Q1. Catalase is an enzyme.

Catalase controls the following reaction:

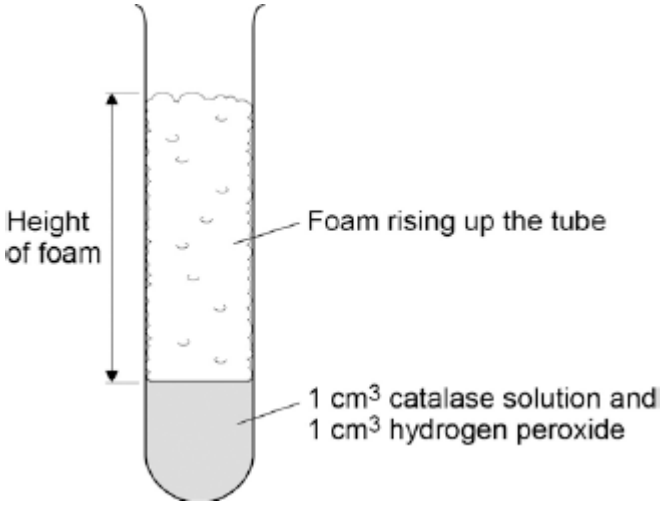
hydrogen peroxide → water + oxygen

A student did an investigation on catalase activity.

This is the method used.

1. Put 1 cm^3 hydrogen peroxide solution in a test tube.
2. Add 1 cm^3 of catalase solution.
   - Bubbles of oxygen are produced.
   - Bubbles cause foam to rise up the tube.
3. Measure the maximum height of the foam.

The diagram below shows the experiment.



The experiment is carried out at 20 °C.

The table below shows some results from the investigation.

Temperature in °C	Maximum height of foam in cm			
	Test 1	Test 2	Test 3	Mean
10	1.3	1.1	0.9	1.1
20	0.0	3.3	3.1	3.2
30	5.2	5.0	5.3	5.2
40	4.2	3.5	4.4	4.0
50	2.1	1.9	2.3	2.1

60	0.0	0.0	0.0	0.0

(a) Why did the student carry out the experiment three times at each temperature?

Tick **one** box.

To make the experiment more accurate ☐

To prove the experiment was correct ☐

To show the experiment was more repeatable ☐

(1)

(b) The student thought one result was an anomaly.

Circle the anomaly in the table above.

(1)

(c) What did the student do with the anomalous result?

.....

.....

(1)

(d) Look at the table above.

What conclusion can be made as the temperature increases?

Tick **one** box.

Decreases the rate of reaction up to 30 °C ☐

Decreases the rate of reaction up to 40 °C ☐

Increases the rate of reaction up to 30 °C ☐

Increases the rate of reaction up to 40 °C ☐

(1)

(e) At which temperature was catalase denatured?

Tick **one** box.

10 °C ☐

30 °C ☐

40 °C ☐

60 °C ☐

(1)

(f) The student thought the optimum temperature for catalase activity was between 30 °C and 40 °C.

How could the investigation be improved to find a more precise value for the optimum temperature?

Tick **one** box.

Do the experiment at 70 °C and 80 °C ☐

Do the experiment at 30 °C, 35 °C and 40 °C ☐

Use less hydrogen peroxide solution ☐

Use more catalase solution ☐

(1)

(g) Amylase is the enzyme that controls the breakdown of starch to glucose.

Describe how the student could investigate the effect of pH on the breakdown of starch by amylase.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(4)
(Total 10 marks)

Q2. A healthy diet contains the right balance of different foods and the right amount of energy.

(a) An unbalanced diet can lead to health problems.

One problem caused by an unbalanced diet is being overweight.

Name **one** health problem, other than being overweight, that is linked to an unbalanced diet.

.....

(1)

(b) Sugar is a type of carbohydrate.

(i) Eating too much sugar can make a person overweight.

Suggest why.

.....

.....

(1)

(ii) Which other substance in food is linked to people being overweight?

