AQA GCSE Biology | 8461

SPECIFICATION POINT 4.2.2.1

The human digestive system

Past-paper questions

Tier	**Foundation**
Question groups	**47**
Available paper years	**2008–2025**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

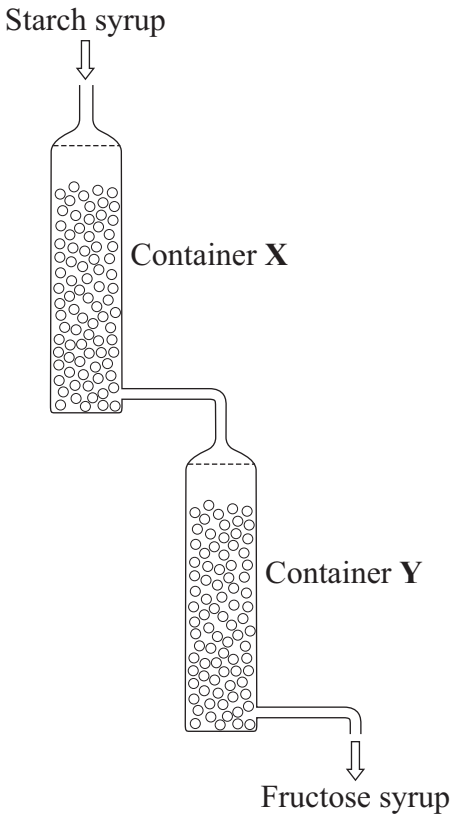
Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

4.2.2.1 The human digestive system

Question 01

January 2008 | BLY2F | Original Q5 | Legacy

5 The diagram shows an industrial process. Containers **X** and **Y** contain enzymes.



(a) Starch syrup slowly trickles into container **X**.
The enzymes in container **X** convert the starch into glucose (sugar).
The enzymes in container **Y** convert the glucose into fructose.

The equation shows what happens in containers **X** and **Y**.

$$\text{starch} \xrightarrow{\text{Enzyme A}} \text{glucose} \xrightarrow{\text{Enzyme B}} \text{fructose}$$

Choose words from the box to name enzyme **A** and enzyme **B**.

carbohydrase	**isomerase**	**lipase**	**protease**

Enzyme **A** .....

Enzyme **B** .....

(2 marks)

4.2.2.1 The human digestive system

Question 01 · continued

BLANK

(b) Fructose syrup is much sweeter than glucose syrup.

Why do manufacturers of slimming foods use fructose syrup rather than glucose syrup?

.....

.....

(1 mark)

(c) Here are some of the properties of enzymes:

- they all work at atmospheric pressures
- they are easily broken down by high temperature or the wrong pH
- they are soluble in water, so it may be difficult to separate them from products
- they are expensive to buy
- they work well at 25–45 °C.

Use **only** the information above to answer these questions.

(i) Give **two** advantages of using enzymes in industry.

1 .....

2 .....

(2 marks)

(ii) Give **two** disadvantages of using enzymes in industry.

1 .....

2 .....

(2 marks)

7

4.2.2.1 The human digestive system

Question 02

June 2008 | BLY2F | Original Q5 | Legacy

5 In fish and chip shops, potatoes are cut into chips several hours before they are cooked.

The amount of water in the chips must be kept constant during this time.

To keep the water in the chips constant, the chips are kept in salt solution.

A student investigated the effect of different concentrations of salt solution on the mass of chips.

- He weighed each of five chips.
- He placed each chip into a different concentration of salt solution.
- After one hour he removed the chips, then reweighed them.

His results are shown in the table.

Concentration of salt solution	**0 M**	**0.5 M**	**1 M**	**2 M**	**3 M**
Mass of chip at start in grams	2.6	2.8	2.8	2.5	2.6
Mass of chip after one hour in grams	2.7	2.8	2.7	2.3	2.1

5 (a) (i) In which concentration of salt solution did the chip gain mass?

..... M

(1 mark)

5 (a) (ii) Complete the sentence by drawing a ring around the correct answer in the box.

The chip gained mass because water entered by

digestion
osmosis
respiration

.

(1 mark)

4.2.2.1 The human digestive system

Question 02 · continued

for mark

5 (b) In which concentration of salt solution should the chips be kept?

..... M

Give a reason for your answer.

.....

.....

(2 marks)

5 (c) How could the student have made his investigation more reliable?

.....

.....

(1 mark)

5

Turn over for the next question

4.2.2.1 The human digestive system

Question 03

June 2008 | BLY2F | Original Q7 | Legacy

7 Enzymes are used in biological detergents.

7 (a) Name the type of enzyme that digests stains containing fats.

.....

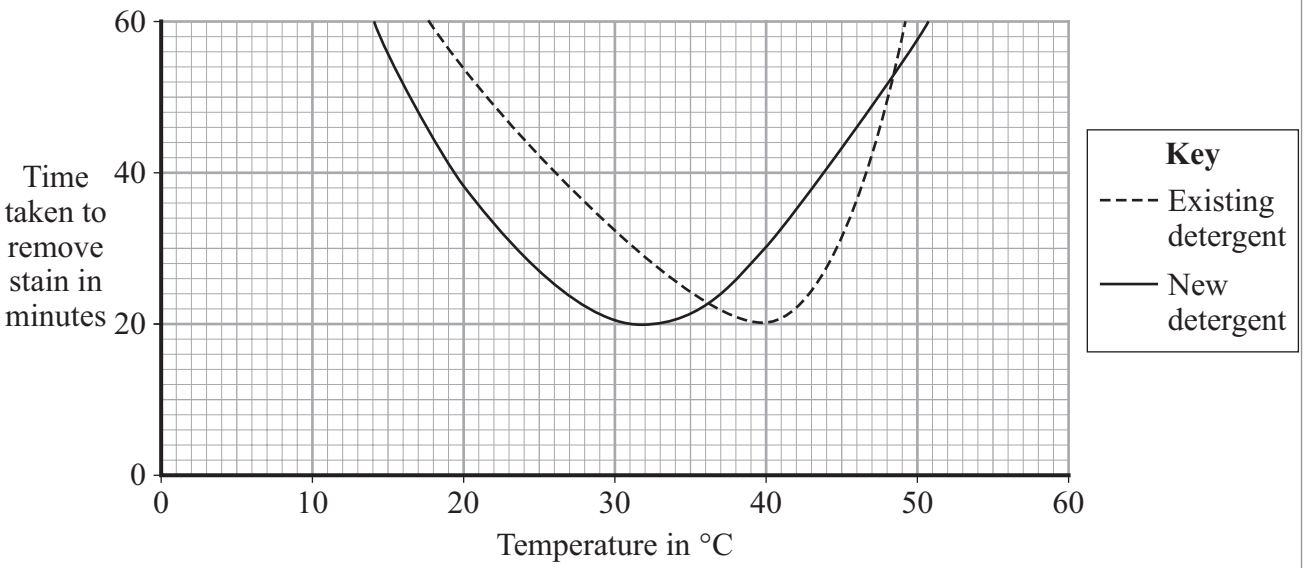
(1 mark)

7 (b) A new detergent is marketed as being 'environmentally-friendly'.

Scientists compared the performance of this new detergent with an existing detergent.

They measured the time taken by the two detergents to remove a fat stain at different temperatures.

The graph shows their results.



7 (b) (i) Describe the effect of increasing the temperature on the time taken by the existing detergent to remove the stain.

.....

.....

.....

.....

(2 marks)

4.2.2.1 The human digestive system

Question 03 · continued

for mark

7 (b) (ii) The new detergent works at a lower temperature than the existing one.

Is the new detergent likely to be more 'environmentally-friendly' than the existing detergent?

Draw a ring around your answer. **Yes / No**

Explain the reason for your answer.

.....

.....

.....

.....

(2 marks)

7 (c) Neither detergent works well at 60 °C.

Explain why.

.....

.....

.....

.....

(2 marks)

7

4.2.2.1 The human digestive system

Question 04

January 2009 | BLY2F | Original Q2 | Legacy

2 Enzymes have many uses in the home and in industry.

2 (a) Which type of organism is used to produce these enzymes?

Tick (✓) **one** box.

Mammals ☐

Microorganisms ☐

Plants ☐

(1 mark)

2 (b) Babies may have difficulty digesting proteins in their food. Baby food manufacturers use enzymes to 'pre-digest' the protein in baby food to overcome this difficulty.

Use words from the box to complete the sentences.

amino acids	**amylases**	**proteases**	**sugars**

2 (b) (i) Proteins are 'pre-digested' using enzymes called .....

(1 mark)

2 (b) (ii) This pre-digestion produces .....

(1 mark)

2 (c) A baby food manufacturer uses enzyme **V** to pre-digest protein.
He tries four new enzymes, **W**, **X**, **Y** and **Z**, to see if he can reduce the time taken to pre-digest the protein.

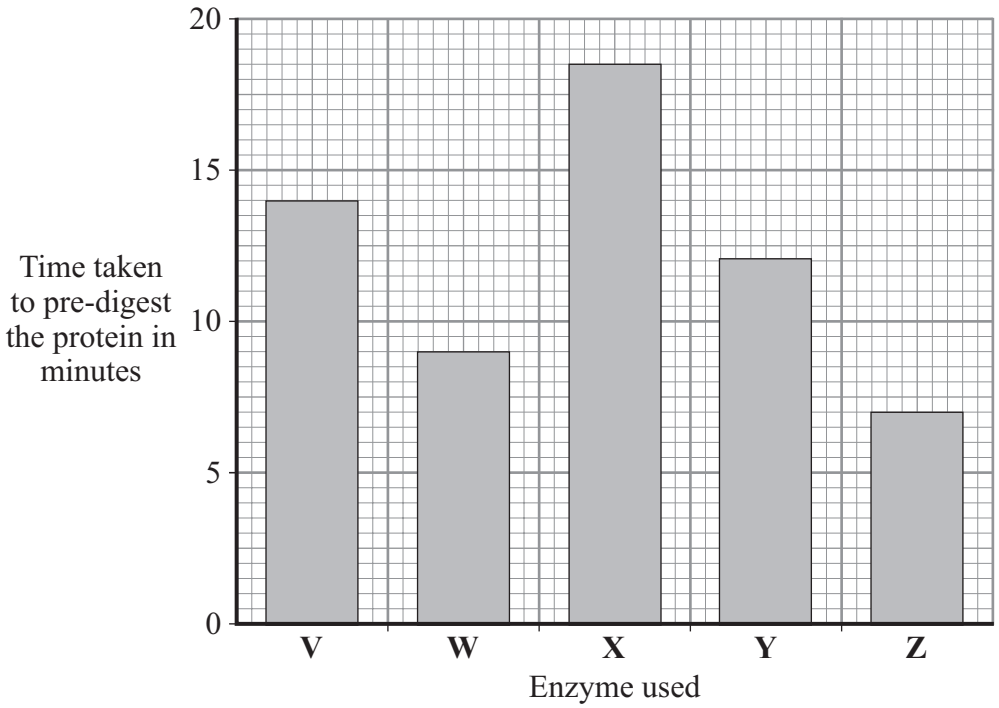
The graph shows the time taken for the enzymes to completely pre-digest the protein.

The manufacturer uses the same concentration of enzyme and the same mass of protein in each experiment.

4.2.2.1 The human digestive system

Question 04 · continued

for mark



2 (c) (i) How long did it take enzyme **V** to pre-digest the protein? ☐ minutes

(1 mark)

2 (c) (ii) Which enzyme would you advise the baby food manufacturer to use?

Draw a ring around your answer.

enzyme V **enzyme W** **enzyme X** **enzyme Y** **enzyme Z**

Give a reason for your answer.

.....

.....

(2 marks)

2 (c) (iii) Give **two** factors which should be controlled in the baby food manufacturer's investigations.

Tick (✓) **two** boxes.

Oxygen concentration ☐

Temperature ☐

Light intensity ☐

pH ☐

(2 marks)

8

4.2.2.1 The human digestive system

Question 05

January 2009 | BLY2F | Original Q4 | Legacy

4 Waste products, such as carbon dioxide and urea, have to be removed from the body.

Draw a ring around the correct answer to complete each sentence.

4 (a) Carbon dioxide is produced by [breathing / diffusion / respiration].

(1 mark)

4 (b) Most carbon dioxide leaves the body through the [kidneys / lungs / skin].

(1 mark)

4 (c) Urea is produced in the [kidneys / liver / lungs].

(1 mark)

4 (d) Urea is produced from the breakdown of [amino acids / glucose / urine].

(1 mark)

4

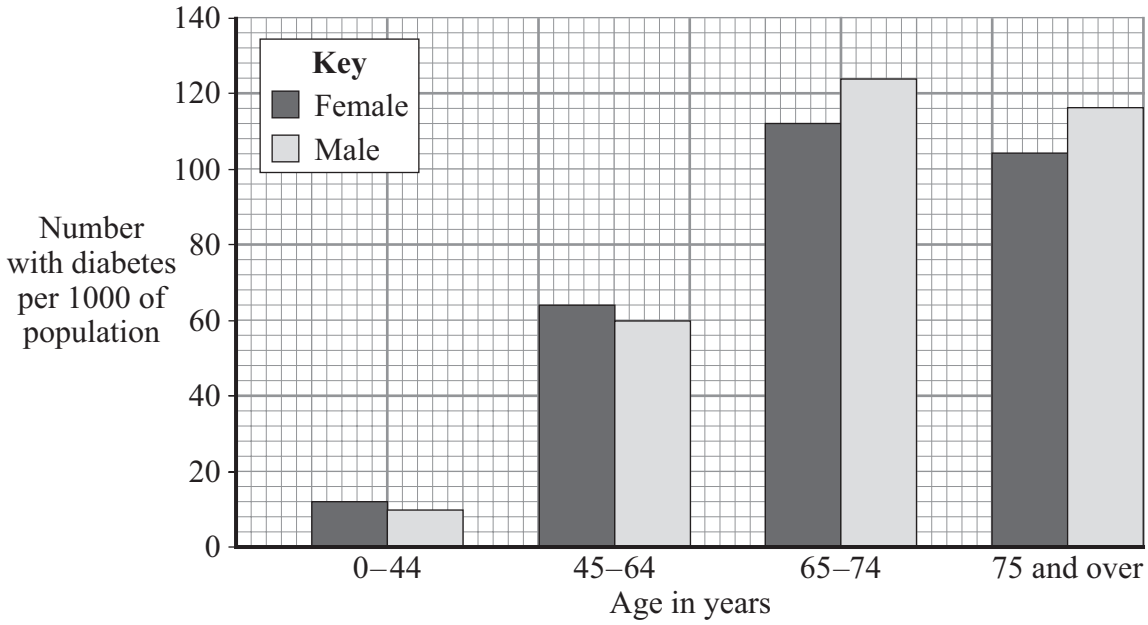
4.2.2.1 The human digestive system

Question 06

June 2009 | BLY2F | Original Q6 | Legacy

6 Diabetes is caused when the body does not produce enough insulin.

6 (a) The bar graph shows the number of people with diabetes per 1000 of population.



6 (a) (i) How many more males aged between 45 and 64 years of age have diabetes than males under 45 years of age?

Show clearly how you work out your answer.

.....

.....

Answer ..... per 1000 of population
(2 marks)

6 (a) (ii) Describe the way in which the number of females with diabetes changes with age.

.....

.....

.....

.....

.....
(2 marks)

4.2.2.1 The human digestive system

Question 06 · continued

for mark

6 (b) One way of treating diabetes is by injecting insulin.

Insulin is a protein.

6 (b) (i) If insulin is taken by mouth, it is broken down in the digestive system.

Where in the digestive system would insulin be broken down?

Draw a ring around your answer.

liver **mouth** **stomach**

(1 mark)

6 (b) (ii) Give **one** way of treating diabetes instead of using insulin.

.....

.....

(1 mark)

6

4.2.2.1 The human digestive system

Question 07

June 2009 | BLY3F | Original Q2 | Legacy

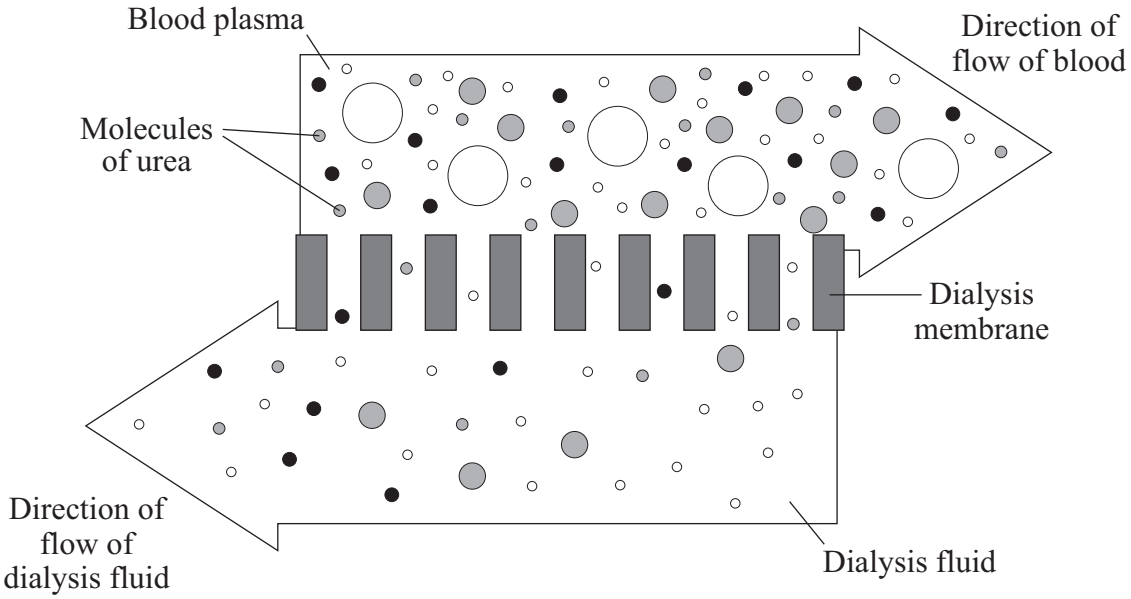
2 (a) Which **two** of the following substances are found in the urine of a healthy person?

