Cambridge Assessment International Education

Specimen Paper Answers – Paper 6

Cambridge IGCSE™ / IGCSE (9–1)

Biology 0610 / 0970

For examination from 2023

Version 1

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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

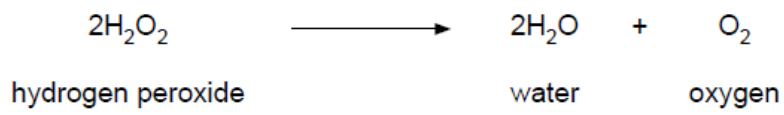
All candidates take one practical paper from a choice of two:

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 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.

A student investigated catalase activity in cooked and uncooked potato tissue.

The student:

Step 1 cut two potato cylinders so that they were identical in shape and size

Step 2 put 5 cm^3 of 3% hydrogen peroxide solution into a test-tube labelled **cooked potato**

Step 3 put 5 cm^3 of 3% hydrogen peroxide solution into a test-tube labelled **uncooked potato**

Step 4 put one of the potato cylinders into a beaker of hot water for five minutes

Step 5 removed the potato cylinder from the hot water and put it into the test-tube labelled **cooked potato**

Step 6 put the uncooked potato cylinder into the test-tube labelled **uncooked potato**

Step 7 left the potato cylinders in the 3% hydrogen peroxide solution for three minutes and then measured the height of the foam produced in each of the test-tubes.

Fig 1.1 shows the test-tubes after three minutes.

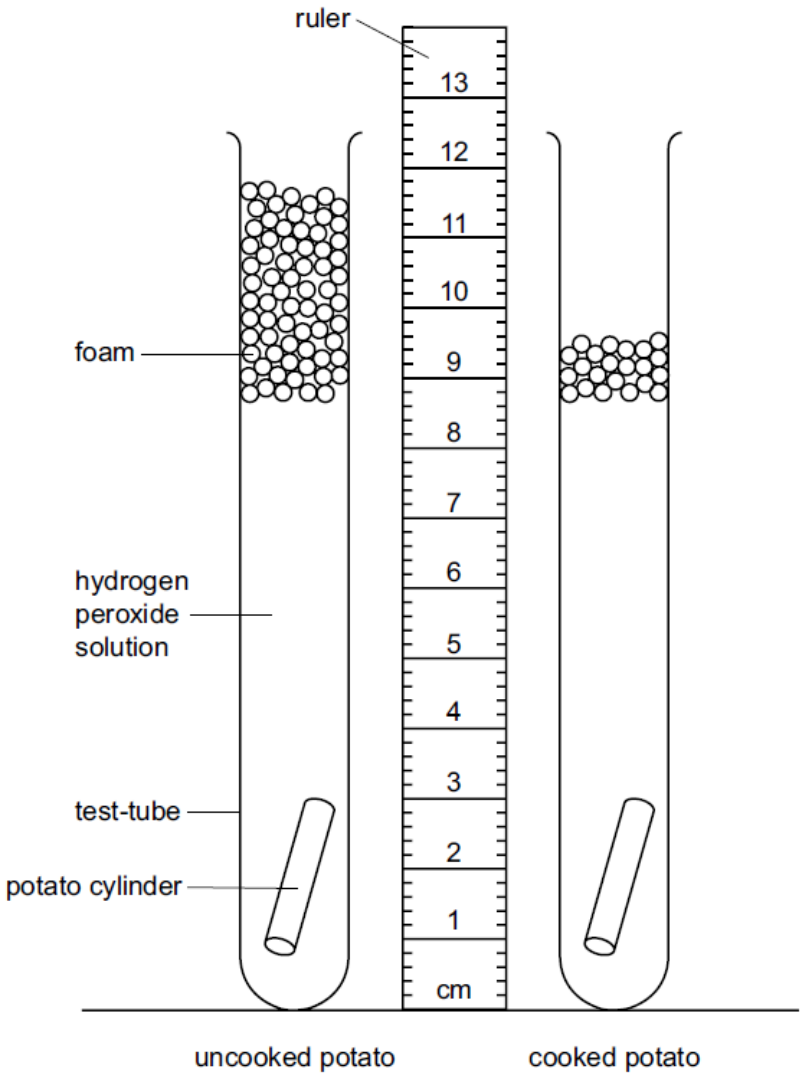


Fig. 1.1

Question 1(a)(i)

