(6 marks)

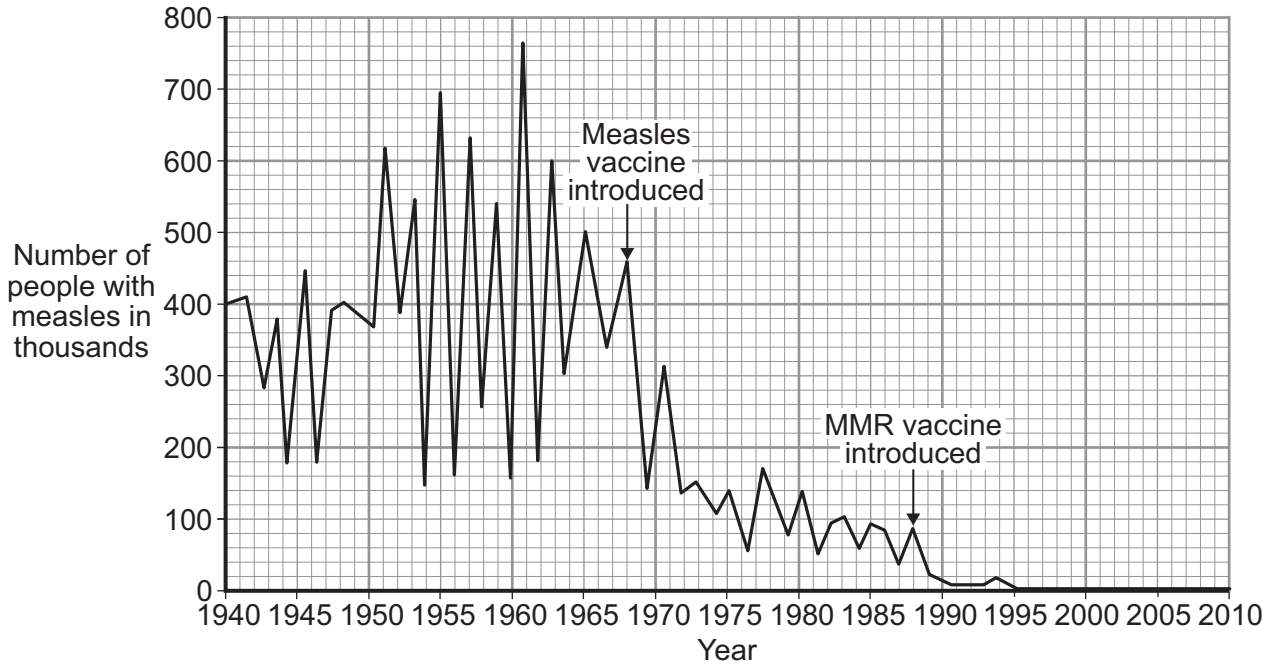
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**Turn over for the next question**

**Turn over ▶**



8 The graph shows the number of people with measles in the UK between 1940 and 2010.



8 (a) Compare how effective introducing the measles vaccine was with introducing the MMR vaccine.

Use data from the graph.

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(3 marks)

**8 (b)** The MMR vaccine was introduced in 1988.

Other than measles, which **two** diseases does the MMR vaccine protect against?

1 ..... 2 .....  
(2 marks)

**8 (c)** To immunise someone against measles, a small quantity of the inactive measles pathogen is injected into the body.

Describe what happens in the body after immunisation to stop a person catching measles in the future.

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(3 marks)

8

**END OF QUESTIONS**

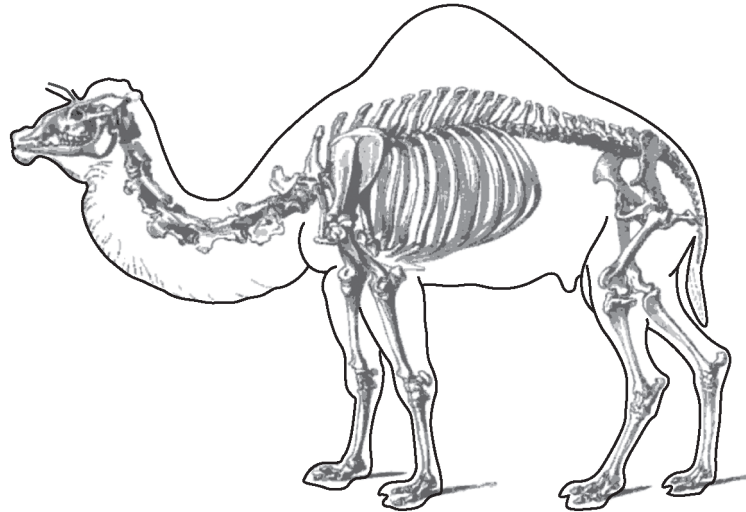
**Answer ALL questions.**

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

**Classification**

- 1 (a) Camels belong to the phylum Chordata.

The drawing shows a dromedary camel that has the binomial name *Camelus dromedaries*.



- (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The second part of the binomial name, *dromedaries*, refers to the

(1)

- A class  
 B genus  
 C order  
 D species

- (ii) State **one** feature that all members of the phylum Chordata have in common.

(1)

.....  
.....

(iii) Members of the phylum Chordata can be further classified by how they regulate their body temperature.

Reptiles are poikilothermic and mammals are homeothermic.  
Explain how reptiles and mammals regulate their body temperature.

(2)

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(b) Scientists classify organisms into five different kingdoms.

Draw **one** straight line from each description to its correct kingdom.

(2)

description	kingdom
unicellular with nucleus present	● Animalia
	● Plantae
	● Fungi
multicellular and photosynthetic	● Protoctista
	● Prokaryotes

(c) Viruses are not classified into any of the five kingdoms.

Suggest reasons for this.

(2)

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**(Total for Question 1 = 8 marks)**

### Reaction times

- 2 (a) The reaction times of some athletes were measured at the Beijing Olympics in the final of the 100 metres sprint.

athlete	reaction time / s	overall race time / s
Bolt: Usain	0.165	9.69
Burns: Marc	0.145	10.01
Dix: Walter	0.133	9.91
Frater: Michael	0.147	9.97
Martina: Churandy	0.169	9.93
Patton: Darvis	0.142	10.03
Powell: Asafa	0.134	9.95
Thompson: Richard	0.133	9.89

- (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The athlete with the slowest reaction time is

(1)

- A** Bolt: Usain
- B** Martina: Churandy
- C** Patton: Darvis
- D** Thompson: Richard

- (ii) Name the athlete who finished the 100 metres sprint in the fastest time.

(1)

(iii) Calculate the difference between the overall race time of the fastest athlete and slowest athlete.

(2)

answer = ..... s

(b) The athlete starts to run when a gun is fired.

(i) State the athlete’s sense organ that detects this stimulus.

(1)

(ii) Describe the nerve pathway a nerve impulse will take from where it is received to where it will cause a response to take place.

(3)

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**(Total for Question 2 = 8 marks)**

### Mistletoe plants

- 3 The photograph shows a mistletoe plant growing on a tree. The mistletoe plant uses nutrients from the tree. This can cause the tree to die.



- (a) (i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The relationship between the mistletoe plant and the tree is an example of (1)

- A mutualism
- B parasitism
- C phototropism
- D symbiosis

- (ii) The mistletoe plant also gains energy from sunlight to produce glucose.

State the name of this process. (1)

- (b) The mistletoe plant produces fruit that contains seeds. The Mistle Thrush is a bird that spreads these mistletoe seeds to other trees.

- (i) Suggest how the Mistle Thrush spreads the mistletoe seeds to other trees. (2)

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(ii) Sparrowhawks are birds that are predators of the Mistle Thrush.

The diagram shows the energy values in the food chain for these organisms.



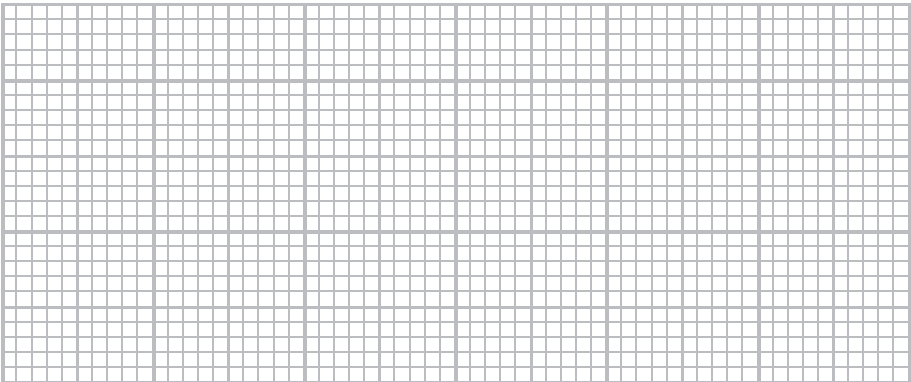
Calculate the percentage of energy that was passed from the mistletoe plant to the Mistle Thrush.

(2)

answer = ..... %

(iii) Draw a pyramid of energy for this food chain.

(2)



(iv) Suggest **two** ways in that energy is lost from this food chain.

(2)

1 .....

.....

2 .....

.....

(Total for Question 3 = 10 marks)

### Homeostasis

- 4 If a person is to survive, the internal environment of their body must be controlled.  
(a) The volume of water in the blood can be controlled.

This is called osmoregulation.

The table shows the volume of urine produced by six different people on a hot day and on a cold day.

person	volume of urine produced / cm <sup>3</sup>	
	hot day	cold day
1	430	890
2	350	1060
3	270	930
4	560	1280
5	400	680
6	390	1160
mean		1000

- (i) Calculate the mean volume of urine produced on the hot day. (1)

answer = ..... cm<sup>3</sup>

- (ii) State the difference between the mean volume of urine produced on the hot day and the mean volume of urine produced on the cold day. (1)

.....

.....

(iii) Explain why, on a hot day, less water is lost from the body as urine.

(2)

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(b) The glucose content of human blood also needs to be controlled.

After a meal, high in carbohydrates, the glucose content of the blood will rise.

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The hormone that lowers the glucose content of the blood is

(1)

- A auxin
- B glycogen
- C insulin
- D pancreas

(ii) Explain how the glucose content of the blood can be decreased by this hormone.

(2)

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(iii) People with Type 1 diabetes cannot produce the hormone needed to control the glucose content of the blood.

Explain how a Type 1 diabetic can control the glucose content of the blood.

(3)

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**(Total for Question 4 = 10 marks)**

### Sickle cell disease

5 (a) The diagram shows a chromosome.



(i) Use words from the box to complete the sentences.

(2)

alleles	DNA
gene	
phenotype	genotypes

Chromosomes have sections which code for specific characteristics.

Each characteristic is coded for by a ..... . These exist in alternative forms called .....

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

In a human body cell, chromosomes are found in the

(1)

- A cell membrane
- B cytoplasm
- C DNA
- D nucleus

(b) Sickle cell disease is a genetic disorder that affects human red blood cells. Individuals with sickle cell disease have the genotype **dd**.

(i) Draw **one** straight line from the genotype to the correct description.

(1)

**genotype**

**description**

**dd**

homozygous  
recessive

homozygous  
dominant

heterozygous

carrier

(ii) Describe the symptoms of sickle cell disease.

(2)

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\*(iii) A father with the genotype **DD** and a mother with the genotype **dd** for sickle cell disease had a number of children.

Explain why none of their children will have sickle cell disease.  
Use a Punnett square or genetic diagram to help your explanation.

(6)

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**(Total for Question 5 = 12 marks)**

**Pollution**

6 (a) As the human population increases, more fossil fuels are burned.  
The burning of coal is one of the main contributors to acid rain.