Tick (✓) **two** boxes.

Glucose	☐
Mineral ions	☐
Proteins	☐
Water	☐

(2 marks)

2 (b) A person with kidney disease can be treated by dialysis.
The diagram shows how dialysis works.
The circles represent molecules of different substances.



Draw a ring around the correct word or phrase to complete each sentence.

2 (b) (i) During dialysis, urea moves out of the

blood cells
blood plasma
dialysis fluid

.

(1 mark)

4.2.2.1 The human digestive system

Question 07 · continued

for mark

2 (b) (ii) During dialysis, urea moves into the [blood cells / blood plasma / dialysis fluid] .

(1 mark)

2 (b) (iii) Urea moves by the process of [diffusion / digestion / transpiration] .

(1 mark)

2 (b) (iv) To allow the movement of urea, the dialysis membrane is [impermeable / partially permeable / thick] .

(1 mark)

2 (b) (v) The urea can pass through the membrane because

the urea molecules are [large / round / small] .

(1 mark)

2 (c) For most patients a kidney transplant is better than continued dialysis treatment.

Tick (✓) **one** box to complete the sentence.

One major problem with a kidney transplant is that

drug treatment is needed to suppress the immune system. ☐

hospital visits are needed three times a week. ☐

yearly costs are higher than for dialysis. ☐

(1 mark)

8

4.2.2.1 The human digestive system

Question 08

January 2010 | BLY2F | Original Q1 | Legacy

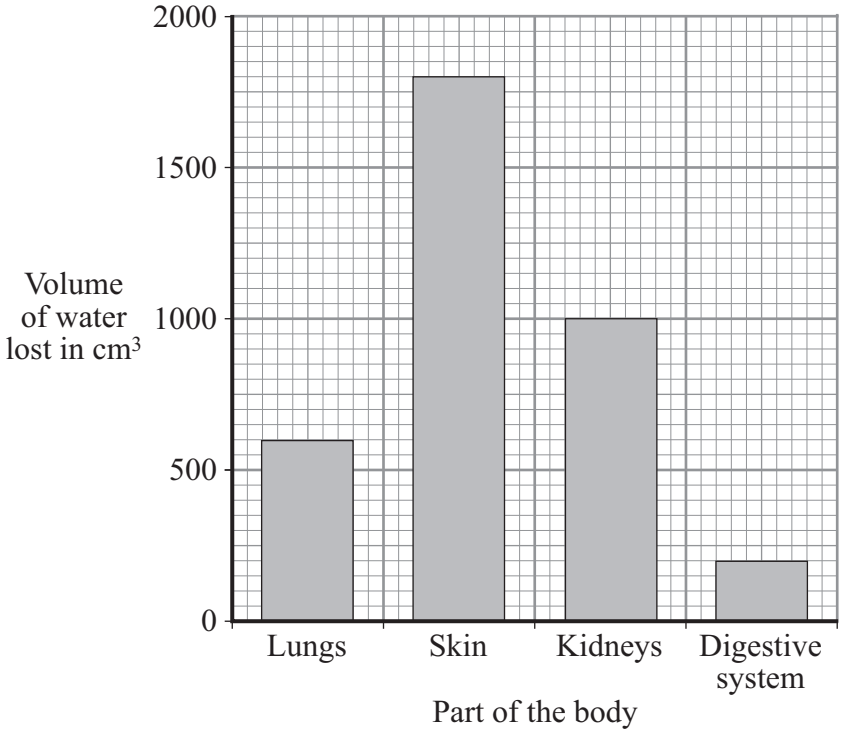
1 Water is lost from several parts of the body.

1 (a) Draw **one** line from each body part to the substance in which water is lost.

Body Part	Substance
Kidneys	Urine
Lungs	Faeces
Skin	Sweat
	Breath

(3 marks)

1 (b) The bar chart shows the volume of water a person lost from different parts of the body during a warm day.



4.2.2.1 The human digestive system

Question 08 · continued

for mark

1 (b) (i) What volume of water was lost through the skin on the warm day?

Tick (✓) **one** box.

600 cm^3 ☐

1600 cm^3 ☐

1800 cm^3 ☐

(1 mark)

1 (b) (ii) What effect would colder weather have on the amount of water lost through the skin?

Draw a ring around your answer.

decreases **increases** **stays the same**

(1 mark)

1 (b) (iii) Give a reason for your answer.

.....

.....

(1 mark)

1 (c) What effect does cold weather generally have on the amount of urine produced?

Draw a ring around your answer.

decreases **increases** **stays the same**

(1 mark)

7

4.2.2.1 The human digestive system

Question 09

January 2019 | BLY2F | Original Q5 | Legacy

5 A group of pupils investigated the digestion of fat by the enzyme lipase.

5 (a) What **two** substances are produced when fats are digested?

Tick (✓) **two** boxes.

Glucose ☐

Fatty acids ☐

Glycerol ☐

Amino acids ☐

(2 marks)

In the investigation:

- the pupils set up five test tubes
- each tube contained 1 cm^3 of fat and 10 cm^3 of lipase solution
- each tube was kept at a different temperature for 24 hours.

5 (b) (i) Give **one** control variable in this investigation.

.....

(1 mark)

5 (b) (ii) What was the independent variable being investigated?

.....

(1 mark)

5 (c) The pH of the solution in each tube was tested at the beginning of the investigation and after 24 hours.

The results of the pupils' investigation are shown in the table.

Tube	Temperature in °C	pH at the beginning	pH after 24 hours
1	0	Neutral	Neutral
2	20	Neutral	'Weak' acid
3	40	Neutral	'Strong' acid
4	60	Neutral	'Weak' acid
5	80	Neutral	Neutral

4.2.2.1 The human digestive system

Question 09 · continued

for mark

One pupil said, "We might **not** have found the best temperature for the lipase to work".

What more could they do to find the best temperature?

.....

.....

.....

.....

.....

(2 marks)

5 (d) The pupils then placed **Tube 1** into a water-bath kept at 40 °C.
The tube was left in the water-bath for 24 hours.

5 (d) (i) What pH would you expect the contents of the tube to be after the extra 24 hours?

Tick (✓) **one** box.

Neutral ☐

'Strong' acid ☐

'Weak' acid ☐

(1 mark)

5 (d) (ii) Give the reason for your answer.

.....

.....

(1 mark)

8

4.2.2.1 The human digestive system

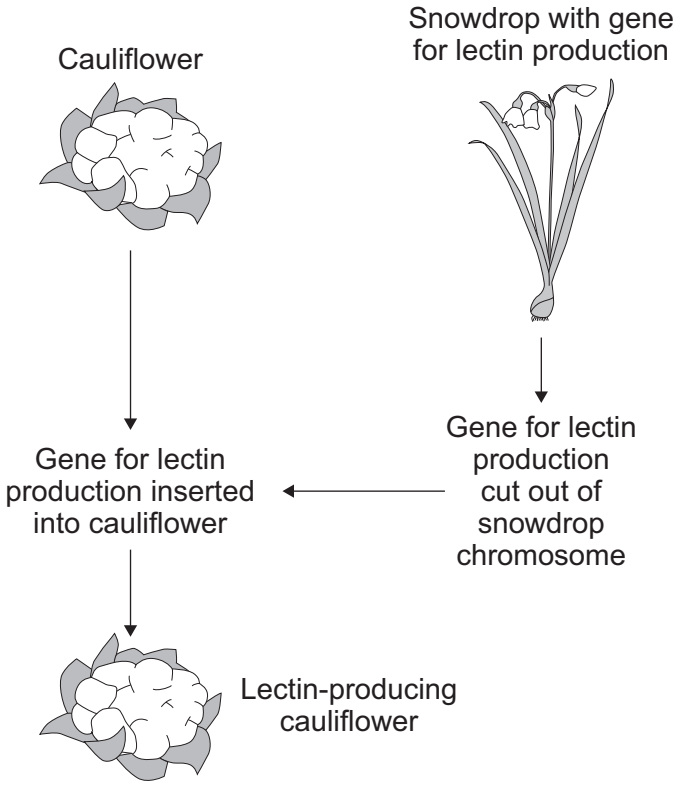
Question 10

June 2010 | BLY1BP | Original Q9 | Legacy

QUESTION NINE

Up to 40 % of cauliflower crops may be eaten by insects.
Snowdrops can survive attacks by insects because they produce a substance called lectin.
Lectin interferes with the insect's digestive system.

The diagram shows one method of introducing the gene for lectin production into cauliflowers.



9A The gene for lectin production is cut from the snowdrop chromosome using . . .

1 lectin.

2 a herbicide.

3 an enzyme.

4 an electric shock.

9B The technique used to transfer the gene from the snowdrop to the cauliflower is called . . .

1 biodiversity.

2 embryo transplant.

3 cloning.

4 genetic engineering.

4.2.2.1 The human digestive system

Question 10 · continued

9C What is the main benefit to the environment of farmers growing lectin-producing cauliflowers?

1 More snowdrops will survive.

2 Less pesticide will be used.

3 Insects will eat something else.

4 Less fertiliser will be needed.

9D An ethical concern about this technique is that . . .

1 it will make farmers richer.

2 it will increase biodiversity.

3 it is interfering with nature.

4 it is sustainable.

END OF TEST

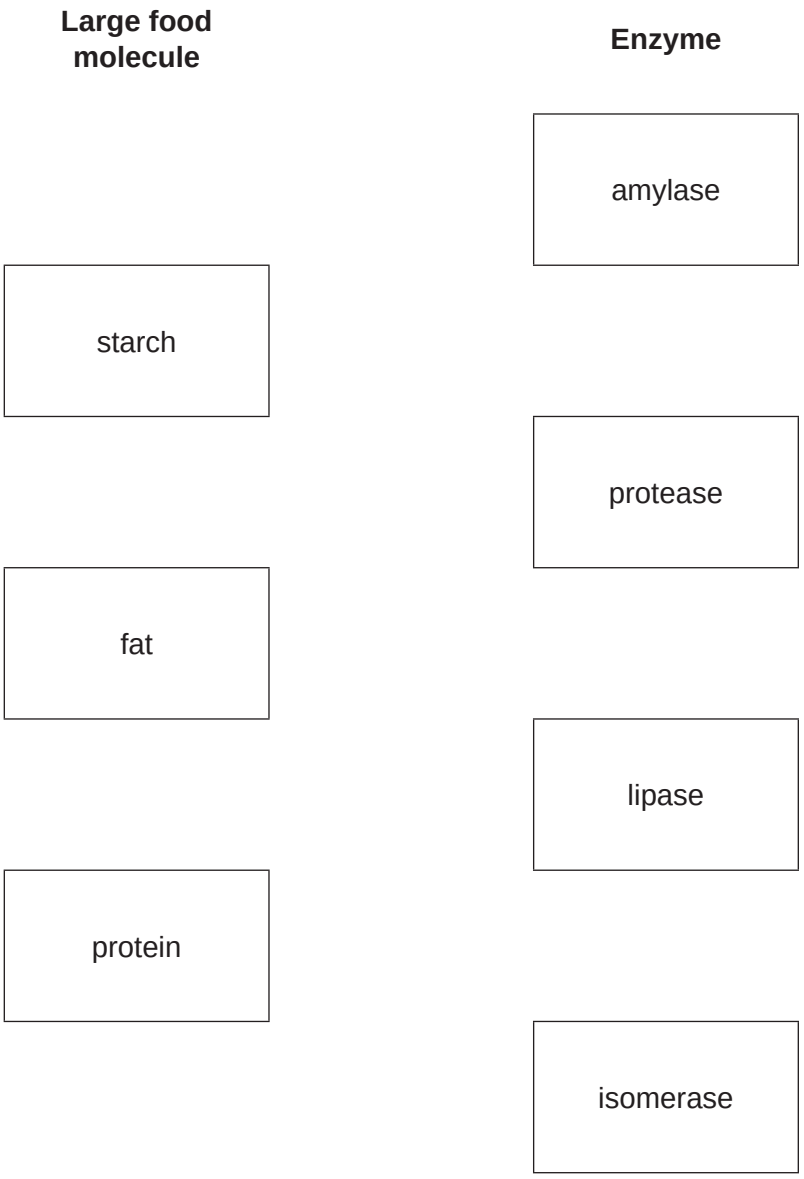
4.2.2.1 The human digestive system

Question 11

June 2010 | BLY2F | Original Q3 | Legacy

3 The body uses enzymes to digest (break down) large food molecules into smaller molecules.

3 (a) (i) Draw **one** line from **each** large food molecule to the enzyme that acts on it.



(3 marks)

4.2.2.1 The human digestive system

Question 11 · continued June 2019 | BLY2F | Original Q3 | Legacy

3 (a) (ii) Draw a ring around the correct answer to complete each sentence.

Starch is broken down into

amino acids.
fatty acids and glycerol.
sugars.

Fat is broken down into

amino acids.
fatty acids and glycerol.
fructose.

Protein is broken down into

amino acids.
fructose.
sugars.

(3 marks)

3 (b) Bile helps digestion.

Where is bile produced?

Draw a ring around **one** answer.

liver **mouth** **stomach**

(1 mark)

7

4.2.2.1 The human digestive system

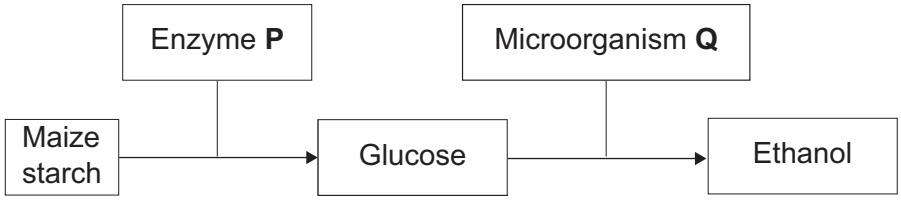
Question 12

June 2019 | BLY3F | Original Q3 | Legacy

3 Ethanol (alcohol) can be mixed with petrol to make gasohol.
The photograph shows three gasohol pumps at a service station.



The flowchart shows one way of manufacturing ethanol.



3 (a) Draw a ring around the correct answer to each question.

3 (a) (i) Enzyme **P** changes starch into glucose.

What type of enzyme is **P**?

carbohydrase **lipase** **protease**

(1 mark)

3 (a) (ii) Microorganism **Q** changes glucose into ethanol.

What type of microorganism is **Q**?

bacterium **mould** **yeast**

(1 mark)

4.2.2.1 The human digestive system

Question 12 · continued

3 (a) (iii) The ethanol produced by microorganism **Q** is contaminated with water.

Ethanol is separated from the mixture by

distillation **fermentation** **filtration**

(1 mark)

3 (b) In the long term, it may be better to use ethanol made from maize crops as a fuel for cars rather than petrol.

Explain why.

.....

.....

.....

.....

.....

(2 marks)

5

4.2.2.1 The human digestive system

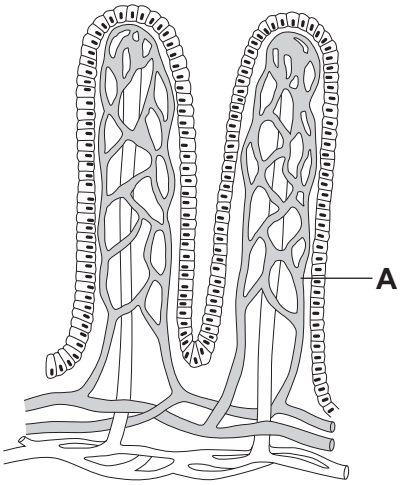
Question 13

January 2011 | BLY3F | Original Q2 | Legacy

2 Villi are found in some parts of the digestive system.

Diagram 1 shows two villi.

Diagram 1



2 (a) Draw a ring around the correct answer to complete each sentence.

2 (a) (i) Structure **A** is a

muscle.

nerve.

capillary.

(1 mark)

2 (a) (ii) The villi absorb the products of digestion by

dialysis.

diffusion.

osmosis.

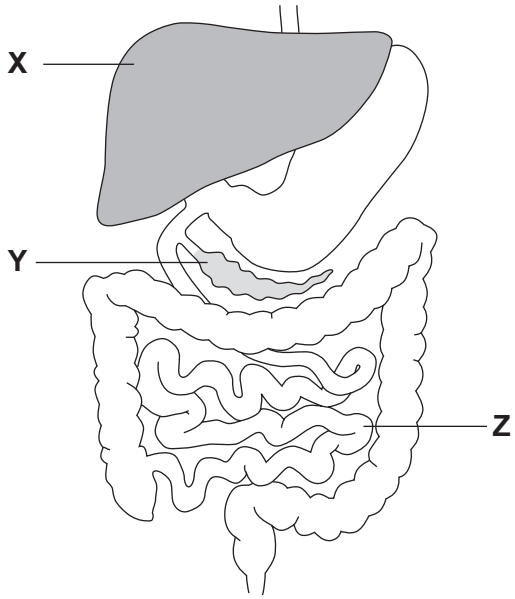
(1 mark)

4.2.2.1 The human digestive system

Question 13 · continued

2 (b) **Diagram 2** shows the digestive system.

Diagram 2



2 (b) (i) In which part of the digestive system, **X**, **Y** or **Z**, are most villi found?

(1 mark)

2 (b) (ii) There are about 2000 villi in each cm^2 of this part of the digestive system.

Why is it helpful to have lots of villi?

.....

.....

(1 mark)

4

4.2.2.1 The human digestive system

Question 14

June 2011 | BLY2F | Original Q3 | Legacy

3 Our bodies control the concentration of glucose in the blood.

Draw a ring around the correct answer to complete each sentence.

3 (a) The concentration of glucose in the blood is controlled by a

hormone called

- carbohydrase.
- insulin.
- protease.

(1 mark)

3 (b) This hormone is produced by the

- intestine.
- stomach.
- pancreas.

(1 mark)

3 (c) If the body does not produce enough of this hormone,

the person develops

- diabetes.
- cystic fibrosis.
- Huntington's disease.