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

Measure the height of the foam in each of the test-tubes in Fig. 1.1. Record these measurements in your table.

treatment of potato	*height of foam / cm*
cooked	*10*
uncooked	*32*

[3]

Mark awarded = 2 out of 3

Examiner comment

The candidate has drawn an appropriate table. The results have been measured and recorded.

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) Calculate the difference in the height of the foam produced by the cooked and uncooked potato after three minutes.

32 – 10 = 22 mm [1]

Mark awarded = 1 out of 1

Examiner comment

The candidate has been awarded the mark for calculating the difference in the height of the foam and recording the correct unit.

Question 1(a)(iii)

(iii) 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. They could have also stated treatment of the potato.

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 why it is important that the two potato cylinders were identical in shape and size.

If the potato sticks were the same size and shape they would have the same surface area [1]

Mark awarded = 1 out of 1

Examiner comment

The candidate has clearly linked the surface area to the size and shape of the potato.

Common mistakes

Candidates often state that the mass would be the same. In this experiment, the surface area exposed to catalase is the key factor.

Other responses simply state that it makes it a fair test. This type of general answer does not directly answer the question and cannot be credited.

Question 1(b)(iii)

(iii) State **two other** variables that were kept constant in this investigation.

1 *concentration of hydrogen peroxide solution*

2 *surface area*

[2]

Mark awarded = 1 out of 2

Examiner comment

The candidate has understood that the concentration of the hydrogen peroxide solution must be controlled. Surface area cannot be credited because the question asks 'State **two other** variables…' and so surface area, shape and size are excluded.

The candidate could have stated 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) Identify **one** possible source of error in the method used in this investigation.

The foam is not the same height over the whole surface making it difficult to measure. [1]

Mark awarded = 1 out of 1

Examiner comment

The candidate has clearly stated a possible error and been awarded the mark. Other suitable errors would have been the fact that the potato was not dried before being added to the hydrogen peroxide solution, the hot potato was not cooled before adding it to the hydrogen peroxide solution or the fact that foam is unstable making it difficult to record the height.

Common mistakes

Candidates often state examples of human error rather than experimental error.

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 cm^3 of hydrogen peroxide solution in a test-tube. Leave for 5 minutes and then measure the height of foam 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 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 cm^3 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 respires the drop of coloured liquid moves along the capillary tube.