Draw a ring around the correct answer.

fat **mineral ions** **vitamins**

(1)

(c) Sugar substitutes taste sweet.
Taking sugar substitutes helps to reduce the chance of becoming overweight.

The table below gives information about four sugar substitutes, **A**, **B**, **C** and **D**.

Sugar substitute	Number of times sweeter than sugar	Effects on health
A	× 200	Harmful to some people
B	× 250	Not known

C	× 600	Not known
D	× 500	None

(i) Which sugar substitute, **A**, **B**, **C** or **D**, is the sweetest? ☐

(1)

(ii) A person is advised to use sugar substitute **D** and **not** sugar substitutes **A, B** or **C**.

Suggest a reason why.

.....

.....

(1)

(iii) A food has a sugar substitute in it.

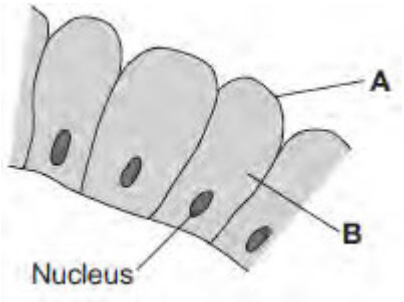
Why must it say on the packet which sugar substitute it is?

.....

.....

(1)
(Total 6 marks)

Q3. The image below shows some cells in the lining of the stomach.



(a) (i) Use words from the box to name structures **A** and **B**.

cell membrane	**chloroplast**	**cytoplasm**	**vacuole**

A .....

B .....

(2)

(ii) What is the function of the nucleus?

Tick (✓) **one** box.

To control the activities of the cell ☐

To control movement of substances into and out of the cell ☐

To release energy in respiration ☐

(1)

(b) Draw **one** line from each part of the human body to its correct scientific name.

Part of human body	Scientific name
Layer of cells lining the stomach	An organ
Stomach	An organism
Mouth, stomach, intestines, liver and pancreas	An organ system
	A tissue

(3)
(Total 6 marks)

Q4. Drugs affect the human body.

(a) Draw **one** line from each drug to the correct information about the drug.

Drug	Information
	Used to boost heart rate
Cannabis	
	Used to treat leprosy
Steroid	
	May cause mental illness in some people
Stimulant	
	Used to increase muscle growth
Thalidomide	
	Used to treat measles

(4)

(b) New drugs must be tested and trialled before being used.

(i) New drugs are tested in a laboratory before they are trialled on people.

What are new drugs tested on in a laboratory?

.....

(1)

(ii) Why is it important that drugs are trialled before doctors give them to patients?

Tick (✓) **two** boxes.

To check that the drug works ☐

To check the cost of the drug ☐

To find out if the drug is legal ☐

To find the best dose to use ☐

(2)

(iii) In a double blind drug trial, only some people know which patients have been given the drug.

Who knows which patients have been given the drug?

Tick (✓) **one** box.

