

# Animal Tissues, Organs and Organ Systems

## Question Paper 1

<b>Level</b>	GCSE (9-1)
<b>Subject</b>	Combined Science: Trilogy - Biology
<b>Exam Board</b>	AQA
<b>Topic</b>	4.2 Organisation
<b>Sub-Topic</b>	Animal Tissues, Organs and Organ Systems
<b>Difficulty Level</b>	Silver Level
<b>Booklet</b>	Question Paper 1

**Time Allowed:** 52 minutes

**Score:** /50

**Percentage:** /100

**Grade Boundaries:**

**Q1.** Amylase is an enzyme that digests starch.

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

This is the method used.

1. Mix amylase solution and starch suspension in a boiling tube.
2. Put the boiling tube into a water bath at 25 °C.
3. Remove a drop of the mixture every 30 seconds and test it for the presence of starch.
4. Repeat the investigation at different pH values.

The table below shows the students' results.

pH	Time when no starch was detected in minutes
5.0	7.0
5.5	4.5
6.0	3.0
6.5	2.0
7.0	1.5
7.5	1.5
8.0	2.0

- (a) The student concluded pH 7.25 was the optimum pH for the amylase enzyme.

This is **not** a valid conclusion.

Suggest **two** reasons why.

1 .....

.....

2 .....

.....

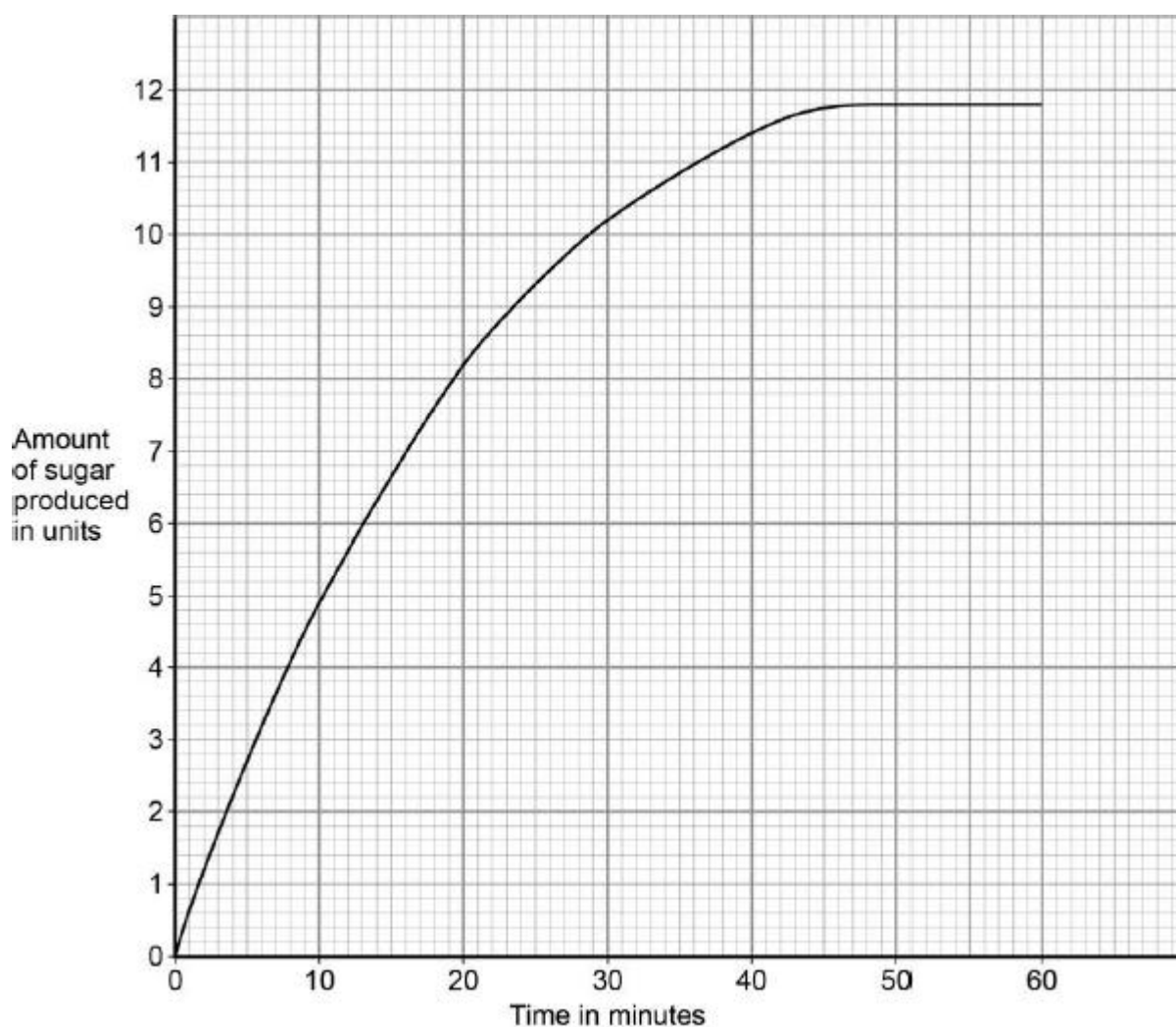
(2)