(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The gas produced when coal burns that can lead to acid rain formation is (1)

- A carbon monoxide
- B methane
- C oxygen
- D sulfur dioxide

(ii) Describe how acid rain is formed. (2)

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(iii) Suggest **one** effect acid rain has on the environment. (1)

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.....

(b) Explain how the quality of a river can be monitored by studying the organisms present in the water. (2)

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\* (c) Eutrophication can cause problems in an aquatic environment such as a lake.

Explain how eutrophication occurs and the problems it can cause in an aquatic environment.

(6)

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**(Total for Question 6 = 12 marks)**

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**TOTAL FOR PAPER = 60 MARKS**

**Answer ALL questions**

**Some questions must be answered with a cross in a box ☒.**  
**If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.**

**Water and mineral uptake by plants**

**1** (a) Complete the sentences by putting a cross (☒) in the box next to your answer.

(i) Plants absorb water from the soil.

The plant cells that absorb water from the soil are called

(1)

**A** root hair cells

**B** palisade cells

**C** stomata cells

**D** xylem cells

(ii) These cells absorb water by a process known as

(1)

**A** active transport

**B** osmosis

**C** photosynthesis

**D** transpiration

(b) Plants also absorb mineral ions from the soil.

Use words from the box to complete the sentences.

(3)

active transport

leaves

xylem

photosynthesis

phloem

roots

Plants absorb mineral ions from the soil through their ..... by a

process called ..... . The mineral ions are then transported up

the stem through ..... vessels.

(c) Magnesium and nitrates are two mineral ions that are absorbed by plants.

The table shows the amount of magnesium ions and nitrate ions in the tips of sunflower and wheat plants.

type of plant	mineral ion content / arbitrary units	
	magnesium ions	nitrate ions
sunflower	0.730	0.147
wheat	0.225	0.226

(i) Compare the mineral ion content in the tips of these two plants.

(2)

.....

.....

.....

.....

(ii) Magnesium is used by plant cells to make chlorophyll.

Describe the function of chlorophyll in plant cells.

(2)

.....

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**(Total for Question 1 = 9 marks)**

**Race horses**

**2** Casper is a horse training for the Grand National.  
Casper’s diet contains an increased amount of carbohydrate.  
Casper runs several miles each day.

(a) (i) Use words from the box to complete the sentences.

(2)

fat   oxygen   protein   carbon dioxide   nitrogen

During training, Casper’s heart rate increases to supply his muscles with  
more .....

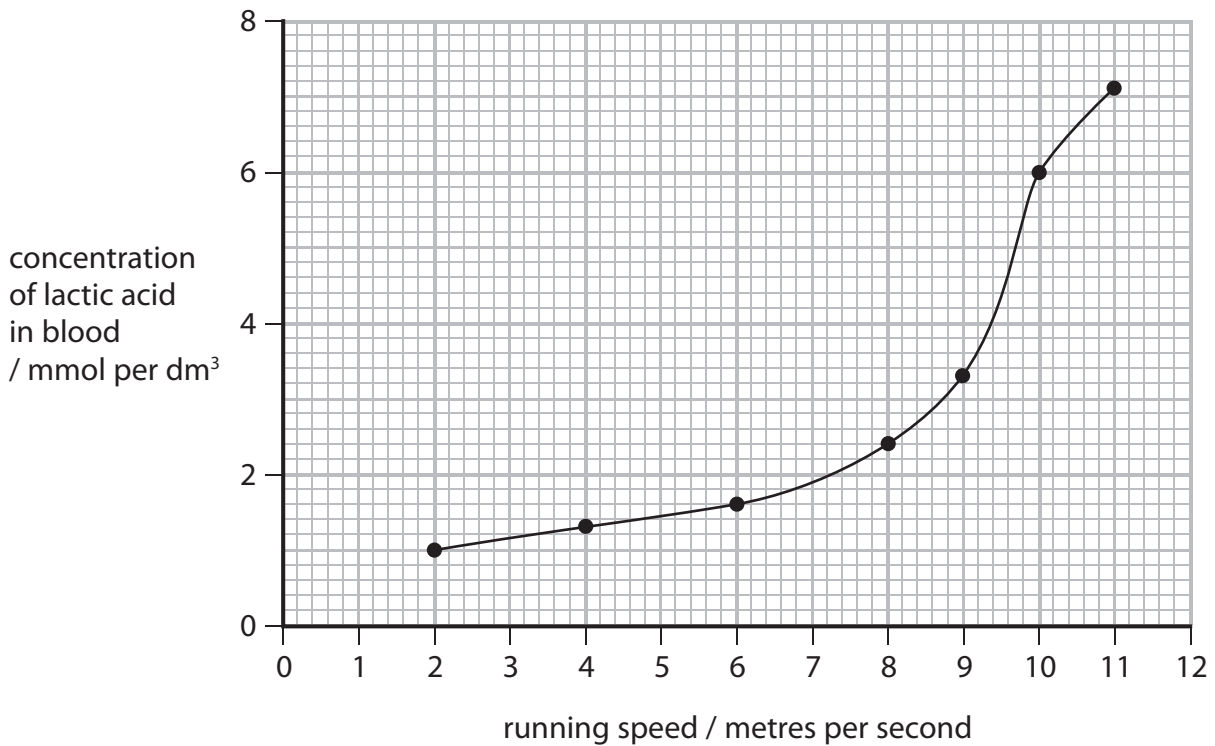
Casper’s breathing rate increases to remove excess .....  
from his blood.

(ii) Explain why Casper needs a diet containing an increased amount of  
carbohydrate.

(3)

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

(b) The graph shows the concentration of lactic acid in Casper's blood as his running speed increases.



(i) Complete the sentence by putting a cross (☒) in the box next to your answer.

The difference in the concentration of lactic acid in Casper's blood between 2 and 10 metres per second is

(1)

- A 1 mmol per dm<sup>3</sup>
- B 2 mmol per dm<sup>3</sup>
- C 5 mmol per dm<sup>3</sup>
- D 8 mmol per dm<sup>3</sup>

(ii) Explain why the concentration of lactic acid in Casper's blood changes as his speed increases.

(2)

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**(Total for Question 2 = 8 marks)**

### Using glucose

3 Leaf cells produce glucose.  
Plants can use glucose to make oils, cellulose and DNA.

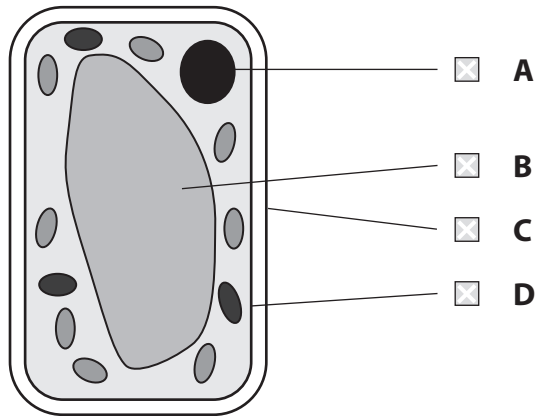
(a) (i) Oils are needed to make cell membranes.

The diagram shows a plant cell.

Which label on the diagram shows the cell membrane?

Put a cross (☒) in the box next to your answer.

(1)



(ii) Cellulose is found in plant cell walls.

Describe the function of cell walls in plant cells.

(2)

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(iii) The nucleus contains chromosomes.  
Chromosomes are made up of DNA.

Describe the structure of DNA.

(2)

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(b) The table shows the concentration of glucose found in plant cells at different times of the day.

time of day	6am	9am	midday	3pm	6pm	midnight
concentration of glucose / mg per g	2	6	18	12	2	2

(i) Calculate the change in the concentration of glucose from 6am to midday. (1)

answer = .....mg per g

(ii) Describe the pattern shown in the concentration of glucose from 6am to midnight. (2)

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(iii) Suggest **two** reasons why the concentration of glucose in the plant cells changes between 3pm and 6pm. (2)

1.....

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2.....

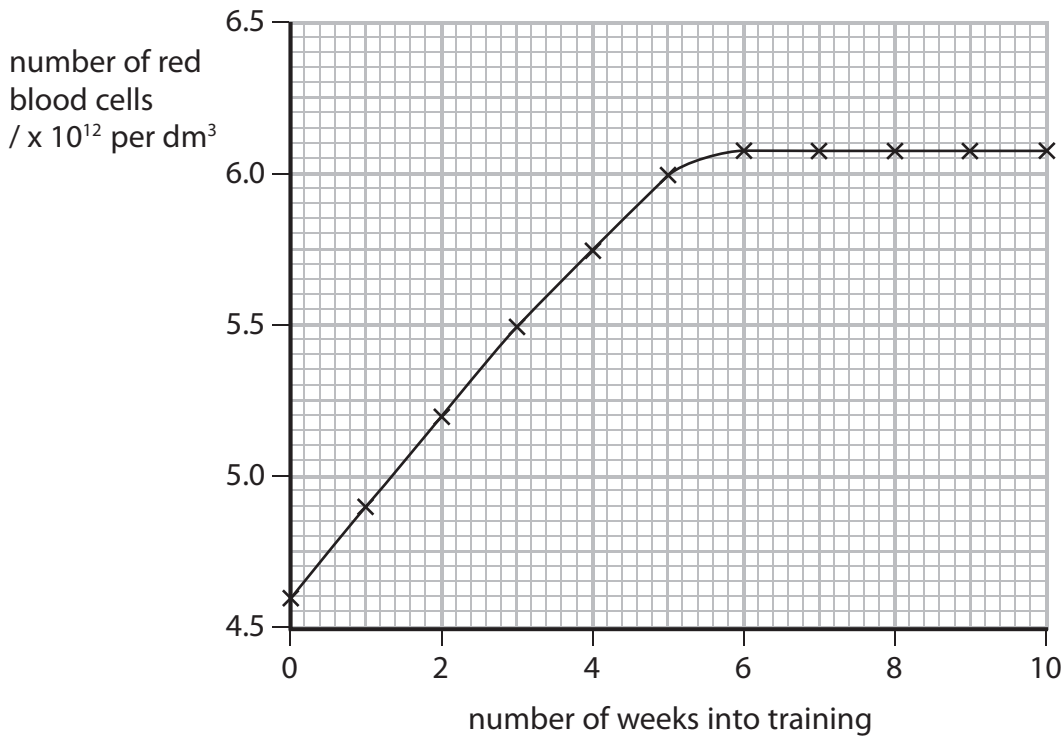
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**(Total for Question 3 = 10 marks)**

### Altitude training

4 Some athletes train at high altitudes (over 2000 m above sea level). There is less oxygen in the air at high altitudes.

(a) The graph shows the number of red blood cells in the blood of an athlete training at high altitudes, over a ten-week period.



(i) Describe the change in the number of red blood cells during this ten-week training period.

(2)

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.....

(ii) Suggest the minimum training period this athlete needs to produce the highest number of red blood cells.

(1)

.....

(iii) State the function of red blood cells.

(1)

.....



(b) When athletes train, the size of their hearts can increase.

Suggest how an increase in the size of the heart is an advantage to an athlete.

(2)

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.....

(c) (i) Draw **two** straight lines from the function to the blood vessels that carry out that function.

(2)

function	blood vessel
<div style="border: 1px solid black; padding: 5px; width: fit-content;">transport blood away from the heart</div>	<div style="border: 1px solid black; padding: 5px; width: fit-content;">● pulmonary artery</div>
	<div style="border: 1px solid black; padding: 5px; width: fit-content;">● pulmonary vein</div>
	<div style="border: 1px solid black; padding: 5px; width: fit-content;">● aorta</div>
	<div style="border: 1px solid black; padding: 5px; width: fit-content;">● vena cava</div>
	<div style="border: 1px solid black; padding: 5px; width: fit-content;">● capillary</div>

(ii) Name the structures in the heart that prevent the backflow of blood.

