6.1 Digestion & Absorption

Question Paper

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

Time allowed: 60

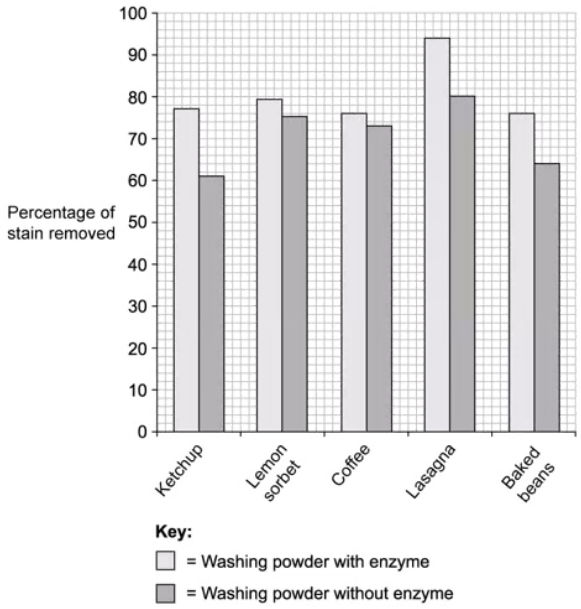
Score: /46

Percentage: /100

Question 1a

a)

Washing powders often contain different types of enzymes that break down substances in stains. An investigation was carried out into washing powder that contained enzymes and washing powder that did not contain enzymes. The graph below shows the results of this investigation.



Some of the substances that cause food stains are large insoluble proteins.

Explain how washing powder containing enzymes would be able to remove these stains.

[2 marks]

[2 marks]

Question 1b

b)

The manufacturers of the washing powder containing enzymes claimed that their washing powder was more effective at removing tough stains compared to the washing powder without enzymes.

Based on the results of the investigation in part a), evaluate the claim of the manufacturers.

[3 marks]

[3 marks]

Question 1c

c)
The investigation at part a) was carried out at 40 °C.

Suggest a reason for this.

[1 mark]

[1 mark]

Question 1d

d)
The investigation was repeated at a temperature of 85 °C.

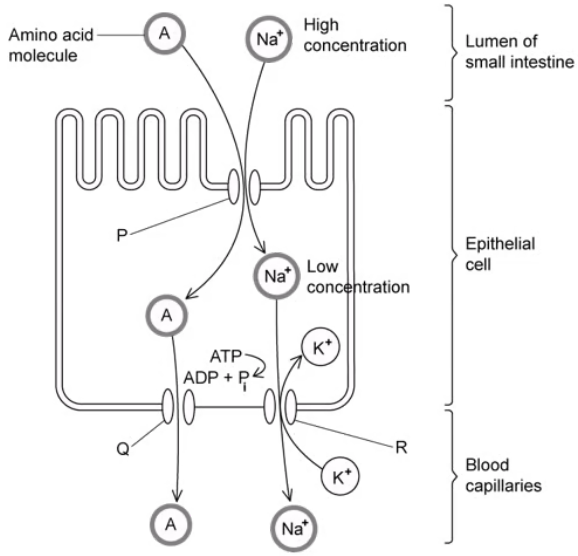
Predict, with a reason, the expected results from this investigation.

[3 mark]

[3 marks]

Question 2a

a)
The following diagram shows the absorption of amino acids from the small intestine into the blood.



The absorption of amino acids involves the process of facilitated diffusion.

Explain where this occurs in the diagram.

[2 marks]

[2 marks]

Question 2b

b)
Cyanide is a potentially deadly chemical that inhibits the functioning of mitochondria.

i)
Suggest the effect that cyanide would have on the concentration of sodium ions inside the intestinal epithelial cells shown in part a).

[1 mark]

ii)
Explain your answer to part i).

[1 mark]

[2 marks]

Question 2c

c)
Suggest, with a reason, the effect that cyanide would have on the absorption of amino acids.

[3 marks]

[3 marks]

Question 2d

d)
Explain why amino acids cannot be absorbed by simple diffusion.

