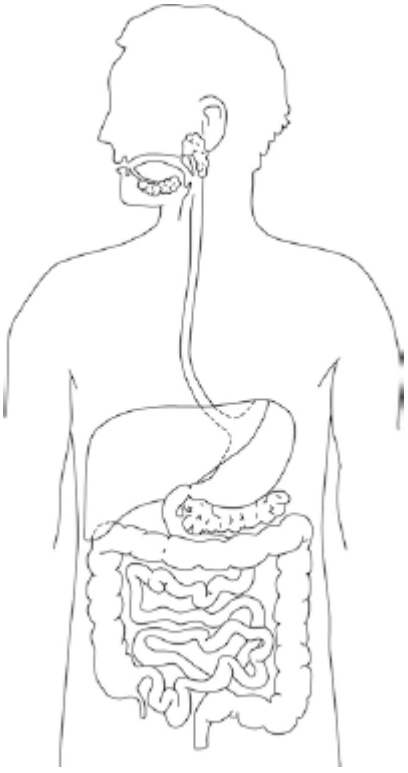
Q1. The diagram below shows the human digestive system.



(a) Label the stomach and pancreas on the diagram.

(1)

(b) Many people suffer from stomach ulcers caused by a species of bacteria called *Helicobacter pylori*.

The stomach is lined with a protective lining of mucus.

Helicobacter pylori are acid-tolerant bacteria which can damage this mucus lining.

Suggest how an infection with *Helicobacter pylori* might result in a stomach ulcer developing.

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(2)

(c) *Helicobacter pylori* can also cause stomach cancer.

Describe how a person infected with *Helicobacter pylori* could also develop liver cancer.

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(3)

(d) Gluten is a form of protein found in some grains.

Describe the test you would use to find out if protein is present in food.

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(2)

(e) Coeliac disease is a disease of the digestive system.

It damages the lining of the small intestine when foods that contain gluten are eaten.

When people with coeliac disease eat foods that contain gluten:
1. their immune system forms antibodies to gluten
2. these antibodies attack the lining of the small intestine
3. this causes inflammation in the intestines and damages the villi.

Symptoms of coeliac disease include poor growth.

Suggest why a person with coeliac disease might have this symptom.

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(4)
(Total 12 marks)

Q2. The concentration of cholesterol in the blood affects people's health.

(a) Give **two** factors that affect the concentration of cholesterol in the blood.

1 .....

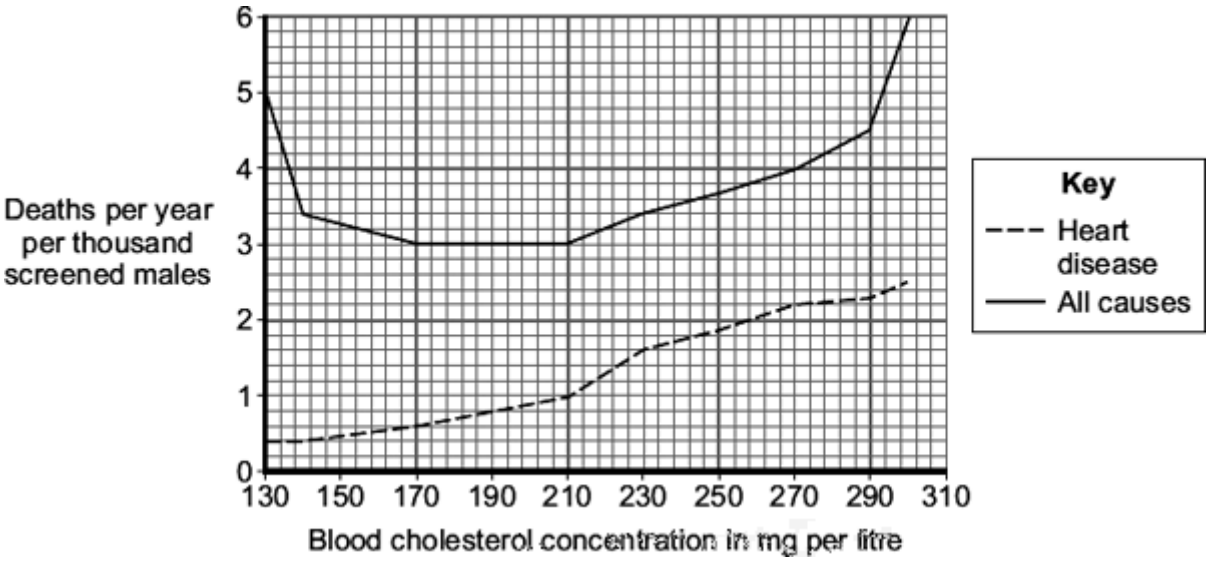
2 .....