(1 mark)

3

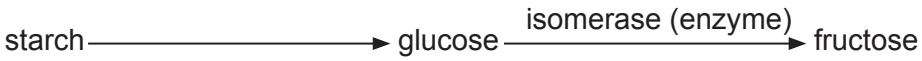
4.2.2.1 The human digestive system

Question 15

June 2011 | BLY2F | Original Q4 | Legacy

4 (a) Starch can be used to produce fructose for slimming foods.

The flow chart shows the process.



4 (a) (i) Isomerase is used to change glucose into fructose.

Which enzyme could be used to change the starch into glucose?

Draw a ring round **one** answer.

carbohydrase **isomerase** **protease**

(1 mark)

4 (a) (ii) What is the advantage of using fructose, instead of glucose, in slimming foods?

Tick (✓) **one** box.

Fructose is not as sweet as glucose so can be used in smaller amounts. ☐

Fructose is sweeter than glucose so can be used in larger amounts. ☐

Fructose is sweeter than glucose so can be used in smaller amounts. ☐

(1 mark)

4.2.2.1 The human digestive system

Question 15 · continued

4 (b) Enzymes are used in industry.

These are some of the properties of industrial enzymes:

- enzymes work at low temperatures
- workers have to use face masks when working with enzymes
- enzymes work in a narrow range of pH values
- enzymes can be re-used many times
- enzymes are easily broken down by high temperature
- enzymes are very expensive to buy.

Use **only** the information above to answer the questions.

4 (b) (i) Give **two** advantages of using enzymes in industry.

1 .....

.....

2 .....

.....

(2 marks)

4 (b) (ii) Give **two** disadvantages of using enzymes in industry.

1 .....

.....

2 .....

.....

(2 marks)

6

4.2.2.1 The human digestive system

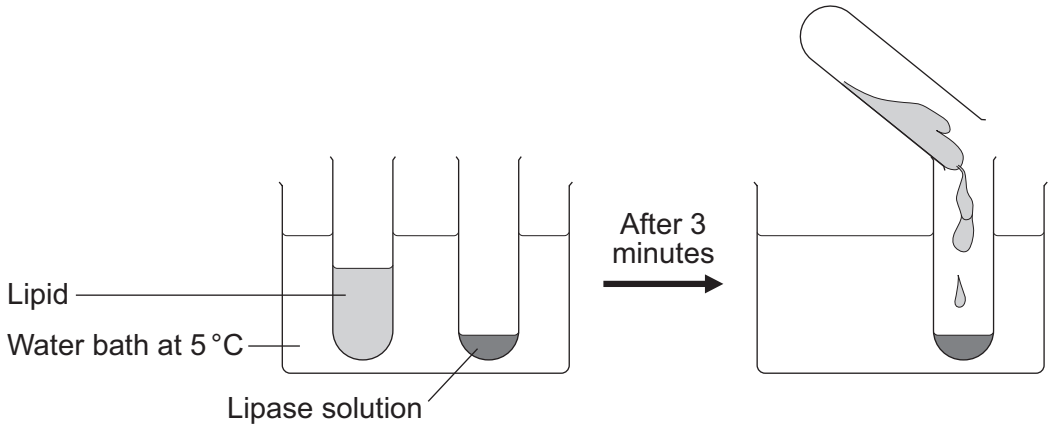
Question 16

June 2011 | BLY2F | Original Q8 | Legacy

8 A group of students investigated the effect of temperature on the action of the enzyme lipase.

The students:

- put 1 cm^3 of lipase solution into a test tube
- put 5 cm^3 of lipid into a different test tube
- put both tubes in a water bath at 5 °C for 3 minutes
- mixed the lipid with the lipase solution.



Every five minutes the students tested a sample of the mixture for lipid, until no lipid remained.
The students repeated the experiment at different temperatures.

8 (a) To make their investigation fair the students needed to control some variables.

Give **one** variable the students controlled in their investigation.

.....

(1 mark)

8 (b) The tubes of lipase solution and lipid were kept separately in the water bath for 3 minutes before mixing. Why?

Tick (✓) **one** box.

So that the lipase broke down the lipid quickly ☐

So that the lipase and the lipid reached the right temperature ☐

To give enough time for the lipase to break down the lipid ☐

To give enough time for the water bath to heat up ☐

(1 mark)

4.2.2.1 The human digestive system

Question 16 · continued

The table shows the students' results.

Temperature in °C	Time taken until no lipid remained in minutes
5	40
20	15
35	5
50	30
95	lipid still there after 120 minutes

8 (c) Describe the effect on the breakdown of the lipid of increasing the temperature from 5 °C to 50 °C.

.....

.....

.....

.....

(2 marks)

8 (d) Suggest **two** ways in which the students could have improved their investigation.

Use information from the students' method and the results table to help you.

1 .....

.....

.....

2 .....

.....

.....

(2 marks)

Question 8 continues on the next page

4.2.2.1 The human digestive system

Question 16 · continued

8 (e) (i) The lipase did **not** break down the lipid at 95°C.

Why?

.....

.....

(1 mark)

8 (e) (ii) At 35°C the lipase broke down the lipid after 5 minutes.

What new substances will be in the tube?

Draw a ring around **one** answer.

amino acids **fatty acids and glycerol** **sugars**

(1 mark)

8

4.2.2.1 The human digestive system

Question 17

June 2011 | BLY3F | Original Q4 | Legacy

4 Muscles need energy during exercise.

Draw a ring around the correct answer in parts (a) and (b) to complete each sentence.

4 (a) (i) The substance stored in the muscles and used during exercise is

glycogen.

lactic acid.

protein.

(1 mark)

4 (a) (ii) The process that releases energy in muscles is

digestion.

respiration.

transpiration.

(1 mark)

4.2.2.1 The human digestive system

Question 17 · continued

4 (b) The table shows how much energy is used by two men of different masses when swimming at different speeds.

Speed of swimming in metres per minute	Energy used in kJ per hour	
	34 kg man	70 kg man
25	651	1155
50	1134	2103

4 (b) (i) When the 34 kg man swims at 50 metres per minute instead of at 25 metres per minute, the extra energy he uses each hour is

36 kJ.
483 kJ.
948 kJ.

(1 mark)

4 (b) (ii) When swimming at 50 metres per minute, each man's heart rate is faster than when swimming at 25 metres per minute.

A faster heart rate helps to supply the muscles with more

carbon dioxide.
glycogen.
oxygen.

(1 mark)

4 (b) (iii) During the exercise the arteries supplying the muscles would

constrict.
dilate.
pump harder.

(1 mark)

4 (c) When a person starts to swim, the breathing rate increases.

Give **one** way in which this increase helps the swimmer.

.....

.....

(1 mark)

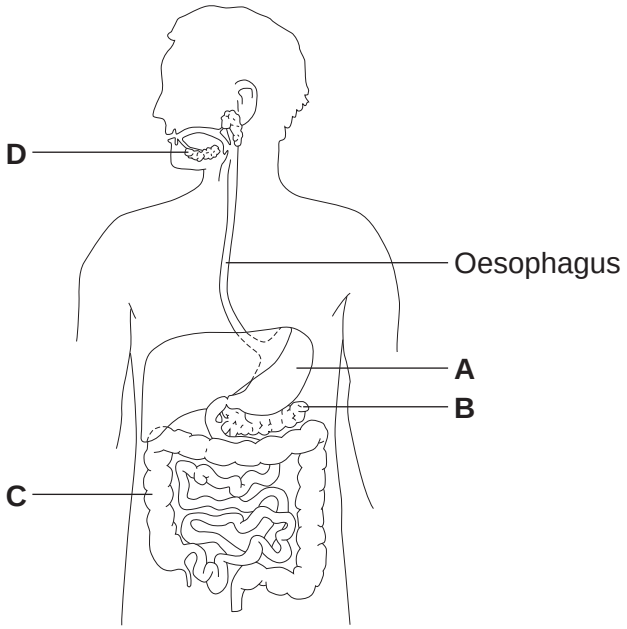
6

4.2.2.1 The human digestive system

Question 18

June 2012 | BL2FP | Original Q5 | Legacy

5 The diagram shows the human digestive system.



5 (a) *Heartburn* is a burning feeling caused when acid enters the oesophagus. The acid comes from the stomach.

5 (a) (i) Which letter on the diagram shows the stomach? ☐

(1 mark)

5 (a) (ii) Name the acid the stomach produces.

.....

(1 mark)

5 (a) (iii) Medicines taken to treat *heartburn* contain chemicals that neutralise excess stomach acid.

What type of chemical will neutralise stomach acid?

.....

(1 mark)

4.2.2.1 The human digestive system

Question 18 · continued

5 (b) Use words from the box and your own knowledge to describe how carbohydrates are digested.

amylase	starch	sugars

.....

.....

.....

.....

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.....

.....

.....

.....

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.....

.....

(5 marks)

5 (c) Where in the body are the products of digestion absorbed?

.....

(1 mark)

9

4.2.2.1 The human digestive system

Question 19

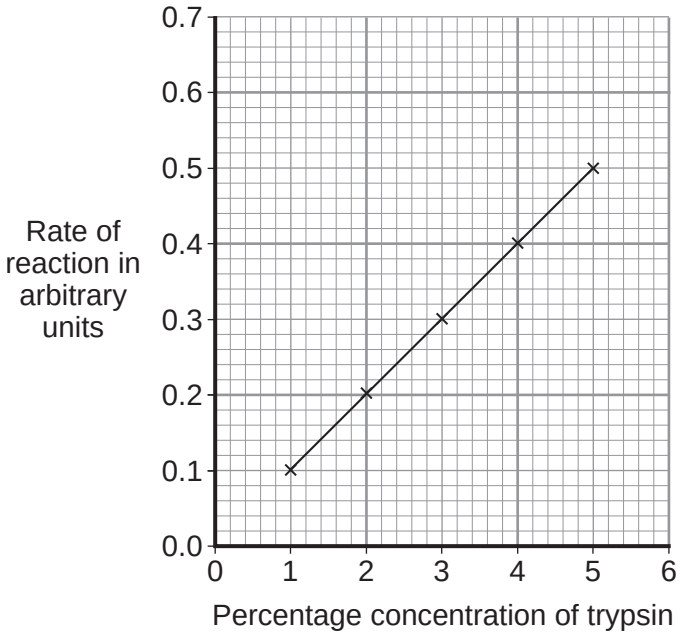
January 2013 | BL2FP | Original Q8 | Legacy

8 Trypsin is a protease enzyme. Trypsin will digest a protein called gelatine which covers the surface of photographic film.

Some students investigated the time taken to digest the gelatine with trypsin.
The students used five different concentrations of trypsin.

The rate of reaction was calculated from the time taken for the gelatine to be digested.

The graph shows the students' results.



8 (a) (i) Describe the relationship between the concentration of trypsin and the rate of reaction.

.....

.....

.....

.....

(2 marks)

8 (a) (ii) Use the graph to predict the rate of reaction with 6% trypsin.

..... arbitrary units

(1 mark)

4.2.2.1 The human digestive system

Question 19 · continued

8 (b) In industry, trypsin is used to pre-treat some baby foods.
In their experiment, the students used 1–5% trypsin at 20°C.
The baby food manufacturers make most profit if they use 0.5% trypsin at 35°C.

Suggest why the manufacturers make most profit with these conditions.

.....

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(4 marks)

8 (c) (i) Describe the effect trypsin would have on the baby food.

.....

.....

.....

.....

(2 marks)

8 (c) (ii) Apart from protease enzymes, give **one** other use of a **named** enzyme in industry.

.....

.....

.....

.....

(2 marks)

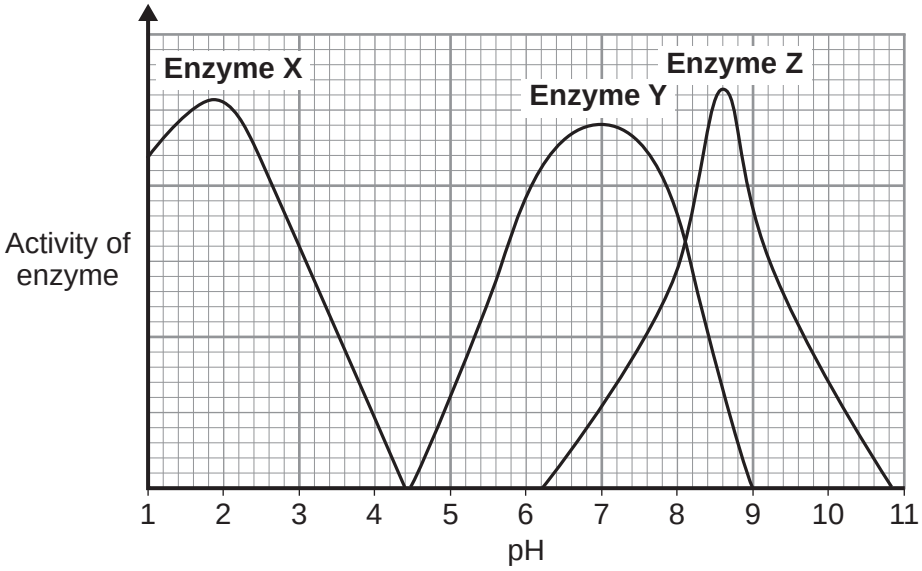
11

4.2.2.1 The human digestive system

Question 20

June 2013 | BL2FP | Original Q9 | Legacy

9 (a) The graph shows the effect of pH on the activities of three enzymes, **X**, **Y** and **Z**.
These enzymes help to digest food in the human digestive system.
Each enzyme is produced by a different part of the digestive system.



9 (a) (i) What is the optimum (best) pH for the action of enzyme **Z**?

.....

(1 mark)

9 (a) (ii) The stomach makes a substance that gives the correct pH for enzyme action in the human stomach.

Name this substance. .....

(1 mark)

9 (a) (iii) Which enzyme, **X**, **Y** or **Z**, will work best in the human stomach?

.....

(1 mark)

4.2.2.1 The human digestive system

Question 20 · continued

9 (b) *In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.*

Different parts of the human digestive system help to break down molecules of fat so that they can be absorbed into the body.

Describe how.

To gain full marks you should refer to:

- the enzyme and where the enzyme is produced
- the products of digestion
- any other chemicals involved.

.....

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(6 marks)

9

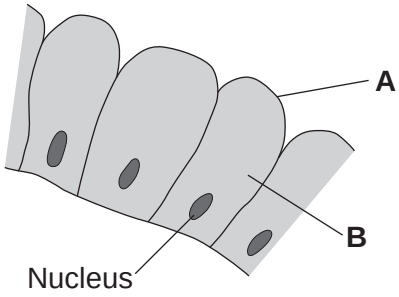
4.2.2.1 The human digestive system

Question 21

June 2014 | BL2FP | Original Q1 | Legacy

1 **Figure 1** shows some cells in the lining of the stomach.

Figure 1



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

[2 marks]

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

A .....

B .....

1 (a) (ii) What is the function of the nucleus?

Tick (✓) **one** box.

[1 mark]

To control the activities of the cell ☐

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

To release energy in respiration ☐

4.2.2.1 The human digestive system

Question 21 · continued

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

[3 marks]

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

6

4.2.2.1 The human digestive system

Question 22

June 2014 | BL2FP | Original Q3 | Legacy

3 Enzymes are used in many industrial processes.

3 (a) Draw a ring around the correct answer to complete each sentence.

3 (a) (i) An enzyme is

an antibody.

a catalyst.

a mineral.

[1 mark]

3 (a) (ii) In industry, enzymes are used so that reactions work well at

all pH values.

higher pressures.

lower temperatures.

[1 mark]

3 (a) (iii) In industry, the enzyme carbohydrase is used to change starch into

amino acids.

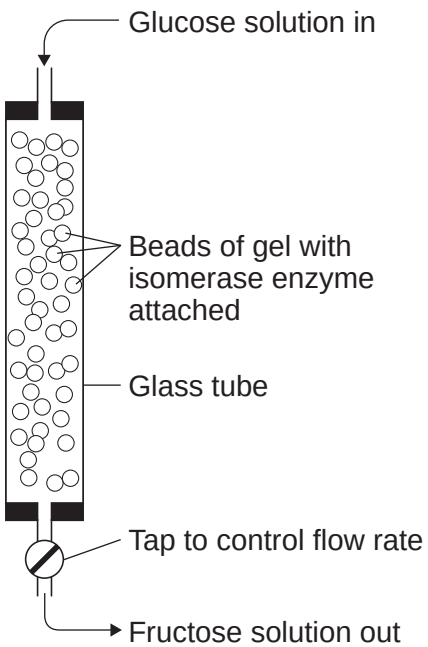
fatty acids.

sugar.

[1 mark]

3 (b) The enzyme isomerase changes glucose into fructose. In industry, the enzyme isomerase is attached to beads of gel in a glass tube, as shown in **Figure 5**.

Figure 5



4.2.2.1 The human digestive system

Question 22 · continued

Give **two** advantages of using an enzyme attached to beads of gel.

Tick (✓) **two** boxes.

[2 marks]

- The enzyme would be denatured. ☐
- The enzyme can easily be used again. ☐
- The fructose does not have any enzyme in it. ☐
- The enzyme can also be used to pre-digest baby foods. ☐

5

Turn over for the next question

4.2.2.1 The human digestive system

Question 23

June 2014 | BL2FP | Original Q6 | Legacy

6 (a) A student carried out the following investigation using a plant with variegated leaves.
A variegated leaf has green and white stripes.

The student:

- left the plant in the dark for 3 days to remove the starch
- fixed two pieces of card to a leaf on the plant
- left the plant in the light for 2 days
- removed the leaf from the plant
- tested the leaf for starch.

Figure 9 shows how the two pieces of card were attached to the leaf.

