

Name of the Student: _____

Max. Marks : 25 Marks

Time : 25 Minutes

Q1.

Proteins are broken down by protease enzymes.

(a) Which organs in the digestive system produce protease enzymes?

Tick **one** box.

Mouth and liver

☐

Mouth and stomach

☐

Pancreas and liver

☐

Stomach and pancreas

☐

(1)

A student used a colorimeter to investigate the rate of protein digestion of an insoluble protein.

A colorimeter measures the percentage of light that passes through a liquid.

The student measured the percentage of light passing through different concentrations of protein suspension.

The student used the results to produce a concentration curve.

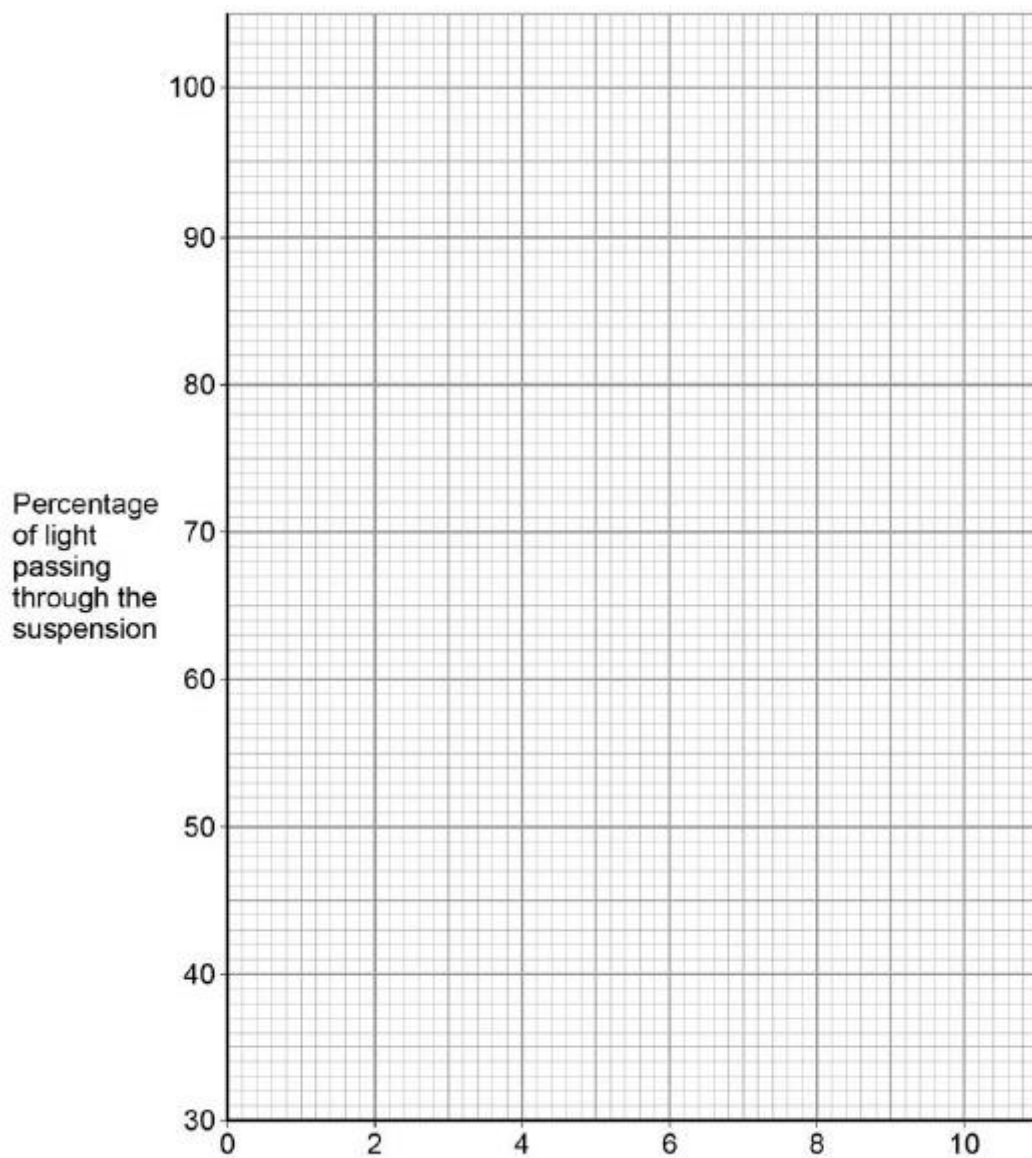
The table shows the results.

Concentration of protein in g/dm ³	Percentage of light passing through the suspension
0.0	100
0.5	93
2.0	75
10.0	38

(b) Plot the data from the table on **Figure 1**.

Draw a line of best fit.

Figure 1



(3)

- (c) Explain the change in the percentage of light passing through the suspension.

