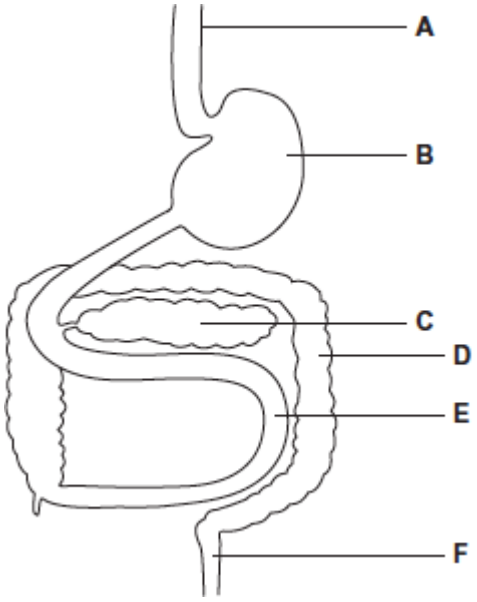
Q1. The diagram represents part of the human digestive system. The organs are labelled **A–F**.



(a) Give the letter of the organ that produces amylase.

(1)

(b) Give the letter of the organ that produces maltase.

(1)

(c) Maltose is hydrolysed by the enzyme maltase.

Explain why maltase catalyses only this reaction.

.....

.....

.....

.....

.....

.....

.....

[Extra space] .....

.....

.....

(3)
(Total 5 marks)

Q2.(a) Messenger RNA (mRNA) is used during translation to form polypeptides. Describe how mRNA is produced in the nucleus of a cell.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(6)

(b) Describe the structure of proteins.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(5)

(c) Describe how proteins are digested in the human gut.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(4)
(Total 15 marks)

Q3.A student investigated the effect of chewing on the digestion of starch in cooked wheat.

He devised a laboratory model of starch digestion in the human gut. This is the method he used.

1. Volunteers chewed cooked wheat for a set time. The wheat had been cooked in boiling water.
2. This chewed wheat was mixed with water, hydrochloric acid and a protein-digesting enzyme and left at 37 °C for 30 minutes.
3. A buffer was then added to bring the pH to 6.0 and pancreatic amylase was added. This mixture was then left at 37 °C for 120 minutes.
4. Samples of the mixture were removed at 0, 10, 20, 40, 60 and 120 minutes, and the concentration of reducing sugar in each sample was measured.
5. Control experiments were carried out using cooked wheat that had been chopped up in a blender, not chewed.

(a) What reducing sugar, or sugars, would you expect to be produced during chewing? Give a reason for your answer.

.....

.....

.....

.....

(2)

(b) In this model of digestion in the human gut, what other enzyme is required for the complete digestion of starch?

.....

(1)

(c) What was the purpose of step 2, in which samples were mixed with water, hydrochloric acid and pepsin?

.....

.....

(1)

(d) In the control experiments, cooked wheat was chopped up to copy the effect of chewing.

Suggest a more appropriate control experiment. Explain your suggestion.

.....

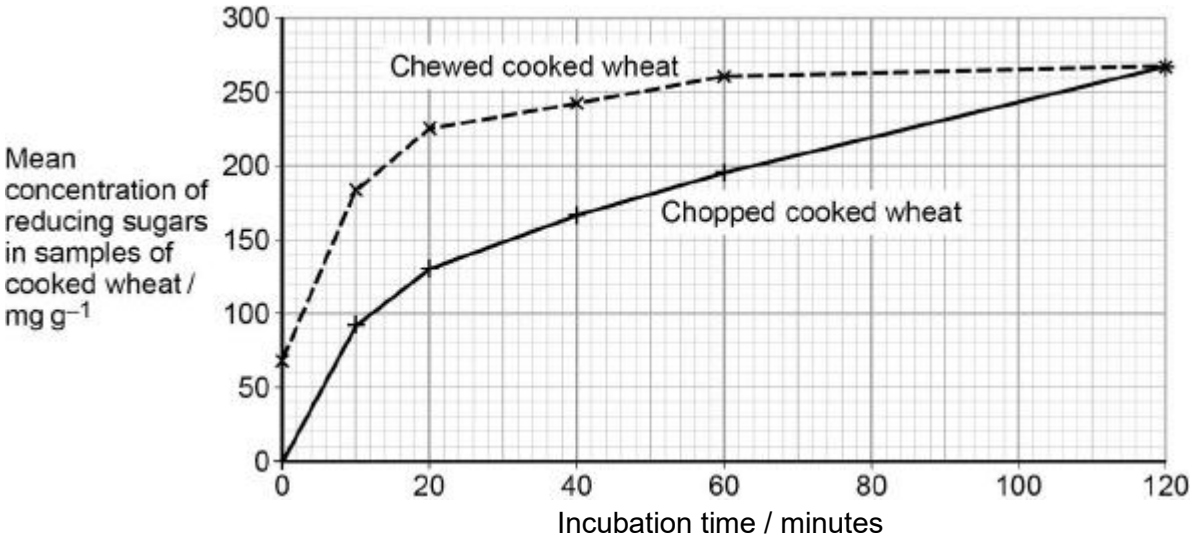
.....

.....

.....

(2)

(e) The figure below shows the student's results.



Explain what these results suggest about the effect of chewing on the digestion of starch in wheat.

.....

.....

.....

.....

.....

.....

(3)
(Total 9 marks)

Q4.(a) Describe how you would test a sample of food for the presence of starch.

.....

.....

.....

.....

.....

(2)

(b) The concentration of glucose in the blood rises after eating a meal containing carbohydrates.