(1)

.....

**(Total for Question 4 = 9 marks)**

### Enzymes

5 (a) Complete the sentences by putting a cross (☒) in the box next to your answer.

(i) Enzymes are

(1)

- A cells
- B hormones
- C proteins
- D sugars

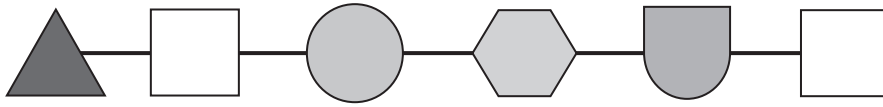
(ii) An enzyme is a biological catalyst that

(1)

- A slows down all chemical reactions
- B speeds up a chemical reaction
- C prevents all chemical reactions taking place
- D has no effect on a chemical reaction

(b) The diagrams show two sequences of six amino acids.

Sequence 1 is found in an enzyme called catalase.



Sequence 2 is found in an enzyme called amylase.



(i) Suggest how the structures of the enzymes, catalase and amylase, are different from each other.

(2)

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(ii) Suggest why the action of these two enzymes will be different.

(2)

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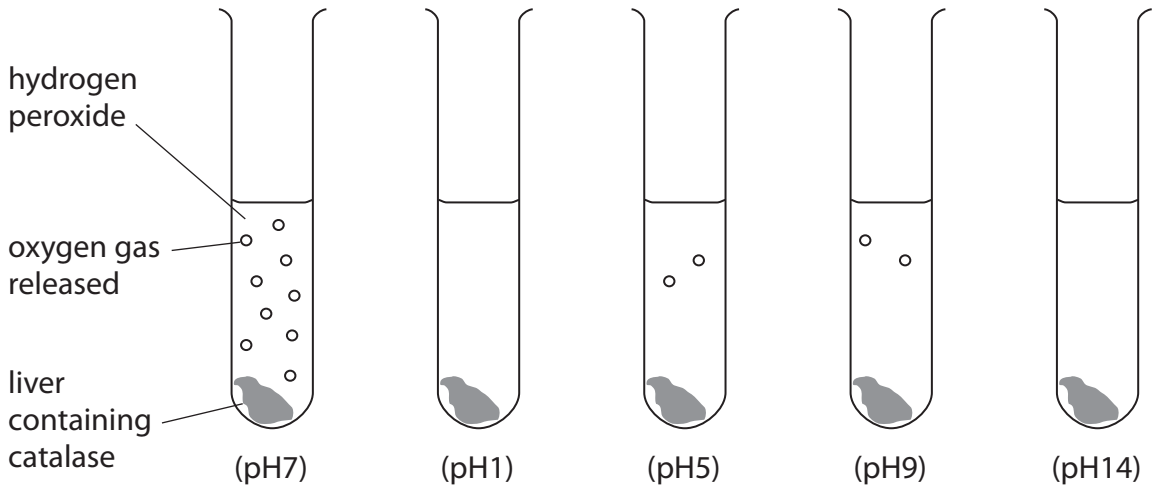
.....

.....

\*(c) A student carried out an investigation to study the effect of pH on the activity of catalase.

In the presence of catalase, hydrogen peroxide breaks down to release oxygen gas.

The student set up five test tubes, as shown in the diagram, and observed the amount of oxygen gas released.



Explain the effect of pH on the enzyme catalase in this investigation.

(6)

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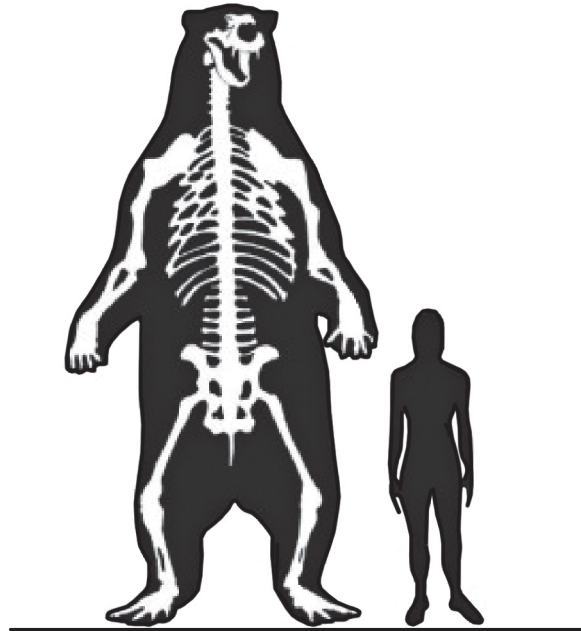
(Total for Question 5 = 12 marks)

### Bears

6 A small number of fossil bones from a very large bear was found in South America in 1935.

The bones were estimated to be about one million years old. Scientists used these bones to predict the shape and size of the bear.

The diagram shows the bear and a person who is 165 cm tall.



(a) (i) Estimate the height of the bear.

(2)

answer = ..... cm

(ii) Which process occurs in animal cells that results in growth?

(1)

(b) Explain why scientists can only make predictions about the size and shape of animals when working from fossil evidence.

(3)

.....

.....

.....

.....

.....

.....

\*(c) Some species of bears eat leaves.

Describe how the structure of a leaf is adapted for photosynthesis.

(6)

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**(Total for Question 6 = 12 marks)**

**TOTAL FOR PAPER = 60 MARKS**

3

Answer **all** the questions.

**Section A – Module B1**

1 Look at the list of things found inside cells.

**amino acid**

**bases**

**chromosomes**

**DNA**

**genes**

**protein**

Finish the following sentences.

Choose the best words from the list.

Inside cells, there are coded instructions called .....

The instructions are made of a chemical called .....

The instructions are carried inside the nucleus on structures called .....

[3]

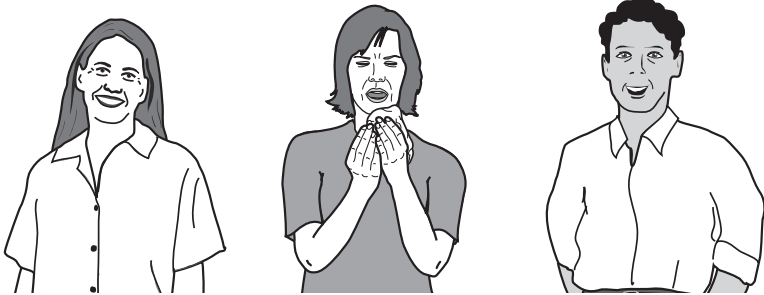
[Total: 3]

[Turn over

2 Ann, John and Lynne are friends.

Ann has a cold.

When Ann sneezes, John and Lynne both breathe in some of the viruses that cause the cold.



Later, John develops a cold but Lynne does not.

(a) Suggest why Lynne does **not** develop the cold even though she does breathe in the viruses.

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

(b) Is a cold an infectious disease or a non-infectious disease? .....

Explain your answer.

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

(c) Look at the list of diseases and disorders.

- athlete's foot
- cholera
- cystic fibrosis
- dysentery
- flu

(i) Write down **one** disease caused by a virus.

Choose from the list.

answer ..... [1]

(ii) Write down **one** inherited disorder.

Choose from the list.

answer..... [1]

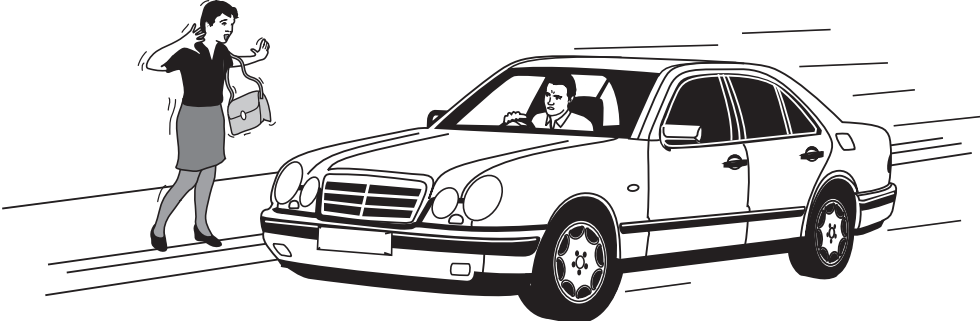
[Total: 4]



3 Natasha is starting to cross the road.

A car is coming towards her.

When Natasha notices the car, she jumps back quickly without thinking.



(a) Natasha sees the car coming with her eyes.

What other sense organ does she use to notice the car?

Put a (ring) around the correct answer.

- ear
- nose
- skin
- tongue

[1]

(b) (i) Natasha’s friend, Vicki, says that jumping back from the car is an example of a reflex.

Is it a reflex? .....

Explain your answer.

.....

..... [1]

(ii) If Natasha had been drinking alcohol, how would her response to the car have been different?

..... [1]

(c) Some people can only see with one eye.

Describe how this affects vision.

.....

..... [1]

[Total: 4]

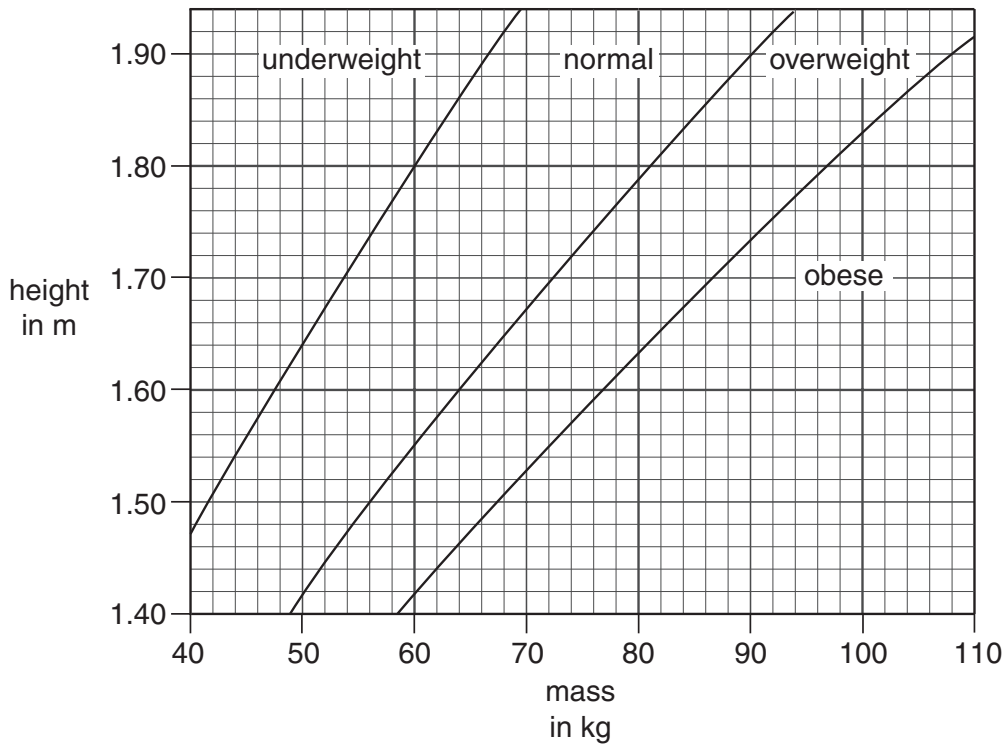
[Turn over

4 Chris and Sam want to see if they have suitable balanced diets.

They measure their mass and height.

	mass in kg	height in m
Chris	90	1.85
Sam	50	1.75

(a) (i) Use the information in the table and the BMI chart to work out whether **Chris** is underweight, normal, overweight or obese.