(b) The student did another investigation.

This is the method used.

1. Put amylase solution and starch suspension into a boiling tube.
2. Make the pH 7.25.
3. Put the boiling tube into a water bath at 25 °C.
4. Measure the amount of sugar produced every 30 seconds.

The results are shown in the figure below.



Calculate the mean rate of sugar produced per minute during the first 5 minutes.

.....  
.....

Mean rate = ..... units per minute

(2)

- (c) Iodine solution is added to a sample taken from the boiling tube after 10 minutes and 60 minutes.

Suggest what you would see in these samples.

After 10 minutes .....

.....

.After 60 minutes .....

.....

(2)

- (d) The scientist repeated the investigation at 37 °C.

Draw a line on the figure above to show the predicted results.

(2)

(Total 8 marks)

**Q2.** Statins are drugs used to treat coronary heart disease (CHD).

New drugs must be trialled before they can be licensed for use.

Some scientists trialled two different types of statin.

The scientists:

- conducted the trial on 325 patients with a history of CHD in their family
- used a double-blind trial method
- measured the change in blood cholesterol levels over two years
- measured the change in thickness of an artery wall over two years.

- (a) During the trials the statins are tested for side effects.

Give **two** other reasons why the statins are trialled before use.

1 .....

.....

2 .....

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(2)

- (b) Describe how the double-blind method is used in this trial.

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(2)

- (c) The results of drug trials are **peer reviewed** before they are published.

Why are peer reviews important in drug trials?

Tick **one** box.

To calculate the best dose

☐

To check the drug works

☐

To make sure the scientist gets credit

☐

To prevent false claims

☐

(1)

- (d) The table below shows the results of the trial.

	Drug A	Drug B
Number of patients who died during the trial	1	2
Number of patients who reported aching muscles	16	17

Number of patients who reported mild abdominal cramps	18	16
Change in blood cholesterol level in percentage	–50.5	–41.2
Change in thickness of artery wall in mm	–0.0033	+0.032

Drug **A** is more effective than Drug **B**.

Give **two** reasons that support this conclusion.

Use information from the table above.

- 1 .....
- .....
- 2 .....
- .....

(2)

- (e) A scientist concludes that Drug **A** is a safer drug than Drug **B**.

Give **two** reasons why this is **not** a valid conclusion.

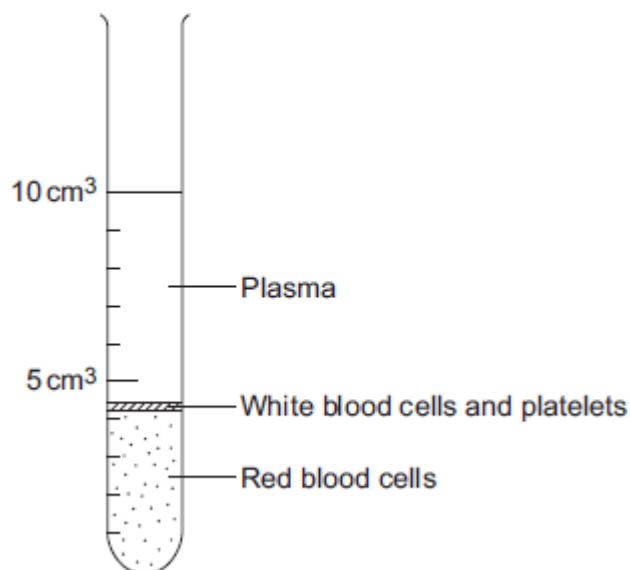
- .....
- .....
- .....
- .....