Figure 9

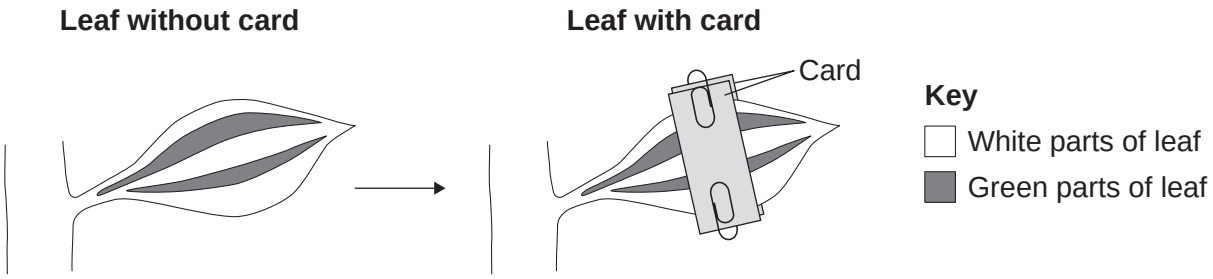
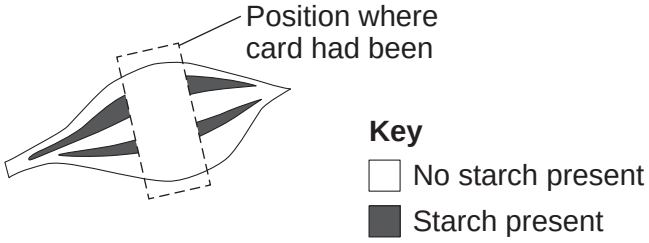


Figure 10 shows the same leaf after 2 days in the light.
The leaf has been tested for starch.

Figure 10



Give **two** conclusions from this investigation.

Tick (✓) **two** boxes.

[2 marks]

- Carbon dioxide is needed for photosynthesis. ☐
- Chlorophyll is needed for photosynthesis. ☐
- Light is needed for photosynthesis. ☐
- Water is needed for photosynthesis. ☐

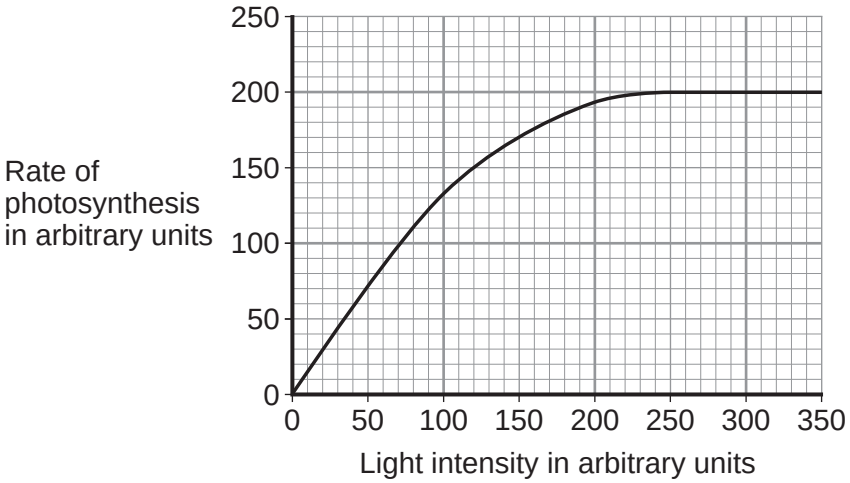
4.2.2.1 The human digestive system

Question 23 · continued

6 (b) Scientists investigated the effect of light intensity on the rate of photosynthesis.

Figure 11 shows the scientists' results.

Figure 11



Describe the effect of increasing light intensity on the rate of photosynthesis.
You should include numbers from **Figure 11** in your description.

[3 marks]

.....

.....

.....

.....

.....

.....

6 (c) At a light intensity of 250 arbitrary units, light is **not** a limiting factor of photosynthesis.

6 (c) (i) What is the evidence for this in **Figure 11**?

[1 mark]

.....

.....

6 (c) (ii) Give **two** factors that could be limiting the rate of photosynthesis at a light intensity of 250 arbitrary units.

[2 marks]

1 .....

2 .....

8

4.2.2.1 The human digestive system

Question 24

June 2014 | BL2FP | Original Q7 | Legacy

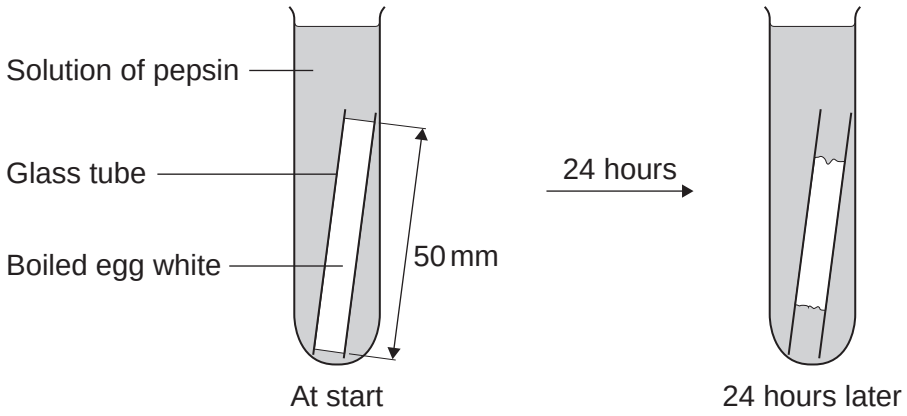
7 Some students investigated the effect of pH on the digestion of boiled egg white by an enzyme called pepsin. Egg white contains protein.

The students:

- put a glass tube containing boiled egg white into a test tube
- added a solution containing pepsin at pH 7
- set up six more tubes with solutions of pepsin at different pH values
- left the test tubes for 24 hours at room temperature.

Figure 12 shows one of the test tubes, at the start and at the end of the 24 hours.

Figure 12



7 (a) (i) Name the product of protein digestion.

[1 mark]

.....

7 (a) (ii) What type of enzyme digests protein?

Tick (✓) **one** box.

[1 mark]

amylase ☐

lipase ☐

protease ☐

4.2.2.1 The human digestive system

Question 24 · continued

7 (b) The egg white in each tube was 50 mm long at the start of the investigation. **Table 1** shows the students' results.

Table 1

pH	Length in mm of boiled egg white after 24 hours
1	38
2	20
3	34
4	45
5	50
6	50
7	50

7 (b) (i) At which pH did the pepsin work best?

[1 mark]

pH .....

7 (b) (ii) The answer you gave in part **(b)(i)** may not be the exact pH at which pepsin works best.

What could the students do to find a more accurate value for this pH?

[2 marks]

.....

.....

.....

.....

7 (b) (iii) There was no change in the length of the egg white from pH 5 to pH 7.

Explain why.

[2 marks]

.....

.....

.....

.....

Question 7 continues on the next page

4.2.2.1 The human digestive system

Question 24 · continued

7 (c) Pepsin is made by the stomach.

Name the acid made by the stomach which allows pepsin to work well.

[1 mark]

.....

8

4.2.2.1 The human digestive system

Question 25

June 2015 | BL2FP | Original Q2 | Legacy

2 (a) Enzymes are used in body cells.

2 (a) (i) What is an enzyme?

Draw a ring around the correct answer.

[1 mark]

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

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

What is this substance?

Draw a ring around the correct answer.

[1 mark]

carbohydrate **fat** **protein**

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

Draw a ring around the correct answer.

[1 mark]

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

2 (b) Enzymes are sometimes used in industry.

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

[3 marks]

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

6

4.2.2.1 The human digestive system

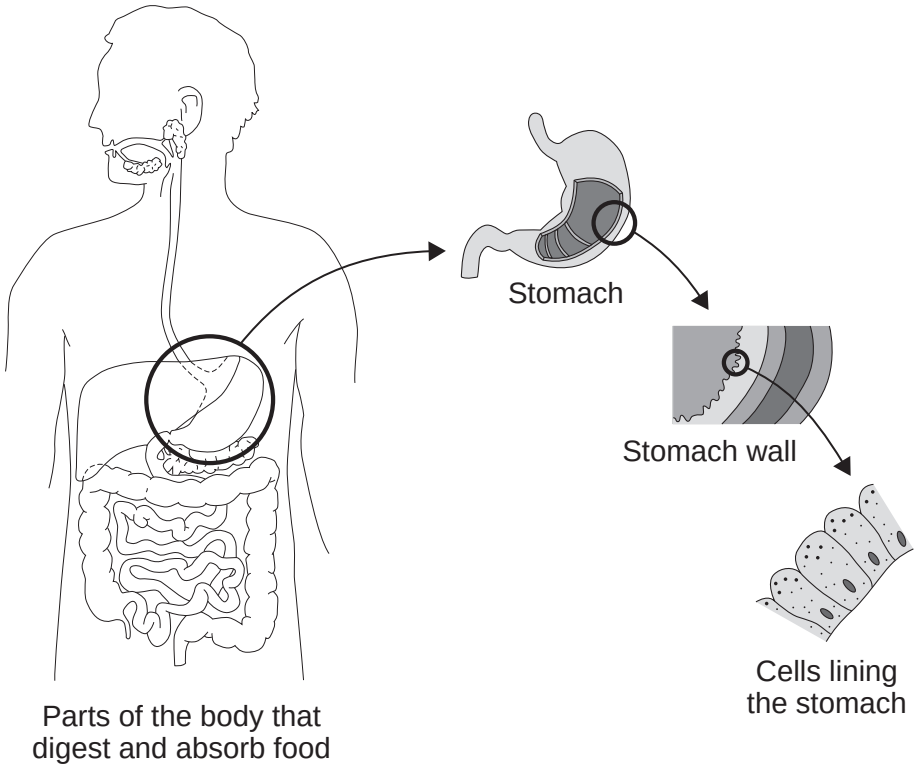
Question 26

June 2015 | BL2FP | Original Q3 | Legacy

3 **Figure 2** shows the parts of the body that digest and absorb food.

Figure 2 also shows some details about the structure of the stomach.

Figure 2



3 (a) Complete **Table 1** to show whether each structure is an organ, an organ system or a tissue.

For each structure, tick (✓) **one** box.

[2 marks]

Table 1

Structure	Organ	Organ system	Tissue
Stomach			
Cells lining the stomach			
Mouth, oesophagus, stomach, liver, pancreas, small and large intestine			

4.2.2.1 The human digestive system

Question 26 · continued

3 (b) (i) The blood going to the stomach has a high concentration of oxygen.
The cells lining the stomach have a low concentration of oxygen.

Complete the following sentence.

[1 mark]

Oxygen moves from the blood to the cells lining the stomach by

the process of ..... .

3 (b) (ii) What other substance must move from the blood to the cells lining the stomach so that respiration can take place?

Draw a ring around the correct answer.

[1 mark]

glucose **protein** **starch**

3 (b) (iii) In which part of a cell does aerobic respiration take place?

Draw a ring around the correct answer.

[1 mark]

cell membrane **mitochondria** **nucleus**

5

4.2.2.1 The human digestive system

Question 27

June 2015 | BL2FP | Original Q7 | Legacy

7 Lipase is an enzyme that digests fat.

7 (a) (i) Complete the equation to show the digestion of fat.

Use the correct answer from the box.

[1 mark]

glucose	**glycerol**	**glycogen**

fat $\xrightarrow{\text{lipase}}$ fatty acids + ...

7 (a) (ii) Name **one** organ that makes lipase.

[1 mark]

.....

7 (b) Some students investigated the effect of bile on the digestion of fat by lipase.

The students:
1 mixed milk and bile in a beaker
2 put the pH sensor of a pH meter into the beaker
3 added lipase solution
4 recorded the pH at 2-minute intervals
5 repeated steps 1 to 4, but used water instead of bile.

Suggest **two** variables that the students should have controlled in this investigation.

[2 marks]

1 .....

.....

2 .....

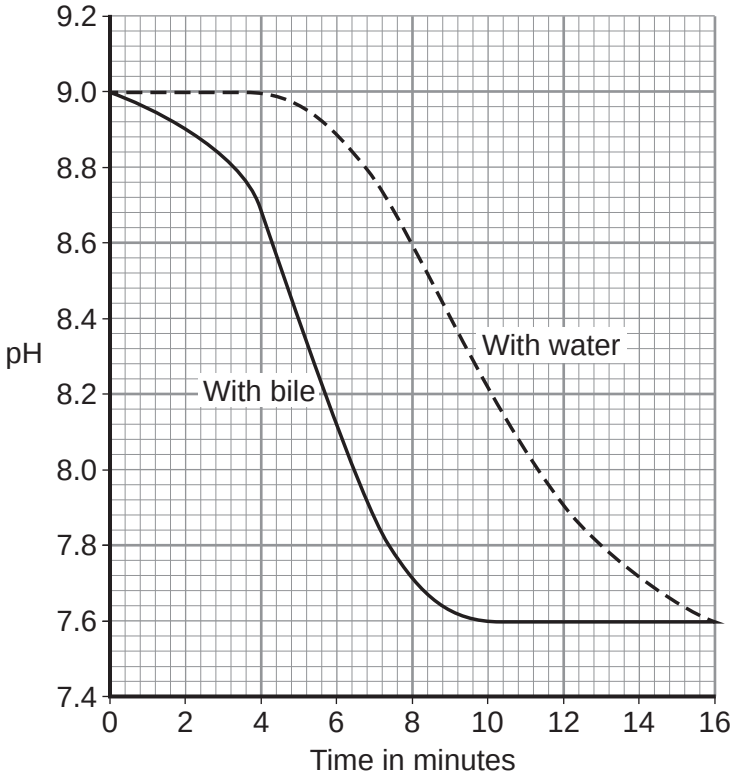
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4.2.2.1 The human digestive system

Question 27 · continued

7 (c) **Figure 7** shows the students' results.

Figure 7



7 (c) (i) Why did the pH decrease in both investigations?

[1 mark]

.....

.....

7 (c) (ii) Bile helps lipase to digest fat.

What evidence is there in **Figure 7** to support this conclusion?

[1 mark]

.....

.....

7 (c) (iii) Suggest **one** reason why the contents of both beakers had the same pH at the end of the investigations.

[1 mark]

.....

.....

7

4.2.2.1 The human digestive system

Question 28

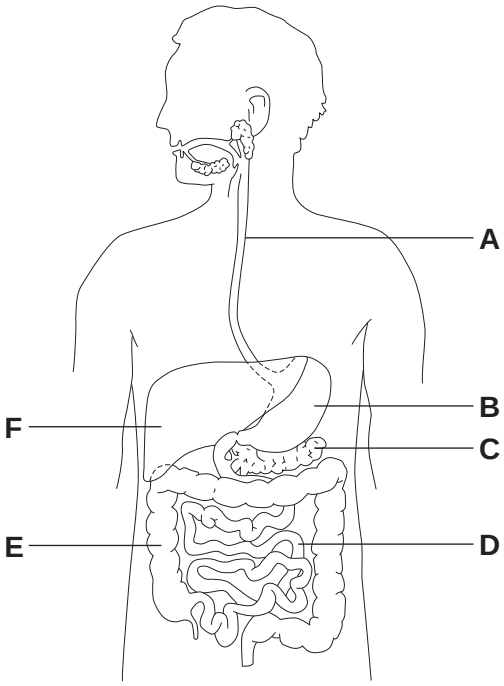
June 2016 | BL2FP | Original Q2 | Legacy

2 The digestive system breaks down food into small molecules.

The small molecules can be absorbed into the blood.

Figure 2 shows the human digestive system.

Figure 2



2 (a) (i) Which letter, **A**, **B**, **C**, **D**, **E** or **F**, shows each of the following organs?

[3 marks]

Write **one** letter in each box.

large intestine ☐

small intestine ☐

stomach ☐

4.2.2.1 The human digestive system

Question 28 · continued

2 (a) (ii) Different organs in the digestive system have different functions.

Draw **one** line from each function to the organ with that function.

[3 marks]

Function	Organ
Digestion of fat	Large intestine
Absorption of water into the blood	Liver
Production of hydrochloric acid	Small intestine
	Stomach

2 (b) Glucose is absorbed into the blood in the small intestine.

Most of the glucose is absorbed by diffusion.

How does the glucose concentration in the blood compare to the glucose concentration in the small intestine?

[1 mark]

Tick (✓) **one** box.

- The concentration in the blood is higher. ☐
- The concentration in the blood is lower. ☐
- The concentration in the blood is the same. ☐

7

4.2.2.1 The human digestive system

Question 29

June 2017 | BL2FP | Original Q3 | Legacy

3 (a) What is an enzyme?

[2 marks]

3 (b) Enzymes are sometimes used in the home and in industry.

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

[3 marks]

Enzyme	Use of enzyme
Protease	Removes grease stains from clothes
Lipase	Pre-digests protein in some baby foods
Isomerase	Breaks down DNA in genetic fingerprinting
	Changes glucose syrup into fructose syrup

3 (c) Fructose and glucose are two types of sugar.

Fructose tastes much sweeter than glucose. This means that a smaller amount of fructose can be used to give the same sweetness.

3 (c) (i) Why is it an advantage to use fructose instead of glucose in **slimming** foods?

[1 mark]

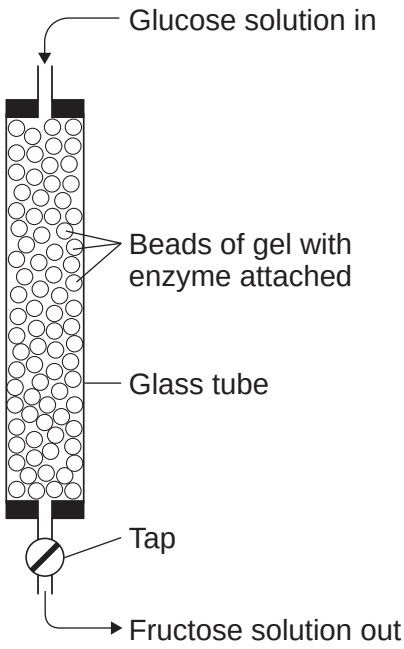
4.2.2.1 The human digestive system

Question 29 · continued

3 (c) (ii) **Figure 3** shows how an enzyme can be used to change glucose into fructose.

The enzyme molecules are firmly attached to beads of gel in a glass tube.

Figure 3



Give **two** advantages of attaching the enzyme to beads of gel.

[2 marks]

Tick (✓) **two** boxes.

