Animal Tissues, Organs, and Systems

Total mark – 23

Question: 1

Carbohydrates are needed as part of a balanced diet.

(a) Which formula shows glucose?

Tick (✓) **one** box.

$C_6H_{12}O_6$ ☐

CO_2 ☐

H_2O ☐

O_2 ☐

(1)

(b) Which type of enzyme breaks down starch?

Tick (✓) **one** box.

Carbohydrase ☐

Lipase ☐

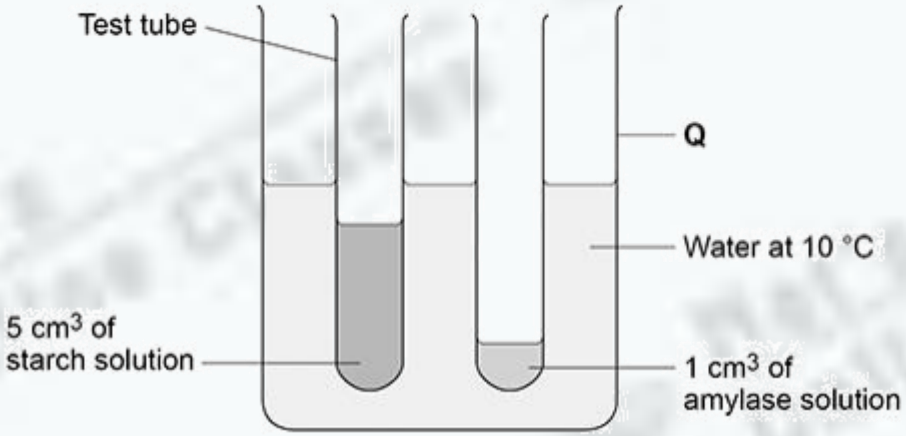
Protease ☐

(1)

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

Figure 1 shows the apparatus used.

Figure 1



This is the method used.

1. Set up the apparatus as shown in **Figure 1**.
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.

(c) Name apparatus **Q** in **Figure 1**.

_____

(1)

(d) Why were the starch solution and the amylase solution left for five minutes before mixing them together?

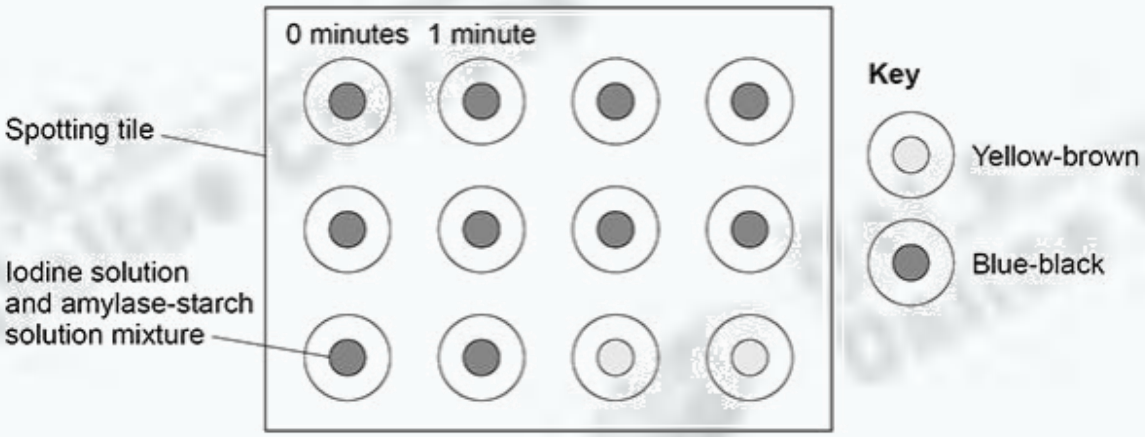
Tick (✓) **one** box.

- 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 ☐

(1)

Figure 2 shows the results.

Figure 2



(e) How many minutes did it take until the iodine solution and amylase-starch solution mixture was yellow-brown?

Use **Figure 2**.

_____ minutes

(1)

(f) How could a more accurate time be obtained?

