SPECIMEN

Advanced Subsidiary GCE

HUMAN BIOLOGY

Unit F223: Practical Skills in Human Biology
        Evaluative Task

Specimen Task

For use from September 2008 to June 2009.

F223

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

INFORMATION FOR CANDIDATES

• Evaluative Task: Investigating the effect of temperature on osmosis in a potato

INFORMATION FOR TEACHERS

• Mark scheme
• Instructions for Teachers and Technicians.

Advanced Subsidiary GCE

F223

HUMAN BIOLOGY

Unit F223: Practical Skills in Human Biology
　　　　　Evaluative Task

Specimen Task

For use from September 2008 to June 2009.
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 **20.**

ADVICE TO CANDIDATES

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

This task consists of **8** printed pages.

Investigating the effect of temperature on osmosis in a potato

Introduction

A student investigated the effect of temperature on osmosis in potato tuber tissue by placing cylinders of potato in 1.0 mol dm^{-3} sucrose solutions at different temperatures and recording the change in mass of the potato. The student carried out 5 repeats of the experiment.

You are to analyse and evaluate the data collected by the student.

1. Analysis

Effect of temperature on osmosis in potato tuber tissue

temperature / °C	percentage loss in mass / %						
	1	2	3	4	5	mean	SD
30	14.0	14.0	17.5	14.6	15.6		1.5
35	16.7	17.1	20.5	17.1	17.5	17.8	1.5
40		19.0	21.1	19.5	20.0	19.7	0.9
45	20.4	22.0	24.1	24.4	22.5	22.7	1.6
50	24.4	24.0	28.1	23.8	25.5	25.2	

(a) Calculate the mean of the repeats for 30°C and add the value to the table.

Show your working and give your answer to **one** decimal place.

(b) The raw data for the first repeat at 40°C are:

Initial mass of potato cylinder = 4.2g

Final mass of potato cylinder = 3.4g

Use this information to calculate the percentage change in mass and add the value to the table.

Show your working and give your answer to **one** decimal place.

(c) Calculate the standard deviation (SD) of the repeats at 50°C and add this value to the table.

Show your working and give your answer to **one** decimal place.

(d) Plot a graph of the mean percentage change in mass against the temperature and draw the line of best fit.
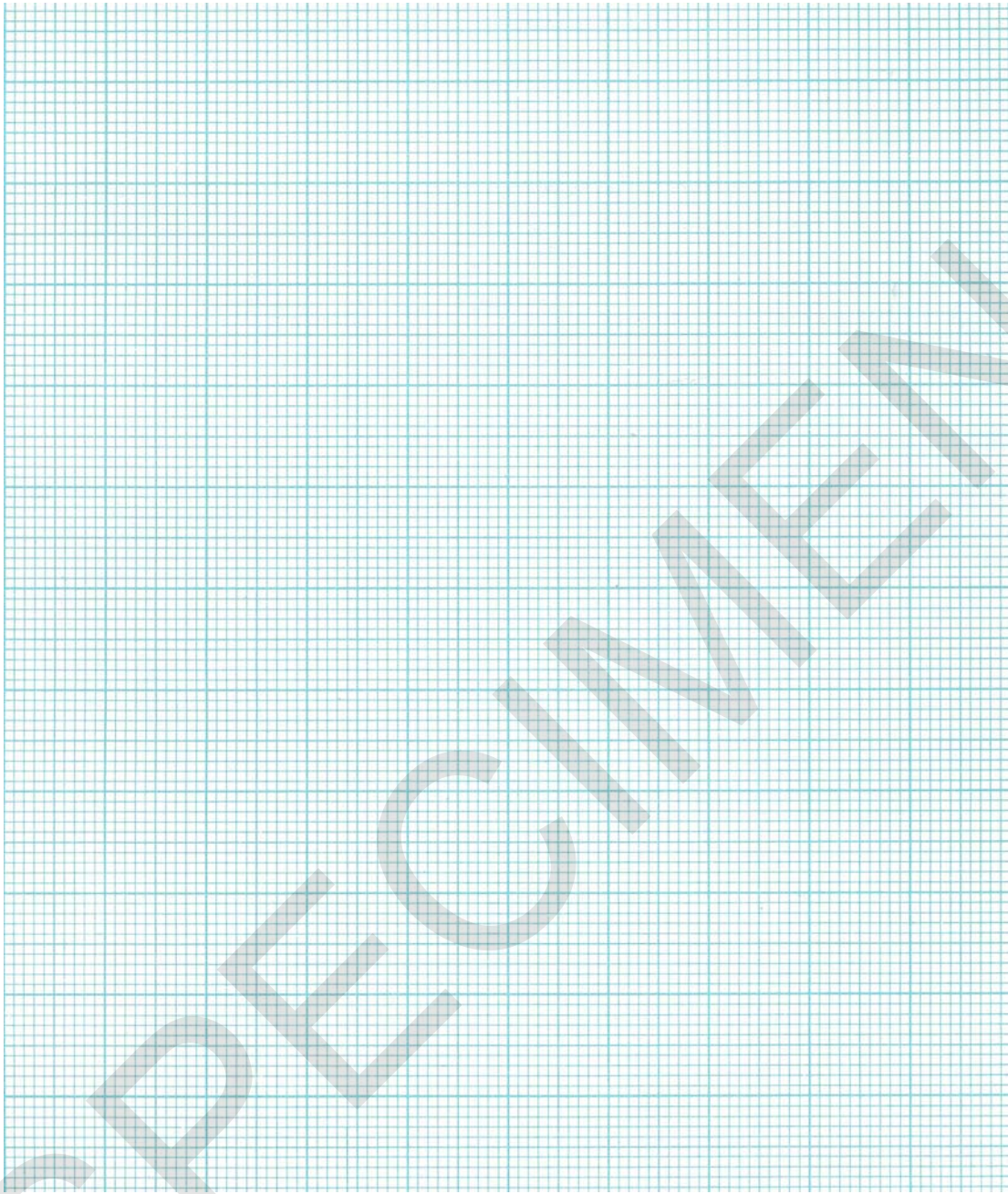
(e) Describe the pattern shown by the results (your conclusion).