Put a **ring** around the correct answer.

**underweight**                      **normal**                      **overweight**                      **obese**

[1]

(ii) Sam works out that he is slightly underweight.

How much should he increase his mass by to reach a normal mass?

Use the information in the table and the BMI chart to work out your answer.

answer ..... kg

[1]

(b) Sam's doctor tells him to eat the recommended daily average intake of protein.

Work out Sam's recommended daily average intake (RDA).

Use information in the table and the formula:

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

answer ..... [1]

(c) A balanced diet also includes carbohydrates.

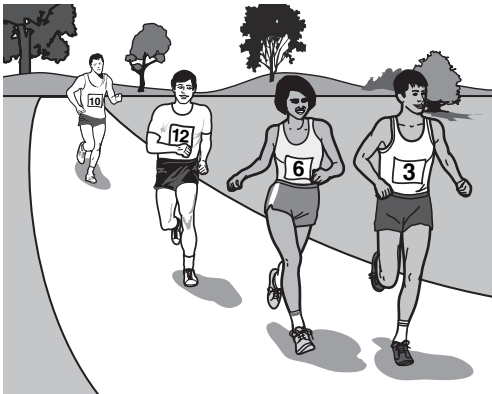
Why do we need carbohydrates?

..... [1]

[Total: 4]

[Turn over

5 Ayshea is running in a long-distance race.



(a) During the race, Ayshea’s breathing rate and heart rate increase.

Write about why her breathing rate and heart rate increase during the race.

.....

.....

.....

..... [3]

(b) During the race, Ayshea’s muscles produce a lot of heat.

One way she loses this extra heat is by sweating more.

(i) Explain how sweating causes Ayshea to lose heat.

..... [1]

(ii) Losing extra heat keeps Ayshea’s body temperature the same.

What word describes keeping body temperature the same?

Put a (ring) around the best answer.

- dehydration      homeostasis      hypothermia      insulation      respiration

[1]

[Total: 5]

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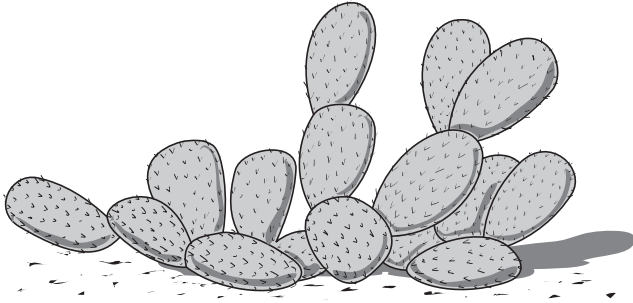
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**[Turn over**

Section B – Module B2

6 Read the following article that appeared in a recent newspaper.

**Money to grow Cacti!**



Las Vegas is a city in the middle of the desert in America.  
Water is in very short supply.  
The local council have decided to take action.  
They are paying local people one dollar per square metre to replace their grass lawns with a plant called the cow's tongue cactus.  
They think that this will help to solve the water shortage.

(a) Cacti are plants.

Write down **one** characteristic of cacti that places them in the plant kingdom.

..... [1]

(b) The scientific name for the cow's tongue cactus is *Opuntia engelmannii*.

Put a tick (✓) in the box next to the system used to produce this name.

- bimodal
- binomial
- classification
- conservation

[1]

(c) The council think that the cacti will need less water than grass plants.

Finish the following sentences by writing words in the gaps.

Choose your words from this list.

**adapted**

**insulated**

**photosynthesis**

**reproduction**

**respiration**

**resistant**

Plants such as cacti and grass use water for .....

Cacti need less water than grass because they are .....

to living in hot, dry areas.

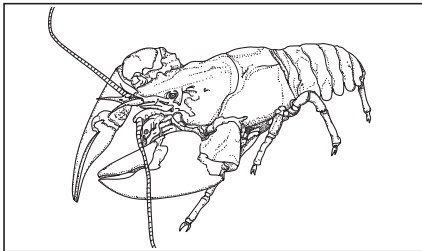
[2]

[Total: 4]

[Turn over

7 Read the passage about the British crayfish.

### British Crayfish in Danger



Crayfish are small animals that live on the bottom of rivers.

Scientists have discovered that British crayfish are becoming endangered due to a larger, faster breeding American crayfish.

These crayfish were brought over from America for food but escaped into rivers.

This is disturbing the **community** living in the rivers.

There is a plan to move a **population** of British crayfish to a **habitat** where there are no American crayfish.

- (a) (i) The two species of crayfish are competing with each other.  
Write down **one** resource that they might be competing for.  
..... [1]
- (ii) The following sentences are meanings for some of the words in **bold** in the passage.  
Write the correct word next to the meaning.  
An area where the crayfish live. ....  
All the living organisms found in one area of a river. ....[2]
- (b) Crayfish may feed on snails.
  - (i) Write down **one** feature that you can see on the crayfish that makes them adapted to eating snails.  
..... [1]
  - (ii) What name is given to an animal that hunts other animals for food?  
Put a **(ring)** around your answer in this list.  
**competitor**                      **parasite**                      **predator**                      **prey**  
..... [1]



(c) The passage says that British crayfish are becoming endangered.

(i) What does the word **endangered** mean?

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

(ii) Put a **ring** around **one other** British animal in this list that is also endangered.

**fox**

**osprey**

**pigeon**

**rat**

[1]

[Total: 7]

[Turn over

8 (a) Burning fossil fuels such as oil produces a number of substances that can cause pollution. One of these substances is carbon dioxide.

(i) Put a ring around **one other** pollutant that is produced by burning fossil fuels.

- CFCs**
- nitrogen**
- sewage**
- sulfur dioxide**

[1]

(ii) The amount of fossil fuels that is being burned is increasing.

Write down **one** reason why.

..... [1]

(b) Many scientists think that increasing levels of carbon dioxide may alter the temperature of the Earth.

Finish the following sentences to show how they think this might happen.

Radiation from the sun passes through the ..... surrounding the Earth.

The Earth's surface is warmed and some of the radiation is re-radiated.

The carbon dioxide in the air ..... some of this radiation.

The Earth therefore warms up.

This process is called ..... [3]

[Total: 5]

9 Byron wants to investigate two ecosystems near his house.

One is a natural pond.

The other is a pond that had been dug in a field that contained cows.

(a) Why is the pond in the cows' field called an **artificial** ecosystem?

..... [1]

(b) Byron samples the small animals living in the natural pond.

Put a tick (✓) next to the apparatus that he would use to sample the pond.

- a net
- a pit-fall trap
- a pooter

[1]

(c) These are the animals that he catches in this pond.



He sampled about 0.5 m<sup>3</sup> of the water in the pond.

The pond contains 200 m<sup>3</sup> of water in total.

Estimate the number of flatworms (  ) living in the pond.

total number of flatworms = .....

[2]

[Total: 4]

[Turn over

Section C – Module B3

10 Scott is learning about cells.

He uses a microscope to look at some of his cheek cells.

The picture shows what he can see.

(a) Label the diagram.

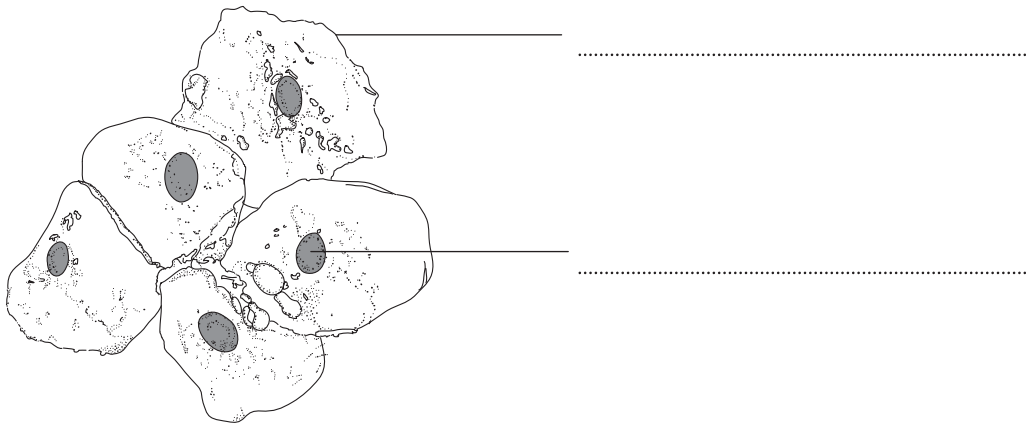
Choose the best words from this list.

cell membrane

cell wall

cytoplasm

nucleus



[2]

(b) Scott finds out about different cells in the body and the jobs they do.

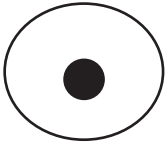
Finish the table by writing the job of each cell.

The first one has been done for you.

cell	job it does
egg cell	develops into an embryo when fertilised
sperm cell	
white blood cell	
red blood cell	

[3]

(c) Look at the picture of a fertilised egg cell.



If this egg implants into the uterus it will grow into a foetus.

Describe the **two** processes involved in growth.

1 .....

2 ..... [2]

[Total: 7]

[Turn over

11 Look at the picture.

It shows a strawberry plant reproducing.



(a) Finish the sentences about the strawberry plant.

Choose the **best** words from this list.

- asexual                  different                  identical                  sexual                  similar**

The strawberry plant sends out runners.

This is a type of reproduction called ..... reproduction.

The runners have plantlets on them.

The plantlets are genetically ..... to the parent plant. [2]

(b) Gardeners can make more plants by taking cuttings.

Here are four sentences (A-D) about taking cuttings.

- A** Put the cutting into a pot of sandy compost.
- B** Cut a short stem off the parent plant.
- C** Put a clear plastic bag over the plant.
- D** Dip the stem into plant hormone.

They are in the wrong order.

Fill in the boxes to show the correct order.

The first one has been done for you.

B			
---	--	--	--

[2]

(c) The plant stem needs to be dipped into plant hormone.

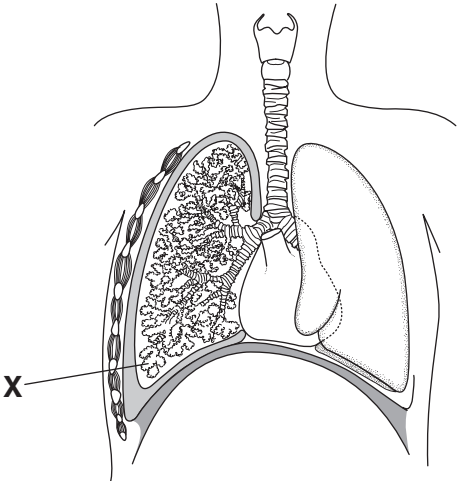
Explain why.

.....

..... [1]

[Total: 5]

12 Look at the diagram. It shows the lungs and heart.



(a) Write down the name of part X.

..... [1]

(b) A gas leaves the lungs and enters the blood.

(i) Write down the name of this gas.

..... [1]

(ii) Describe how this gas enters the blood.

Include ideas about concentration in your answer.

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

[Total: 4]

[Turn over

13 Read the article about bacterial mutations.

**Bacterial mutations**

There are many types of bacteria.

New strains occur because bacteria keep mutating.

Some of these new strains have an advantage when it comes to fighting off antibiotics.

MRSA is a bacterium which is resistant to antibiotics.

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

..... [1]

(b) Mutations can occur spontaneously or are caused by some factors.

Write down **two** factors that can cause mutations to occur.

1 .....