The patient and the doctor ☐

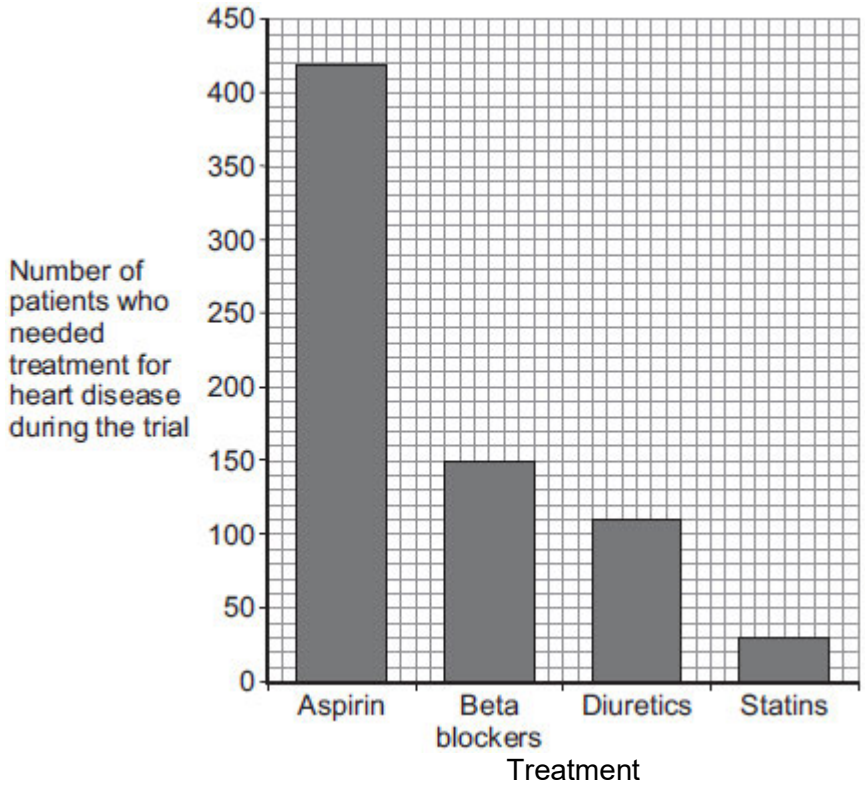
Only the doctor ☐

Only scientists at the drug company ☐

(1)

(c) Doctors trialled four different treatments for reducing the risk of heart disease.
Each treatment was trialled on the same number of patients for 5 years.
The patients did **not** have heart disease at the start of the trial.

The graph below shows the results.



(i) How many patients who took aspirin needed treatment for heart disease during the trial?

Number of patients = ...

(1)

(ii) Based **only** on the evidence in the graph, which would be the best treatment to reduce the risk of developing heart disease?

.....

(1)

(iii) Suggest **one** other factor that a doctor might consider before deciding which treatment to use for a patient.

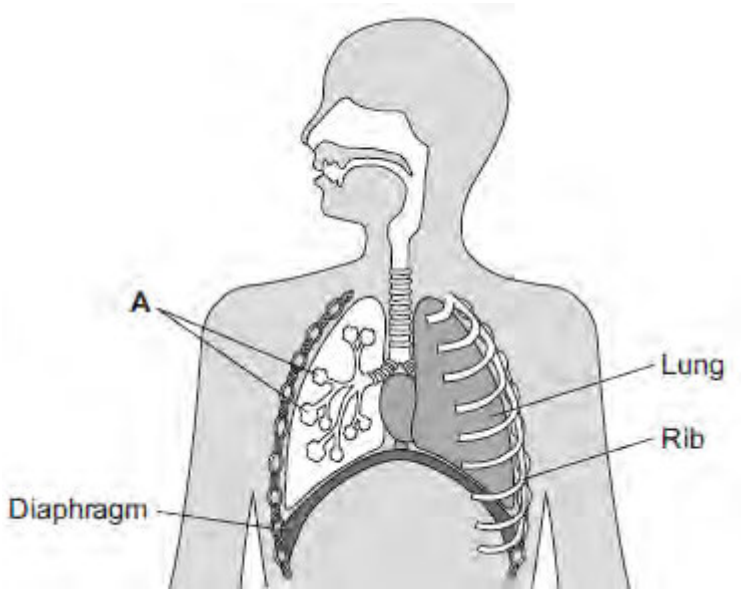
.....

(1)

(Total 11 marks)

Q5. Our lungs help us to breathe.

The image below shows the human breathing system.



(a) (i) Name part **A**.

.....

(1)

(ii) Give **one** function of the ribs.

.....

(1)

(b) (i) Use the correct answer from the box to complete the sentence.

active transport	**diffusion**	**osmosis**

Oxygen moves from the air inside the lungs into the blood by the process of ..... .

(1)

(ii) Use the correct answer from the box to complete the sentence.

arteries	capillaries	veins

Oxygen moves from the lungs into the blood through the walls

of the ..... .

(1)

(iii) Inside the lungs, oxygen is absorbed from the air into the blood.

Give **two** adaptations of the lungs that help the rapid absorption of oxygen into the blood.

1 .....

.....

2 .....

.....

(2)

(Total 6 marks)

Q6.(a) Enzymes are used in body cells.