(2)

(Total 9 marks)

**Q3.** The parts of the blood can be separated from each other by spinning the blood in a centrifuge.

The image below shows the separated parts of a 10 cm<sup>3</sup> blood sample.



- (a) Calculate the percentage of the blood that is made up of plasma.

.....  
 .....

Answer = ..... %

(2)

- (b) Name **three** chemical substances transported by the plasma.

1.....  
 2.....  
 3.....

(3)

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

White blood cells are part of the immune system. White blood cells help the body to defend itself against pathogens.

Describe how pathogens cause infections **and** describe how the immune system defends the body against these pathogens.

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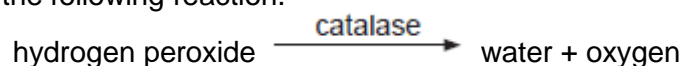
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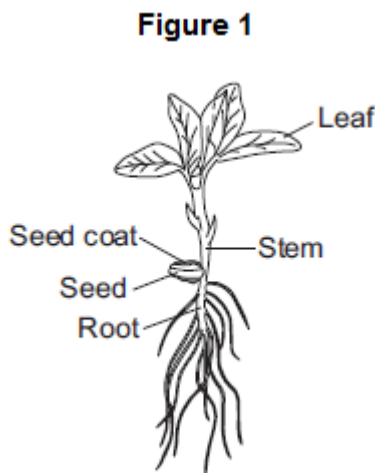
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(6)  
(Total 11 marks)

**Q4.** Catalase is an enzyme found in many different tissues in plants and animals. It speeds up the rate of the following reaction.



**Figure 1** shows a 25-day-old broad bean seedling.



Some students investigated whether different parts of bean seedlings contained different amounts of catalase.

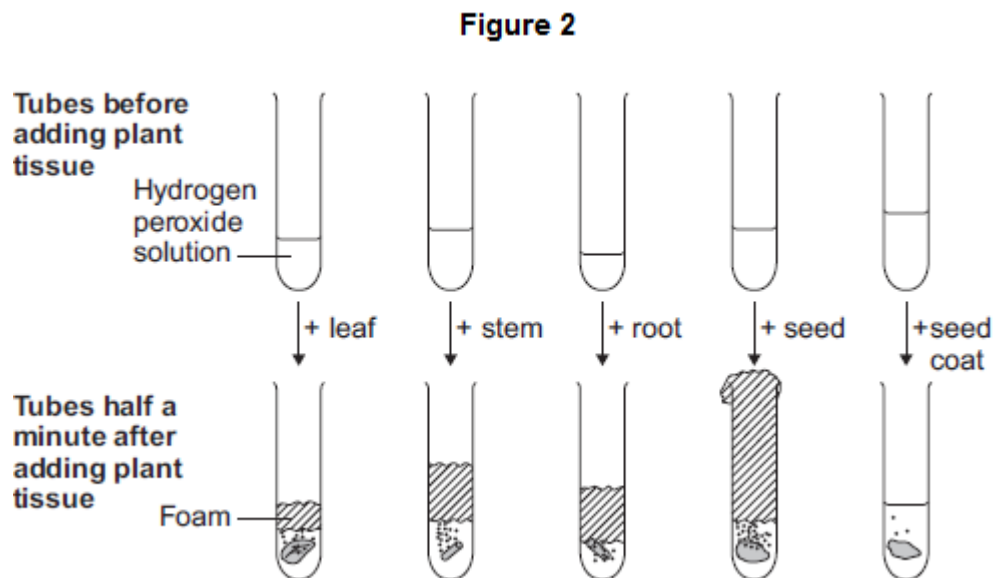
The students:

- put hydrogen peroxide into five test tubes
- added a different part of a bean seedling to each tube
- recorded the results after half a minute.

