

Specimen Paper Answers – Paper 5

Cambridge IGCSE™ / IGCSE (9–1)

Biology 0610 / 0970

For examination from 2023



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Introduction

The main aim of this booklet is to exemplify standards for those teaching Cambridge IGCSE / IGCSE (9-1) Biology 0610 / 0970, and to show examples of very good answers.

In this booklet, we have provided answers for all questions with examiner comments where relevant. This paper requires candidates to answer short-answer and structured questions and candidates are awarded maximum of 40 marks for this paper and the mark scheme provides the answers required to gain the marks. In some cases, the question and answer is followed by an examiner comment on the candidates answer. Additionally, the examiner has set out a number of common mistakes that occur when candidates answer the questions. In this way, it is possible to understand what candidates have done to gain their marks and how they could improve their answers and avoid errors.

The mark schemes for the Specimen Papers are available to download from the School Support Hub at www.cambridgeinternational.org/support

2023 Specimen Paper 5 Mark Scheme

Past exam resources and other teaching and learning resources are available on the School Support Hub www.cambridgeinternational.org/support

Assessment at a glance

The syllabus for Cambridge IGCSE Biology 0610 is available at www.cambridgeinternational.org

All candidates take three papers. Candidates who have studied the Core syllabus content, or who are expected to achieve a grade D or below, should be entered for Paper 1, Paper 3 and either Paper 5 or Paper 6. These candidates will be eligible for grades C to G.

Candidates who have studied the Extended syllabus content (Core and Supplement), and who are expected to achieve a grade C or above, should be entered for Paper 2, Paper 4 and either Paper 5 or Paper 6. These candidates will be eligible for grades A* to G.

Core assessment

Core candidates take Paper 1 and Paper 3. The questions are based on the Core subject content only:

Paper 1: Multiple Choice (Core)		
45 minutes		
40 marks		30%
40 four-option multiple-choice questions		
Externally assessed		

Paper 3: Theory (Core)		
1 hour 15 minutes		
80 marks		50%
Short-answer and structured questions		
Externally assessed		

Extended assessment

Extended candidates take Paper 2 and Paper 4. The questions are based on the Core and Supplement subject content:

Paper 2: Multiple Choice (Extended)		
45 minutes		
40 marks		30%
40 four-option multiple-choice questions		
Externally assessed		

Paper 4: Theory (Extended)		
1 hour 15 minutes		
80 marks		50%
Short-answer and structured questions		
Externally assessed		

Practical assessment

All candidates take one practical paper from a choice of two:

Paper 5: Practical Test		
1 hour 15 minutes		
40 marks		20%
Questions will be based on the experimental skills in Section 4		
Externally assessed		

Paper 6: Alternative to Practical		
1 hour		
40 marks		20%
Questions will be based on the experimental skills in Section 4		
Externally assessed		

Question 1

- 1 You are going to investigate catalase activity in cooked and uncooked potato tissue.

Catalase is an enzyme found in plant and animal cells. It catalyses the breakdown of hydrogen peroxide to form water and oxygen.



The oxygen produced forms a foam. You can measure the height of the foam to determine catalase activity.

Read all the instructions but **DO NOT CARRY THEM OUT** until you have drawn a table for your results in the space provided in 1(a)(i).

You should wear the gloves and eye protection provided during the practical work.

Step 1 Label one test-tube **C** and the other test-tube **U**.

Step 2 Place the two potato cylinders on the white tile. Cut each potato cylinder to exactly 4 cm in length.

Step 3 Cut one potato cylinder into four 1 cm long pieces, as shown in Fig. 1.1. Repeat this with the other potato cylinder.

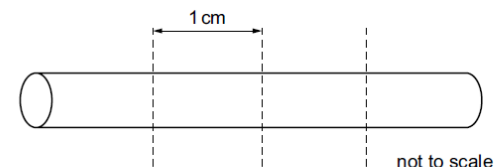


Fig. 1.1

Step 4 Raise your hand when you are ready for hot water to be added to the beaker labelled **hot water**.

Step 5 Put **four** of the 1 cm pieces of potato into the **hot water**. Leave them in the hot water for five minutes.

While you are waiting continue with the other questions.

Step 6 After five minutes use forceps to carefully remove the four cooked potato pieces from the **hot water** and put them into the test-tube labelled **C**.

Step 7 Put the remaining four uncooked potato pieces into the test-tube labelled **U**.

