6.1 Digestion & Absorption

Question Paper

Course	DP IB Biology
Section	6. Human Physiology
Topic	6.1 Digestion & Absorption
Difficulty	Medium

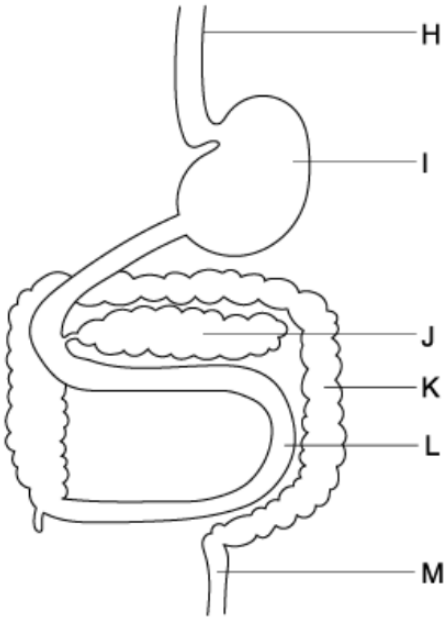
Time allowed: 60

Score: /48

Percentage: /100

Question 1a

a) The diagram below shows part of the human digestive system. The different organs are labelled **H - M**.



Give the letter of an organ where peristalsis does not occur.

[1 mark]

Question 1b

b) Outline how peristalsis ensures one way movement of food through the alimentary canal.

[2 marks]

Question 1c

c) Name organ **L** in the diagram above, and identify a digestive enzyme that it produces.

[2 marks]

Question 1d

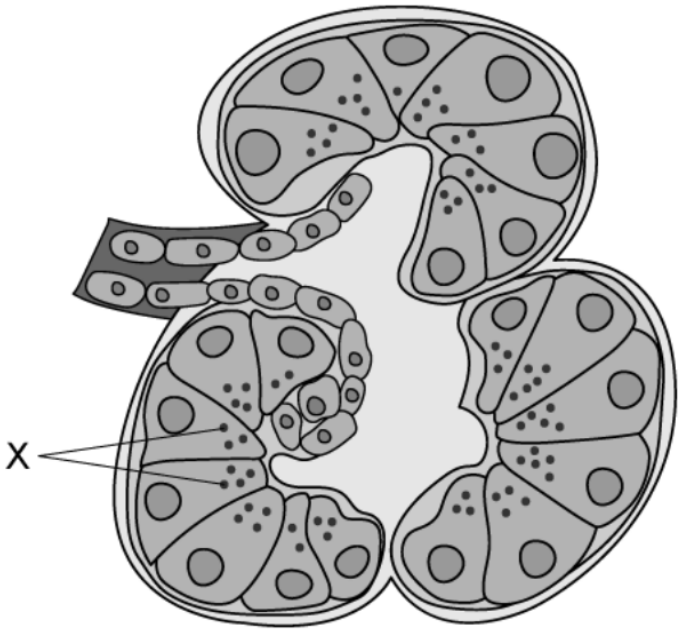
d) The glucose concentration in blood rises after eating a meal that contains carbohydrates. The increase in glucose concentration occurs at a slower rate if the carbohydrate ingested is starch, rather than sucrose.

Explain why this is.

[3 marks]

Question 2a

a) The diagram shows some acinar cells in the pancreas.



Identify the structures labelled **X** and state what is contained within these structures.

[1 mark]