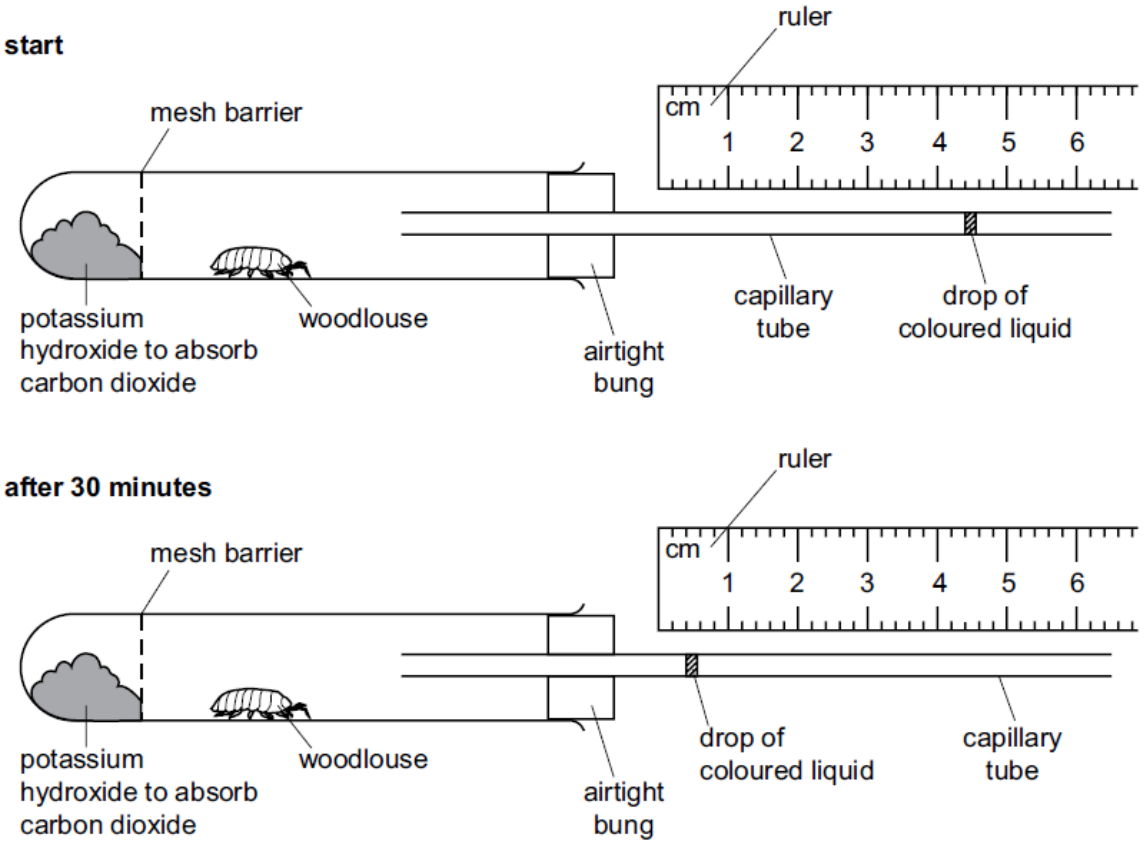


Fig. 2.1

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 ..... 44 ..... mm

after 30 minutes ..... 4 ..... 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 moved .....40..... 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 mm ÷ 30 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]