The rise is slower if the carbohydrate is starch rather than sucrose. Explain why.

.....

.....

.....

.....

.....

(Extra space).....

.....

.....

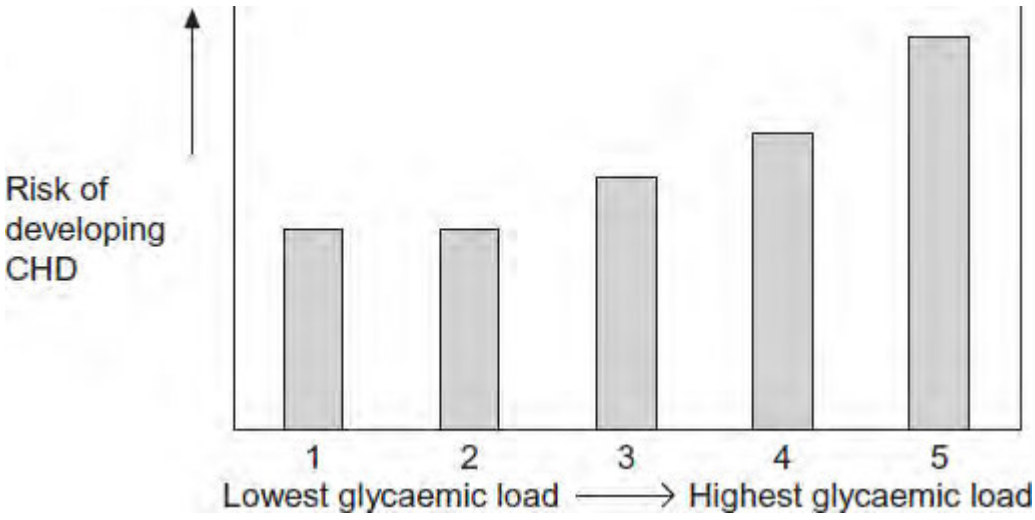
(3)

The glycaemic load (GL) of a diet is a measure of how much digestible carbohydrate it contains. The higher the GL of a diet the more quickly it raises the blood glucose concentration after a meal. A diet with a high GL also increases the concentration of harmful lipids in the blood.

Scientists investigated the relationship between diets with different glycaemic loads and the risk of developing coronary heart disease (CHD) in women.

The scientists determined the glycaemic loads of the diets of a large number of women. They then divided the women into 5 groups. Group 1 had diets with the lowest glycaemic load and group 5 had diets with the highest glycaemic load. The scientists determined the risk of developing CHD in each group.

The graph shows their results.



(c) The scientists excluded women who smoked from the study. Explain why.

.....

.....

.....

(1)

(d) (i) What do these data show about the effect that glycaemic load of the diet has on the risk of developing CHD?

.....

.....

.....

(1)

(ii) Use the information provided to explain the effect that glycaemic load of the diet has on the risk of developing CHD.

.....

.....

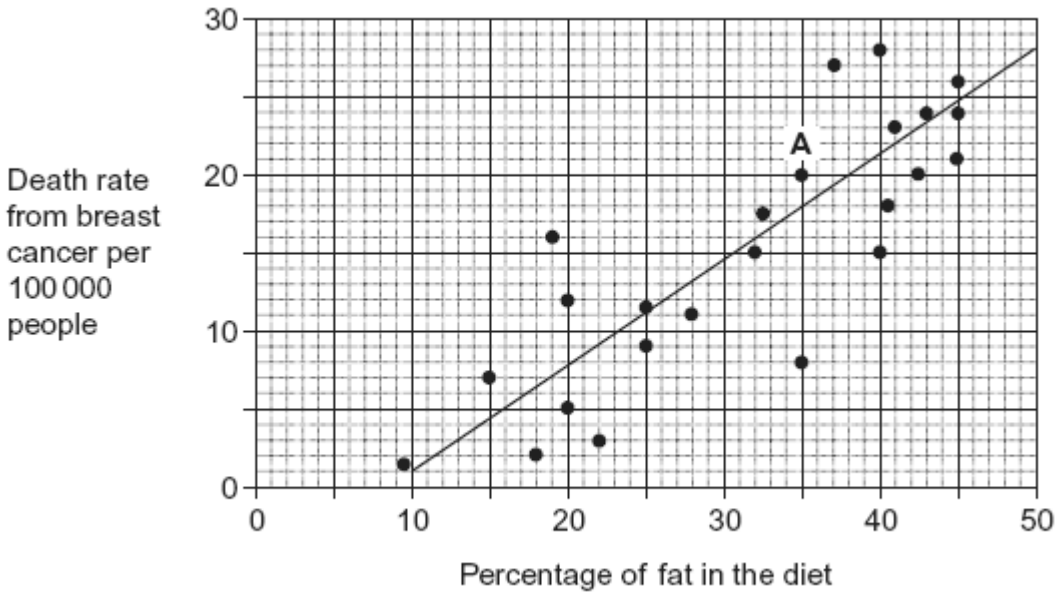
.....

.....

(2)

(Total 9 marks)

Q5. Scientists investigated the relationship between the percentage of fat in the diet and the death rate from breast cancer in 24 different countries. They plotted the data from each country on the graph below.



(a) Describe the information given by point **A** on the graph.

.....

.....

.....

(1)

(b) Describe how the scientists calculated the death rate from breast cancer for each country.

.....

.....

.....

(1)

(c) Some people have used the graph to conclude that a high percentage of fat in the diet causes breast cancer. Evaluate this conclusion.

.....

.....

.....

.....

.....

.....

(Extra space) .....

.....

.....

(3)
(Total 5 marks)