(2)

(b) Doctors screened men for blood cholesterol concentration.

The doctors then compared death rates from heart disease with deaths from all causes in this screened group.

The graph shows the results.



(i) Which is the best conclusion that can be drawn from the data?

Tick (✓) **one** box.

There is a positive correlation between blood cholesterol concentration and deaths from all causes. ☐

There is a negative correlation between blood cholesterol concentration and deaths from all causes. ☐

Blood cholesterol concentration is only one of several factors affecting death from all causes. ☐

(1)

(ii) Based on the data in the graph **only**, which is the ideal range for blood cholesterol concentration?

Range ..... to..... mg cholesterol per litre.

(1)

(Total 4 marks)

Q3. Drugs are used to treat cardiovascular diseases (diseases of the heart and blood vessels).

(a) What is a drug?

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(1)

(b) People can be treated for cardiovascular diseases with statins or aspirin.

Information about these two drugs is given in the table.

STATINS	**ASPIRIN**
Statins are only available on prescription from doctors.	Aspirin can be bought over the counter. Treatment with aspirin costs up to £15 per year.
In studies, 30 000 patients were monitored over several years. Statins were found to reduce the rate of non-fatal heart attacks by about 30%.	In a study of 1000 patients, aspirin was found to cause bleeding of the stomach in around 0.5% of patients and there was a slightly increased risk of poor blood clotting at cuts.
Approximately 0.1% of the patients suffered serious muscle damage and 0.01% suffered kidney failure.	There was a slightly increased risk of damage to the blood vessels in the brain in older patients.
Statins reduce blood cholesterol which builds up in the walls of blood vessels. The cost of treating patients with statins can vary between £150 and £500 per year, depending on the type of cardiovascular disease being treated.	Aspirin was found to reduce the risk of non-fatal heart attacks by 31%.

Would you recommend statins or aspirin for the treatment of cardiovascular diseases?

In your answer you should:

- give your recommendation
- use information from the table to support your recommendation by making comparisons of the two drugs.

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(5)
(Total 6 marks)

Q4. The pancreas and the liver are both involved in the control of the concentration of glucose in the blood.

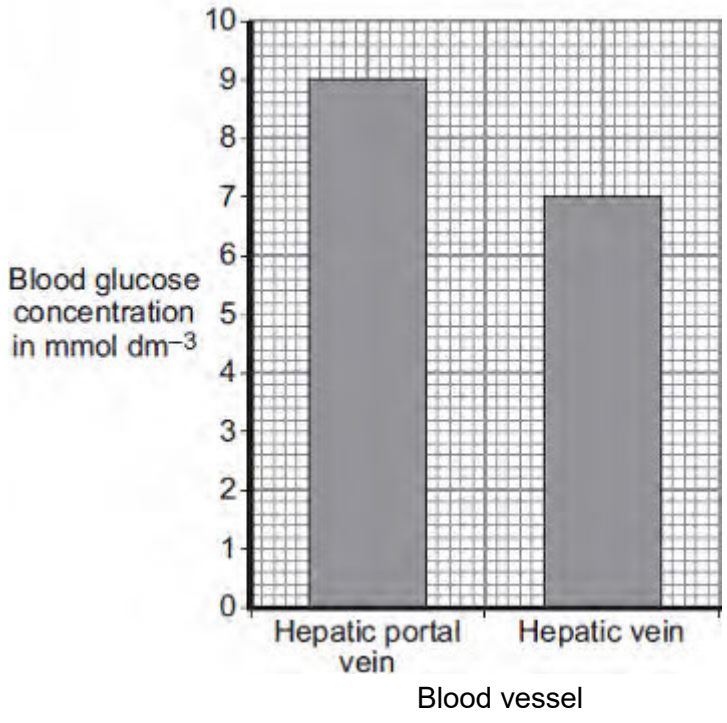
The liver has two veins:

- the hepatic portal vein taking blood from the small intestine to the liver
- the hepatic vein taking blood from the liver back towards the heart.

Scientists measured the concentration of glucose in samples of blood taken from the hepatic portal vein and the hepatic vein. The samples were taken 1 hour and 6 hours after a meal.

Graph 1 shows the concentration of glucose in the two blood vessels 1 hour after the meal.

Graph 1



(a) The concentration of glucose in the blood of the two vessels is different. Explain why.