Step 8 Use the syringe to put 15 cm³ of hydrogen peroxide solution into each of the test-tubes. Leave them for three minutes.

Step 9 After three minutes place the ruler against the outside of each of the test-tubes.

Measure the height of the foam produced in each test-tube. Record your results in your table in 1(a)(i).

Question 1(a)(i)

- (a) (i) Prepare a table to record your results.

treatment of potato	height of foam / cm
cooked	9
uncooked	30

[4]

Mark awarded = 3 out of 4

Examiner comment

The candidate has drawn an appropriate table. The results have been recorded and they show the correct trend because the cooked potatoes should have less foam than the uncooked potatoes.

The candidate could not be awarded the mark for headings and units because they stated centimetres in the heading of the table but recorded their data in millimetres.

Common mistakes

Candidates often record data using incorrect units, particularly when using units such as mm, cm, m or s, minutes and hours. In addition, when converting data, such as mm to cm, care must be taken to ensure the correct unit is being used.

Question 1(a)(ii)

- (ii) State one conclusion for these results.

.....
In an uncooked potato the catalase is more active because heating kills the enzyme in the cooked potato...... [1]

Mark awarded = 1 out of 1

Examiner comment

The candidate has stated an appropriate conclusion and been awarded the mark. The candidate has gone on to explain their conclusion but that wasn't required by the question.

Common mistakes

Candidates often state that enzymes are killed. This term should not be used with respect to enzymes. Enzymes are denatured by heat, not killed. Candidates should be encouraged to use appropriate scientific terminology.

Question 1(b)(i)

- (b) (i) Identify the independent variable in this investigation.

treatment of the potato..... [1]

Mark awarded = 1 out of 1

Examiner comment

The candidate has correctly identified the independent variable.

Common mistakes

Most candidates can identify the independent variable as the variable that is changed during the experiment. Some candidates confuse the independent with the dependent variable.

Question 1(b)(ii)

- (ii) State two variables that were kept constant in this investigation.

1 *size of the potato piece*.....
 2 *surface area of the potato piece*..... [2]

Mark awarded = 1 out of 2

Examiner comment

The candidate has understood that the size and surface area of the potato piece must be controlled. However, size and surface area can only be awarded one mark because they are closely linked. It is not possible to change the size of the potato without changing the surface area so they are included in the same mark point. The candidate could have stated concentration of hydrogen peroxide solution, volume of hydrogen peroxide solution or the time the potato was left in the hydrogen peroxide solution.

Common mistakes

Candidates often state hydrogen peroxide solution without qualifying their answer and therefore cannot be awarded the mark. Responses must be as specific as possible. In this instance, candidates should state concentration of hydrogen peroxide solution or volume of hydrogen peroxide solution.

Question 1(c)

(c) There are possible sources of error in steps 6, 7 and 9.

Identify **two** of these sources of error.

error 1 *The foam is not the same height over the whole surface.*

.....

.....

error 2 *The hot potato was added to the hydrogen peroxide solution.*

.....

.....

[2]

Mark awarded = 2 out of 2

Examiner comment

The candidate has clearly stated two possible errors and been awarded full marks. Other suitable errors would have been the fact that the potato was not dried before being added to the hydrogen peroxide solution or the fact that foam is unstable making it difficult to record the height.

Common mistakes

Some candidates state that the potato sticks were not cut accurately into 1 cm lengths. The question asked for errors to be identified from steps 6, 7 or 9 and this procedure is in step 3.

Question 1(d)

(d) A student stated that:

'Catalase activity is the same in all species of plants.'

Plan an investigation to test this statement.

.....

Choose 4 different plant species and remove 2 leaves from each plant. Grind the leaves up in a mortar and pestle.

Use a spatula to add some of the ground up leaves to 10 cm³ of hydrogen

peroxide solution in a test-tube. Leave for 5 minutes and then measure the height

with a ruler. Record the height of foam in mm. Use exactly the same procedure

for all 4 plant species then repeat the whole procedure so an average height of

foam for each species can be calculated.

Hydrogen peroxide solution is dangerous so gloves and goggles should be worn.

.....

.....

.....

..... [6]

Mark awarded = 6 out of 6

Examiner comment

The candidate has designed a well-constructed investigation and has made six points that would gain credit so scores a maximum mark.

