

Advanced Subsidiary GCE

F213

BIOLOGY

Unit F213: Practical Skills in Biology 1
Quantitative Task

Specimen Task

For use from September 2008 to June 2009

All items required by teachers and candidates for this task are included in this pack.

INFORMATION FOR CANDIDATES

- Practical Skills in Biology 1: Quantitative Task

INFORMATION FOR TEACHERS

- Mark scheme.
- Instructions for Teachers and Technicians.

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Candidates answer on this task sheet.

INSTRUCTIONS TO CANDIDATES

- Answer **all** parts of the task.

INFORMATION FOR CANDIDATES

- The total number of marks for this task is **10**.

ADVICE TO CANDIDATES

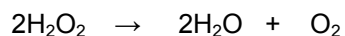
- Read each part carefully and make sure you know what you have to do before starting your answer.

FOR TEACHER'S USE		
	Max.	Mark
TOTAL	10	

This task consists of **5** printed pages and **1** blank page.

Seeds are metabolically very active as they germinate and develop into seedlings, producing high levels toxic hydrogen peroxide (H_2O_2). Hydrogen peroxide must be broken down to prevent cellular damage, so the seeds produce catalase to break it down. The activity of catalase changes as the seeds germinate and develop into seedlings.

Catalase catalyses the breakdown of hydrogen peroxide:



Your task is to investigate the effect of germination age on the activity of the enzyme catalase in mung beans. It is your responsibility to work safely and to organise your time effectively.

You are supplied with five labelled tubes containing beans that have been germinated for 12 hours, 2 days, 4 days, 6 days and 10 days.

Read the procedure carefully before you start.

Procedure:

- 1 Weigh approximately, but accurately, 10g of the beans that have been germinated for 12 hours, place them in a clean pestle and mortar and crush well.
- 2 Pour the crushed beans into the conical flask or boiling tube.
- 3 Invert a full burette of water into a water bath and clamp into position.
- 4 Set up connecting tubing with rubber bung and check for a good fit.
- 5 Carefully measure 20 cm³ of 20 volume H_2O_2 using the most suitable measuring instrument.
- 6 Quickly add all of the H_2O_2 to the flask of crushed beans and attach the rubber bung with connection tubing to the top.
- 7 Start the stop watch immediately.
- 8 Record the volume of oxygen collected in the burette after 30 seconds.
- 9 Take the apparatus apart and rinse it to remove any traces of the H_2O_2 and seeds, and dry the apparatus well. The burette only needs to be topped up with water.
- 10 Repeat steps 1 to 9 for the other four samples of beans.
- 11 Record all your raw data in the most suitable form in the space provided on page 3.
- 12 Calculate the **rate** of production of oxygen after 30 seconds and present this information in a separate table in the space provided on page 4.

Record your raw data here.

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(a) Which measuring instrument did you use to measure out the H_2O_2 ?

.....

(b) Explain the reason for your choice.

.....

.....

.....

.....

[Turn over

Record your processed data here.

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Total [10]

END OF TASK

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Unit F213: Practical Skills in Biology 1:
Quantitative Task

Specimen Mark Scheme

The maximum mark for this task is **10**.

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	Mark
all raw data presented in a single table with columns correctly labelled ;	[1]
soaking time recorded in column 1 ;	[1]
all volumes recorded to an accuracy of no more than 1 decimal place ;	[1]
all units written correctly and in column headings only	[1]
each rate calculated as $\text{cm}^3 \text{s}^{-1}$ and recorded with correct units ;	[1]
each rate calculated as $\text{cm}^3 \text{s}^{-1} \text{g}^{-1}$ and recorded with correct units ;	[1]
rates recorded to an accuracy of no more than 1 decimal place ;	[1]
trend in data is appropriate ;	[1]
selection of 20 cm^3 syringe explained in terms of increased accuracy ;	[1]
appropriate explanation of why smaller syringes or measuring cylinder would be less accurate ;	[1]
Total	[10]

Unit F213: Practical Skills in Biology 1:

Quantitative Task

Instructions for Teachers and Technicians

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This document consists of **3** printed pages and **1** blank page.

This task relates to Module 2, Unit F211. There is no time limit but it is expected that it can be completed within one timetabled lesson.

It is assumed that you will have completed the teaching of the above module before setting your students this task. This module has links to other modules which contain related learning experiences – please refer to your specification.

Candidates may attempt more than one quantitative task with the best mark from this type of task being used to make up the overall mark for Unit F213.

Preparing for the assessment

It is expected that before candidates attempt Practical Skills in Biology 1 (Unit F213) they will have had some general preparation in their lessons. They will be assessed on a number of qualities such as demonstration of skilful and safe practical techniques using suitable qualitative methods, the ability to make and record valid observations, and the ability to organise results suitably. It is therefore essential that they should have some advance practice in these areas so that they can maximise their attainment.

Preparing candidates

At the start of the task the candidates should be given the task sheet.

Candidates must work on the task individually under controlled conditions with the completed task being submitted to the teacher at the end of the lesson. Completed tasks should be kept under secure conditions until results are issued by OCR.

Candidates should not be given the opportunity to redraft their work, as this is likely to require an input of specific advice. If a teacher feels that a candidate has under-performed, the candidate may be given an alternative task. In such cases it is essential that the candidate be given detailed feedback on the completed assessment before undertaking another Quantitative Task. Candidates are permitted to take each task **once** only.

Assessing the candidate's work

The mark scheme supplied with this pack should be used to determine a candidate's mark out of a total of 10 marks. The cover sheet for the task contains a grid for ease of recording marks. To aid moderators it is preferable that teachers mark work using red ink, including any appropriate annotations to support the award of marks.

Notes to assist teachers with this task

Teachers must trial the task before candidates are given it, to ensure that the apparatus, materials, chemicals etc provided by the centre are appropriate. The teacher carrying out the trial must complete a candidate's task sheet showing the results attained, and retain this, clearly labelled, so that it can be provided to the moderator when requested.

Health and Safety

Attention is drawn to Appendix E of the specification.

Teacher / technician guide

Each student will require:

Materials:

- Five labelled sample tubes containing:

Label	Contents
12 hours	mung beans germinated for 12 hours
2 days	mung beans germinated for 2 days (these should be just sprouting)
4 days	mung beans germinated for 4 days
6 days	mung beans germinated for 6 days
10 days	mung beans germinated for 10 days

Apparatus:

- Balance
- Pestle and mortar
- 5 sample tubes
- One 20 cm³ syringe, one 1 cm³ syringe, one 5 cm³ syringe, one 50 cm³ measuring cylinder, one 100 cm³ measuring cylinder
- 5 rubber bungs with connectors long enough for the end to be placed under the open end of the burette in the water bath
- One 100 cm³ burette
- Burette clamp
- Stop watch, stopclock or bench timer
- 100 cm³ 20 volume H₂O₂ in a beaker labelled **20 volume H₂O₂**
- 1000 cm³ beaker or similar to use as water bath
- Paper towels
- Safety spectacles
- Warning hazard card for H₂O₂
- Heat proof mat
- Access to cold water tap

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