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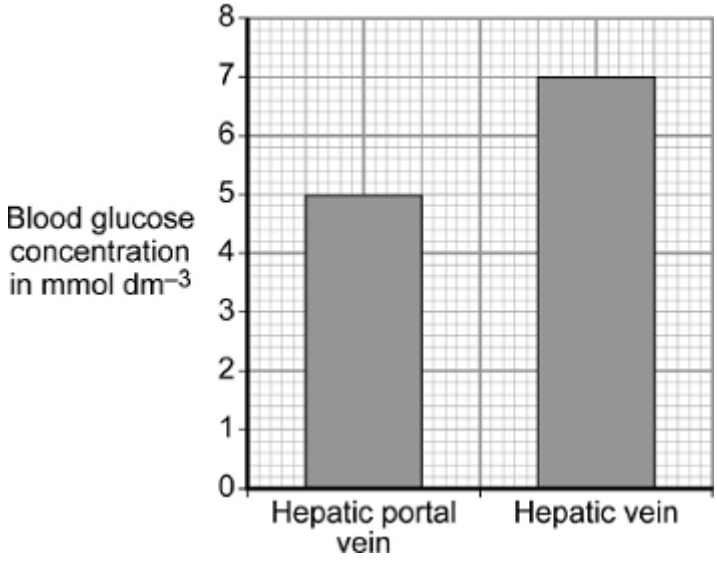
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(3)

(b) **Graph 2** shows the concentration of glucose in the two blood vessels 6 hours after the meal.

Graph 2



(i) The concentration of glucose in the blood in the hepatic portal vein 1 hour after the meal is different from the concentration after 6 hours.

Why?

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(1)

(ii) The person does **not** eat any more food during the next 6 hours after the meal.

However, 6 hours after the meal, the concentration of glucose in the blood in the hepatic vein is higher than the concentration of glucose in the blood in the hepatic portal vein.

Explain why.

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(3)
(Total 7 marks)

Q5. Fresh milk is a mixture of compounds including lipid, protein and about 5% lactose sugar.

Lactose must be digested by the enzyme lactase, before the products can be absorbed.

Lactase can be added to fresh milk to pre-digest the lactose. This makes 'lactose-free' milk, which is suitable for people who do not produce enough lactase of their own.

A student investigated the effect of changing pH and temperature on the digestion of lactose in milk.

The results are shown in **Tables 1** and **2**.

Table 1
Effect of pH

pH	Time taken to digest lactose in minutes
4.0	20
5.0	18
6.0	13
7.0	7
8.0	5
9.0	6

Table 2
Effect of temperature

Temperature in °C	Time taken to digest lactose in minutes
25	20
30	14
35	11
40	6
45	29
50	No digestion

(a) The label on a carton of lactose-free milk states:

'Lactase is normally produced in the stomach of mammals.'

The results in **Table 1** suggest that this statement is **not** true.

Explain how.

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(2)

(b) Explain, as fully as you can, the results shown in **Table 2** .

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(3)

(c) Bile is produced in the liver and is released into the small intestine.

Bile helps the digestion of lipid in the milk.

Describe how.