(i) What is an enzyme?

Draw a ring around the correct answer.

an antibody **a catalyst** **a hormone**

(1)

(ii) All enzymes are made of the same type of substance.

What is this substance?

Draw a ring around the correct answer.

carbohydrate **fat** **protein**

(1)

(iii) Where is the enzyme amylase produced in the human body?

Draw a ring around the correct answer.

liver **salivary glands** **stomach**

(1)

(b) Enzymes are sometimes used in industry.

Draw **one** line from each enzyme to the correct industrial use of that enzyme.

Enzyme	**Industrial use**
Carbohydrase	Changes starch into sugars

Isomerase	Removes grease stains from clothes
Protease	Pre-digests proteins in some baby foods
	Changes glucose syrup into fructose syrup

(3)
(Total 6 marks)

Q7. After a meal rich in carbohydrates, the concentration of glucose in the small intestine changes.

The table below shows the concentration of glucose at different distances along the small intestine.

Distance along the small intestine in cm	Concentration of glucose in mol dm^{-3}
100	50
300	500
500	250
700	0

(a) At what distance along the small intestine is the glucose concentration highest?

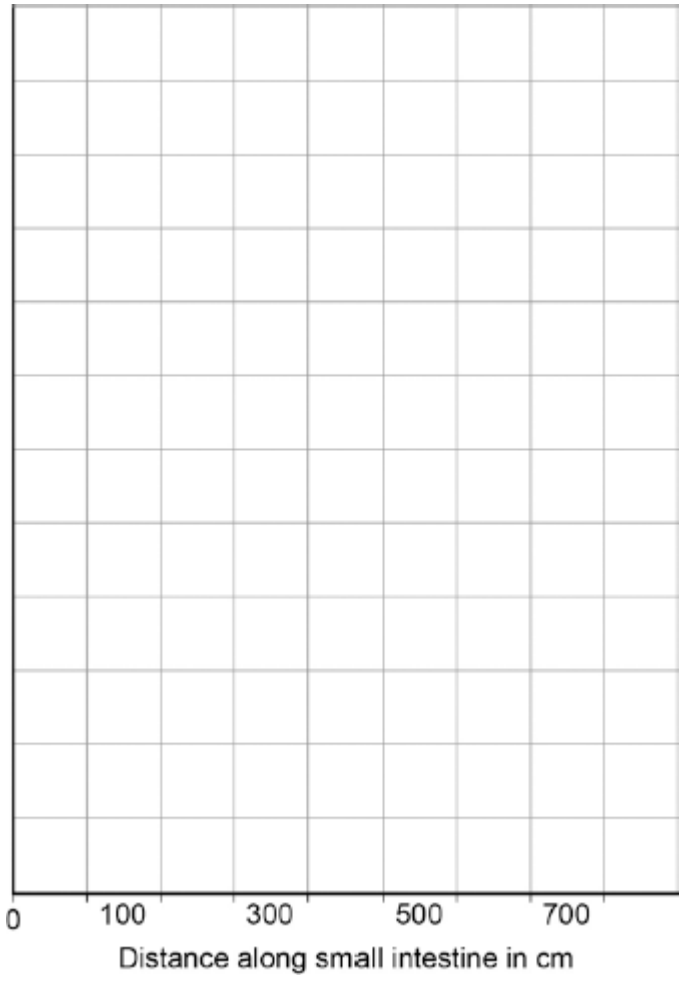
..... cm

(1)

(b) Use the data in the table to plot a bar chart on the graph below.

- Label the *y*-axis.

- Choose a suitable scale.



(4)

(c) Look at the graph above.

Describe how the concentration of glucose changes as distance increases along the small intestine.

.....

.....

.....

.....

(2)

(d) Explain why the concentration of glucose in the small intestine changes between 100 cm and 300 cm.

.....

.....

.....

.....

.....

.....

(2)

(e) Explain why the concentration of glucose in the small intestine changes between 300 cm and 700 cm.

.....

.....

.....

.....

.....

.....

.....

.....

(3)
(Total 12 marks)