Question 2b

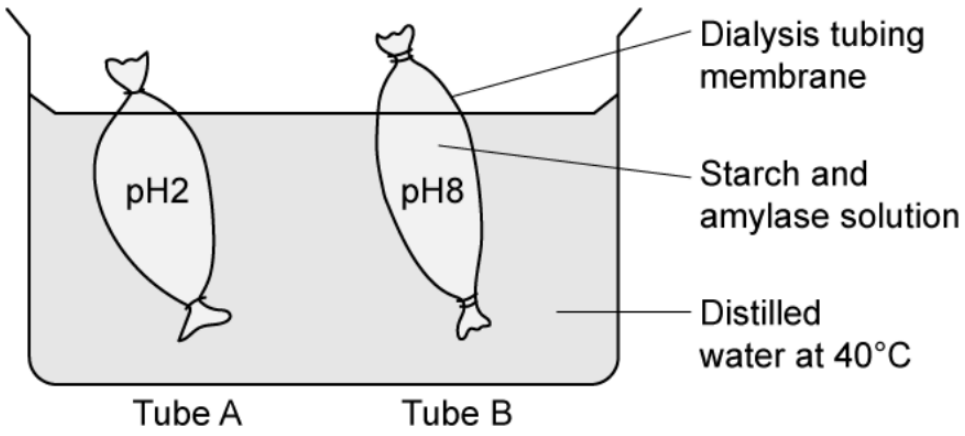
b) Pancreatitis is a medical condition that can lead to the pancreatic duct becoming blocked. It can also cause protein-digesting enzymes to be released into the bloodstream.

Suggest one reason why this might be harmful.

[2 marks]

Question 2c

c) The image below shows an investigation carried out into the effect of pH on the activity of amylase enzymes.



In the investigation, two sections of dialysis tubing were set up containing the following mixtures:

Tube A	Tube B
• 1 ml of 1% amylase solution • 10 ml of 1% starch solution • 5 ml of pH 2 buffer solution	• 1 ml of 1 % amylase solution • 10 ml of 1% starch solution • 5 ml of pH 8 buffer solution

After 30 minutes, the substances were tested using iodine solution.

Using the information given, deduce the results that would be expected from the mixtures tested in **tube A**.

[2 marks]

