Cambridge Assessment International Education

Specimen Paper Answers
Paper 3: Practical Test

Cambridge O Level Biology

5090

For examination from 2023

Version 1

Cambridge Pathway

In order to help us develop the highest quality resources, we are undertaking a continuous programme of review; not only to measure the success of our resources but also to highlight areas for improvement and to identify new development needs.

We invite you to complete our survey by visiting the website below. Your comments on the quality and relevance of our resources are very important to us.

www.surveymonkey.co.uk/r/GL6ZNJB

Would you like to become a Cambridge consultant and help us develop support materials?

Please follow the link below to register your interest.

www.cambridgeinternational.org/cambridge-for/teachers/teacherconsultants/

Contents

Introduction

The main aim of this booklet is to exemplify standards for those teaching Cambridge O Level Biology 5090, and to show examples of very good answers.

In this booklet, we have provided answers for all questions with examiner comments. These exercises require candidates to answer questions on experimental skills and candidates are awarded maximum of 40 marks for this paper and the mark scheme provides the answers required to gain the marks.

Each question and answer is followed by an examiner comment on the candidate's 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 3 Mark Scheme

2023 Specimen Paper 3 Confidential Instructions

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 O Level Biology 5090 is available at www.cambridgeinternational.org

All candidates take three papers. Candidates will be eligible for grades A* to E.

Paper 1: Multiple Choice		And	Paper 2: Theory	
1 hour			1 hour 45 minutes	
40 Marks	30%		80 Marks	50%
40 four-option multiple-choice questions			Short-answer and structured questions	
Externally assessed			Externally assessed	

Practical assessment

Paper 3: Practical Test		Or	Paper 4: Alternative to Practical	
1 hour 30 minutes			1 hour	
40 Marks	20%		40 Marks	20%
Questions will be based on the experimental skills in Section 4			Questions will be based on the experimental skills in Section 4	
Externally assessed			Externally assessed	

Question 1

Question 1(a)(i)

1 You are going to determine the concentration of glucose solution **X**.
Benedict's solution is used to test for reducing sugars, such as glucose.

You are provided with Benedict's solution and five test-tubes containing 5 cm^3 of:

distilled water labelled **W**

0.2% glucose solution labelled **A**

0.4% glucose solution labelled **B**

0.6% glucose solution labelled **C**

unknown glucose solution labelled **X**

- Using the measuring cylinder or syringe provided, add 5 cm^3 of Benedict's solution to each of these five test-tubes.
- Place the test-tubes in a beaker to use as a water-bath.
- When ready, raise your hand to request hot water which the supervisor will pour into your water-bath. **Caution: the water will be hot.**
- Record the start time when the hot water was added to the water-bath in **(a)(i)**.
- Leave the test-tubes for 10 minutes. **While you are waiting, start Question 2.**

(a) **(i)** After 10 minutes remove the test-tubes from the water-bath and place them in the test-tube rack. Record the time.

start time 10.00 ✓

time when test-tubes removed 10.10 ✓

[1]

Mark awarded = 1 out of 1

Examiner comment

If a stop watch was used, then start 0 followed by 10 min would score the mark.

Question 1(a)(ii)

(ii) Record the colours of the contents of each test-tube in Table 1.1.

Table 1.1

test-tube	glucose solution concentration (%)	observations
W	0.0 (distilled water)	*blue* ✓
A	0.2	*Greenish-blue* ✓
B	0.4	*Dull orange-brown* ✓
C	0.6	*Bright orange* ✓
X	unknown	*Duller orange-brown* ✓

[4]

Mark awarded = 4 out of 4

Examiner comment

Four marks scored. The first for W being blue, the second for C being clearly orange, the third for A and B being of intermediate colour between W (blue) and C (orange), and the fourth for X being intermediate between A and B

Question 1(b)(i)

(b) **(i)** Using your observations in Table 1.1, estimate the % concentration of glucose solution **X**.

concentration of glucose solution **X** ..... *0.3* ✓ % [1]

Mark awarded = 1 out of 1

Examiner comment

Mark scored for a value between A (2%) and B (4%)

Question 1(b)(ii)

(ii) Explain how you estimated this concentration.

The colour of X is between the colours of A and B ✓

..... [1]

Mark awarded = 1 out of 1

Examiner comment

Mark scored for observing the colour was intermediate to A and B.

Question 1(b)(iii)

(iii) Suggest how you could determine a more accurate % concentration for glucose solution **X**.