2 ..... [2]

(c) Bacteria reproduce in the body and make us ill.

They reproduce by dividing into two.

This can take about 30 minutes.

If you start with 10 bacteria there would be 40 bacteria after 1 hour.

How many would there be after 3 hours?

number of bacteria ..... [1]

[Total: 4]

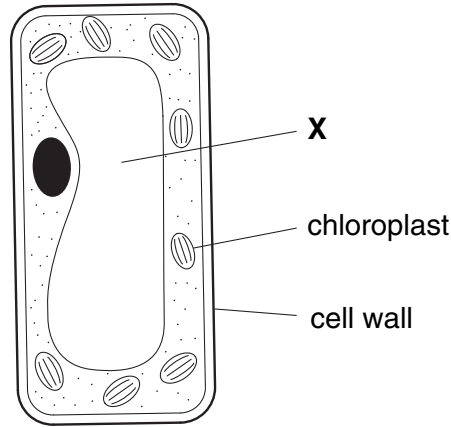
**END OF QUESTION PAPER**



Answer **all** the questions.

**Section A – Module B4**

1 Look at the diagram of a plant cell.



(a) What is part **X**?

Put a **ring** around the correct answer.

**cell membrane**

**cytoplasm**

**nucleus**

**vacuole**

[1]

(b) Chloroplasts are needed for plants to grow.

Explain why, as fully as you can.

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

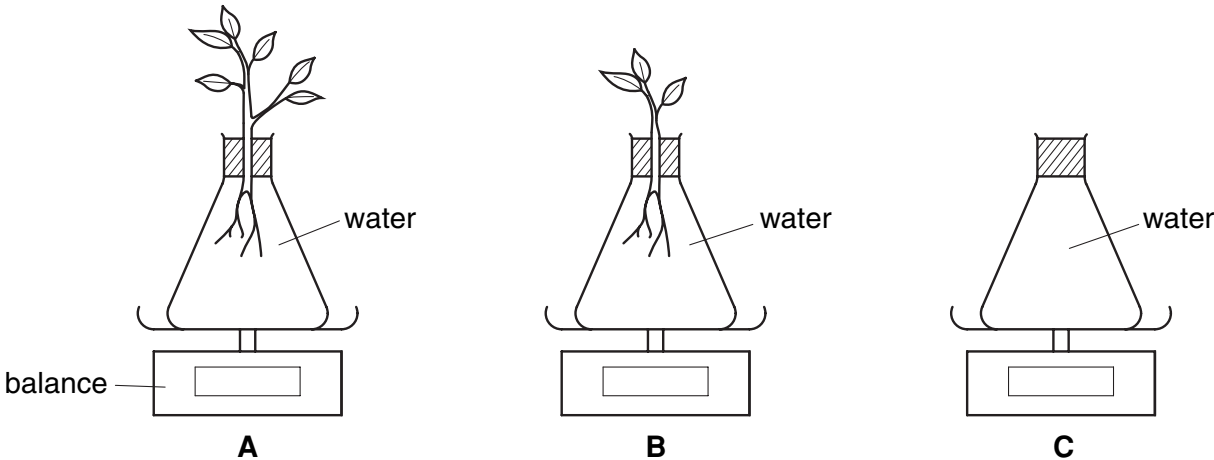
(c) What is the job of the cell wall?

.....[1]

[Total: 4]

2 Kate is investigating water loss in plants.

She sets up three flasks, **A**, **B** and **C**.



(a) All the flasks weigh the same at the start.

Kate leaves the flasks for 24 hours.

Which flask would you expect to lose most weight after 24 hours? .....

Explain your answer.

.....

.....

.....[3]

(b) Kate leaves the plants in the flasks to grow.

She keeps the water filled up and makes sure the plants have enough light.

However, the plants don't grow very well and the leaves become yellow.

Kate's teacher says that this is because the plants are **not** getting something from the water.

Suggest what Kate could add to the water to stop the leaves becoming yellow.

.....[1]

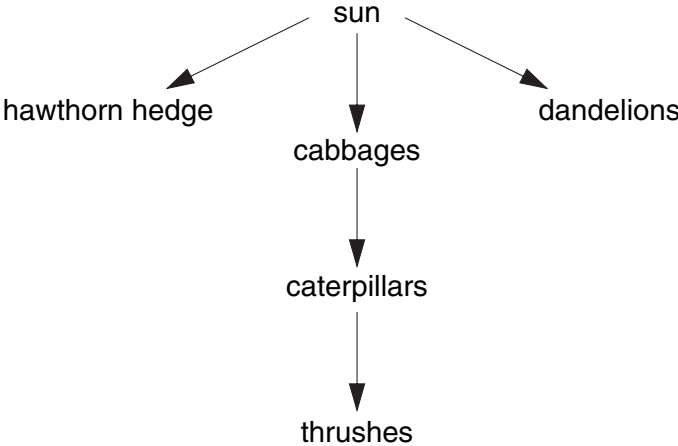
[Total: 4]

[Turn over

3 Chris is a farmer.

He grows cabbages in one of his fields.

Look at part of the food web in his cabbage field.



(a) Chris puts **pesticide** on his cabbage field.

(i) What is Chris trying to kill with the pesticide?

Choose your answer from the food web.

.....[1]

(ii) How does using the pesticide improve the cabbage crop?

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

(b) Chris puts **herbicide** on his cabbage field.

(i) What is Chris trying to kill with the herbicide?

Choose your answer from the food web.

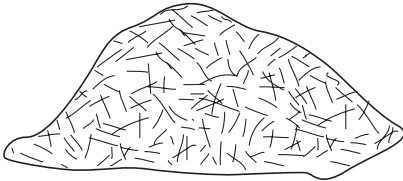
.....[1]

(ii) How does using the herbicide improve the cabbage crop?

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

[Total: 4]

4 When Eileen cuts her grass, she puts the cuttings in a heap at the end of her garden.



The grass cuttings decay to form compost.

Eileen adds the compost to the soil in her garden.

(a) Decay is caused by **decomposers**.

Write down **one** example of a decomposer.

.....[1]

(b) Decay happens faster in the spring than in the winter.

Suggest why.

.....[1]

(c) The decomposers release carbon dioxide. This is part of the carbon cycle.

Put **rings** around **two** processes that release carbon dioxide.

**combustion**

**diffusion**

**photosynthesis**

**respiration**

**translocation**

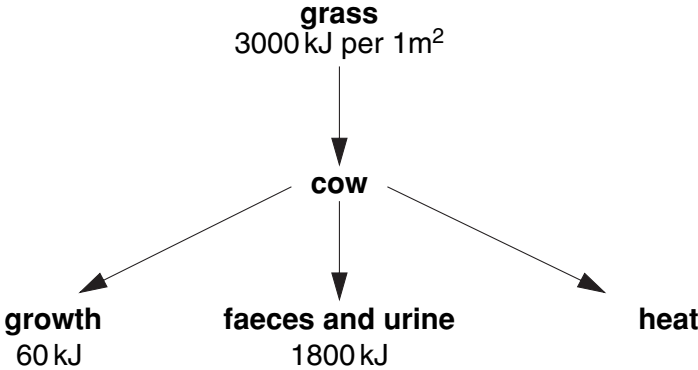
**transpiration**

[2]

[Total: 4]

[Turn over

5 Look at the energy flow through a cow.



(a) (i) For every 1 m<sup>2</sup> of grass that a cow eats, how much energy is transferred as heat?

answer ..... kJ [1]

(ii) What process in the cow's cells releases heat?

.....[1]

(b) What percentage of the energy in 1 m<sup>2</sup> of grass is used for the cow's **growth**?

answer ..... % [1]

(c) If humans use the milk and meat from a cow, what is the maximum amount of energy they can get for every 1 m<sup>2</sup> of grass?

Put a (ring) around the best answer.

- 30 kJ**
- 300 kJ**
- 1200 kJ**
- 1860 kJ**
- 3000 kJ**

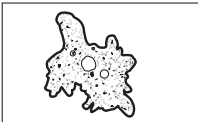
[1]

[Total: 4]

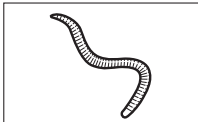
Section B – Module B5

6 This question is about the skeleton and blood system of different animals.

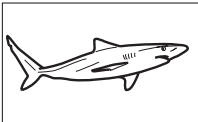
Look at these examples.



amoeba



worm



shark



human

Choose your answers from these examples.

(a) Which animal does **not** have a blood system?

.....[1]

(b) Which animal has gills for the exchange of gases?

.....[1]

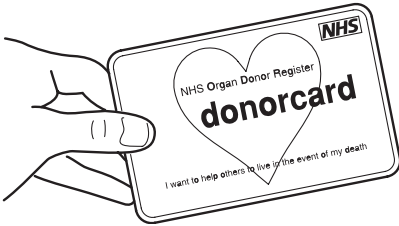
(c) Which **two** animals have an internal skeleton?

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

[Total: 3]

[Turn over

7 Some people carry a donor card.



(a) (i) Why do people carry donor cards?

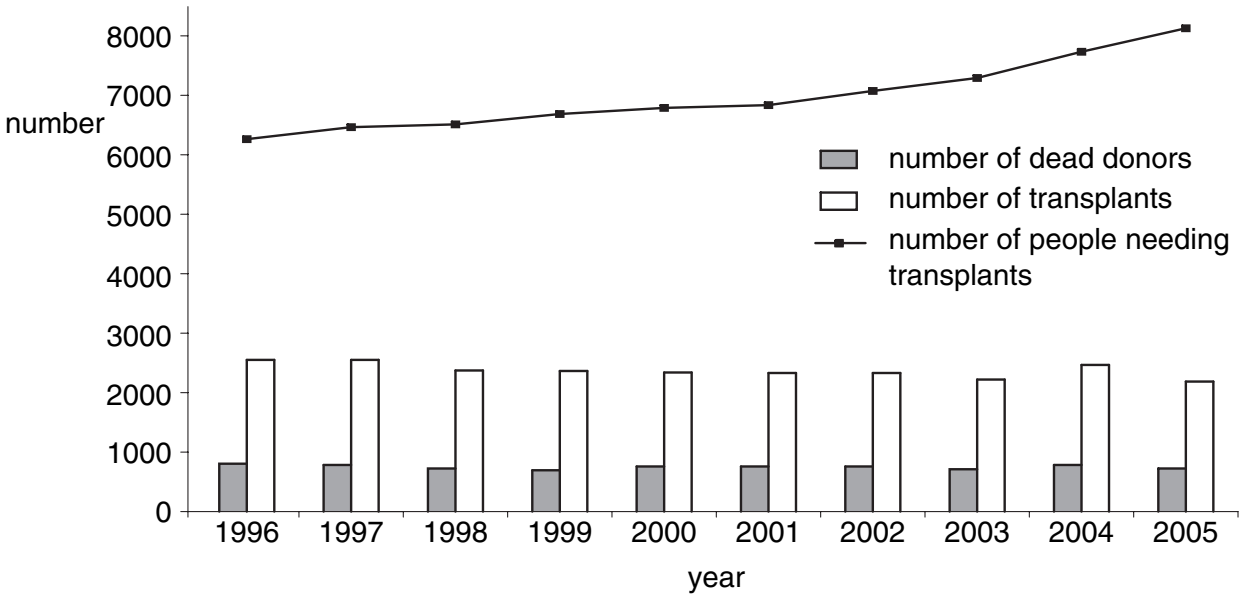
.....[1]

(ii) Write down **two** body parts that can be biologically replaced.

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

(b) The graph shows the number of dead donors and the number of transplants carried out from 1996 to 2005.