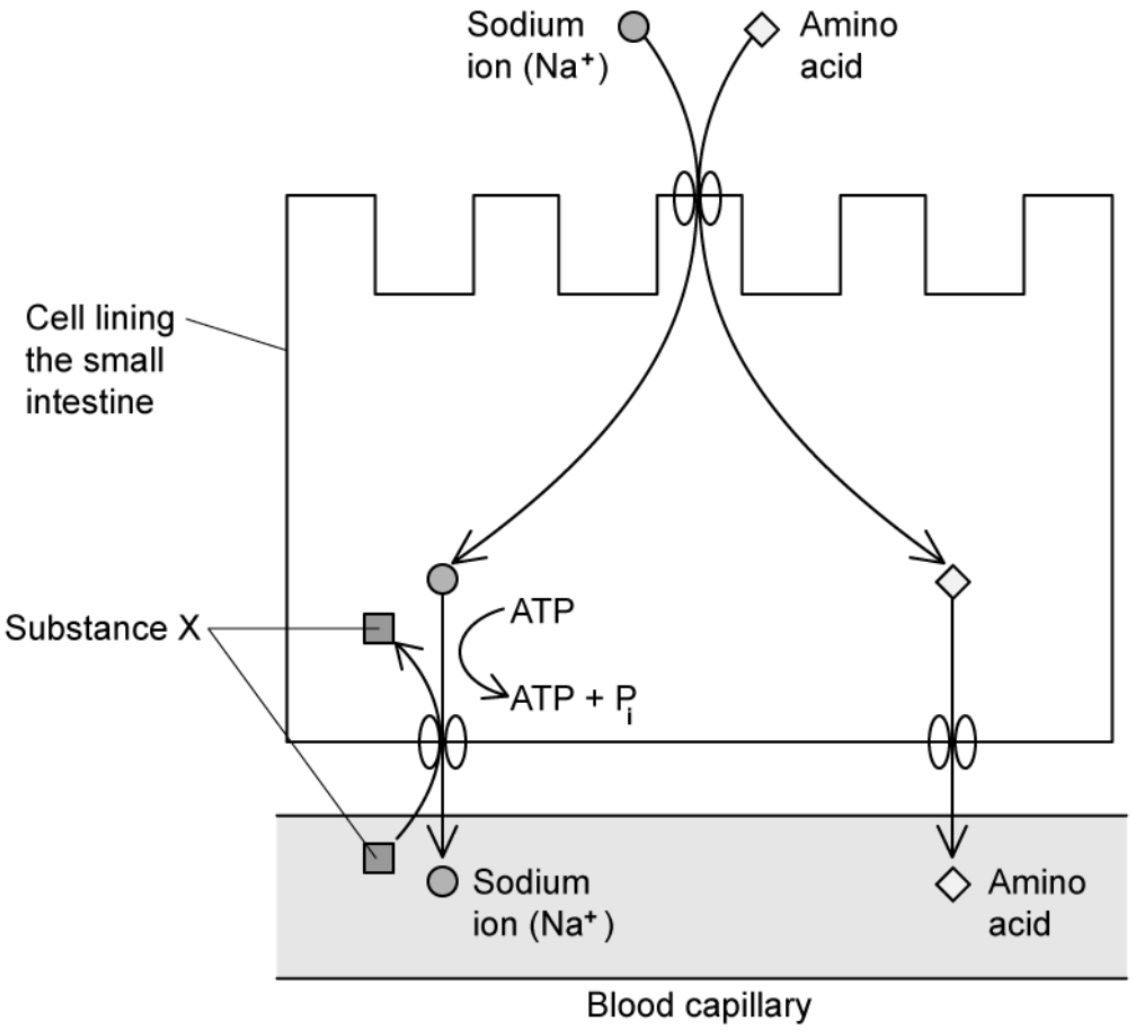
Question 2d

d) Suggest how **tube B** provides an accurate representation of absorption in the small intestine.

[2 marks]

Question 3a

a) The diagram below illustrates the co-transport mechanism for the absorption of amino acids into the blood by a cell lining in the small intestine.



Identify the substance **X** on the diagram.

[1 mark]

Question 3b

b) Use the diagram in part **(a)** and your knowledge of the co-transport mechanism, to explain why cells in the small intestine contain a large number of mitochondria.

[3 marks]

Question 3c

c) Describe the role that enzymes play in the digestion and complete breakdown of starch into glucose.

[4 marks]

Question 3d

d) State the property of glucose which prevents it from passing into the blood by simple diffusion.

[1 mark]

Question 4a

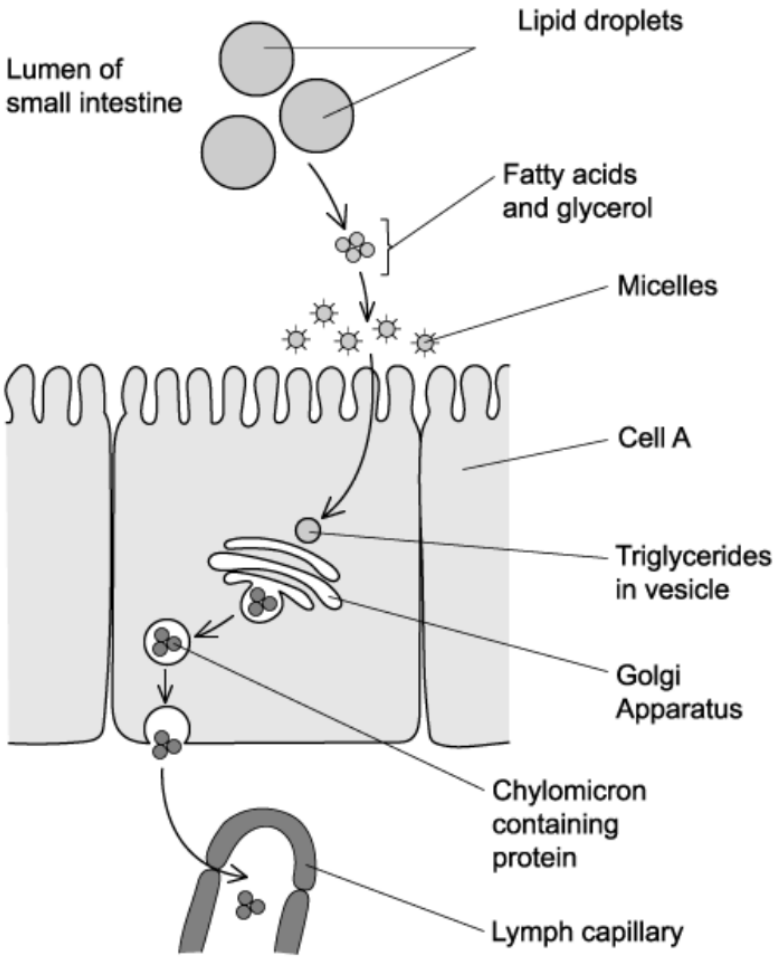
a) Bile salts bind to fat droplets and break them down into smaller fat droplets.