I would prepare glucose solutions with concentrations between 0.3% and 0.4% i.e. 0.31%, 0.32% 0.33% etc. ✓ I would test these with Benedict's solution, observe the colours produced and discover which concentration had the same as the colour as solution X. ✓

..... [2]

Mark awarded = 2 out of 2

Examiner comment

Two marks scored. The first for recognising that dilutions between the two dilutions identified in 1(b)(ii) should be used, the second for comparing the colour of X with the colours of the dilutions after treatment with Benedict's solution.

Question 1(c)

(c) Explain why it was important to test distilled water with Benedict's solution.

To see the colour produced by Benedict's when no glucose was present ✓

..... [1]

Mark awarded = 1 out of 1

Examiner comment

The candidate is correct.

Common mistakes

'As a control' or 'to show that the water contains no glucose' are insufficient answers.

Question 1(d)

(d) A student is given a 1.0% glucose solution.

Describe how the student should use it to produce 5 cm^3 of 0.5% glucose solution.

I would take 2.5cm³ of the 1.0% glucose solution ✓ and add 2.5cm³ of water. ✓

..... [2]

Mark awarded = 2 out of 2

Examiner comment

Two marks scored. The first for using 2.5cm^3 of 1.0% glucose solution. The second for diluting it with the same volume of water (to give 5cm^3 of 0.5% glucose solution). Also scoring both marks would be equal volumes of 1.0% glucose solution and water being mixed and a 5cm^3 sample of the resulting 0.5% glucose solution being taken.

Question 1(e)(i)

Approximately 20 minutes after removing the test-tubes from the water-bath, observe them again and answer **1(e)(i)** and **1(e)(ii)**.

(e) **(i)** Describe the contents of the test-tubes now, compared to when you first placed them in the test-tube rack.

Some test-tubes have solid at the bottom. ✓ C has the most. ✓

..... [2]

Mark awarded = 2 out of 2

Examiner comment

Two marks scored. The first for observing the settled precipitate and the second for a quantitative statement.

Question 1(e)(ii)

(ii) Solids may form after the Benedict's test.
Suggest how you could separate any solid from a solution and obtain its mass.

I would filter the solution through filter paper and collect the solid. ✓ I would then dry the solid and measure its mass. ✓

[2]

Mark awarded = 2 out of 2

Examiner comment

Two marks scored. The first for a good technique for collecting the solid and the second for drying it and measuring its mass.

Common mistakes

Not drying the solid which means that the mass measured also includes water.

Total mark awarded = 16 out of 16

Question 2

Question 2(a)

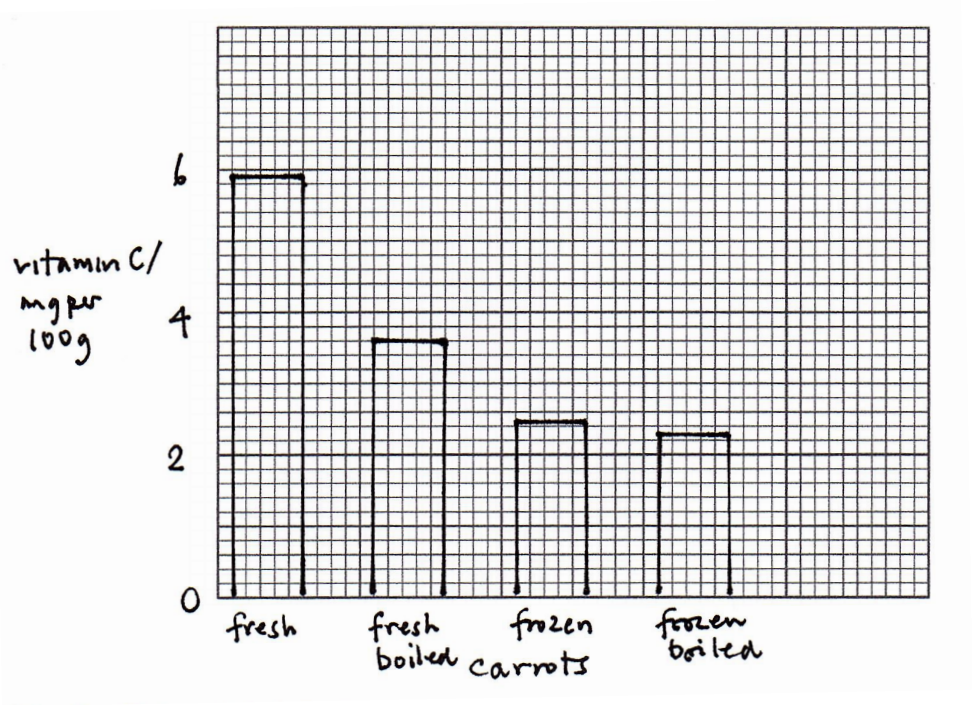
2 Carrots are a food containing vitamin C. They can be frozen to be preserved and stored.