The candidate has identified the plant species as the independent variable and has chosen to use a suitable number of species. The candidate has tried to control the mass of leaf tissue by using two leaves but leaves are different sizes so that factor is not controlled. They could have specified a mass, e.g. 5 g, and would have been awarded the mark. The candidate has explained how two other variables are to be controlled, namely volume of hydrogen peroxide solution and the amount of time the leaf tissue will be left before results are recorded. They have clearly stated that the height of foam should be recorded.

The candidate has given an explanation of why repeats are made but this is not required. The candidate would not have gained the mark for repeating the investigation as they only did one replicate when two were required for this marking point.

Safety is always important in science investigations and the candidate not only recognised which chemical was hazardous but suggested appropriate safety precautions.

The response did gain full marks but a useful addition would have been to explain how a control could have been used. For instance, repeating the method with boiled leaves.

Common mistakes

Candidates often design a suitable investigation but are not awarded full marks if details have been omitted or if their answer has not been structured carefully enough. The candidate stated 'add some of the ground up leaf' which could not be credited as a mass was not specified. Candidates should be encouraged to specify masses, volumes and times to ensure variables are being controlled.

When planning investigations candidates should structure their answers carefully to ensure all aspects of a good plan are included. For instance, strong responses state:

- a suitable range for the independent variable
- exactly how variables will be controlled
- how the dependent variable will be measured
- sufficient experimental details to make the method clear
- a suitable control, if appropriate
- if repeats will be taken
- relevant safety procedures.

Question 1(e)

(e) Potatoes contain starch. Starch can be broken down into reducing sugars.

Describe the tests to identify starch and reducing sugars and give the results of the positive tests.

starch ...Add a few drops of iodine solution to a piece of crushed potato. If starch is.....
present, it will turn blue-black.

reducing sugars ...Add a crushed piece of potato to 5 cm³ of Benedict's solution and....
shake it up to mix. If reducing sugars are present, it will turn
brick red.

[5]

Mark awarded = 4 out of 5

Examiner comment

The candidate clearly knows the details of food tests but has omitted one important detail. Benedict's reagent must be heated (to 80°C) for the colour to develop.

Common mistakes

Candidates commonly confuse Benedict's solution with biuret reagent. Candidates should remember that Benedict's solution tests for the presence of reducing sugars, whereas biuret reagent tests for the presence of proteins.

Total mark awarded = 18 out of 21

Question 2

2 A woodlouse is a small animal.

The rate of respiration of a woodlouse can be measured using a simple respirometer as shown in Fig. 2.1.

As the woodlouse respire the drop of coloured liquid moves along the capillary tube.

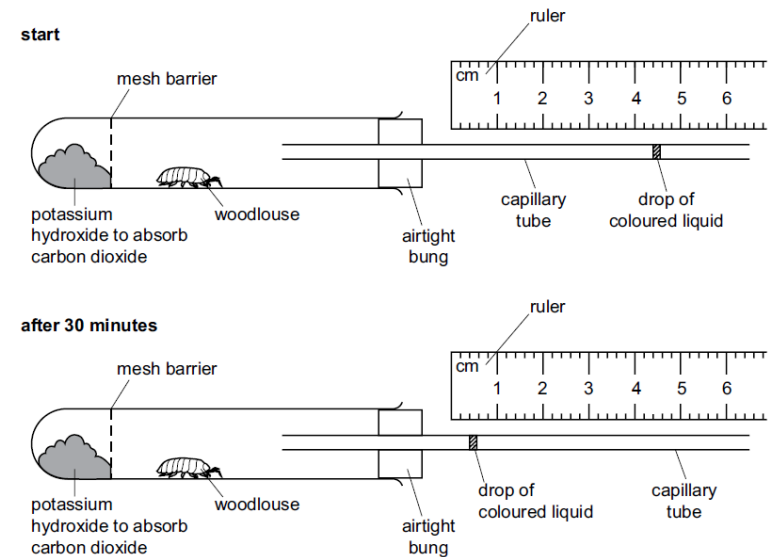


Fig. 2.1

Question 2(a)(i)

(a) (i) Record the position of the drop of coloured liquid in the capillary tube shown in Fig. 2.1 at the start and after 30 minutes.

start 4.4 mm
after 30 minutes 4.0 mm
[1]

Mark awarded = 1 out of 1

Examiner comment

The candidate has measured the position of the drop by measuring to the left-hand side in both diagrams. The candidate has also stated their recording in mm despite the ruler having a cm scale. The mark was awarded for two correct answers.

Common mistakes

Some candidates measure inaccurately or choose different reference points when measuring. The same reference point should always be used when measuring. In this instance, the left or right-hand side of the drop should be used.