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(f) Use scientific knowledge and understanding to explain:

(i) why all the potato cylinders lost mass;

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(ii) the effect of temperature on the loss of mass.

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2. Evaluation

(a) Suggest a reason for any anomalous results in the data or explain why there aren't any.

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(b) Identify two major errors that could have occurred during the collection of the data.

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2. ....

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[Turn over

(c) For each of the errors identified in part **(a)**, explain how they might have affected the data collected, suggest an improvement to the procedure and explain how it will reduce the source of error.

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2. ....

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(d) (i) Do you think the student's set of data is reliable or not? Explain your reasons.

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(ii) State two pieces of evidence from the data to support your opinion.

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(e) (i) Do you think the student's set of data is accurate or not? Explain your reasons.

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(ii) State two pieces of evidence from the data to support your opinion.

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(f) **(i)** Using your answers to parts **(a)** to **(d)**, discuss the validity of your conclusion.

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(ii) State the evidence that supports your answer to **(f)(i)**.

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Total [20]

END OF TASK

8

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Advanced Subsidiary GCE

HUMAN BIOLOGY   F223

Unit F223: Practical Skills in Human Biology
Evaluative Task

Specimen Mark Scheme

The maximum mark for this task is **20**.

For use from September 2008 to June 2009.

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

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Strand		Max Mark
(a) process the results quantitatively and interpret the results to give valid conclusions	calculates mean	**[1]**
	presents data (mean percentage loss in mass) as a graph	**[1]**
	draws line of best fit (no mistakes on graph)	**[1]**
	calculates percentage change in mass	**[1]**
	calculates standard deviation	**[1]**
(b) use scientific knowledge and understanding to suggest explanations for trends and patterns	potatoes lose mass because they lose water by osmosis	**[1]**
	uses water potential to explain loss of water by osmosis	**[1]**
	uses increase in kinetic energy to explain why more water lost at higher temperatures	**[1]**
	explains how osmosis is a net movement of water	**[1]**
	explains how water crosses cell surface membrane by referring to water channel proteins	**[1]**
(c) identify the main limitations of the data collection strategy and suggest and give reasons for simple improvements	identifies **two** of the main errors in the procedure	**[1]**
	suggests an improvement to reduce the effect of the two sources of error identified	**[1]**
	describes how each of the **two** errors may affect the data collected	**[1]**
	explains how the improvements will reduce the effect of the two sources of error on the data	**[1]**
	explains how the improvements will increase the reliability of the data	**[1]**
(d) comment upon the reliability of the data collected and discuss the validity of the conclusion	gives an opinion on the reliability / accuracy of the data collected	**[1]**
	identifies any anomalous result and suggests an explanation for it or explains why there aren't any	**[1]**
	refers to: number of repeats, standard deviation or range, all repeats showing same pattern as evidence for saying data reliable	**[1]**
	refers to: mean data shows expected pattern and all means close to line of best fit as evidence for data being accurate	**[1]**
	decides on validity of data by referring to variability of repeated measurements, accuracy of data and errors in procedure not having a big effect on data.	**[1]**
	Total	**[20]**

temperature / °C	percentage loss in mass / %						
	1	2	3	4	5	mean	SD
30	14.0	14.0	17.5	14.6	15.6	**15.1**	1.5
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40	**19.0**	19.0	21.1	19.5	20.0	19.7	0.9
45	20.4	22.0	24.1	24.4	22.5	22.7	1.6
50	24.4	24.0	28.1	23.8	25.5	25.2	**1.8**

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OXFORD CAMBRIDGE AND RSA EXAMINATIONS

Advanced Subsidiary GCE

HUMAN BIOLOGY   F223

Unit F223: Practical Skills in Human Biology
Evaluative Task

Instructions for Teachers and Technicians

For use from September 2008 to June 2009.

This task relates to Module 1, Unit F221. 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 Evaluative task with the best mark from this type of task being used to make up the overall mark for Unit F223.

Preparing for the assessment

It is expected that before candidates attempt Human Biology (Unit F223) 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 Evaluative 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 20 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 F of the specification.