It also shows the number of people needing transplants.



(i) The Government is keen to encourage more people to be donors.

Use the information in the graph to explain why.

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

(ii) The number of transplants carried out each year is greater than the number of dead donors.

How can this be possible?

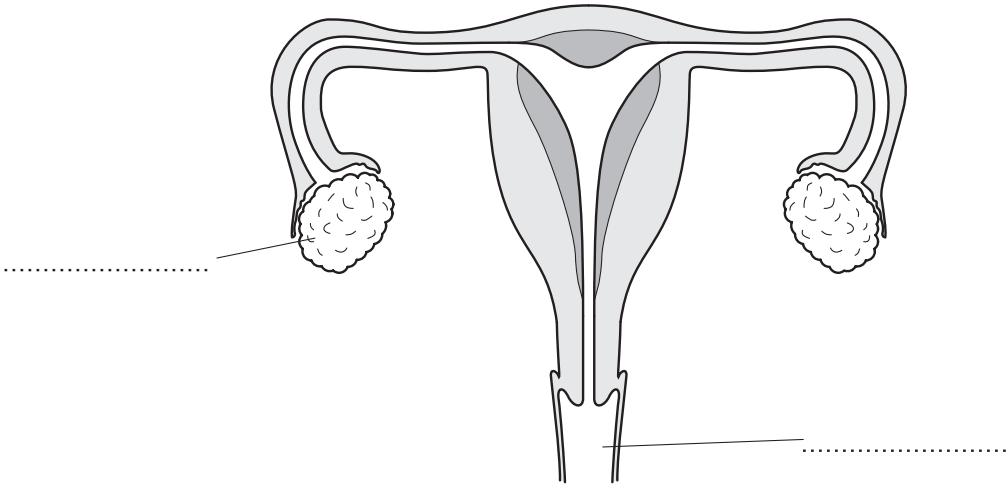
.....  
.....[1]

[Total: 5]

[Turn over



8 (a) The diagram shows the female reproductive system.



(i) Finish the diagram by adding the correct labels.

Choose your words from this list.

ovary

oviduct

uterus

vagina

[2]

(ii) Where are eggs produced?

Choose your answer from the list.

.....[1]

(b) Many couples may need treatment for infertility.

The boxes show some **causes** of infertility and some possible **treatments**.

Draw straight lines to link each cause with the most suitable treatment.

cause	treatment
blocked oviducts	surrogacy
ovulation is irregular	use of FSH
uterus cannot support a baby	in vitro fertilisation (IVF)

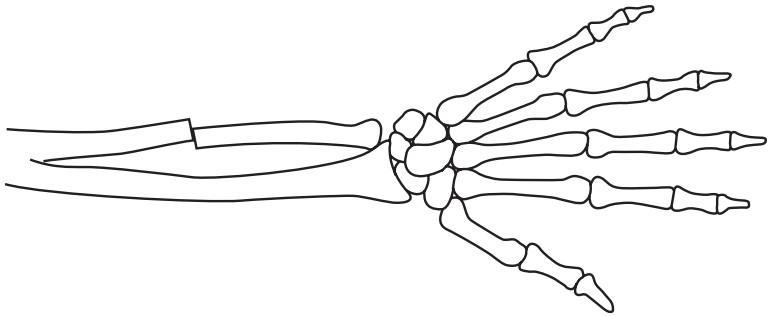
[2]

[Total: 5]

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**[Turn over**

9 Rupert has injured himself playing football. He goes to the hospital and has an X-ray taken of his arm.



(a) There is no sign of any damage on the outside of his body but Rupert is in a lot of pain. The doctor tells Rupert that his radius bone is fine but he has broken another bone in his arm.

(i) What is the name of this other bone?

.....[1]

(ii) What is the name given to this type of fracture?

Put a ring around the correct answer in this list.

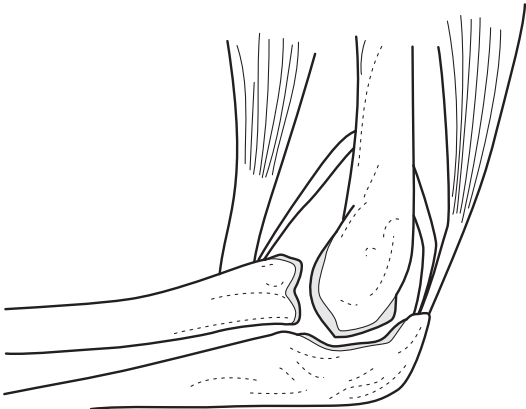
**compound**

**greenstick**

**simple**

[1]

(b) The diagram shows one of Rupert's elbow joints. It was not damaged in the accident.



(i) What type of joint is the elbow joint?

.....[1]

(ii) The diagram shows two muscles.

How are these muscles attached to the bones?

Put a ring around the correct answer in this list.

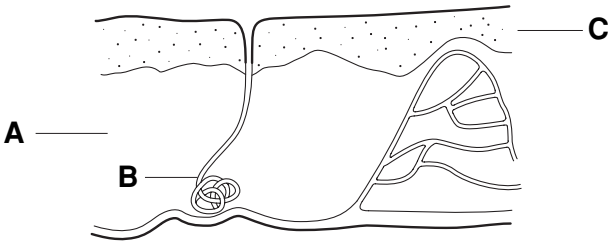
- cartilage
- ligaments
- tendons

[1]

[Total: 4]

[Turn over

10 The diagram shows the basic parts of the skin.



(a) The table shows three possible sets of labels for the diagram.

Put a tick (✓) in the box next to the row which has the correct labels.

A	B	C	
epidermis	sweat gland	dermis	<input type="checkbox"/>
dermis	sweat gland	epidermis	<input type="checkbox"/>
epidermis	hair follicle	dermis	<input type="checkbox"/>

[1]

(b) Write about how the sweat glands help to control the temperature of the body.

.....

.....

.....[2]

[Total: 3]

Section C – Module B6

11 (a) Look at the diagram.

It shows a bacterial cell.

Label the diagram.

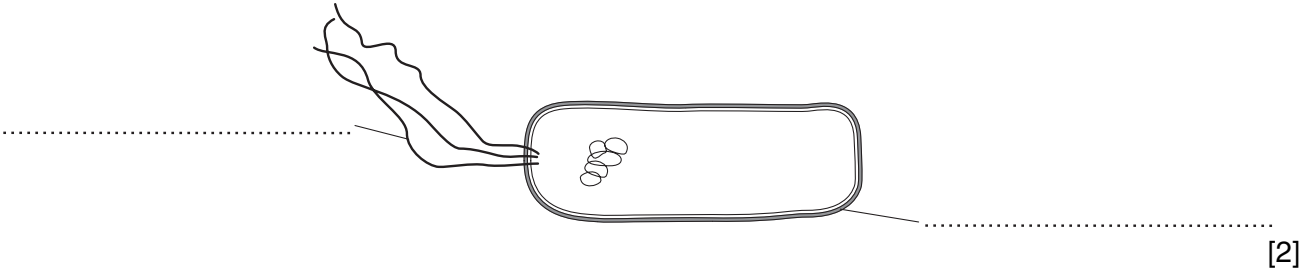
Choose words from the list.

cell membrane

cell wall

flagellum

nucleus



(b) Some bacteria are used to make cheese.




Write down **one other** use of bacteria.

..... [1]

(c) Bacteria can be classified by their shape.

Finish the table by writing in the shape of each type of bacterium.

The first one has been done for you.

type of bacterium	shape
	<i>rod</i>
	
	

[2]

[Total: 5]

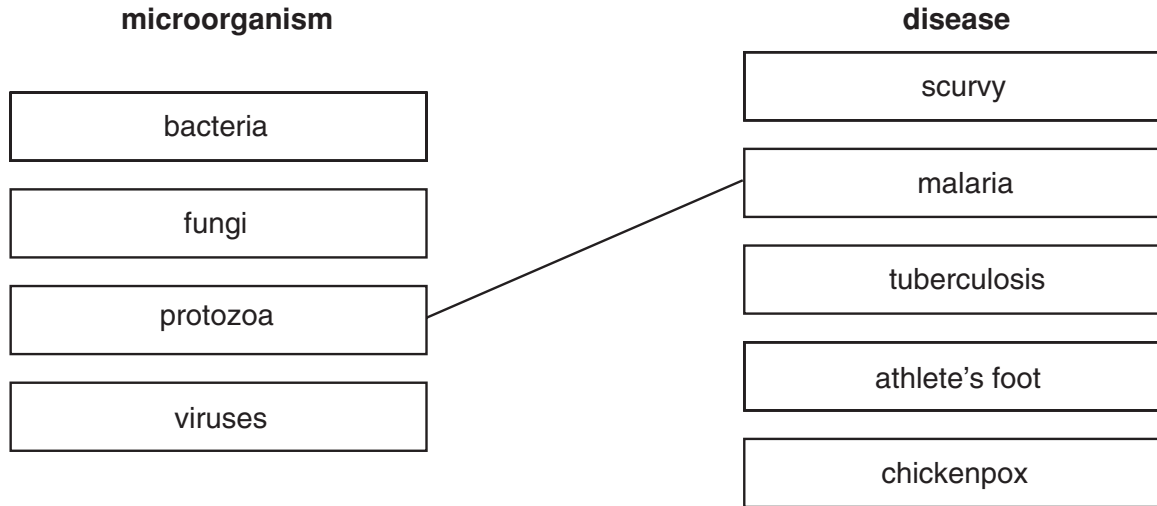
[Turn over

12 Microorganisms can cause disease.

(a) The boxes contain the names of some microorganisms and some diseases.

Draw a straight line from each **microorganism** to the **disease** it causes.

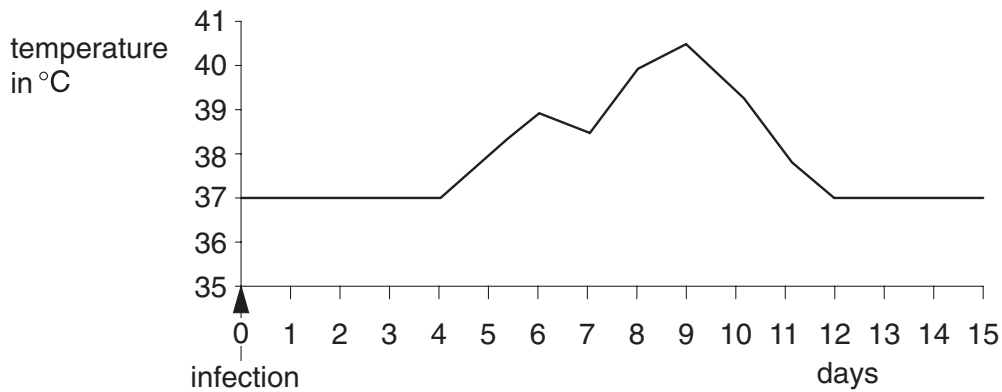
One has been done for you.



[3]

(b) Look at the graph.

It shows the temperature of someone suffering from a bacterial disease.



(i) How many days did the fever last?

..... days [1]

(ii) Why do large numbers of bacteria cause the increase in temperature?

..... [1]

17

(c) A type of drug can be taken to treat bacterial infections.

What is the name of this type of drug?

Put a ring around the correct answer in this list.