[1 mark]

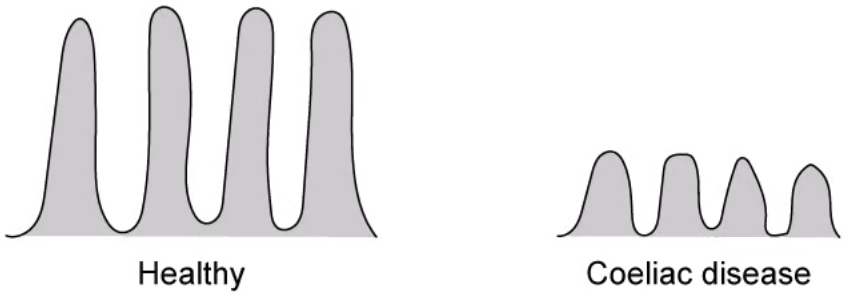
[1 mark]

Question 3a

a)

Coeliac disease is an autoimmune disorder that occurs in some people when they consume gluten, a type of protein found in certain grains. During an autoimmune disorder the immune system launches an attack on healthy body tissue which involves lymphocytes.

The following diagram compares the lining of the small intestine of a healthy person and a person suffering from coeliac disease.



Based on the information provided, explain how coeliac disease will affect the absorption of nutrients.

[2 marks]

[2 marks]

Question 3b

b)

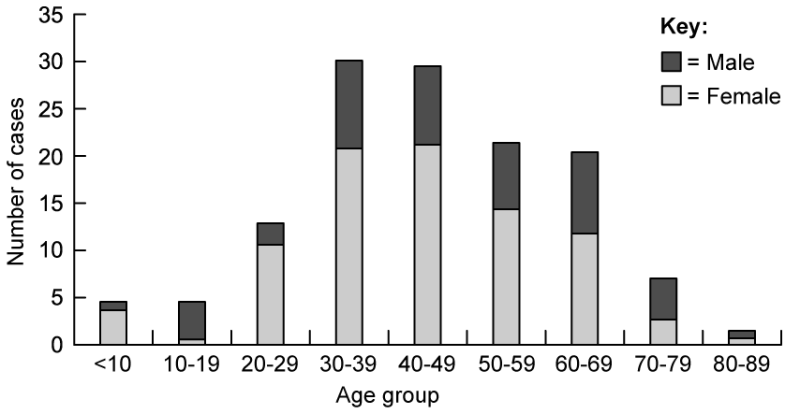
Suggest how the immune system would respond to the presence of gluten proteins.

[3 marks]

[3 marks]

Question 3c

c)
The following graph shows the number of people at a hospital diagnosed with coeliac disease according to their age group.



Describe what the data show about age and number of cases of coeliac disease.

[3 marks]

[3 marks]

Question 3d

d)
Suggest an explanation for the observed prevalence of coeliac disease across different age groups shown in part c).

[1 mark]

[1 mark]

Question 4a

a)
People suffering from stomach cancer can undergo surgery to remove a part of their stomach. This type of surgery is known as a gastrectomy and can result in the patient developing a set of symptoms known as 'dumping syndrome'.

Usually the stomach will slowly release small amounts of partially digested food into the small intestine over a period of several hours, but in patients suffering from dumping syndrome large amounts of poorly digested food are released into the small intestine in a short period of time after a meal. This poorly digested food tends to be high in dissolved nutrients such as sugars.

i)
One symptom of dumping syndrome is a large volume of fluid in the small intestine.

Explain why this is the case.

[2 marks]

ii)
Suggest **one** possible symptom that might result from this excess of fluid.

[1 mark]

[3 marks]

Question 4b

b)
Patients will often suffer from nutrient deficiencies after developing dumping syndrome.

Suggest a reason for this.

[2 marks]

[2 marks]

Question 4c

c)
Up to a third of dumping syndrome patients suffer from a form of the condition known as late dumping syndrome. These patients will experience symptoms 1–3 hours after eating due to the effects of the hormone insulin.

Suggest why these symptoms would arise 1–3 hours after eating.

[1 mark]

[1 mark]

Question 4d

d)
One of the symptoms of late dumping syndrome is fatigue.

Using information provided in part c), explain why people suffering from late dumping syndrome would feel fatigued.

[3 marks]

[3 marks]

Question 5a

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

a)
Compare and contrast the process of peristalsis in the oesophagus and the small intestine.

[4 marks]

[4 marks]

Question 5b

b)
The products of lipid digestion are absorbed by the villi of the small intestine.

Outline the process of lipid absorption.

[7 marks]

[7 marks]