Question 2(a)(ii)

- (ii) Calculate the distance moved by the drop of coloured liquid in 30 minutes.

distance moved40..... mm [1]

Mark awarded = 1 out of 1

Examiner comment

The candidate has correctly subtracted 4 from 44 and stated a value that matches the appropriate unit.

Question 2(a)(iii)

- (iii) Calculate the rate of movement of the drop of coloured liquid in mm per minute.

Give your answer to one decimal place.

Space for working.

$$40 \text{ mm} \div 30 \text{ minutes} = 1.33$$

.....1.3..... mm per minute
[2]

Mark awarded = 2 out of 2

Examiner comment

The candidate has been awarded a mark for dividing the distance moved by the time taken. They have been awarded the second mark for rounding their answer to one decimal place.

Common mistakes

Candidates often read too quickly and miss parts of the question. This question asks for the rate to be calculated and the answer to be given to one decimal place. Some candidates gained only one mark because they missed the instruction to round their answer. At the end of the examination it is always beneficial reading through answers to check for simple mistakes such as this.

Question 2(b)(i)

- (b) The rate of movement of the drop of coloured liquid along the respirometer can be used to estimate the rate of respiration.

A student used a respirometer to investigate the rate of respiration in four animal species.

The results are shown in Table 2.1.

Table 2.1

animal species	rate of movement of the drop of coloured liquid / mm per minute			
	trial 1	trial 2	trial 3	mean
A	1.5	1.7	1.3	1.5
B	0.9	1.0	0.7	0.9
C	2.4	2.6	2.5	2.5
D	1.9	2.0	1.9	1.9

- (i) Calculate the missing mean for animal species **A**.

Write your answer in Table 2.1.

[1]

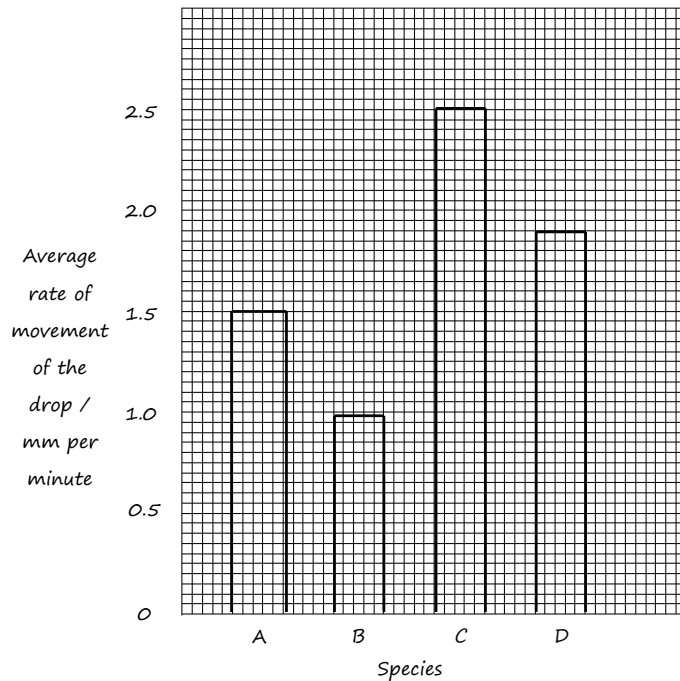
Mark awarded = 1 out of 1

Examiner comment

The candidate has correctly calculated the average of trials 1, 2 and 3 and written their answer in the table.

Question 2(b)(ii)

- (ii) Plot a bar chart on the grid to show the **mean** rate of movement of the drop of coloured liquid in the capillary tube for the four animal species.



Mark awarded = 2 out of 3

Examiner comment

The candidate has drawn an appropriate graph. The first mark was awarded for both axes being labelled, including the unit of mm per minute on the y-axis. The second mark was awarded for a suitable scale being used on both axes. The bar for species B was actually plotted at 0.95 rather than 0.9 so the plotting mark could not be awarded.

Common mistakes

Candidates often find graphs challenging. When selecting the scale, the data points should occupy at least half of the graph grid along both the x- and the y-axis. The axes should be clearly labelled and the appropriate units should be given. For bar graphs displaying discrete data, the bars should not touch and they should be of the same width. Plotting should be done with a sharp pencil and must be accurate to within $\pm$ half a small square.

Question 2(b)(iii)

- (iii) State the letter of the animal species which has the highest rate of respiration.