Some students measured the vitamin C content of fresh and frozen carrots. They then boiled the carrots in water and measured the vitamin C content again. Their results are shown in Table 2.1.

Table 2.1

carrots	vitamin C / mg per 100 g
fresh	5.9
fresh, boiled	3.6
frozen	2.5
frozen, boiled	2.3

(a) Construct a bar chart of the data in Table 2.1 on the grid.



[4]

Mark awarded = 4 out of 4

Examiner comment

Four marks scored. The first for the axes being fully labelled with the physical quantity and also with the appropriate unit on the y axis. The second for the scale for vitamin C content being linear, including a value at the origin and using over half of the grid. The third for the data values being correctly plotted and the fourth for the bars being ruled, narrow, of equal width and not touching. Vitamin C content would be acceptable on the x axis with horizontal bars drawn as an alternative.

Common mistakes

Not fully labelling the axes e.g. omitting carrots, the bars touching and omitting the value at the origin of the vitamin C/mg per 100g axis.

Question 2(b)(i)

(b) (i) State which boiled carrots contained the most vitamin C.

fresh ✓ ..... [1]

Mark awarded = 1 out of 1

Examiner comment

One mark for correctly interpreting the data given in Table 2.1

Question 2(b)(ii)

(ii) Suggest **two** conclusions the students could reach from these results.

1 boiling reduces vitamin C content ✓ .....

.....

2 freezing reducing vitamin C content ✓ .....

.....

[2]

Mark awarded = 2 out of 2

Examiner comment

Two marks scored both for interpreting the data given. Answers such as fresh carrots contain more vitamin C than boiled or frozen carrots would also score both marks.

Question 2(c)

(c) Carrots can be cooked by heating them in an oven or by boiling them in water.

You want to investigate the effect of these two cooking methods on the vitamin C content of the cooked carrots.

Describe how you would do this investigation.

There is a simple test that can be used to measure vitamin C content. You do not need to know this test. Refer to **the vitamin C test** in your answer.

I would do the vitamin C test on some fresh carrot to measure its content. ✓ I would then take two samples ✓of the same mass ✓ from that carrot. One sample I would boil in water at 100°C ✓ and the other sample I would cook in an oven at the same temperature. ✓ I would then carry out the vitamin C test on both samples and determine their vitamin C contents and compare them. ✓

[6]

Mark awarded = 6 out of 6

Examiner comment

Six marks scored. The first for measuring the vitamin C content of a fresh carrot. The second taking samples from the same carrot. The third for ensuring those samples were of the same mass. The fourth for using both cooking methods under investigation. The fifth for using the same temperature in both and the sixth for re-testing both samples for their vitamin C content after cooking.

Other scoring points would be:

- cooking the samples for the same length of time
- repeating the whole procedure to see if similar results were obtained.

Total mark awarded = 13 out of 13

Question 3

Question 3(a)

3 The potato is a plant that can store starch grains in its cells. Fig. 3.1 shows some of these starch grains as seen under a microscope.

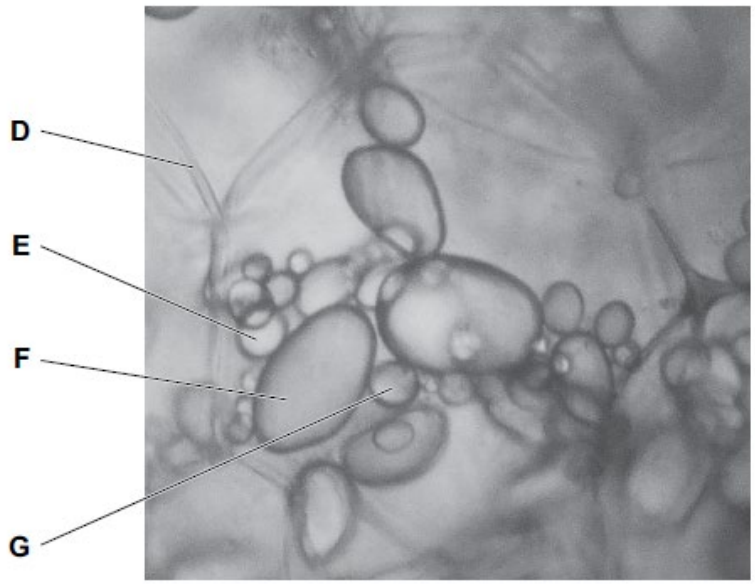


Fig. 3.1

(a) Identify the structure labelled **D**.