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. ☐

(1)

The student repeated the investigation at five different temperatures.

The table below shows the results.

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

(g) Which temperature did the enzyme work quickest at?

Tick (✓) **one** box.

20 °C ☐

35 °C ☐

50 °C ☐

65 °C ☐

(1)

(h) Explain why the iodine solution remained blue-black in the investigation at 80 °C.

_____

_____

_____

_____

(2)

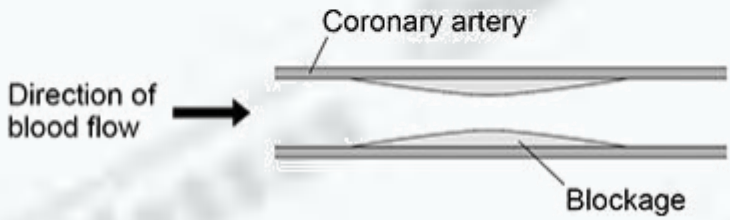
Question-2

A high cholesterol concentration in the blood can lead to blockages inside arteries.

The coronary arteries supply blood to the heart muscle.

Figure 1 shows a coronary artery with a blockage.

Figure 1



(a) Why could the blockage in **Figure 1** cause cells in the heart to die?

(2)

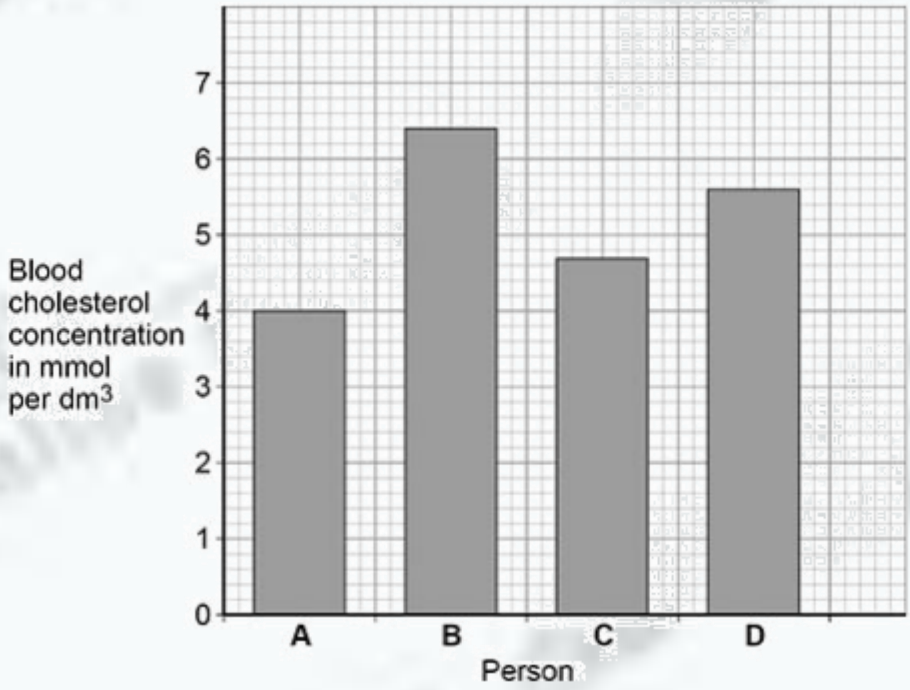
Doctors can measure the concentration of cholesterol in the blood.

The table below shows four different blood cholesterol categories.

Blood cholesterol concentration in mmol per dm^3	Cholesterol category
<4.6	Low
4.6–5.0	Normal
5.1–6.1	Medium
6.2 and above	High

Figure 2 shows the blood cholesterol concentration of four people.

Figure 2



(b) Which person is in the medium cholesterol category?

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

(1)

(c) Which person is most at risk of having a heart attack?

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

(1)

(d) Give a reason for your answer to part (c).

_____

_____

(1)

(e) The blood cholesterol concentration of person **D** is greater than the blood cholesterol concentration of person **A**.

Calculate how many times greater.