**antibodies**

**antibiotics**

**antiseptics**

**disinfectants**

[1]

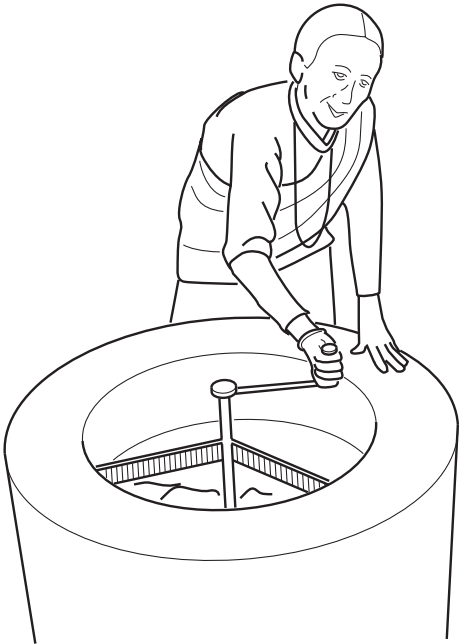
[Total: 6]

[Turn over



13 Look at the picture.

It shows Mitha with her biogas digester.



(a) The digester contains rotting organic material.

The rotting material makes a mixture of gases called biogas.

The **main** gas in the mixture can be burned to release energy.

Write down the name of this gas.

.....[1]

(b) Mitha uses the biogas to heat her home.

Write down **one other** use of biogas.

.....[1]

(c) The waste material from the digester is added to the soil to help Mitha's crops grow.

Write down **two** things the plants need from soil and waste.

1.....

2.....[2]

[Total: 4]

14 Robert has diabetes. He needs to test his urine for the presence of glucose.

(a) Describe **one** way Robert can test his urine.

how he tests his urine .....

.....

the result he gets if glucose is in the urine .....

.....[2]

(b) Robert has to inject insulin into his body to control his blood sugar level.

The insulin is made by bacteria.

The bacteria have had their DNA changed by scientists.

Name the process the scientists use to change the DNA of the bacteria.

.....[1]

(c) Diet is important to Robert.

He eats food with a low sugar content.

The food industry uses the enzyme sucrase to produce food that Robert can eat.

Explain how sucrase produces a sweet food with a low sugar content.

In your answer include

- what sucrase does
- why the food is still sweet even though it has a low sugar content.

.....

.....

.....

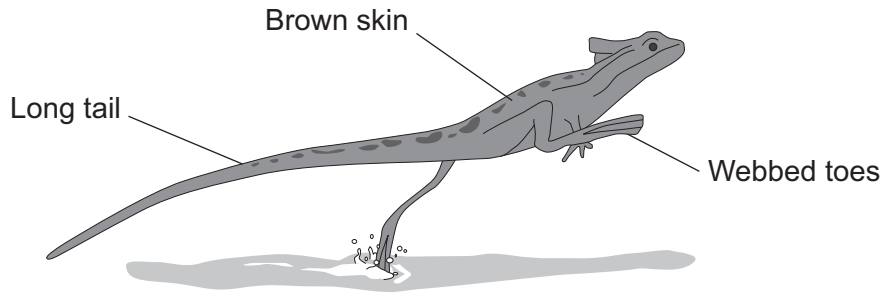
.....[2]

[Total: 5]

END OF QUESTION PAPER

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

1 The picture shows a basilisk lizard. Some of the adaptations of the lizard are labelled.



Basilisk lizards are often found resting on branches of trees that grow next to water. Basilisk lizards can run across the surface of the water.

1 (a) Draw **one** line from each adaptation of the lizard to the advantage of the adaptation.

**Adaptation**

**Advantage**

Toes on the back feet are webbed

For camouflage on branches of trees

Long tail

Helps the lizard to balance when running

Brown skin

Warning colours to deter predators

Increases surface area in contact with the water

(3 marks)

- 1 (b)** Suggest **one** advantage to the basilisk lizard of being able to run across the surface of the water.

.....  
.....

(1 mark)

- 1 (c)** Animals, such as lizards, compete with each other.

Give **two** factors that animals compete for.

Tick (✓) **two** boxes.

Oxygen

Food

Territory

Light

(2 marks)

6

Turn over for the next question

Turn over ►

2 The body controls internal conditions.

2 (a) Use words from the box to complete the sentences about water loss from the body.

<b>kidneys</b>	<b>liver</b>	<b>lungs</b>	<b>skin</b>
----------------	--------------	--------------	-------------

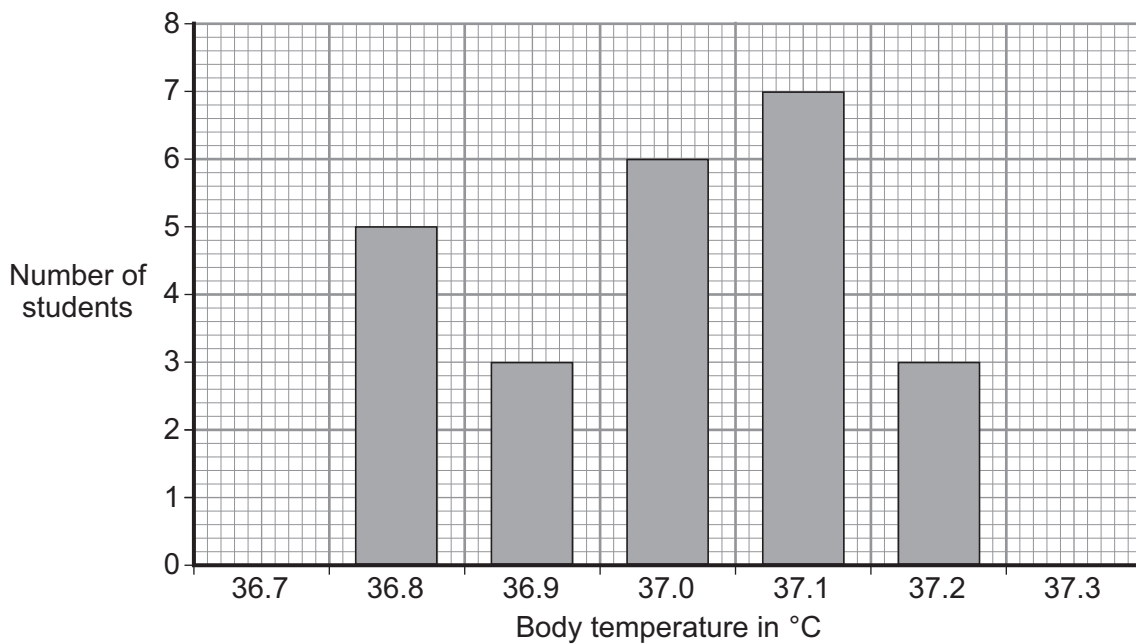
2 (a) (i) Water is lost in sweat via the ..... (1 mark)

2 (a) (ii) Water is lost in urine via the ..... (1 mark)

2 (a) (iii) Water is lost in the breath via the ..... (1 mark)

2 (b) Students investigated body temperature in the class.

The bar chart shows the results.



**2 (b) (i)** One student used the bar chart to calculate the mean body temperature of the class. The student calculated the mean body temperature as 37.0 °C.

How did the student use the bar chart to calculate the mean?

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

(2 marks)

**2 (b) (ii)** How many students had a body temperature higher than the mean of 37.0 °C?

.....

(1 mark)

**2 (b) (iii)** Body temperature must be kept within a narrow range.

Why?

.....  
.....

(1 mark)

7

**Turn over for the next question**

**Turn over ►**

**3** Viruses and bacteria cause diseases in humans.

**3 (a)** Draw a ring around the correct word to complete the sentence.

Organisms that cause disease are called

- |            |
|------------|
| algae.     |
| pathogens. |
| vaccines.  |

(1 mark)

**3 (b)** In August 2011 the United Nations gave a warning that there was a new strain of the bird flu virus in China.

Bird flu may kill humans. The new strain of the bird flu virus could cause a *pandemic* very quickly.

**3 (b) (i)** What is a *pandemic*?

Tick (✓) **one** box.

A disease affecting the people all over one country.

A disease affecting hundreds of people.

A disease affecting people in many countries.

(1 mark)

**3 (b) (ii)** The swine flu virus is carried by pigs.

The bird flu virus is likely to spread much more quickly than the swine flu virus.

Suggest **one** reason why.

.....

.....

(1 mark)

3 (c) This notice is from a doctor's surgery.

**Unfortunately,  
antibiotics  
will NOT get  
rid of your flu.**

3 (c) (i) Why will antibiotics **not** get rid of flu?

.....  
.....

(1 mark)

3 (c) (ii) The symptoms of flu include a sore throat and aching muscles.

What would a doctor give to a patient to relieve the symptoms of flu?

.....

(1 mark)

3 (c) (iii) It is important that antibiotics are **not** overused.

Explain why.

Use words from the box to complete the sentence.

**antibody      bacteria      immune      resistant      viruses**

Overuse of antibiotics might speed up the development

of ..... strains of .....

(2 marks)

**7**

Turn over ►



4 Students tested eight different foods, **A – H**, for carbohydrate, fat and protein.

The table shows the students' results.

Food	Carbohydrate	Fat	Protein
<b>A</b>	×	✓	✓
<b>B</b>	×	✓	✓
<b>C</b>	✓	✓	✓
<b>D</b>	✓	×	✓
<b>E</b>	×	×	×
<b>F</b>	✓	×	×
<b>G</b>	✓	×	×
<b>H</b>	✓	×	✓

Key
✓ = present
× = not present

4 (a) (i) How many of the foods contained **only** carbohydrate?

.....  
(1 mark)

4 (a) (ii) Which of the foods contained carbohydrate **and** fat **and** protein?

Tick (✓) **one** box.

**B, C and D** only

**B and D** only

**C** only

(1 mark)

4 (b) A person’s diet should contain carbohydrate **and fat and** protein.

Give **two** reasons why.

1 .....

.....

2 .....

.....

(2 marks)

4 (c) As well as carbohydrate, fat and protein, the body also needs vitamins and mineral ions.

4 (c) (i) Why does the body need vitamins and mineral ions?

.....

(1 mark)

4 (c) (ii) Draw a ring around the correct answer to complete the sentence.

Compared to the mass of carbohydrates, the body needs

a greater

a smaller

the same

mass

of vitamins and mineral ions.

(1 mark)

6

Turn over for the next question

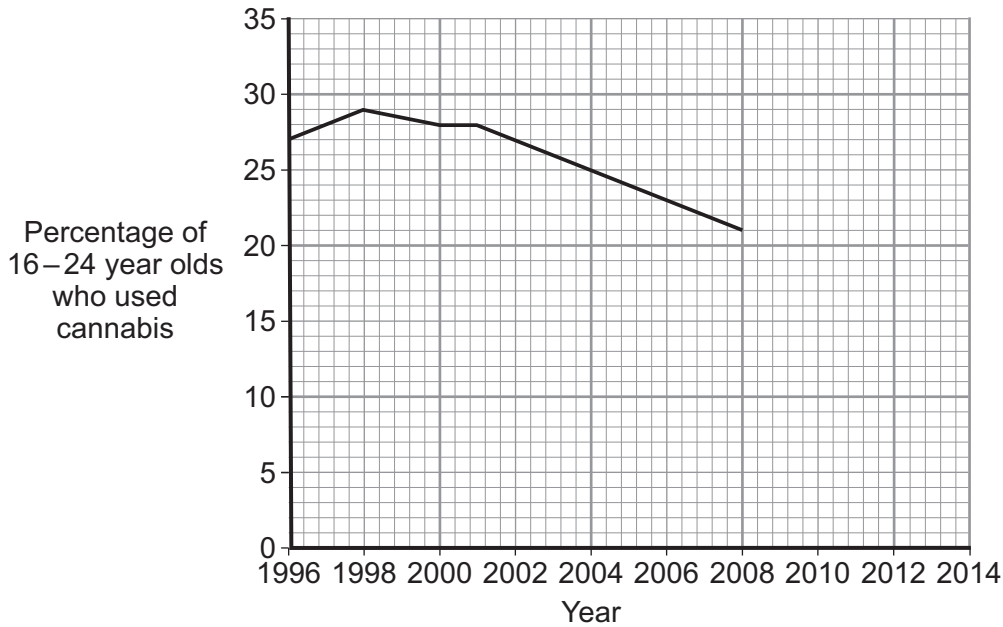
Turn over ►

**5** Cannabis is an illegal drug.

**5 (a)** What type of illness might be caused by smoking cannabis regularly?

.....  
(1 mark)

**5 (b)** The graph shows the use of cannabis by 16–24 year olds in the UK between 1996 and 2008.



**5 (b) (i)** Use the graph to predict the percentage of 16–24 year olds who will use cannabis in 2014.

Show your working **on the graph**.