The enzyme can be used for more than one type of reaction. ☐

The enzyme can easily be used again. ☐

The enzyme would be denatured. ☐

The fructose solution produced does not have any enzyme in it. ☐

There is less contact between the enzyme and the glucose. ☐

8

4.2.2.1 The human digestive system

Question 30

June 2017 | BL2FP | Original Q8 | Legacy

8 Amylase is an enzyme that breaks down starch.

8 (a) Complete the equation to show the breakdown of starch.

[1 mark]

Starch $\xrightarrow{\text{amylase}}$ _____

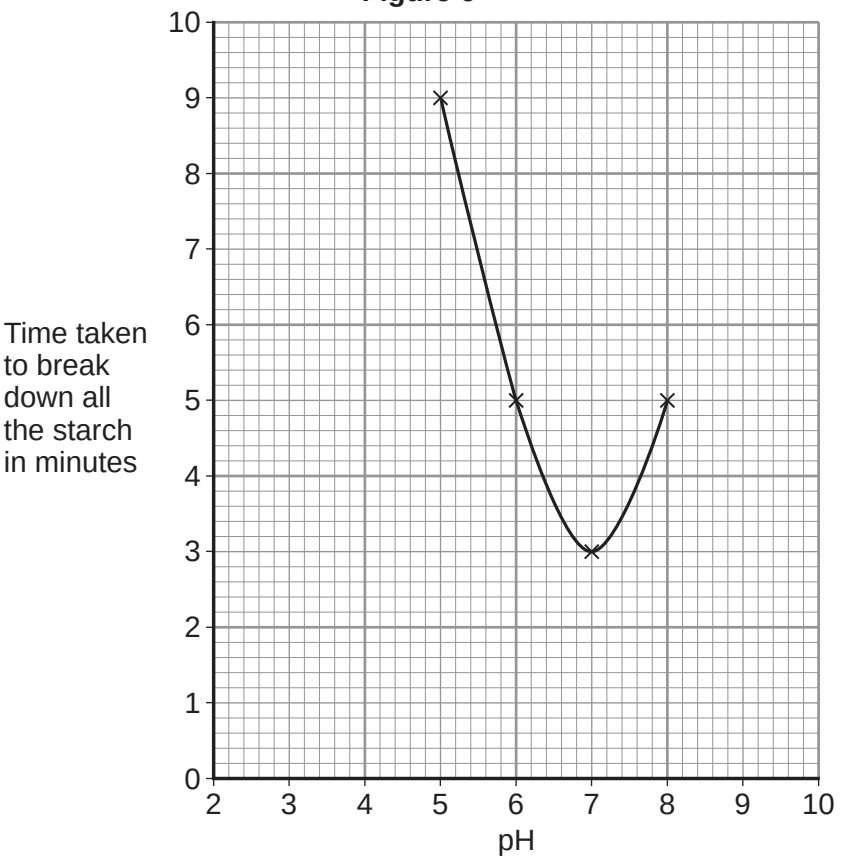
8 (b) Some students investigated the effect of pH on the activity of amylase.

The students:

- put 5 cm^3 of pH5 solution + 1 cm^3 of amylase solution into a test tube
- put 4 cm^3 of starch suspension into a second test tube
- left both test tubes at room temperature for 5 minutes
- mixed the contents of the two test tubes
- removed a small sample of the mixture at 1-minute intervals
- tested each sample for starch
- timed how long it took to break down all the starch
- repeated each of the above steps at pH6, pH7 and pH8.

Figure 9 shows the students' results.

Figure 9



4.2.2.1 The human digestive system

Question 30 · continued

8 (b) (i) Give **two** variables which were controlled in this investigation.

[2 marks]

1 _____

_____

2 _____

_____

8 (b) (ii) The students tested samples of the reaction mixture for starch.
In each test, they added one drop of the reaction mixture to one drop of iodine solution on a white tile.

- Iodine solution = light brown colour
- Iodine solution + starch = dark blue colour

Predict the colour seen in the iodine test on the samples of the pH6 reaction mixture at 4 minutes and at 6 minutes.

[1 mark]

4 minutes _____

6 minutes _____

8 (b) (iii) The students concluded that amylase works best at pH7.
This may **not** be a valid conclusion.

Suggest **two** improvements to the investigation that would increase the validity of the students' conclusion.

[2 marks]

1 _____

_____

2 _____

_____

Question 8 continues on the next page

4.2.2.1 The human digestive system

Question 30 · continued

8 (b) (iv) The students repeated the investigation at pH3.

What result would you expect at pH3?

Give a reason for your answer.

[2 marks]

8

4.2.2.1 The human digestive system

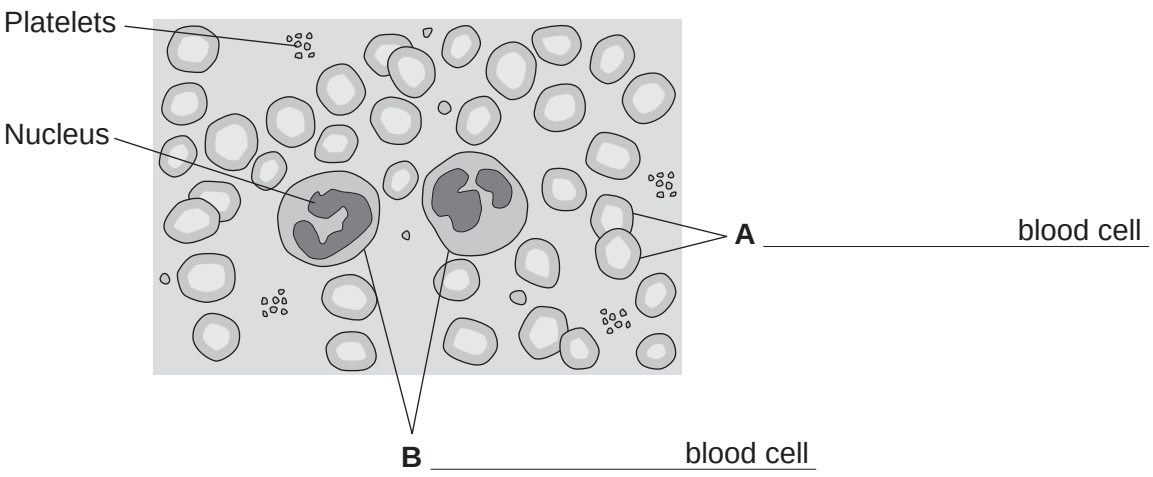
Question 31

June 2017 | BL3FP | Original Q3 | Legacy

3 Blood is a tissue.

Figure 4 is a diagram of the parts of the blood.

Figure 4



3 (a) **A** and **B** are different types of blood cell.

Label cells **A** and **B** in **Figure 4**.

[2 marks]

3 (b) A man has a bad cut on his arm that continues to bleed.

The man goes to hospital and has a blood test.

Table 1 shows the results of the man's blood test.

Table 1

Blood test results

Test	Normal range	Result	Healthy	Abnormal
Platelets	140 – 400	98		✓
Cholesterol	112 – 328	297	✓	
Iron	12 – 300	120	✓	

4.2.2.1 The human digestive system

Question 31 · continued

3 (b) (i) Use information from **Table 1** and your own knowledge to explain why the man's cut does not stop bleeding.

[2 marks]

_____

_____

_____

_____

_____

3 (b) (ii) The doctor gives the man a blood transfusion.

Suggest why the blood needs to be the same blood group as the man.

[1 mark]

Tick (✓) **one** box.

So the donor is not harmed ☐

To prevent rejection of the new blood cells ☐

To reduce the number of blood cells ☐

To suppress the immune system ☐

3 (c) Blood plasma carries substances around the body.

Use the correct answers from the box to complete the sentences.

[3 marks]

bladder	**carbon dioxide**	**kidneys**	**lungs**
oxygen	**small intestine**	**starch**	

Blood plasma carries _____ from the organs to the lungs.

Blood plasma carries the soluble products of digestion from the _____ to other organs.

Blood plasma carries urea from the liver to the _____ to be removed.

8

4.2.2.1 The human digestive system

Question 32

June 2017 | BL3FP | Original Q5 | Legacy

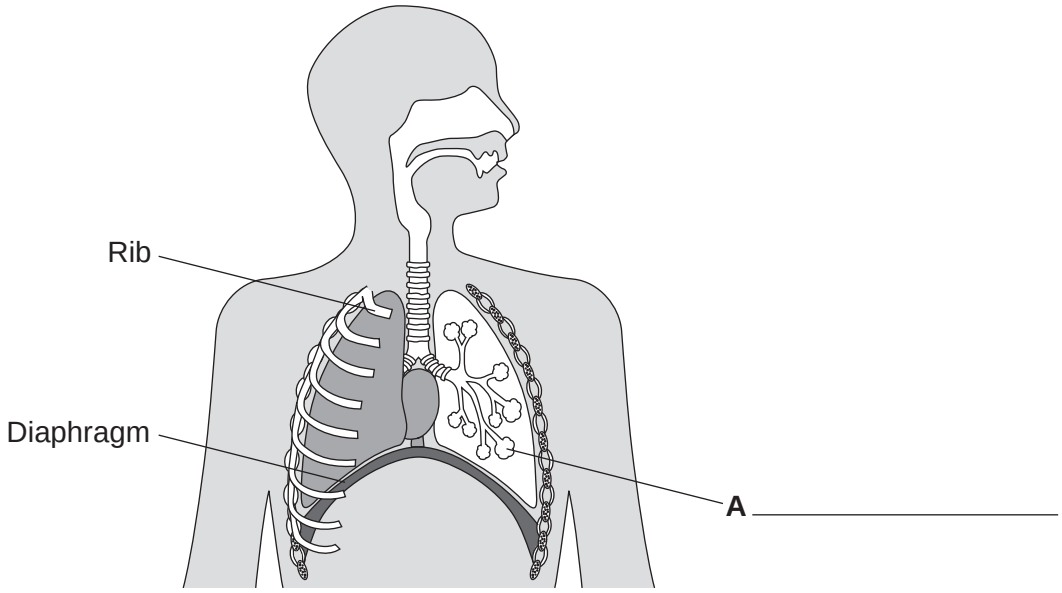
5 Some organs in the human body are adapted to exchange materials.

5 (a) **Figure 6** shows the human breathing system and heart.

5 (a) (i) Label part **A** in **Figure 6**.

[1 mark]

Figure 6



5 (a) (ii) Complete the sentences about breathing in.

[4 marks]

To make air move **into** the lungs the ribs move up and _____

and the diaphragm moves _____ .

These movements are caused when muscles between the ribs and muscles in the diaphragm _____ .

The increase in volume in the thorax causes the pressure in the thorax to _____ .

5 (a) (iii) In the lungs, which type of blood vessel does oxygen pass into?

[1 mark]

_____

Question 5 continues on the next page

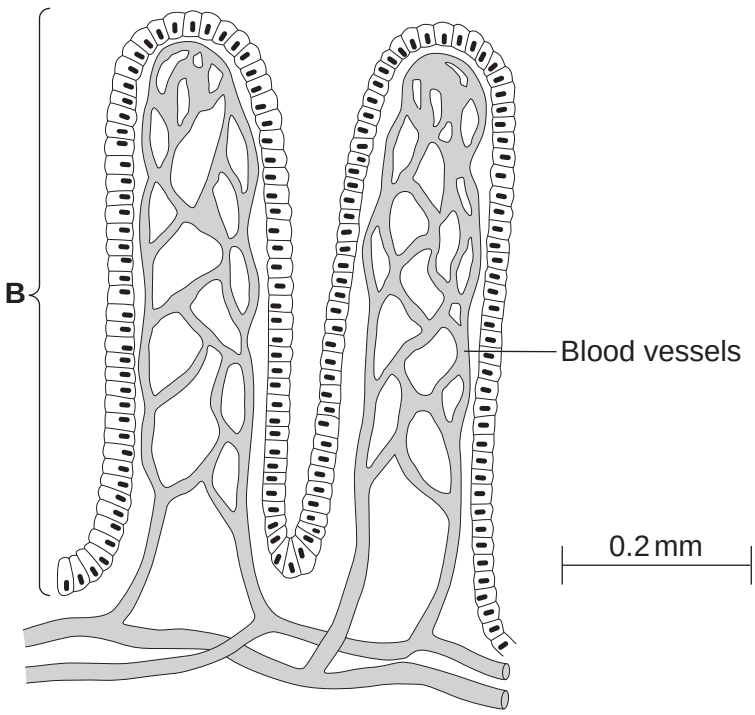
4.2.2.1 The human digestive system

Question 32 · continued

5 (b) The small intestine is adapted to absorb digested food.

Figure 7 shows the lining of the small intestine.

Figure 7



5 (b) (i) Name part **B** shown in **Figure 7**.

[1 mark]

_____

5 (b) (ii) Give **two** ways that part **B** in **Figure 7** is adapted to help the small intestine absorb digested food quickly.

[2 marks]

1 _____

_____

2 _____

_____

9

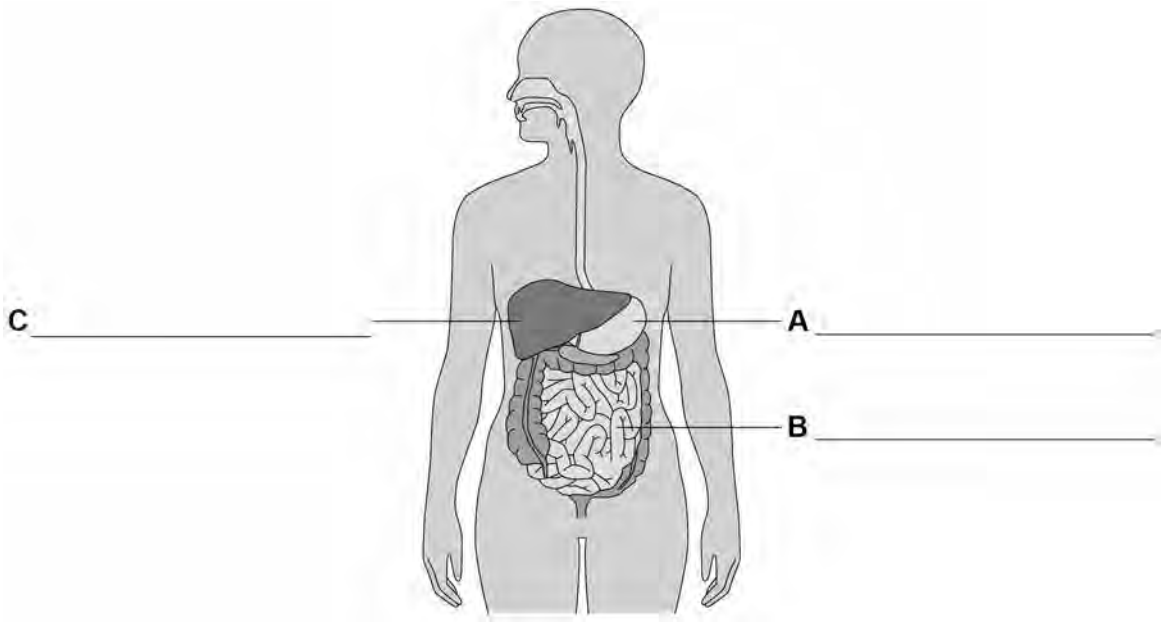
4.2.2.1 The human digestive system

Question 33

June 2018 | 8461/1F | Original Q3

0 3 **Figure 5** shows the human digestive system.

Figure 5



0 3 . 1 Label organs **A**, **B** and **C**.

[3 marks]

0 3 . 2 Complete the sentences.

[3 marks]

Choose the answers from the box.

catalyse	**denatured**	**digest**	**energise**
excreted	**ingested**	**insoluble**	**soluble**

Digestion is the process of breaking down large food molecules into smaller molecules that are _____.

Enzymes help to break down food because they _____ chemical reactions.

If the temperature of an enzyme gets too high, the enzyme is _____.

4.2.2.1 The human digestive system

Question 33 · continued

0 3 . 3 Protease is an enzyme.

Protease breaks down protein.

What is protein broken down into?

[1 mark]

Tick **one** box.

- Amino acids ☐
- Fatty acids ☐
- Glucose ☐
- Glycerol ☐

0 3 . 4 Why is protein needed by the body?

[1 mark]

_____

_____

0 3 . 5 Which organ in the human digestive system produces protease?

[1 mark]

Tick **one** box.

- Gall bladder ☐
- Large intestine ☐
- Liver ☐
- Stomach ☐

4.2.2.1 The human digestive system

Question 33 · continued

0 3 . 6 Describe how you would test a sample of food to show it contains protein.

Give the reason for any safety precautions you would take.

[4 marks]

0 3 . 7 Complete the sentence.

[1 mark]

Choose the answer from the box.

fat	**fibre**	**minerals**	**vitamins**

Obesity can be caused by a diet high in _____.

0 3 . 8 Complete the sentence.

[1 mark]

Choose the answer from the box.

skin cancer	**type 1 diabetes**	**type 2 diabetes**

Obesity is a risk factor for _____.

15

4.2.2.1 The human digestive system

Question 34

June 2018 | 8461/1F | Original Q6

0 6 Earthworms are small animals that live in soil. Earthworms have no specialised gas exchange system and absorb oxygen through their skin.

0 6 . 1 What is the name of the process in which oxygen enters the skin cells?

[1 mark]

Tick **one** box.

- Active transport ☐
- Diffusion ☐
- Osmosis ☐
- Respiration ☐

Table 3 shows information about four skin cells of an earthworm.

Table 3

Cell	Percentage of oxygen	
	Outside cell	Inside cell
A	9	8
B	12	8
C	12	10
D	8	12

0 6 . 2 Which cell has the smallest difference in percentage of oxygen between the outside and the inside of the cell?

[1 mark]

Tick **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

4.2.2.1 The human digestive system

Question 34 · continued

0 6 . 3 Which cell will oxygen move **into** the fastest?

[1 mark]

Tick **one** box.

A		B		C		D	

0 6 . 4 Earthworms have a large surface area to volume ratio.

Suggest why a large surface area to volume ratio is an advantage to an earthworm.