If there was catalase in part of the seedling, oxygen gas was given off.  
When oxygen gas is given off, foam is produced in the tubes.



Figure 2 shows the results.



The students made the following conclusions:

- most parts of a bean seedling contain catalase
- the seed contains a lot of catalase
- stems and roots have quite a lot of catalase
- the leaves have a little bit of catalase
- the seed coat has hardly any catalase.

The students' teacher said that the students needed to improve their investigation in order to make valid conclusions.

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

Describe how you would carry out an investigation to compare the amounts of catalase in different parts of bean seedlings.

You should include details of how you would make sure your results give a valid comparison of the amounts of catalase.

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(6)

- (b) Scientists investigated the effect of pH on the activity of the enzyme catalase in a fungus.

The table below shows the scientists' results.

pH	Enzyme activity in arbitrary units					
	Test 1	Test 2	Test 3	Test 4	Test 5	Mean
3.0	0	0	0	0	0	0
4.0	6	5	8	4	7	6
5.0	38	65	41	42	39	
5.5	80	86	82	84	88	84
6.0	100	99	96	103	102	100
6.5	94	92	90	93	91	92
7.0	61	63	61	62	63	62
8.0	22	22	21	24	21	22

- (i) Calculate the mean enzyme activity at pH 5.0.

.....

.....

Mean = ..... arbitrary units

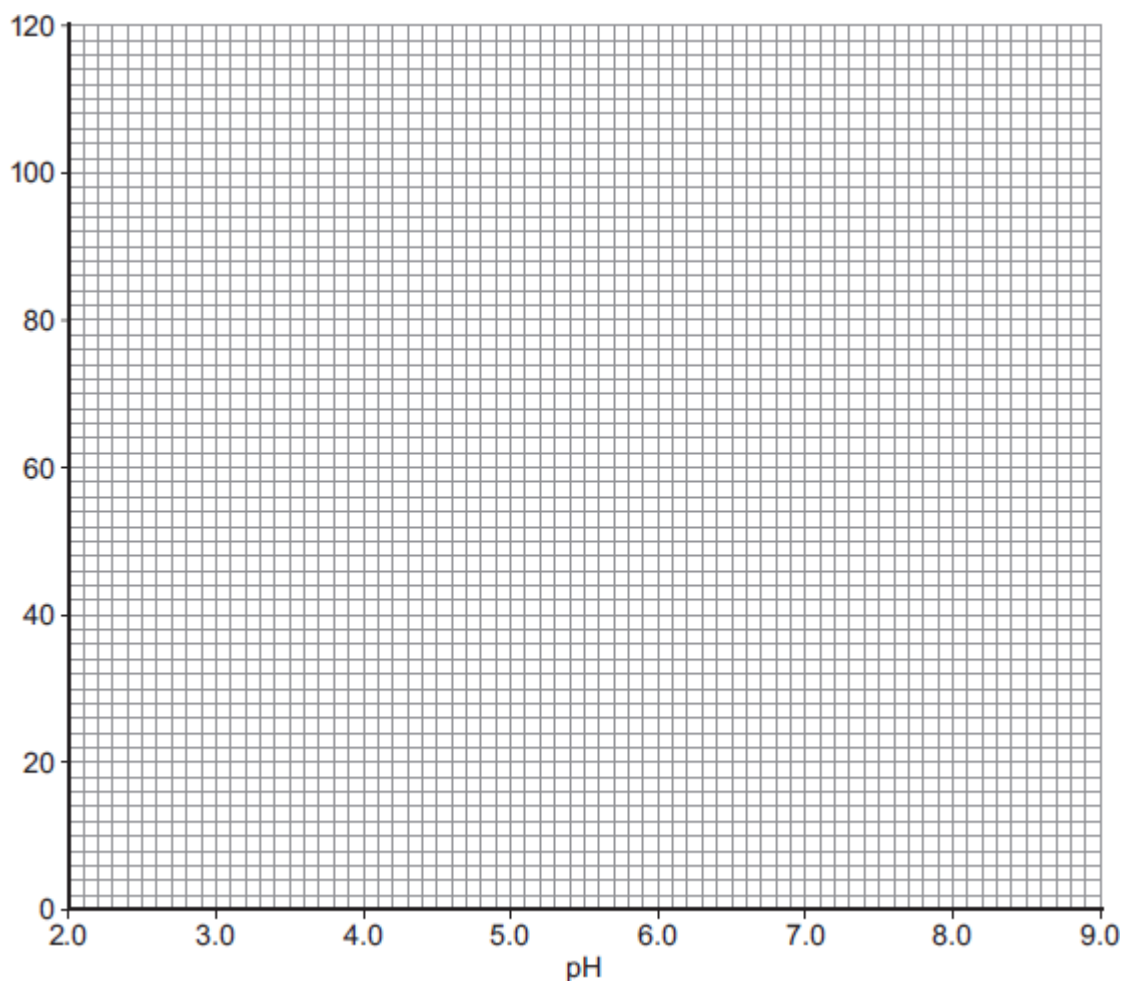
(2)