Cell wall ✓ [1]

Mark awarded = 1 out of 1

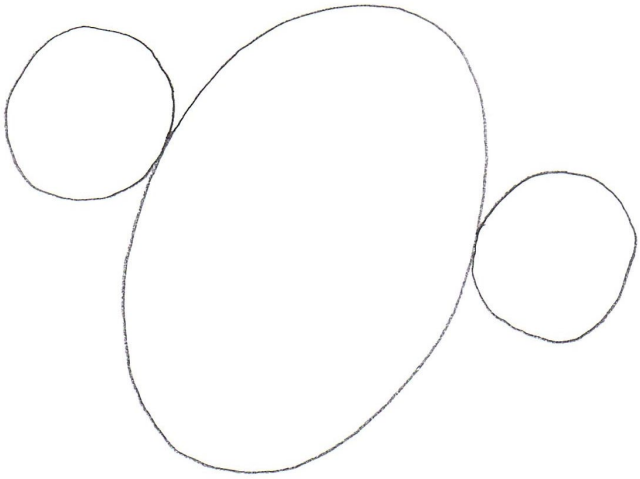
Examiner comment

The candidate is correct.

Question 3(b)

(b) Draw the starch grains labelled **E**, **F** and **G** as they appear in Fig. 3.1.

Grain **F** should be at least 60 mm long.



[3]

Mark awarded = 3 out of 3

Examiner comment

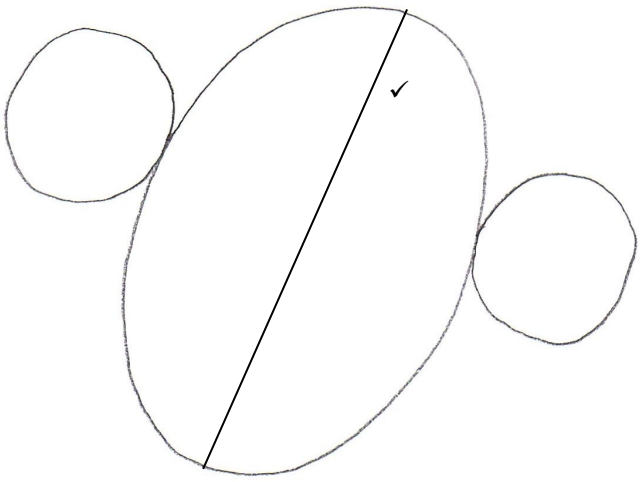
Three marks are scored. The first for the outline of grain F being cleanly drawn with a continuous line with no overlapping at 'joins' and with no shading anywhere. The second for grain F being more than 60mm long as asked for and the three grains touching 'as they appear in Fig. 3.1'. The third for the positioning of the three cells and their proportions being shown well.

As the outlines of the grains in Fig. 3.2 are thick, double lines may be drawn. Only the outer line would be assessed.

Common mistakes

- Making three separate drawings of the grains and so not drawing them 'as they appear in Fig. 3.1'
- Drawing of grain F being less than 60mm long.

Question 3(c)(i)



(c) (i) On your drawing, draw a line to indicate the maximum length of grain **F**.

Measure this length and record it.

.....65 ✓mm [2]

Mark awarded = 2 out of 2

Examiner comment

Two marks scored. The first for a correctly drawn line and the second for an accurate measurement greater than 60mm.

Common mistakes

- Drawing and then measuring a line longer than the actual drawn grain
- Confusing 'length' and 'width'.

Question 3(c)(ii)

(ii) The actual length of grain **F** is 0.03 mm. Calculate the magnification of your drawing to the nearest whole number.

Space for working

65/0.03 = 2166.67 ✓

magnification × .....2167 ✓..... [2]

Mark awarded = 2 out of 2

Examiner comment

Two marks scored. The first for the use of a correct expression i.e. measurement in 3(c)(i) divided by the given actual measurement, 0.03. The second for the resulting magnification being correctly expressed to the nearest whole number, as asked for, and with no units.

Common mistakes

0.03/65

Question 3(d)

(d) Describe how to prepare a slide of potato tissue to observe starch grains as clearly as possible under a microscope.

I would scrape some potato tissue on to a microscope slide. ✓ I would add iodine solution ✓ to stain the starch grains. ✓ I would then put a cover slip on, avoiding air bubbles forming. I would then place the slide on the stage of the microscope and observe it under low power.

[3]

Mark awarded = 3 out of 3

Examiner comment

Three marks scored. The first for a description of how the starch grains would be obtained and used. The second for use of a stain and the third for the naming of a suitable stain.

Use of a cover slip and preventing/removing air bubbles would also score here, but there are only 3 marks available.

Total mark awarded = 11 out of 11

Cambridge Assessment International Education
The Triangle Building, Shaftesbury Road, Cambridge, CB2 8EA, United Kingdom
t: +44 1223 553554
e: info@cambridgeinternational.org www.cambridgeinternational.org