Explain how this process makes lipid digestion more efficient.

[2 marks]

Question 4b

b) The diagram below outlines the mechanism of lipid digestion and absorption.



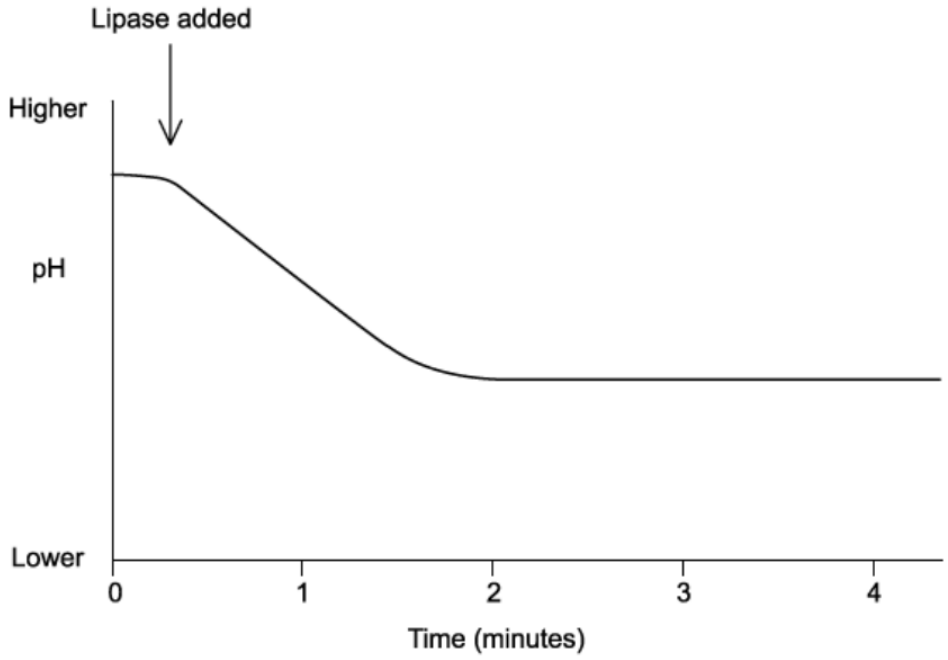
State what type of cell **A** is

[1 mark]

Question 4c

c) A student wanted to investigate the breakdown of triglycerides in cow milk by human lipase at 20 °C.

They recorded the pH of a sample of cow's milk before and after adding human lipase, using a pH meter to measure the pH. Their results are shown in the graph below.



Describe and explain the changes in pH after human lipase is added.

[4 marks]

Question 4d

d) The student carried out his experiment at a controlled temperature of 20 °C. They repeated the experiment at 25 °C.

Draw a line on the graph in part **(c)** to show the results you would expect at 25 °C.

[2 marks]

Question 5a

One mark is available for clarity of communication throughout this question.

a) Compare and contrast the action of endopeptidases and exopeptidases in the small intestine.

[4 marks]

Question 5b

b) Explain how the small intestines are adapted to maximise absorption.

[7 marks]

Question 5c

c) Outline the structure **and** function of the following layers of the wall of the small intestine:

- Muscle layer
- Submucosal layer

[4 marks]