- (ii) On the graph paper in **Figure 3**, draw a graph to show the scientists' results.

Remember to:

- add a label to the vertical axis
- plot the mean values of enzyme activity
- draw a line of best fit.

**Figure 3**



(4)

- (iii) At what pH does the enzyme work best?

.....

(1)

- (iv) Predict the activity of the enzyme at pH 9.0.

..... arbitrary units

(1)

- (v) Suggest why the enzyme's activity at pH 3.0 is zero.

.....  
 .....

(1)  
 (Total 15 marks)

**Q5.** Lipase is an enzyme that digests fat.

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

Use the correct answer from the box.

glucose	glycerol	glycogen
---------	----------	----------

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

(1)

- (ii) Name **one** organ that makes lipase.

.....

(1)

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

The students:

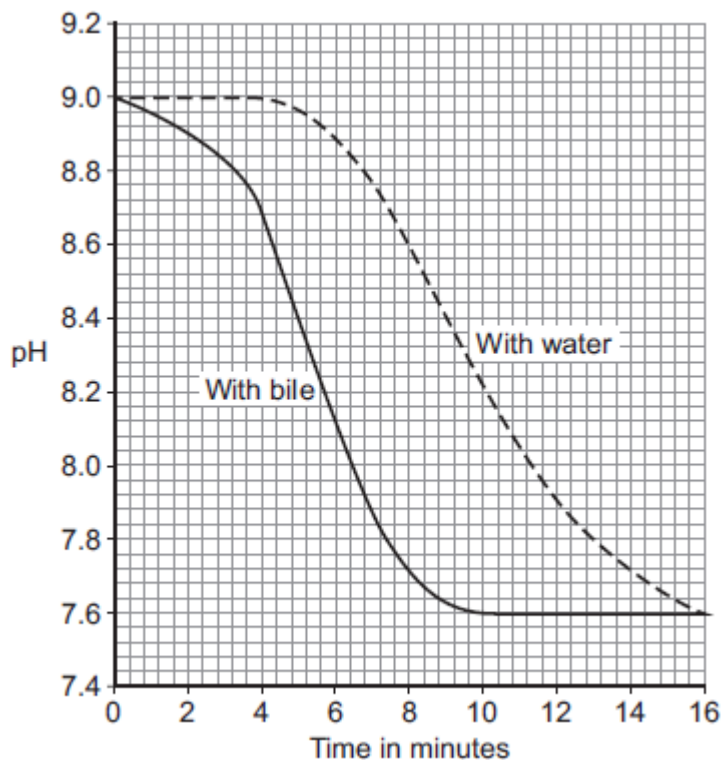
- 1 mixed milk and bile in a beaker
- 2 put the pH sensor of a pH meter into the beaker
- 3 added lipase solution
- 4 recorded the pH at 2-minute intervals
- 5 repeated steps 1 to 4, but used water instead of bile.

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

1.....  
 .....  
 2.....  
 .....

(2)

- (c) The graph shows the students' results.



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

.....  
 .....

(1)

- (ii) Bile helps lipase to digest fat.

What evidence is there in the graph to support this conclusion?

.....  
 .....

(1)

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

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(1)  
(Total 7 marks)