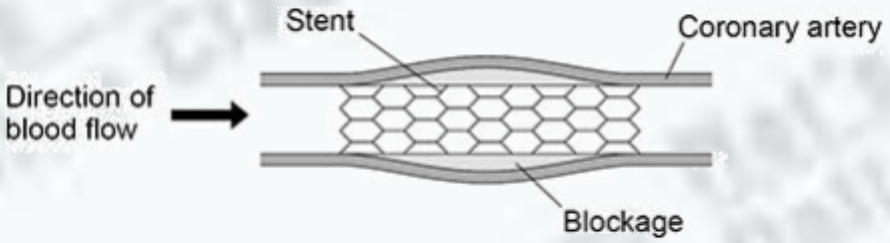
Use **Figure 2**.

Number of times greater = _____

(2)

Figure 3 shows how a stent can be used to treat a person with a blockage in a coronary artery.

Figure 3



(f) Explain how a stent works as a treatment for a person with a blockage in a coronary artery.

(2)

Patients are given anti-clotting drugs after they have a stent fitted.

The drugs help to prevent clots forming in the blood.

(g) Which part of the blood starts the blood clotting process?

Tick (✓) **one** box.

- Antibodies ☐
- Plasma ☐
- Platelets ☐
- Red blood cells ☐

(1)

(h) When a stent is fitted the doctor gives the patient an injection of anti-clotting drugs.

The patient then takes one anti-clotting tablet every day.

Anti-clotting drugs:

- are very effective
- can take a week to begin working fully
- have been used for over 60 years
- cost very little to make
- do **not** work effectively if the patient eats certain types of food.

The patient must have their blood tested every few weeks to check that the anti-clotting drugs are working.

Evaluate the use of anti-clotting drugs in patients who have had a stent fitted.

(4)

Mark Scheme

Question-1

(a) $C_6H_{12}O_6$

1

(b) carbohydrase

1

(c) beaker

allow water bath

1

(d) so that both solutions could reach 10 °C

1

(e) 10 / ten (minutes)

1

(f) test the mixture with iodine solution every 30 seconds

1

(g) 35 °C

1

(h) enzyme / amylase is denatured
or
enzyme / amylase stops working

allow active site / enzyme has changed shape

*do **not** accept enzyme / amylase has died*

1

(so) starch is not broken down
or
starch is still present

1

Question-2

(a) less blood flows through **or** less blood flows to the heart (muscle / cells / tissue)

1

less oxygen (reaches the heart muscle)

allow less respiration

allow less energy released

*do **not** accept less energy produced / made / created*

1

(b) D

1

(c) B

1

(d) is more likely to get a blockage (with high cholesterol)
or
blockage could be biggest

ignore has the highest blood cholesterol concentration

1

(e) 4 **and** 5.6

1

$\left(\frac{5.6}{4}\right) = 1.4$

allow correct division using either 5.3 or 5.8 (for person D)

1

(f) opens / widens (artery)

allow pushes blockage to the side

1

so (more) blood can flow through

allow (more) oxygen(ated blood) can flow through

1

(g) platelets

1

(h) **Level 2:** A judgement, strongly linked and logically supported by a sufficient range of correct reasons, is given.

3–4

Level 1: Relevant points are made. They are not logically linked. 1–2

1–2

No relevant content

0

Indicative content:

Advantages:

- **only** have to take the tablet once a day
- **only** a tablet so easy to take **or only** a tablet so not painful to take
- (drugs are effective so) less likely to get a blood clot
- drugs are cheap so less cost to NHS **or** drugs are cheap so

  (more) people can afford them
- drugs have been used for a long time so must be safe / trusted

Disadvantages:

- patients have to make sure they always have a supply of drugs
- patients could forget to take the drugs (every day)
- patients could still get a blood clot in the first week
- restrictions on lifestyle because patients have to have a blood test every few weeks
- restrictions on lifestyle because patient can't eat certain foods
- patients may get a blood clot if they eat the wrong food
- risks associated with puncturing skin / infection
- patient may have a fear of needles
- higher risk of bleeding / bruising

For **Level 2** students must evaluate, including consideration of, the advantage and disadvantage of anti-clotting drugs.