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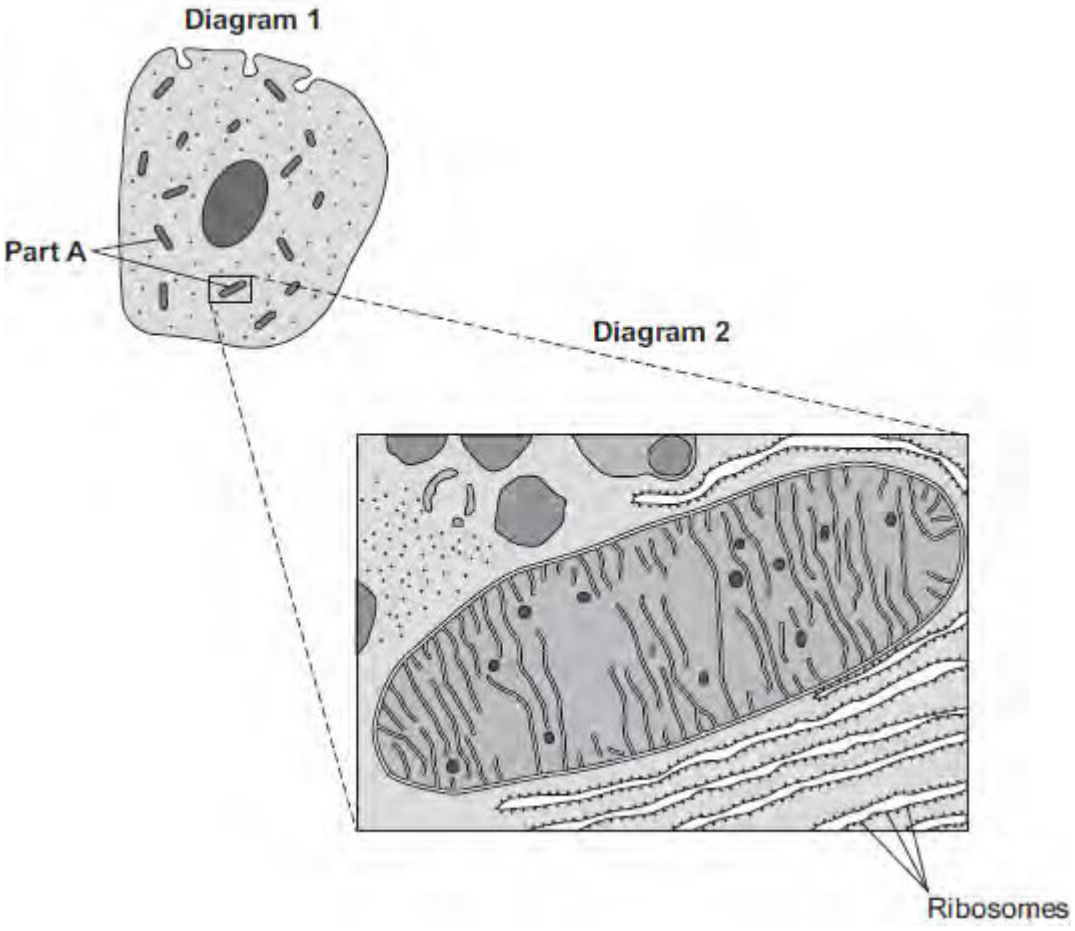
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(2)
(Total 7 marks)

Q6.Diagram 1 shows a cell from the pancreas.

Diagram 2 shows part of the cell seen under an electron microscope.



Part **A** is where most of the reactions of aerobic respiration happen.

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

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(1)

(ii) Complete the equation for aerobic respiration.

glucose + oxygen ⟶ ..... + ... (+ energy)

(2)

(iii) Part **A** uses oxygen.

Explain how oxygen passes from the blood to part **A**.

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(3)

(b) The pancreas cell makes enzymes.

Enzymes are proteins.

Describe how the ribosomes and part **A** help the cell to make enzymes.

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(3)
(Total 9 marks)

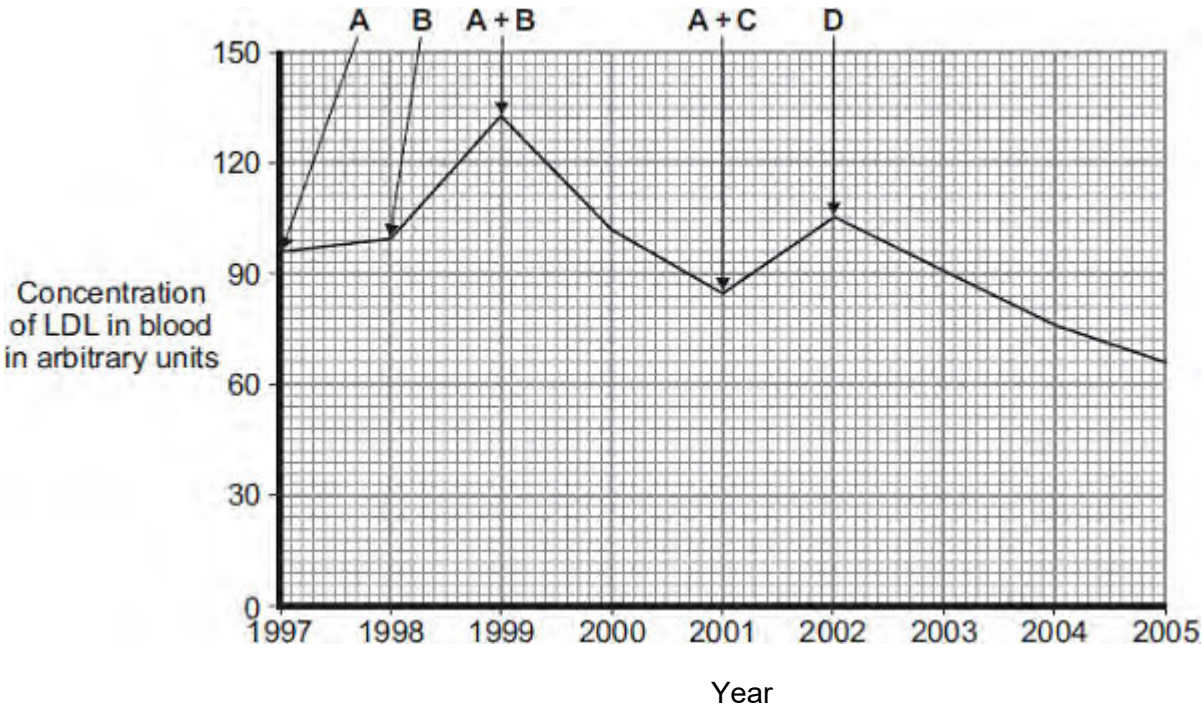
Q7.LDL is one form of cholesterol found in the blood.

