1 Listeriosis is an illness caused by eating food containing the bacterium *Listeria*.

(a) The diagram shows the cell wall of one of these bacteria. Other structures found in the bacterium are not shown.

Draw and label three other structures that would be found in the bacterium.

(3)



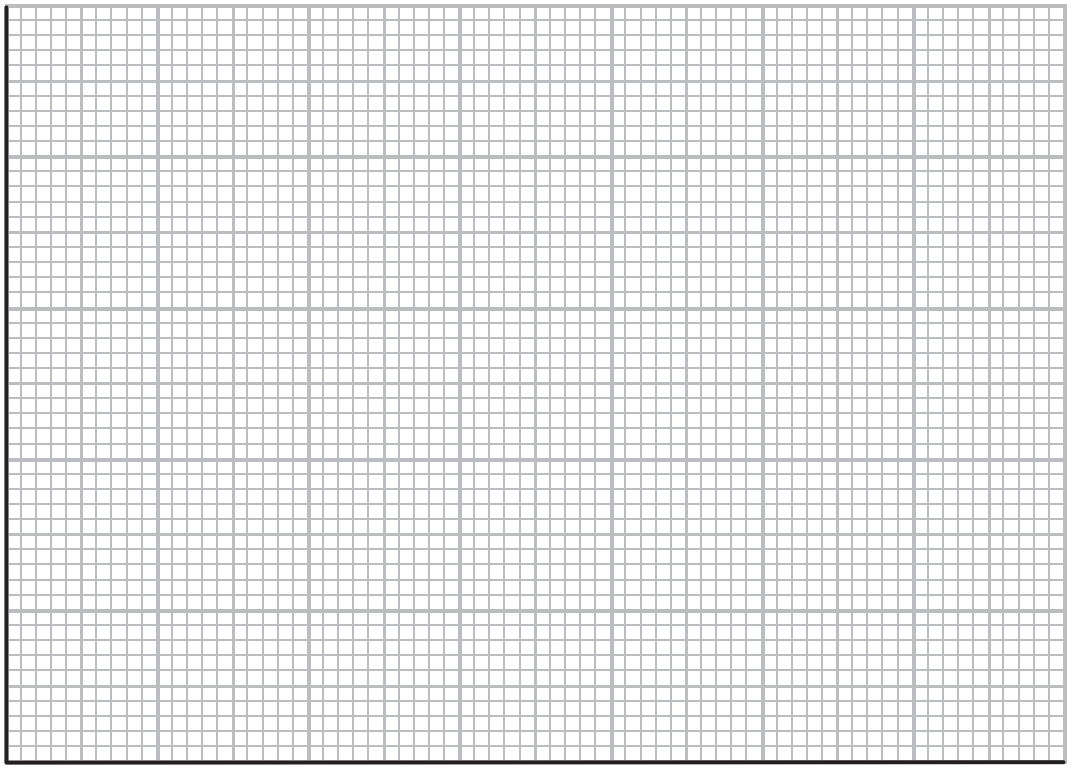
(b) Many different foods have been found to contain *Listeria*.

A study was carried out in the USA over a two-year period. The table shows the number of people who became ill with listeriosis after eating different types of food. It also shows the number of people who died as a result of becoming ill with listeriosis.

Type of food eaten	Number of people who became ill	Number of people who died
coleslaw	52	11
milk	105	5
cheese	364	80
processed meat	458	98
fresh meat	494	96

(i) Plot a bar graph to show the number of people who became ill and the number of people who died from listeriosis after eating the different types of food.

(5)



(ii) The likelihood of a person dying from listeriosis depends on which food the bacterium came from.

Use the information in the table to determine which type of food is most likely to cause a bacterial infection that leads to death.

Show your working.

(2)

type of food .....

(c) Explain how the immune system protects most people from becoming ill with listeriosis.

(5)

(Total for Question = 15 marks)

2 (a) The table lists the effects of some hormones.

Complete the table by naming each hormone and its source.

The first one has been done for you.

(5)

Effect	Name of hormone	Source
converts glucose to glycogen	insulin	pancreas
stimulates male secondary sexual characteristics		testis
increases permeability of the collecting duct		
repairs the uterus lining		

(b) Cells do not store glucose. Instead it is converted into glycogen to be stored.

Suggest why cells do not store glucose.