(2)

- (d) Suggest how the student could improve their investigation to draw a more accurate concentration curve.

(1)

The student then investigated the rate of protein digestion with protease obtained from two different organs.

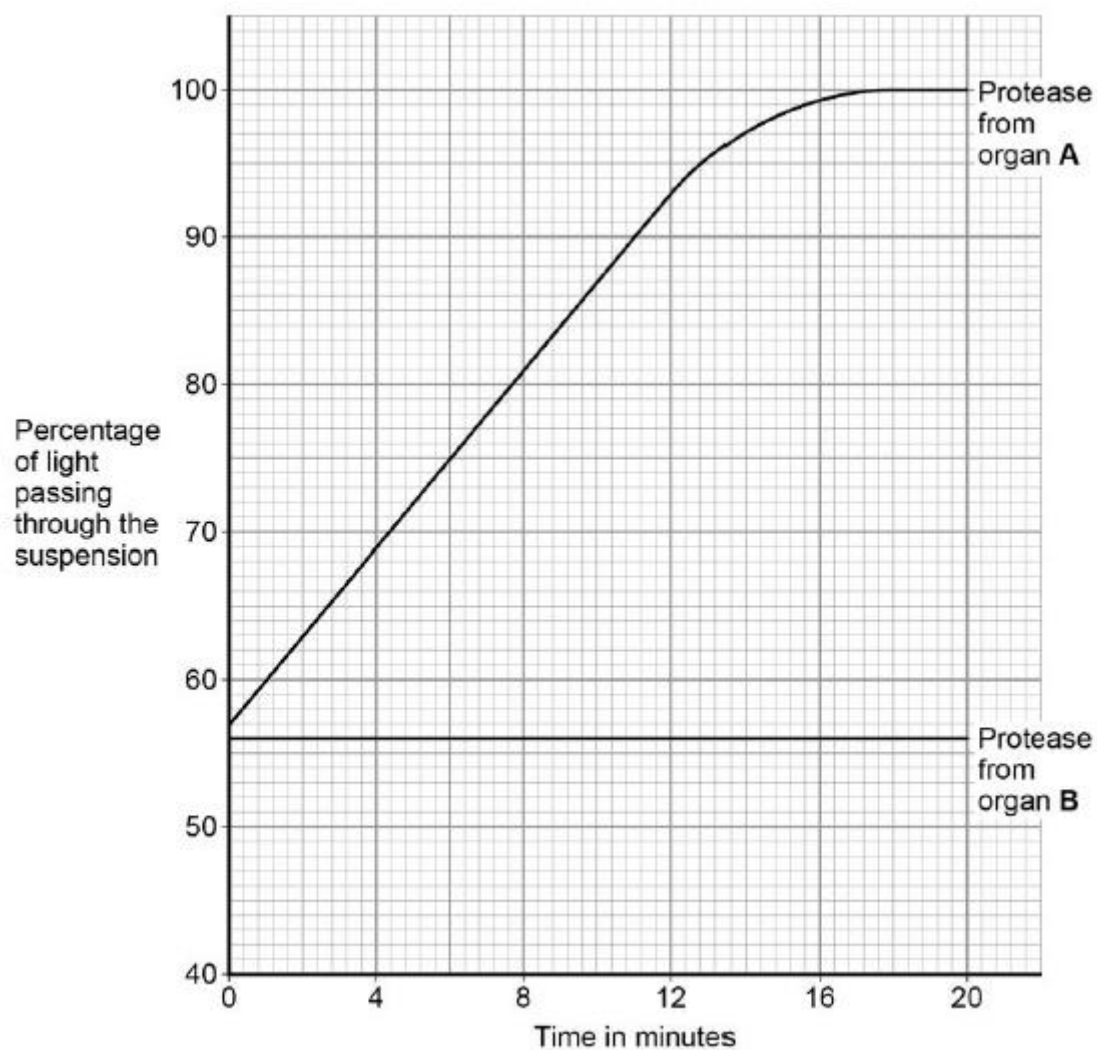
This is the method used.

1. Put 5 cm³ of protease from each organ into separate test tubes.
 2. Put 10 cm³ of protein suspension into two other test tubes.
 3. Put all four tubes into a water bath at 37 °C for 10 minutes.
 4. Mix each 5 cm³ of protease into a tube of protein suspension.
 5. Take a sample of each mixture every 2 minutes.
 6. Measure the percentage of light passing through each sample using a colorimeter.
- (e) Suggest why the protease and the protein suspension were put into a water bath before being mixed.

(1)

Figure 2 shows the student's results.

Figure 2



- (f) Determine the concentration of protein at the start of the reaction with protease from organ **A**.

Use **Figure 2** and your graph in **Figure 1**.

Concentration = _____ g/dm³

(1)

- (g) Calculate the rate of protein digestion with protease from organ **A** over the first 12 minutes.