Percentage = .....  
(2 marks)

**5 (b) (ii)** Illegal drugs are classified as Class A, Class B or Class C.  
Class C drugs are the least dangerous.

In 2004, the government changed the classification of cannabis from Class B to Class C.

In 2009, the government changed the classification of cannabis back from Class C to Class B.

Do you think that changing the classification of cannabis back to a Class B drug will reduce the percentage of 16–24 year olds who use cannabis?

Use evidence from the graph to explain your answer.

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

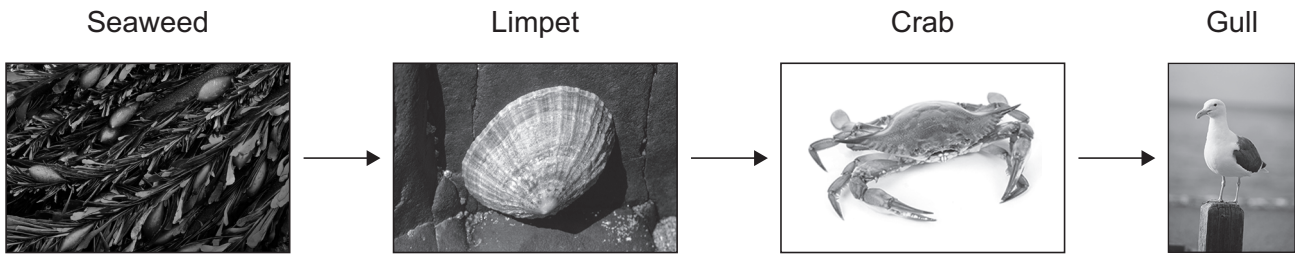
(2 marks)

5

**Turn over for the next question**

**Turn over ►**

6 The photographs show a food chain from a seashore. The photographs are **not** to the same scale.



Students estimated the population and biomass of each of the organisms on part of a seashore.

The table shows the students' results.

Organism	Population	Mean mass of one organism in grams	Biomass of population in grams
Seaweed	50	4000	200 000
Limpet	1200	30	36 000
Crab	100	90	9 000
Gull	2	900	

6 (a) (i) Use the data in the table to calculate the biomass of the gull population.

.....  
 .....

Biomass = ..... g  
 (1 mark)

**6 (a) (ii)** Draw a pyramid of biomass for this food chain.

Label the pyramid.

(2 marks)

**6 (b)** The biomass of the crab population is much less than the biomass of the limpet population.

Suggest **two** reasons why.

1 .....

.....

2 .....

.....

(2 marks)

5

**Turn over for the next question**

**Turn over ►**

7 (a) Complete the sentences about evolution.

Draw a ring around the correct answer to complete each sentence.

7 (a) (i) Darwin suggested the theory of evolution by

- artificial
- natural
- asexual

selection.

(1 mark)

7 (a) (ii) Darwin's theory of evolution says that all species of living things have

evolved from

- artificial
- complex
- simple

life forms.

(1 mark)

7 (a) (iii) Most scientists believe that life first developed about

- three billion
- three million
- three thousand

years ago.

(1 mark)

7 (b) Darwin's theory of evolution was only slowly accepted by other people.

Give **two** reasons why.

1 .....

.....

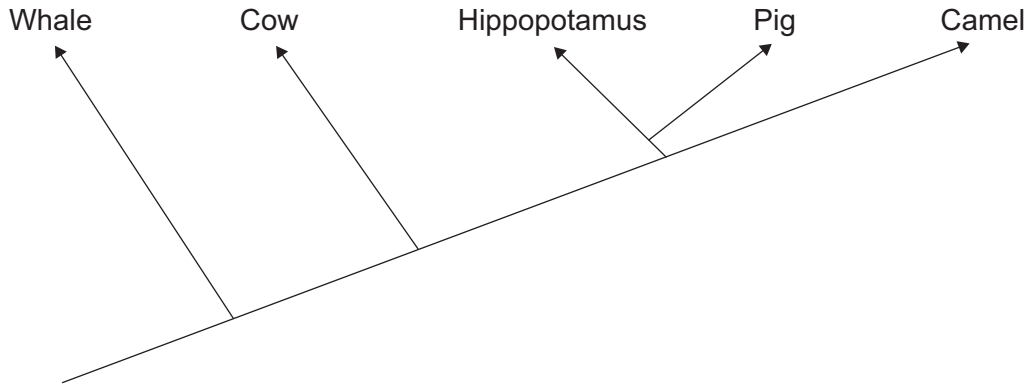
2 .....

.....

(2 marks)

7 (c) **Diagram 1** shows one model of the relationship between some animals.

**Diagram 1**



7 (c) (i) Complete the sentence.

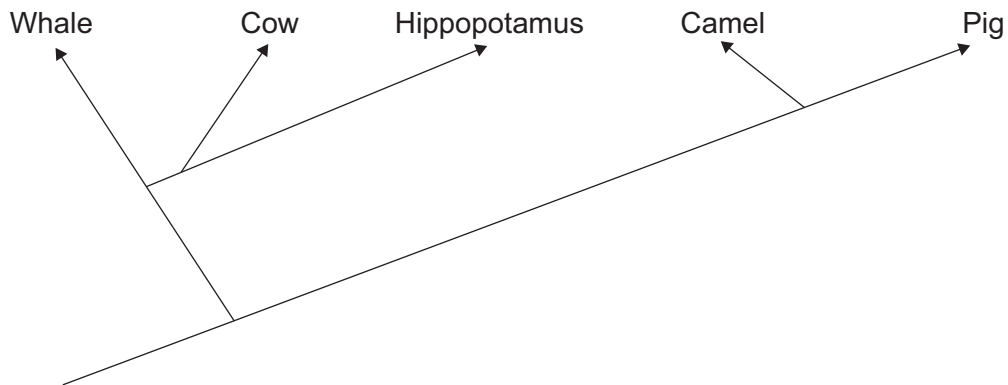
The model shown in **Diagram 1** is an evolutionary ..... (1 mark)

7 (c) (ii) Which **two** of the animals in **Diagram 1** are most closely related?

..... and ..... (1 mark)

7 (c) (iii) **Diagram 2** shows a more recent model of the relationship between the animals.

**Diagram 2**



Suggest **one** reason why scientists have changed the model of the relationships between the animals shown in the diagram.

Draw a ring around the correct answer.

**more powerful computers**

**new evidence from fossils**

**new species discovered**

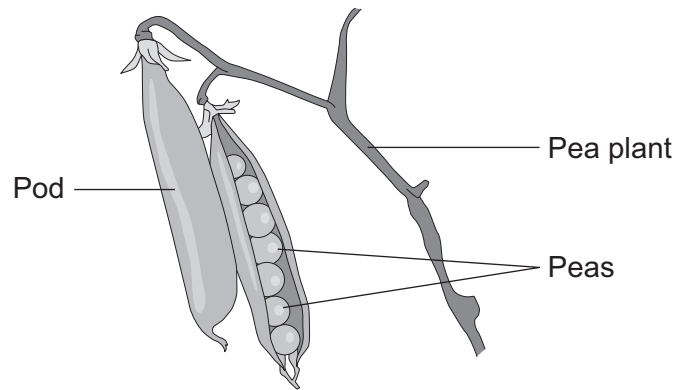
(1 mark)

8

Turn over ►



8 Peas grow in pods on pea plants.



A gardener grew four varieties of pea plants, **A**, **B**, **C** and **D**, in his garden. The gardener counted the number of peas in each pod growing on each plant.

The table shows his results.

Variety	Range of number of peas in each pod	Mean number of peas in each pod
<b>A</b>	2–6	4
<b>B</b>	3–7	5
<b>C</b>	3–8	6
<b>D</b>	6–8	7

8 (a) Give **one** environmental factor and **one other** factor that might affect the number of peas in a pod.

Environmental factor .....

Other factor .....

(2 marks)

**8 (b)** The gardener thinks that he will get the largest mass of peas from his garden if he grows variety **D**.

Why is the gardener **not** correct?

Suggest **one** reason.

.....  
.....

(1 mark)

**8 (c)** It is important that carbon is cycled through living things.

After he has picked the peas, the gardener puts the dead pea plants onto a compost heap.

Over the next few months, the carbon in the carbon compounds from the pea plants is returned to the air.

Describe how.

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

(4 marks)

7

**Turn over for the next question**

**Turn over ►**

**9** A student is given a tube containing a liquid nutrient medium. The medium contains one type of bacterium.

**9 (a)** *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

The student is told to grow some of the bacteria on agar jelly in a Petri dish.

Describe how the student should prepare an uncontaminated culture of the bacterium in the Petri dish.

You should explain the reasons for each of the steps you describe.

.....

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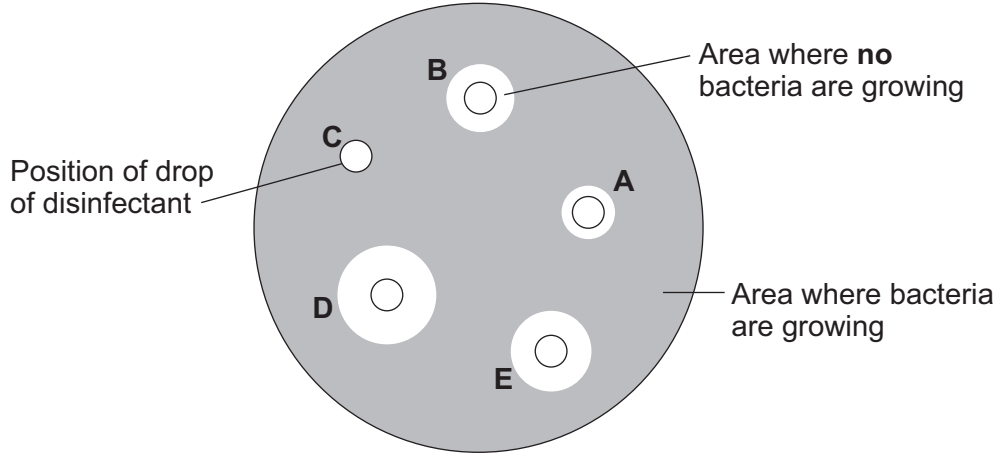
.....

.....

(6 marks)

9 (b) After the culture had been prepared, the student added one drop of each of five disinfectants, **A**, **B**, **C**, **D** and **E**, onto the culture.

The diagram shows the appearance of the Petri dish 3 days later.



9 (b) (i) There are areas on the agar jelly where **no** bacteria are growing.

Why?

.....

.....

(1 mark)

9 (b) (ii) The student concluded that disinfectant **D** would be the best for using around the home.

Give **one** reason why the student might be correct.

.....

.....

.....

Give **one** reason why the student might **not** be correct.

.....

.....

.....

(2 marks)

9
---

END OF QUESTIONS