..... C [1]

Mark awarded = 1 out of 1

Examiner comment

The candidate understood that the species with the highest rate of respiration was species C.

Question 2(b)(iv)

- (iv) Suggest a suitable control for the investigation described in 2(b).

.....
 Use a piece of plastic the same size as a woodlouse
 [1]

Mark awarded = 1 out of 1

Examiner comment

The candidate was awarded a mark for realising that the woodlouse should be replaced with a piece of inert material.

Common mistakes

Candidates often suggest that another animal should be used instead of the woodlouse. This would not work because all animals respire. The woodlouse must be replaced with an item that is inert and does not respire. It is important to note that no animals should ever be harmed during a science practical, nor should it be suggested in an exam answer.

Question 2(b)(v)

- (v) The student decided it would be better to calculate the rate of respiration per gram of animal so that the values could be compared.

Describe how the student could find out the rate of respiration per gram of animal.

.....
 The rate of respiration should be divided by the mass of the animal
 [2]

Mark awarded = 1 out of 2

Examiner comment

The candidate understood how to calculate the rate of respiration per gram of animal but omitted to state that the mass of the animal also needs to be measured.

Common mistakes

Candidates often miss low-demand marks because they overlook them. Candidates should always take note of the number of marks available. This question has two marks available and therefore two points should be made in order to be awarded full marks. This candidate has only made one point so cannot achieve full marks.

Question 2(c)(i)

(c) Fig. 2.2 shows a photograph of a woodlouse.

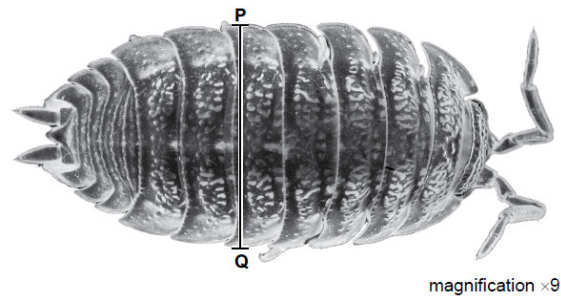
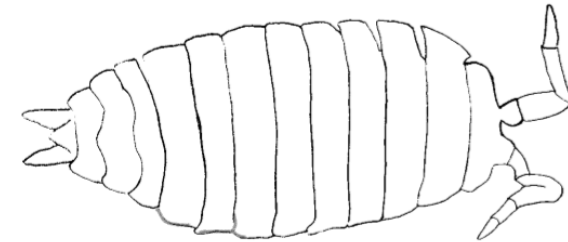


Fig. 2.2

(i) Draw a large diagram of the woodlouse in Fig. 2.2.



[4]

Mark awarded = 4 out of 4

Examiner comment

The candidate has drawn a good diagram of the woodlouse and has been awarded full marks.

There are some lines that are not completely unbroken, but overall, the outline has been drawn in a single clear line. There is no shading present and the diagram is larger than the photograph. The diagram has the correct amount of detail which in this instance is at least eight segments and two projections shown at the front and back of the animal.

Common mistakes

Diagrams are often challenging, particularly ones with difficult outlines like this woodlouse. When drawing diagrams candidates should always consider the following points:

- Is the outline drawn with a single, clear line?
- Is the diagram the correct size? i.e. smaller or larger than the image as requested in the question.
- Is the diagram sufficiently detailed?

Question 2(c)(ii)

- (ii) The magnification of the woodlouse in Fig. 2.2 is $\times 9$.

Measure the length of the line **PQ** on Fig. 2.2.

length of **PQ** 4.7 mm

Calculate the actual width of the woodlouse using the formula and your measurement.

$$\text{magnification} = \frac{\text{length of line PQ}}{\text{actual width of woodlouse}}$$

Give your answer to **three** significant figures.

Space for working.

$$\text{actual width} = \text{length of line PQ} \div \text{magnification}$$

$$\text{.....} = 4.7 / 9 = 5.22 \text{ mm}$$

[3]

Mark awarded = 3 out of 3

Examiner comment

The candidate has accurately measured line **PQ** and rearranged the formula to calculate the actual width. The correct answer has been given to an appropriate number of significant figures and the unit is correct.

Common mistakes

When using formula candidates often rearrange the formula incorrectly. If the formula is inverted a final answer of 0.19 mm is obtained. Strong candidates should realise that a width of 0.19 mm is too small to be feasible and so a mistake must have been made.

Total mark awarded = 17 out of 19