Use **Figure 2** and your graph in **Figure 1**.

Rate = _____ g/dm³ per minute

(1)

- (h) Describe how the activity of protease from organ **B** is different from the activity of protease from organ **A**.

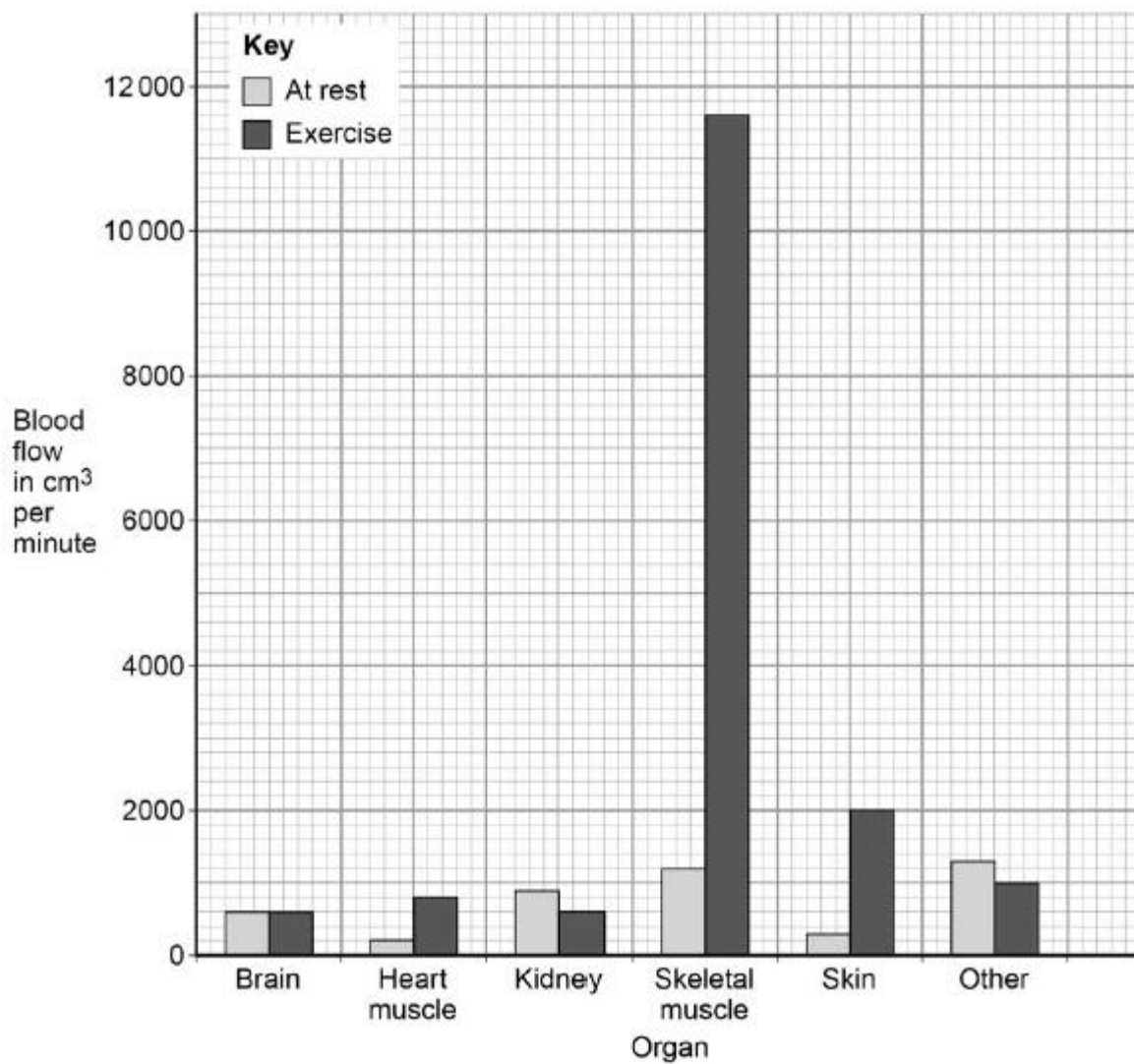
Suggest **one** reason for the difference.

(2)

(Total 13 marks)

Q2.

The graph shows the rate of blood flow through different organs at rest and during exercise.



- (a) Determine the total volume of blood that flows through the brain in 1 hour.

Volume = _____ cm³

(1)

- (b) Look at the blood flow through the skeletal muscle.

Calculate how many times the blood flow increases by during exercise compared to at rest.

Answer = _____

(2)

- (c) Explain why the blood flow to the skeletal muscles increases during exercise.

(3)

- (d) Arteries and veins have different structures and different functions.

Explain how the different structure of arteries and veins relates to their different functions.

(6)

(Total 12 marks)