[1 mark]

0 6 . 5 The earthworm uses enzymes to digest dead plants.

Many plants contain fats or oils.

Which type of enzyme would digest fats?

[1 mark]

Question 6 continues on the next page

4.2.2.1 The human digestive system

Question 34 · continued

0 6 . 6 Earthworms move through the soil.

This movement brings air into the soil.

Dead plants decay faster in soil containing earthworms compared with soil containing **no** earthworms.

Explain why.

[3 marks]

0 6 . 7 When earthworms reproduce, a sperm cell from one earthworm fuses with an egg cell from a different earthworm.

Name the process when an egg cell and a sperm cell fuse.

[1 mark]

0 6 . 8 Some types of worm reproduce by a process called fragmentation.

In fragmentation, the worm separates into two or more parts. Each part grows into a new worm.

What type of reproduction is fragmentation?

[1 mark]

10

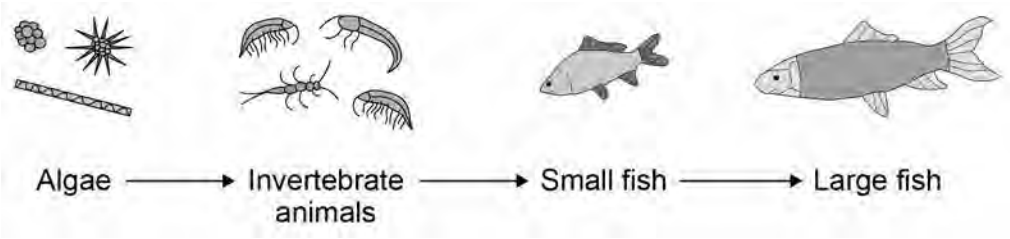
4.2.2.1 The human digestive system

Question 35

June 2018 | 8461/2F | Original Q1

0 1 **Figure 1** shows a food chain in a river.

Figure 1



0 1 . 1 Draw **one** line from each scientific term to the correct organism in the food chain.

[3 marks]

Scientific term	Organism in the food chain
	Algae
Apex predator	Invertebrate animals
Primary consumer	Large fish
Producer	Small fish

4.2.2.1 The human digestive system

Question 35 · continued

0 1 . 2 **Table 1** shows the biomass of the organisms at each stage in the food chain.

Table 1

Organism	Biomass in arbitrary units
Algae	840
Invertebrate animals	200
Small fish	40
Large fish	10

Calculate the percentage of the biomass of the invertebrate animals that is transferred to the large fish.

[2 marks]

Use the equation:

$$\text{percentage} = \frac{\text{biomass of large fish}}{\text{biomass of invertebrate animals}} \times 100$$

Percentage = _____

Question 1 continues on the next page

4.2.2.1 The human digestive system

Question 35 · continued

0 1 . 3 A large amount of biomass is lost from the food chain.

Complete the sentences.

Choose answers from the box.

[3 marks]

coordination	**digestion**	**excretion**
filtration	**ingestion**	**respiration**

When the small fish eat the invertebrate animals, not all of this material is broken down during _____ .

Materials absorbed from the gut may enter the body cells of the small fish. These materials are broken down into carbon dioxide and water by _____ .

The carbon dioxide and other waste materials from the body cells are removed from the small fish by _____ .

0 1 . 4 A disease kills many of the small fish.

Why does the number of invertebrate animals increase?

[1 mark]

_____

_____

9

4.2.2.1 The human digestive system

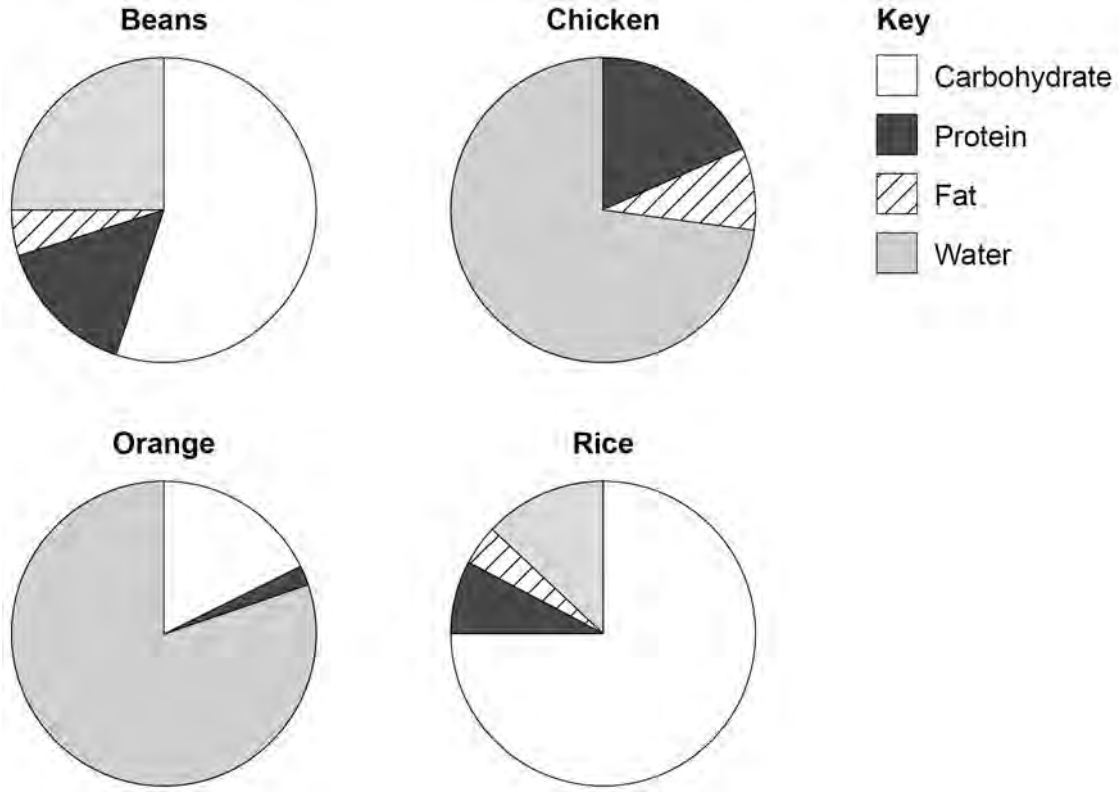
Question 36

June 2019 | 8461/1F | Original Q1

0 1 Many foods contain carbohydrates.

Figure 1 shows information about four different foods.

Figure 1



0 1 . 1 Which food contains the highest percentage of carbohydrate?

[1 mark]

Tick (✓) **one** box.

- Beans ☐
- Chicken ☐
- Orange ☐
- Rice ☐

4.2.2.1 The human digestive system

Question 36 · continued

0 1 . 2 Estimate the percentage of water found in beans.

[1 mark]

Percentage = _____ %

0 1 . 3 Look at **Figure 1**.

Why would eating only beans provide a more balanced diet than eating only chicken?

[1 mark]

_____

_____

0 1 . 4 Sugars are produced when enzymes break down starch.

What is the name of the enzyme which breaks down starch to produce sugars?

[1 mark]

Tick (✓) **one** box.

- Amylase ☐
- Bile ☐
- Lipase ☐
- Protease ☐

0 1 . 5 Which chemical could be used to test for glucose?

[1 mark]

Tick (✓) **one** box.

- Benedict's reagent ☐
- Biuret reagent ☐
- Iodine solution ☐
- Sulfuric acid ☐

4.2.2.1 The human digestive system

Question 36 · continued

0 1 . 6 What colour change would be seen in a positive test for glucose?

[1 mark]

From blue to _____.

0 1 . 7 People with diabetes have difficulty controlling the concentration of glucose in their blood.

The blood of four people was tested.

Table 1 shows the results.

Table 1

Person	Concentration of glucose in blood in arbitrary units
A	4.2
B	6.9
C	7.1
D	5.1

Table 2 shows the information used to help decide if a person has diabetes.

Table 2

Concentration of glucose in blood in arbitrary units	Conclusion
<5.6	No diabetes
5.6 to 7.0	Mild diabetes
>7.0	Severe diabetes

Which person has severe diabetes?

[1 mark]

Tick (✓) **one** box.

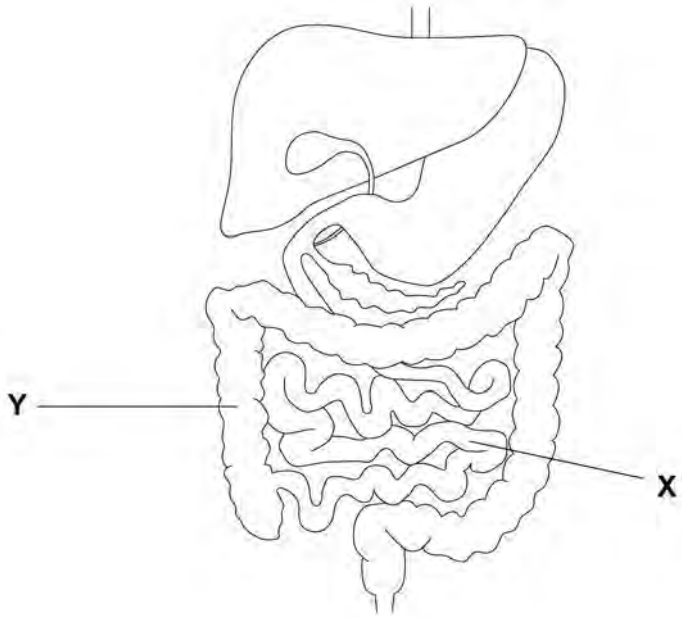
A ☐ **B** ☐ **C** ☐ **D** ☐

4.2.2.1 The human digestive system

Question 36 · continued

Figure 2 shows part of the human digestive system.

Figure 2



0 1 . 8 Glucose is absorbed into the bloodstream in part **X**.

Name part **X**.

[1 mark]

_____

0 1 . 9 Complete the sentences.

[2 marks]

Choose answers from the box.

active transport	**digestion**	**excretion**
osmosis	**respiration**	

Some glucose is absorbed into the bloodstream against the concentration gradient by the process of _____.

Water moves out of part **Y** and into the bloodstream by the process of _____.

10

4.2.2.1 The human digestive system

Question 37

June 2019 | 8461/2F | Original Q6

0 6 Two of the substances the body excretes are urea and carbon dioxide.

0 6 . 1 Complete the sentence.

[1 mark]

Choose the answer from the box.

carbohydrate	**lipid**	**protein**	**salt**

A person makes a lot of urea if the person's diet contains

a lot of _____.

0 6 . 2 Why must urea be excreted from the body?

[1 mark]

_____

_____

0 6 . 3 A person produces more carbon dioxide during exercise than when resting.

Complete the sentences.

[2 marks]

Choose answers from the box.

breathing	**digestion**	**egestion**
osmosis	**respiration**	

The process that makes carbon dioxide is _____.

During exercise, extra carbon dioxide can be removed from the body by increasing the rate of _____.

4.2.2.1 The human digestive system

Question 37 · continued

0 6 . 4 Excess water must also be removed from the body.

If a person sweats a lot, less water will be excreted in the urine.

A healthy person did the same amount of exercise on each of 3 days.

Table 2 shows information for the 3 days.

Table 2

Day	Air temperature in °C	Volume of water consumed in cm^3	Relative amount of urine produced by the kidneys
1	30	1500	
2	20	1500	
3	15	2000	

Complete **Table 2**.

[2 marks]

Choose answers from the box.

least	medium	most

Question 6 continues on the next page

4.2.2.1 The human digestive system

Question 37 · continued

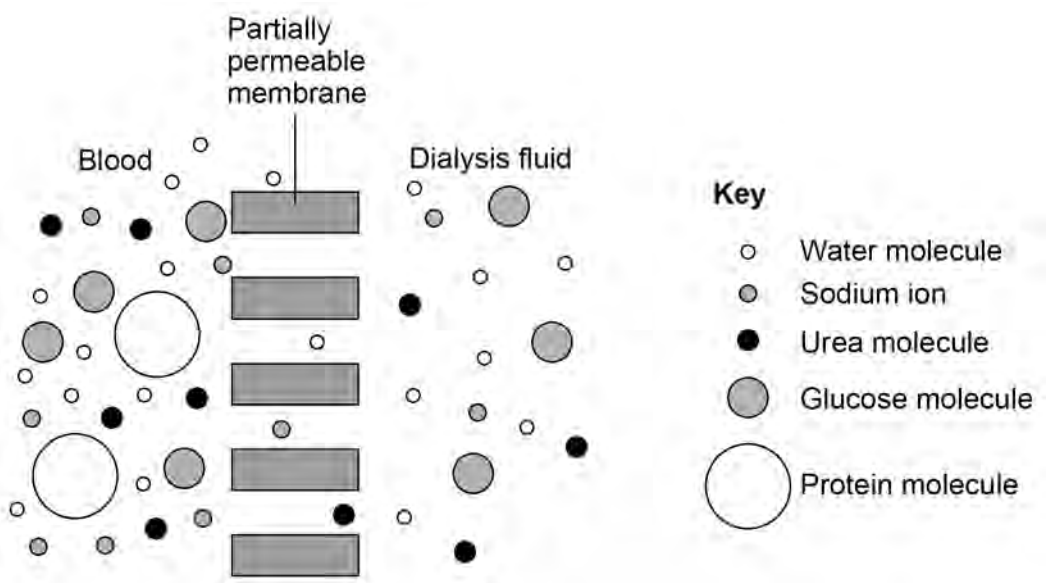
Some people have kidney disease.

Kidney disease may be treated by dialysis or by having a kidney transplant operation.

- During dialysis, a person is connected to a machine that filters the blood.
- Each dialysis session lasts about 6 hours.
- The person has several dialysis sessions each week.

Figure 12 shows how dialysis works.

Figure 12



0 6 . 5 How does urea move out of the blood during dialysis?

[1 mark]

Tick (✓) **one** box.

Diffusion ☐

Digestion ☐

Osmosis ☐

Respiration ☐

4.2.2.1 The human digestive system

Question 37 · continued

June 2019 | 8461/2F | Original Q6

0 6 . 6 Which substance in **Figure 12** does **not** pass from the blood into the dialysis fluid?

Give the reason for your answer.

[2 marks]

Substance _____

Reason _____

_____

Question 6 continues on the next page

Question 37 · continued

Two people have kidney disease.

- Person **A** is treated by dialysis.
- Person **B** has had a kidney transplant.

Figure 13 shows changes in the urea concentration in the blood of each person over 2 weeks.

Figure 13



0 6 . 7 How many dialysis sessions did person **A** have **each week**?

[1 mark]

_____

0 6 . 8 What happens to the concentration of urea in the blood between dialysis sessions?

[1 mark]

_____

0 6 . 9 Give **two** reasons why a kidney transplant is a better method for treating kidney disease than dialysis.

[2 marks]

1 _____

_____

2 _____

_____

13

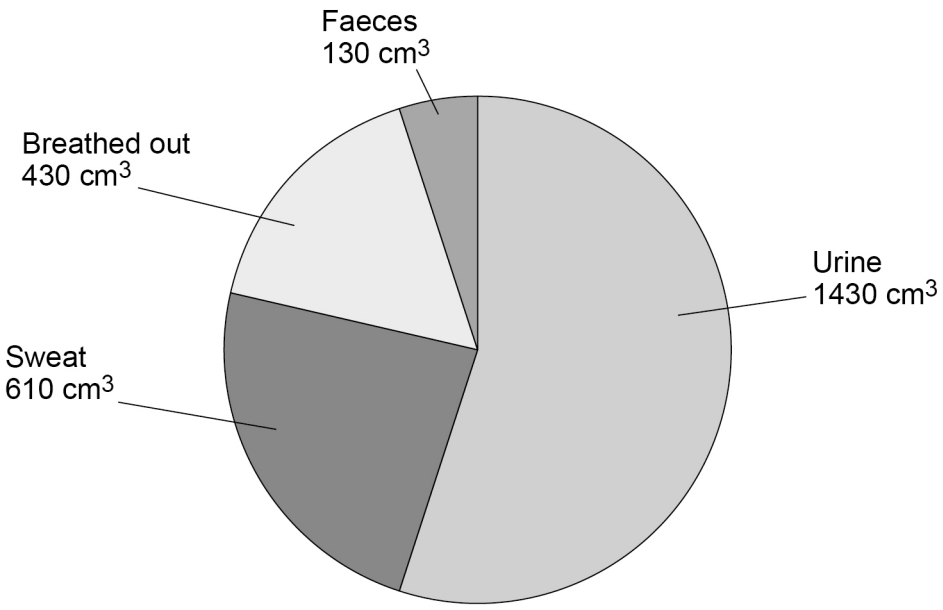
4.2.2.1 The human digestive system

Question 38

November 2020 | 8461/2F | Original Q4

0 4 **Figure 5** shows the water loss from a person on one day.

Figure 5



0 4 . 1 The total water loss was 2600 cm^3.

Calculate the percentage of the total water loss that was lost as urine.

[2 marks]

Percentage lost as urine = _____ %

4.2.2.1 The human digestive system

Question 38 · continued

A marathon race is 42 km long.

0 4 . 2 What happens to the volume of water lost as sweat when a person runs a marathon?

[1 mark]

0 4 . 3 What must marathon runners do to prevent themselves becoming dehydrated?

[1 mark]

0 4 . 4 Complete the sentences.

[3 marks]

Choose answers from the box.

digestion	**excretion**	**fertilisation**	**filtration**	**reabsorption**

Blood entering the kidneys goes through the process of

_____ .

Glucose is **not** found in urine because of _____.

Urine is removed from the body in the process of _____.

Question 4 continues on the next page

4.2.2.1 The human digestive system

Question 38 · continued

0 4 . 5 People with kidney failure can have dialysis or a kidney transplant.

Dialysis is often needed 3 times each week and can take over 4 hours each time.

Dialysis usually happens in a hospital.

Kidney transplants require a donor and major surgery.

Describe the advantages **and** disadvantages of having a kidney transplant instead of having dialysis.

[4 marks]

11

4.2.2.1 The human digestive system

Question 39

November 2021 | 8461/1F | Original Q4

0 4 Carbohydrates are needed as part of a balanced diet.