People with a high concentration of LDL in their blood may be treated with drugs called statins.

A high concentration of LDL cholesterol in the blood may result in an increased risk of heart and circulatory diseases.

The graph shows the effects of the treatment of one person with four different statins, **A**, **B**, **C** and **D**, over a period of 8 years. The arrows show when each new treatment was started.

Each treatment was continued until the next treatment was started.



Compare the effectiveness of the five treatments in reducing the risk of heart and circulatory diseases for this person.

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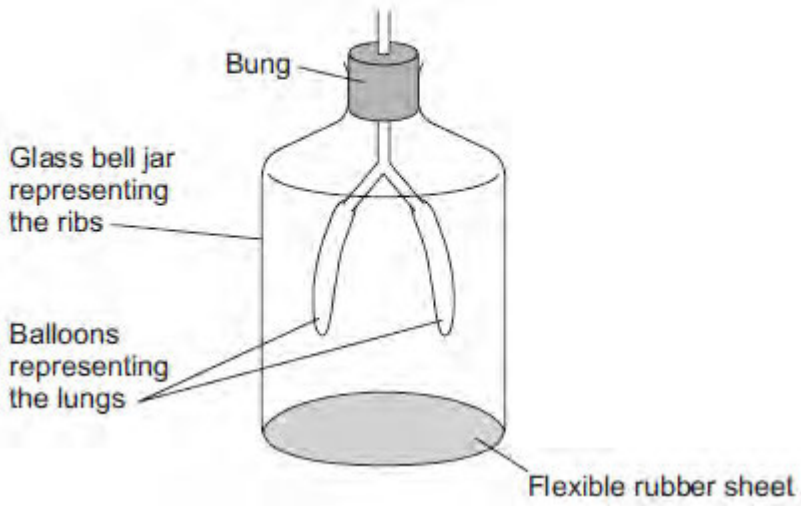
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(Total 4 marks)

Q8.Figure 1 shows a model representing the human breathing system.

The different parts of the model represent different parts of the human breathing system.

Figure 1



(a) (i) Which part of the human breathing system does the flexible rubber sheet represent?

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(1)

(ii) Explain why the balloons inflate when the flexible rubber sheet is pulled down.

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(3)

(b) (i) During breathing, oxygen moves into the blood.

Explain how oxygen moves into the blood.

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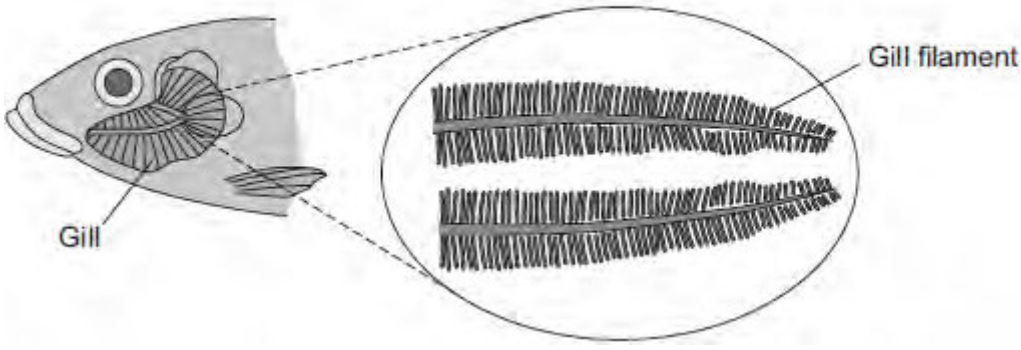
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(2)

(ii) **Figure 2** shows a fish head and gill.

Figure 2



Fish absorb oxygen from the water. Oxygen is absorbed through the gills of the fish.

Explain **one** way in which the gills are adapted for rapid absorption of oxygen.

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(2)
(Total 8 marks)