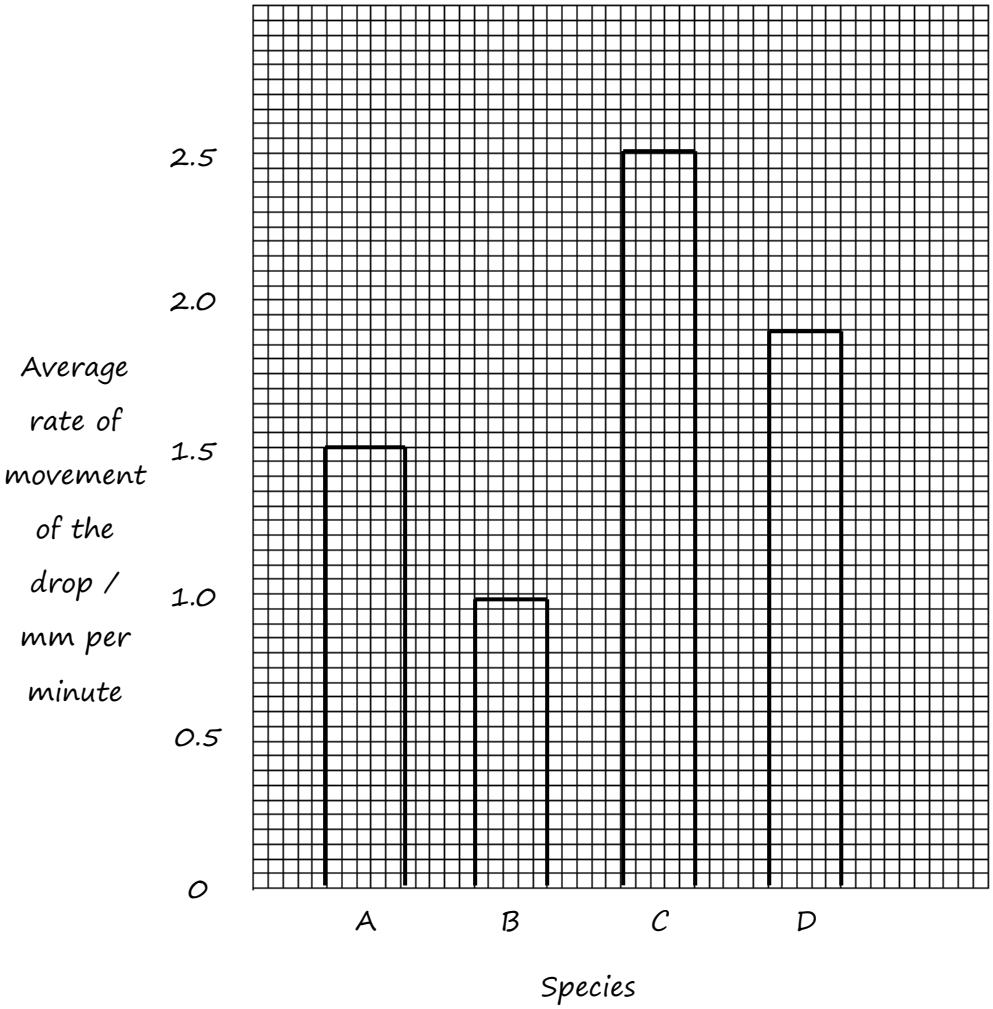
Mark awarded = 1 out of 1

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 ± 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

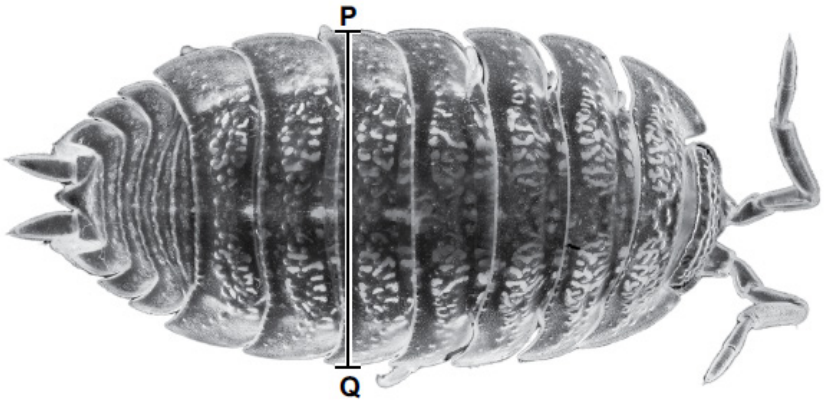
The candidate understood how to calculate the rate of respiration per gram of animal but omitted to state that the mass of the animal also needs to be measured.

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)

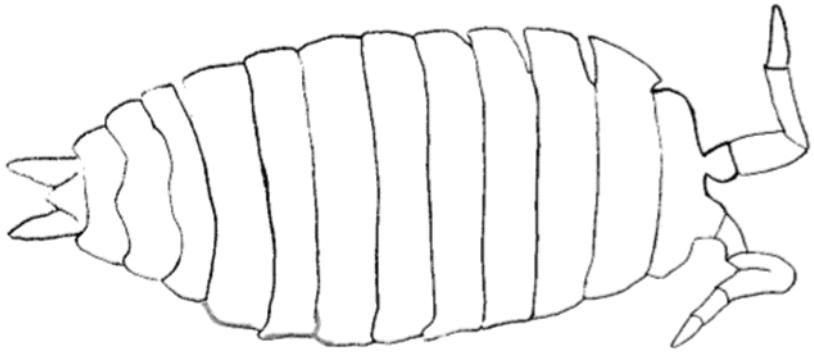
(c) Fig. 2.2 shows a photograph of a woodlouse.



magnification ×9

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 ×9.

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

length of **PQ** .....47..... 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.

actual width = length of line **PQ** ÷ magnification

.....= 47 / 9 = 5.22..... 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

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