0 4 . 1 Which formula shows glucose?

[1 mark]

Tick (✓) **one** box.

- $C_6H_{12}O_6$ ☐
- CO_2 ☐
- H_2O ☐
- O_2 ☐

0 4 . 2 Which type of enzyme breaks down starch?

[1 mark]

Tick (✓) **one** box.

- Carbohydrase ☐
- Lipase ☐
- Protease ☐

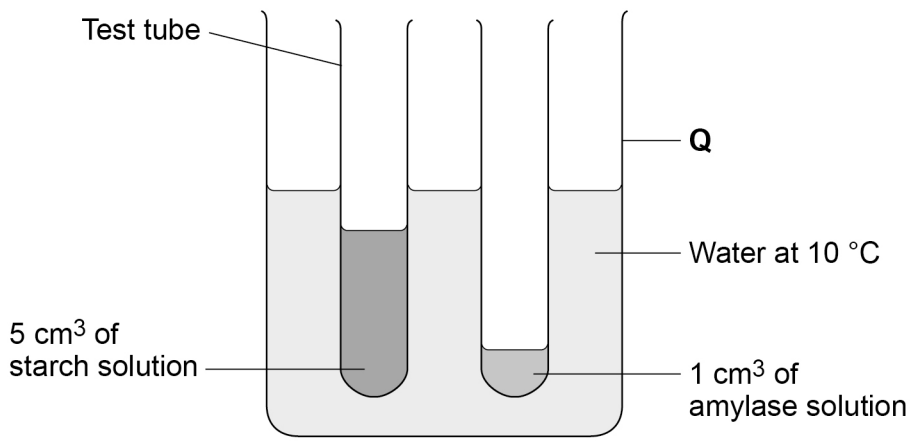
Question 4 continues on the next page

Question 39 · continued

A student investigated the effect of temperature on the activity of the enzyme amylase.

Figure 7 shows the apparatus used.

Figure 7



This is the method used.

1. Set up the apparatus as shown in **Figure 7**.
2. After 5 minutes, pour the starch solution into the amylase solution and mix.
3. Remove one drop of the amylase-starch solution mixture and place onto a spotting tile.
4. Immediately add two drops of iodine solution to the amylase-starch solution mixture on the spotting tile.
5. Record the colour of the iodine solution added to the amylase-starch solution mixture.
6. Repeat steps 3 to 5 every minute until the iodine solution is yellow-brown.

0 4 . 3 Name apparatus **Q** in **Figure 7**.

[1 mark]

4.2.2.1 The human digestive system

Question 39 · continued

0 4 . 4 Why were the starch solution and the amylase solution left for five minutes before mixing them together?

[1 mark]

Tick (✓) **one** box.

- So that both solutions could reach 10 °C ☐
- So that the student could calculate a mean ☐
- So that the student could repeat the investigation ☐
- So that the student had time to draw a table of results ☐

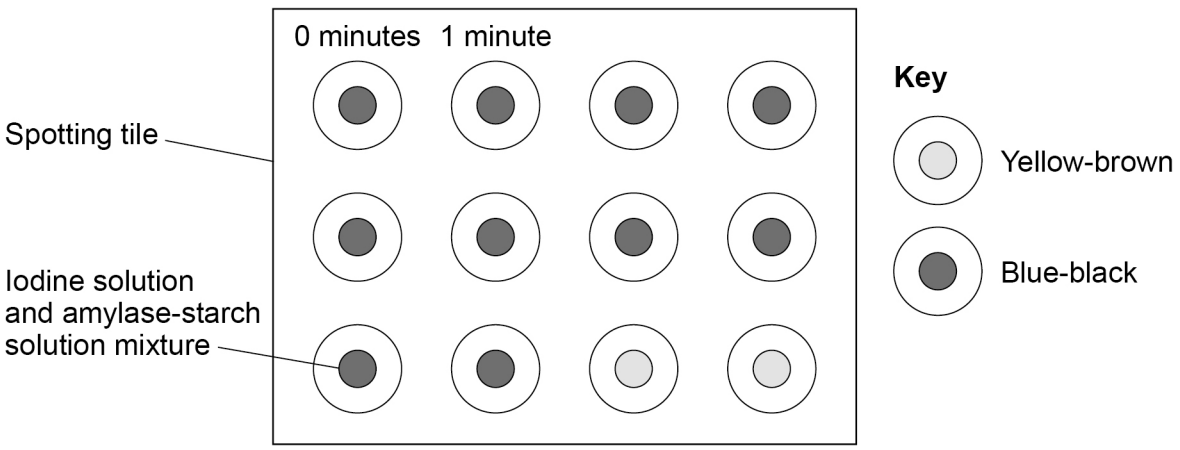
Question 4 continues on the next page

4.2.2.1 The human digestive system

Question 39 · continued

Figure 8 shows the results.

Figure 8



0 4 . 5 How many minutes did it take until the iodine solution and amylase-starch solution mixture was yellow-brown?

Use **Figure 8**.

[1 mark]

_____ minutes

0 4 . 6 How could a more accurate time be obtained?

[1 mark]

Tick (✓) **one** box.

Add more iodine solution to the spotting tile. ☐

Test the mixture with iodine solution every 30 seconds. ☐

Test the mixture with iodine solution for more time. ☐

Use two drops of amylase-starch solution mixture in each test. ☐

4.2.2.1 The human digestive system

Question 39 · continued

The student repeated the investigation at five different temperatures.

Table 2 shows the results.

Table 2

Temperature in °C	Time taken until iodine solution and mixture was yellow-brown in minutes
20	5
35	2
50	7
65	12
80	Remained blue-black

0 4 . 7 Which temperature did the enzyme work quickest at?

[1 mark]

Tick (✓) **one** box.

20 °C ☐

35 °C ☐

50 °C ☐

65 °C ☐

0 4 . 8 Explain why the iodine solution remained blue-black in the investigation at 80 °C.

[2 marks]

9

4.2.2.1 The human digestive system

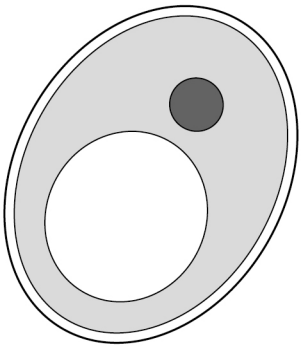
Question 40

June 2022 | 8461/1F | Original Q8

0 8 Plant cells and fungal cells are similar in structure.

Figure 10 shows a fungal cell.

Figure 10



0 8 . 1 Name **one** structure in **Figure 10** which is present in both plant cells and fungal cells but **not** in animal cells.

[1 mark]

0 8 . 2 Which disease is caused by a fungus?

[1 mark]

Tick (✓) **one** box.

- Gonorrhoea ☐
- Malaria ☐
- Measles ☐
- Rose black spot ☐

Question 8 continues on the next page

4.2.2.1 The human digestive system

Question 40 · continued

0 8 . 3 A fungal cell divides once every 90 minutes.

How many times would this fungal cell divide in 24 hours?

[2 marks]

Number of times cell divides in 24 hours = _____

4.2.2.1 The human digestive system

Question 40 · continued

Some types of fungal cell are grown to produce high-protein food.

The high-protein food can be used to make meat-free burgers.

0 8 . 4 Where is protein digested in the human digestive system?

[1 mark]

Tick (✓) **one** box.

- Large intestine ☐
- Liver ☐
- Salivary glands ☐
- Stomach ☐

0 8 . 5 Which chemical could be used to test if the burgers contain protein?

[1 mark]

Tick (✓) **one** box.

- Benedict's reagent ☐
- Biuret reagent ☐
- Ethanol ☐
- Iodine solution ☐

Question 8 continues on the next page

4.2.2.1 The human digestive system

Question 40 · continued

0 8 . 6 **Table 7** shows some information about burgers made from meat and meat-free burgers.

Table 7

	Mass per 100 g of burger	
	Burgers made from meat	**Meat-free burgers**
Protein in g	14.0	9.0
Fibre in g	0.9	5.5
Fat in g	16.0	5.2
Carbohydrate in g	15.5	15.1
Cholesterol in mg	120.0	0.0

Evaluate the use of burgers made from meat compared with meat-free burgers in providing humans with a healthy, balanced diet.

Use information from **Table 7** and your own knowledge.

[6 marks]

4.2.2.1 The human digestive system

Question 40 · continued

June 2022 | 8461/1F | Original Q8

12

4.2.2.1 The human digestive system

Question 41

0 2 Viruses cause disease.

0 2 . 1 What name is given to microorganisms that cause disease?

[1 mark]

Tick (✓) **one** box.

- Pathogens ☐
- Predators ☐
- Producers ☐

0 2 . 2 The body has defences to stop viruses entering.

Draw **one** line from each defence to the part of the body that provides the defence.

[2 marks]

Defence	Part of the body that provides the defence
	Brain
A physical barrier that stops viruses entering	Heart
Mucus that traps viruses	Nose
	Skin

4.2.2.1 The human digestive system

Question 41 · continued

Some viruses can cause tumours to develop.

0 2 . 3 Complete the sentence.

Choose the answer from the box.

[1 mark]

digestion	division	metabolism

A tumour can form when changes to cells cause uncontrolled cell _____.

0 2 . 4 Malignant tumours are cancers.

Which **two** sentences describe malignant tumours?

[2 marks]

Tick (✓) **two** boxes.

- Malignant tumours are only found in the reproductive system. ☐
- Malignant tumours contain digestive enzymes. ☐
- Malignant tumours do not change in size. ☐
- Malignant tumours have cells that can spread to other parts of the body. ☐
- Malignant tumours may form secondary tumours. ☐

Question 2 continues on the next page

Question 41 · continued

HPV is a virus that can cause one type of cancer in females.

In the UK since 2008, most 12 to 13-year-old females have been vaccinated against HPV.

Scientists investigated the percentage of 16 to 18-year-old females with HPV.

Table 2 shows the results.

Table 2

Year	Percentage (%) of 16 to 18-year-old females with HPV
2010	8.2
2012	3.2
2014	2.0
2016	1.6

0 2 . 5 What does **Table 2** show about the percentage of females with HPV from 2010 to 2016?

[1 mark]

0 2 . 6 Suggest the reason for the change you described in Question **02.5**.

[1 mark]

4.2.2.1 The human digestive system

Question 41 · continued

The HPV vaccine contains an inactive form of the virus.

The inactive form of the virus is injected into the body.

0 2 . 7 Which part of the blood responds to the inactive virus?

[1 mark]

Tick (✓) **one** box.

- Platelets ☐
- Red blood cells ☐
- White blood cells ☐

0 2 . 8 What is produced by the body in response to the inactive virus?

[1 mark]

Tick (✓) **one** box.

- Antibiotics ☐
- Antibodies ☐
- Antiseptics ☐

0 2 . 9 Suggest **one** reason why some **parents** refuse to allow their children to have the HPV vaccine.

Do **not** refer to the pain of the injection in your answer.

[1 mark]

_____

_____

11

4.2.2.1 The human digestive system

Question 42

June 2023 | 8461/1F | Original Q5

0 5 This question is about food and digestion.

0 5 . 1 Proteins are needed to make new body cells by mitosis.

Give **one** reason why a person needs new body cells.

[1 mark]

0 5 . 2 What are proteins made of?

[1 mark]

Tick (✓) **one** box.

- Amino acids ☐
- Fatty acids ☐
- Glucose ☐
- Starch ☐

0 5 . 3 Which chemical is used to test for protein in food?

[1 mark]

Tick (✓) **one** box.

- Benedict's reagent ☐
- Biuret reagent ☐
- Ethanol ☐

4.2.2.1 The human digestive system

Question 42 · continued

0 5 . 4 What colour would be seen in a positive test for protein?

[1 mark]

Tick (✓) **one** box.

- Black ☐
- Purple ☐
- Red ☐
- White ☐

Enzymes break down food molecules in the human body.

0 5 . 5 Characteristics of enzymes are linked to their function.

Draw **one** line from each characteristic to its effect on enzyme function.

[2 marks]

Characteristic	Effect on enzyme function
Has a special shape	Only fits one molecule
Is a catalyst	Speeds up reactions
	Works fast at high pH

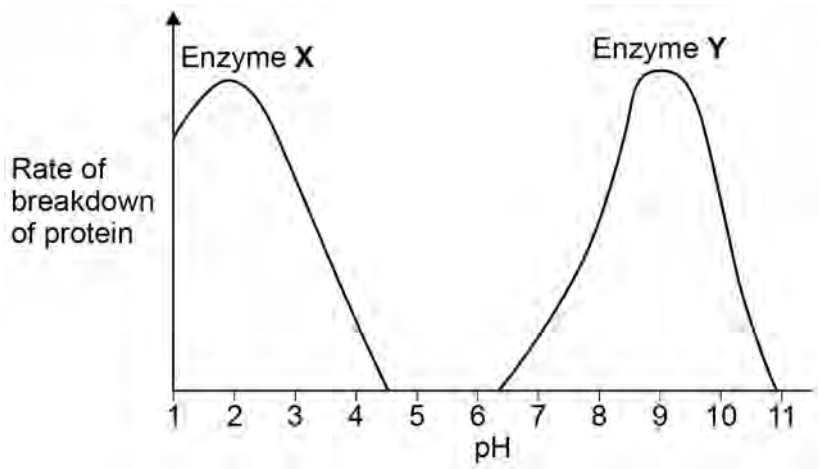
Question 5 continues on the next page

4.2.2.1 The human digestive system

Question 42 · continued

Figure 3 shows how pH affects the rate of breakdown of protein.

Figure 3



0 5 . 6 Which pH does enzyme **Y** work fastest at?

[1 mark]

pH = _____

0 5 . 7 Explain why enzyme **X** works best in the stomach.

[2 marks]

_____

_____

_____

_____

4.2.2.1 The human digestive system

Question 42 · continued

0 5 . 8 Complete the sentences.

Choose answers from the box.

[2 marks]

active site	**antigen**	**glucose**	**starch**	**substrate**

Enzyme **Y** does **not** break down protein at pH 6 because the shape of the enzyme has changed.

The part of the enzyme that changes shape is

the _____.

The change in shape means the enzyme cannot bind to

the _____.

Question 5 continues on the next page

4.2.2.1 The human digestive system

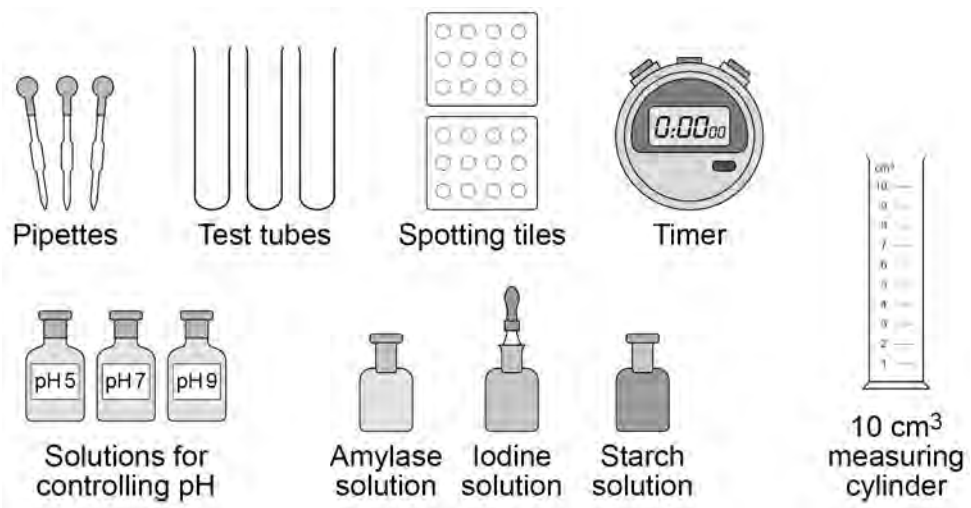
Question 42 · continued

0 5 . 9 Amylase is an enzyme which breaks down starch.

A student investigated the effect of pH on the rate of starch breakdown by amylase.

Figure 4 shows some of the apparatus the student used.

Figure 4



Describe a method to investigate the effect of pH on the rate of starch breakdown by amylase.

You should include the apparatus shown in **Figure 4**.

[6 marks]

4.2.2.1 The human digestive system

Question 43

0 5 Bacteria are one type of organism that cause decay.

0 5 . 1 Which other type of organism causes decay?

[1 mark]

Tick (✓) **one** box.

Fungi ☐

Plants ☐

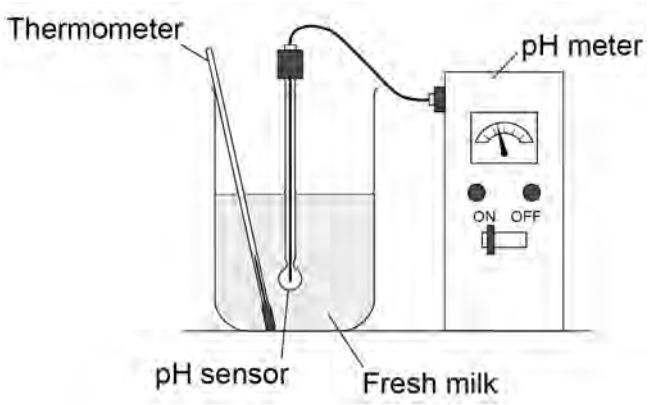
Viruses ☐

Students investigated the effect of temperature on the decay of milk.

The decay was caused by bacteria in the milk.

Figure 8 shows the apparatus used.

Figure 8



This is the method used.

1. Set up the apparatus as shown in **Figure 8** with the milk at 20 °C.
2. Record the pH each day for 7 days.
3. Repeat with more samples of milk at 5 °C and at 30 °C.

4.2.2.1 The human digestive system

Question 43 · continued

0 5 . 2 What was the dependent variable in the investigation?

[1 mark]

Tick (✓) **one** box.

- The pH of the milk ☐
- The type of milk ☐
- The volume of the milk ☐

0 5 . 3 How could the students keep the milk at 30 °C for 7 days?

[1 mark]

Tick (✓) **one** box.