(2)

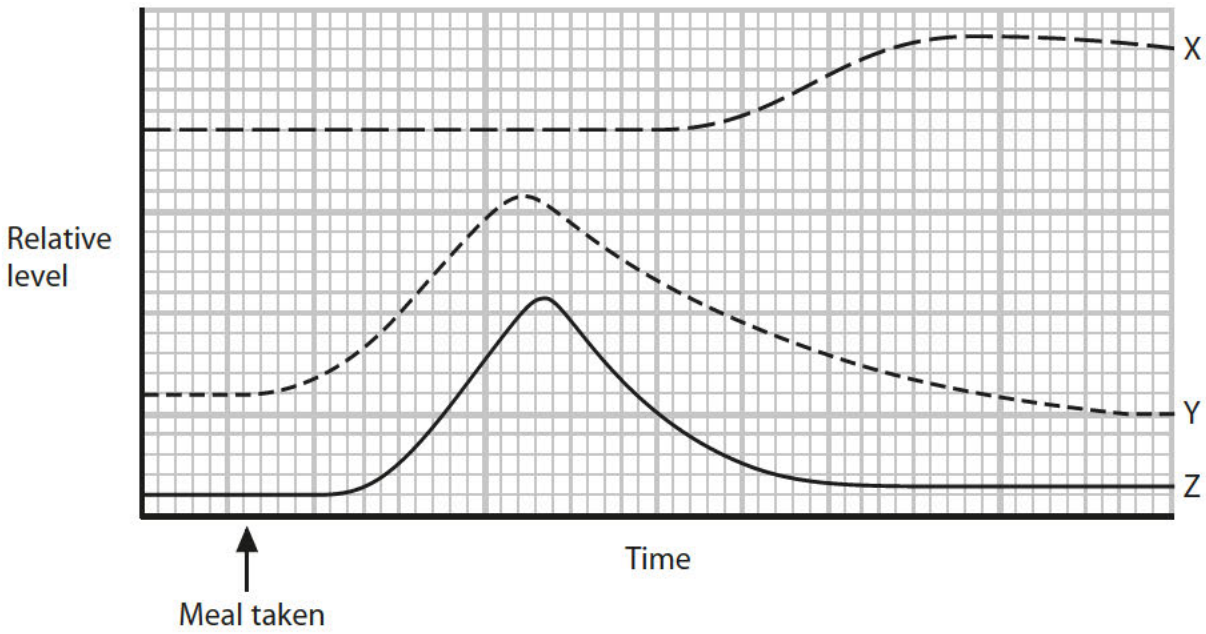
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(c) The graph shows changes in the relative level of glucose, glycogen and insulin before and after a meal.



Give the letter of the line which represents changes in the relative level of glycogen.

(1)

.....

(Total for Question = 8 marks)

3 (a) Complete the table to show the characteristic features of the three groups of organisms.

Use a tick (✓) if the group has the characteristic and a cross (×) if the group does not have the characteristic. The first box has been done for you.

(4)

Group	Can carry out photosynthesis	Have a cell wall	Can be pathogenic
bacteria	✓		
fungi			
viruses			

(b) The table below shows some characteristics shared by most animals.

Complete the table by giving the missing characteristics and examples.

(4)

Characteristic	Example
they require nutrition	eating food
they respire	releasing energy from carbohydrate
	some animals can fly
they control their internal conditions	
	increase of the population of foxes
they grow	

(c) Another characteristic shown by animals is the ability to respond to their surroundings. For example, a person may withdraw their hand from a hot object.

Describe the sequence of events that cause this response.

(5)

(Total for Question = 13 marks)

4 Emperor penguins live in the southern Polar Regions. The temperature here can be as low as –30 °C.

They have a number of adaptations that enable them to survive in such a cold climate.



(a) Fully grown penguins are large, often weighing up to 30 kg. Most other birds are much smaller.

Explain how being large helps the penguin to survive at very low temperatures.

(2)

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(b) Penguins also have soft downy feathers and a thick layer of fat just below the skin.

Suggest how these features help penguins to survive.

(2)

.....

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.....

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.....

(c) One part of the penguin that is especially exposed to the cold is their feet. The muscles that operate the feet are located in the penguin's body rather than in the feet themselves.

(i) Suggest how this benefits the penguin.

(3)

(ii) The penguin's feet move when the muscles pull on string-like structures called tendons.

Suggest a property that these tendons should have.

(1)

(d) Penguins huddle together to maintain their body temperature.

Explain how this behaviour is an advantage to penguins.

(2)

(Total for Question = 10 marks)

5 Farmers use bird scarers that make a sudden loud noise to frighten birds away from their crops.

Design an investigation to find out if noise affects the amount of crops birds eat.

(6)

(Total for Question = 6 marks)