- Put a lid on the beaker. ☐
- Put the beaker in a water bath. ☐
- Stir the milk continuously. ☐
- Wrap cloth around the beaker. ☐

0 5 . 4 As the milk decays, the bacteria digest fats in the milk.

What type of acid is produced by digestion of fats in the milk?

[1 mark]

Tick (✓) **one** box.

- Amino acid ☐
- Fatty acid ☐
- Hydrochloric acid ☐

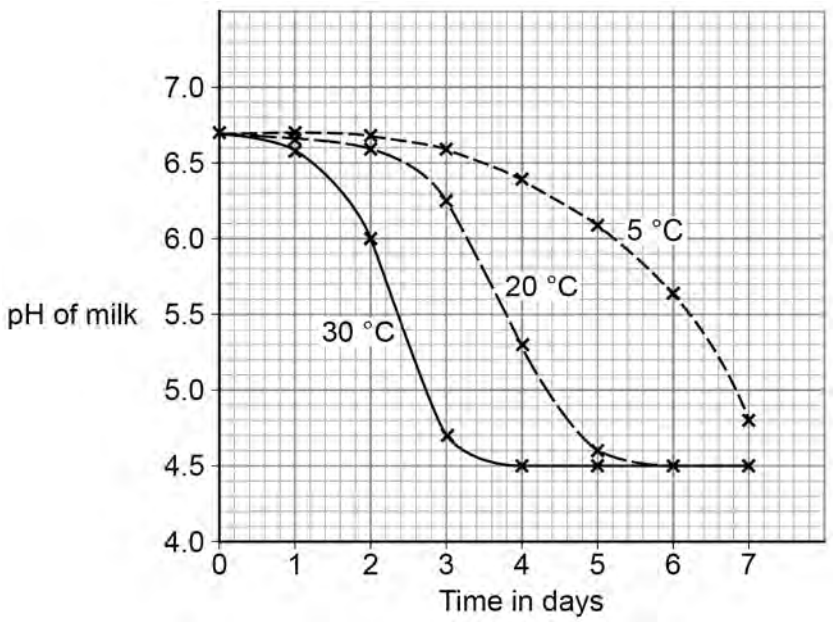
Question 5 continues on the next page

4.2.2.1 The human digestive system

Question 43 · continued

Figure 9 shows the results.

Figure 9



0 5 . 5 Why did the pH **not** fall below pH 4.5 at 20 °C?

[1 mark]

Tick (✓) **one** box.

All the fat had been digested. ☐

The reaction was too fast. ☐

The temperature was too low. ☐

4.2.2.1 The human digestive system

Question 43 · continued

The digestion of fat was fastest at 30 °C and slowest at 5 °C.

0 5 . 6 Give **one** reason why the rate of digestion was faster at 30 °C than at 5 °C.

[1 mark]

0 5 . 7 Calculate the rate of digestion at 30 °C from day 2 to day 3.

Complete the following calculation.

Use data from **Figure 9**.

[2 marks]

At 30 °C, the pH at day 2 = _____

At 30 °C, the pH at day 3 = _____

Therefore the fall in pH at 30 °C from day 2 to day 3 = _____ pH units/day

0 5 . 8 The rate of digestion at 5°C from day 2 to day 3 is 0.1 pH units/day.

How many times faster is the rate of digestion at 30°C than the rate of digestion at 5°C from day 2 to day 3?

[2 marks]

Use your answer to Question **05.7**.

Rate at 30 °C is _____ times faster

10

4.2.2.1 The human digestive system

Question 44

June 2024 | 8461/1F | Original Q4

0 4 Starch and sugar are two types of carbohydrate.

0 4 . 1 Describe the chemical tests that a student could use to show if bread contains:

- starch
- sugar.

You should include the results of a positive test **and** a negative test for each type of carbohydrate.

[4 marks]

Question 4 continues on the next page

Question 44 · continued

A student investigated three types of bread.

For each type of bread, the student:

- put a square piece of bread into their mouth
- did **not** chew the bread
- recorded the time taken for the bread to taste sweet.

Table 2 shows the results.

Table 2

Type of bread	Time taken for bread to taste sweet in seconds
Brown	43
White	35
Wholemeal	57

0 4 . 2 Complete the sentences.

Choose answers from the box.

[2 marks]

amylase	fat	lipase	protease	sugar

The starch in the bread was broken down by the

enzyme _____.

The enzyme broke down the starch into _____.

4.2.2.1 The human digestive system

Question 44 · continued

0 4 . 3 What was the independent variable in the investigation?

[1 mark]

Tick (✓) **one** box.

- The size of the piece of bread ☐
- The temperature of the mouth ☐
- The type of bread ☐

0 4 . 4 Give **two** conclusions that can be made from the results in **Table 2**.

[2 marks]

1 _____

_____

2 _____

_____

Question 4 continues on the next page

4.2.2.1 The human digestive system

Question 44 · continued

Table 2 is repeated below.

Table 2

Type of bread	Time taken for bread to taste sweet in seconds
Brown	43
White	35
Wholemeal	57

The student improved the investigation.

Table 3 shows the results.

Table 3

Type of bread	Time taken for bread to taste sweet in seconds			
	Test 1	Test 2	Test 3	Mean
Brown	38	43	45	42
White	35	31	39	35
Wholemeal	58	55	61	**X**

0 4 . 5 What did the student do to improve the investigation?

Use **Table 2** and **Table 3**.

[2 marks]

4.2.2.1 The human digestive system

Question 44 · continued

0 4 . 6 Calculate value **X** in **Table 3**.

[2 marks]

X = _____ seconds

0 4 . 7 Why should the student do the investigation with more people?

[1 mark]

Tick (✓) **one** box.

Each person's sense of taste is different. ☐

More people would make the investigation safer. ☐

There are many different types of bread. ☐

14

4.2.2.1 The human digestive system

Question 45

June 2024 | 8461/1F | Original Q8

0 8 Cystic fibrosis (CF) is an inherited disorder caused by a faulty gene.

0 8 . 1 Where in a cell would the CF gene be found?

[1 mark]

4.2.2.1 The human digestive system

Question 45 · continued

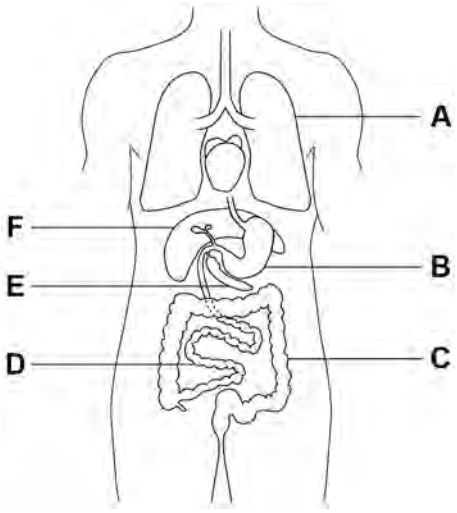
CF affects many organs in the body.

The main organs affected are:

- the lungs
- the pancreas
- the small intestine.

0 8 . 2 **Figure 7** shows organs of the human body.

Figure 7



Which letters in **Figure 7** show the lungs, the pancreas and the small intestine?

[1 mark]

Tick (✓) **one** box.

A, **D** and **E** ☐

A, **E** and **F** ☐

B, **C** and **D** ☐

B, **C** and **F** ☐

Question 8 continues on the next page

4.2.2.1 The human digestive system

Question 45 · continued

0 8 . 3 The pancreas produces several digestive enzymes.

CF reduces the amount of each enzyme that reaches the small intestine.

Explain why a person with CF has:

- difficulty digesting food
- difficulty gaining body mass.

[6 marks]

4.2.2.1 The human digestive system

Question 45 · continued

0 8 . 4 Gas exchange happens in the alveoli in the lungs.

Describe **three** features of the alveoli that help maximise gas exchange.

[3 marks]

1 _____

_____

2 _____

_____

3 _____

_____

0 8 . 5 CF reduces the amount of oxygen that can enter the blood from the alveoli.

Explain how a reduced amount of oxygen entering the blood will affect the human body.

[3 marks]

_____

_____

_____

_____

_____

_____

14

4.2.2.1 The human digestive system

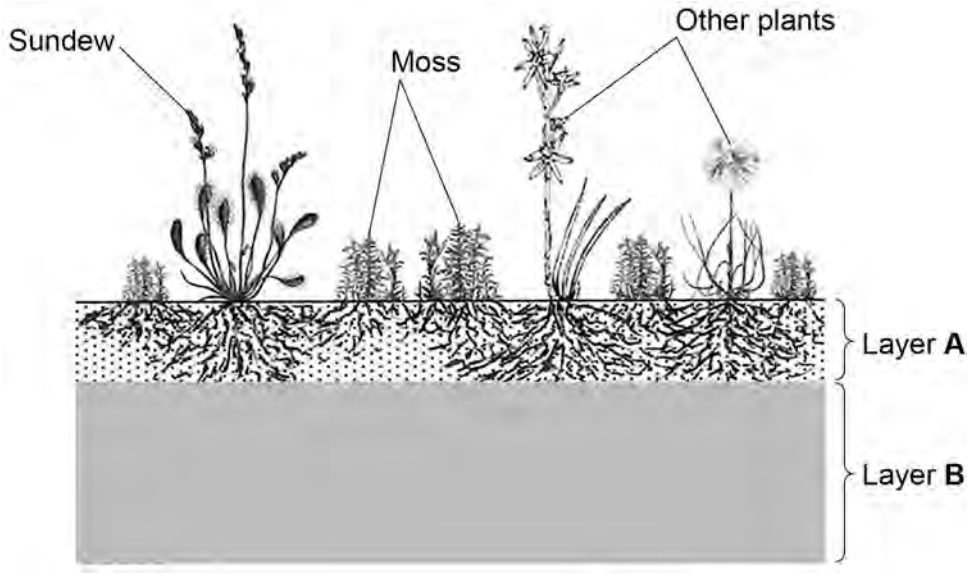
Question 46

June 2024 | 8461/2F | Original Q10

1 0 Peat bogs are estimated to contain twice as much carbon as all the world's forests.

Figure 13 shows a section through part of a peat bog.

Figure 13



Layer **A** contains a lot of air.

Layer **B**:

- contains the dead remains of plants
- has a low pH
- contains very little oxygen
- contains carbon dioxide and methane.

4.2.2.1 The human digestive system

Question 46 · continued

1 0 . 1 Explain why most of the dead remains of plants in layer **B** do **not** decay.

[3 marks]

1 0 . 2 The peat bog in **Figure 13** is a stable community.

The moss produces biomass at a rate of 340 g/m^2/year.

What is the approximate biomass of the moss that becomes biomass in primary consumers?

[1 mark]

Tick (✓) **one** box.

- 0.34 g/m^2/year ☐
- 3.4 g/m^2/year ☐
- 34 g/m^2/year ☐
- 340 g/m^2/year ☐

Question 10 continues on the next page

4.2.2.1 The human digestive system

Question 46 · continued

The sundew plant shown in **Figure 13** on page 38 has leaves with sticky hairs that trap and digest insects.

Digestion of the insects releases phosphates and simple compounds of nitrogen that are used by the sundew plant.

10.3 What substance can the sundew plant make using the **phosphates**?

[1 mark]

Tick (✓) **one** box.

- Cellulose ☐
- DNA ☐
- Glycerol ☐
- Starch ☐

10.4 What substance can the sundew plant make using the **nitrogen**?

[1 mark]

Tick (✓) **one** box.

- Fatty acid ☐
- Glucose ☐
- Lactic acid ☐
- Protein ☐

4.2.2.1 The human digestive system

Question 46 · continued

1 0 . 5 Humans have destroyed large areas of peat bog to collect peat.

The peat provides fuel and provides compost for gardeners to use.

The peat comes from layer **B** in **Figure 13** on page 38.

Layer **B**:

- contains the dead remains of plants
- has a low pH
- contains very little oxygen
- contains carbon dioxide and methane.

Figure 14 shows the removal of peat from a peat bog.

Figure 14



Explain how the destruction of peat bogs and the use of peat affects the temperature of the Earth's atmosphere.

[4 marks]

10

4.2.2.1 The human digestive system

Question 47

0 7 Eating too much carbohydrate can cause obesity.

0 7 . 1 Name **one** disease that obesity is a risk factor for.

[1 mark]

Table 5 shows information about sugar intake and obesity in different countries.

Table 5

Country	Mean sugar intake per person per day in grams	Mean obesity rate in arbitrary units
A	122	18
B	80	9
C	172	25
D	150	23
E	110	15
F	144	19
G	192	32

4.2.2.1 The human digestive system

Question 47 · continued

0 7 . 2 Complete **Figure 10**.

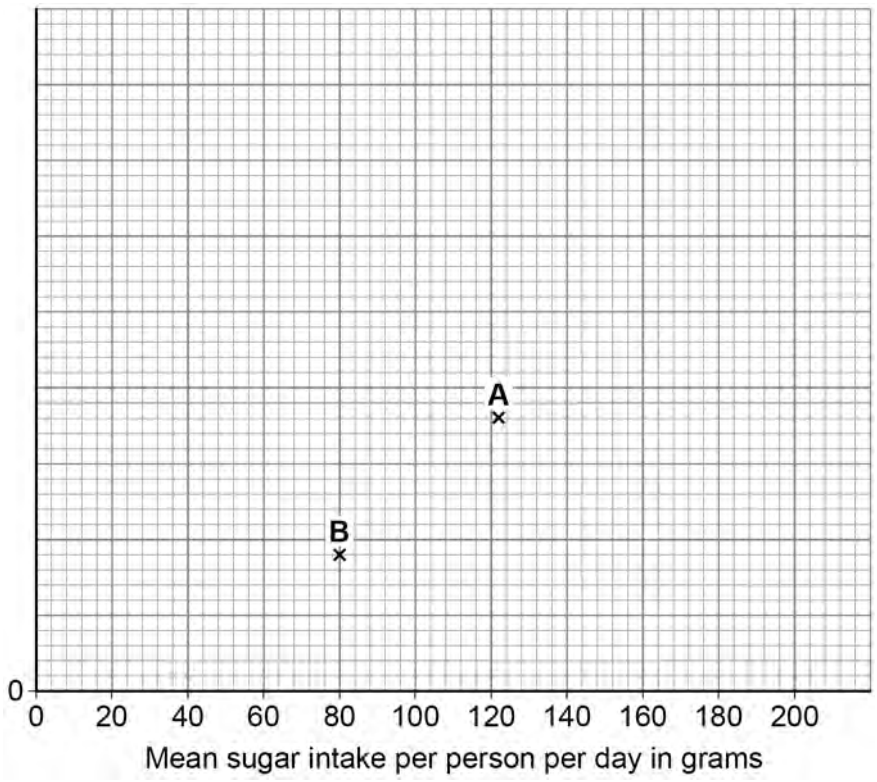
You should:

- label the *y*-axis
- add the scale for the *y*-axis
- plot the data for countries **C**, **D**, **E**, **F** and **G** from **Table 5**
- draw a line of best fit.

Countries **A** and **B** have been completed for you.

[4 marks]

Figure 10



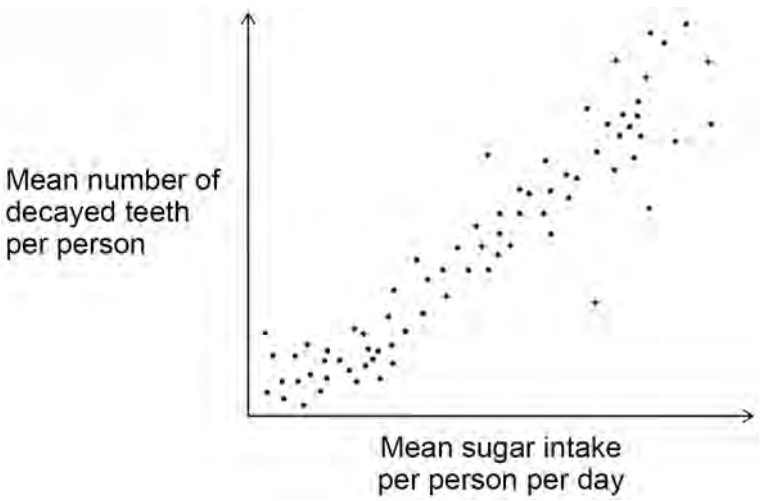
Question 7 continues on the next page

4.2.2.1 The human digestive system

Question 47 · continued

Figure 11 shows information about the relationship between sugar intake and tooth decay.

Figure 11



0 7 . 3 Name the type of graph shown in **Figure 11**.

[1 mark]

0 7 . 4 What relationship is shown between the two variables in **Figure 11**?

[1 mark]

Tick (✓) **one** box.

Inversely proportional ☐

No correlation ☐

Positive correlation ☐

Question 47 · continued

Sugars and starch are carbohydrates.

A student investigated the effect of temperature on the activity of amylase.

For each temperature, the student:

- mixed starch and amylase together
- added iodine solution after 5 minutes.

The iodine solution was yellow-brown before it was added to the mixture.

Table 6 shows the results.

Table 6

Temperature in °C	Colour of iodine solution
10	blue-black
30	yellow-brown
60	blue-black
90	blue-black

0 7 . 5 Explain the results at 30 °C and at 90 °C.

[4 marks]

30 °C _____

_____

_____

_____

90 °C _____

_____

_____

_____

4.2.2.1 The human digestive system

Question 47 · continued

0 7 . 6 How could the student change the investigation to find a more precise temperature that amylase works best at?

[1 mark]

Tick (✓) **one** box.

Test more temperatures between 10 °C and 30 °C. ☐

Test more temperatures between 10 °C and 60 °C. ☐

Test more temperatures between 30 °C and 60 °C. ☐

Test more temperatures between 30 °C and 90 °C. ☐

0 7 . 7 Protease enzymes are involved in protein digestion.

Different types of protease enzyme are active in different organs of the digestive system.

Complete **Table 7** to identify the organ where each protease enzyme is active.

[2 marks]

Table 7

Protease enzyme	Optimum pH	Organ where enzyme is active
Pepsin	2	
Trypsin	8	

14