

STAGE 2 BIOLOGY

Assessment using SACE Performance Standards

KEY IDEAS IN BIOLOGY

Alan Crierie & David Greig



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PRACTICAL MANUAL

Name

Teacher

School

Preface (draft)

The Biology Practical Manual was first published in 1994 and in every year since then has been modified to meet the changing needs of teachers and students doing the successive Year 12 (Stage 2) Biology course(s). The advent of the ‘new SACE’ provides another opportunity to extensively revise the content and format of the practical activities in a way that meets the needs of teachers and students and in a form that will assist with the **moderation procedures** that are to be introduced in Stage 2 Biology in 2011.

In order to do this we have worked closely with other experienced Senior Biology teachers and

- Devised an ‘**Assessment Design Overview**’ table in which we have shown how each activity can be used to teach and assess the **6 Learning Requirements** and meet the special features of the **4 Assessment Design Criteria (ADC)**. Teachers can then use this information to prepare their particular Assessment Plan as required by the SACE Board.
- Revised some familiar practicals and to provide some **choice** for schools and teachers to accommodate the various learning needs of students. Schools will also have a choice concerning which practical they Design for assessment purposes.
- Devised Assessments Tables for each practical which include the traditional headings used in a Science report (Method, Results, Discussion, Conclusion etc.) but also including the special features of the **Assessment Design Criteria** with reference also to the **Intended Student Learnings**.
- Devised a ‘**Assessment Record**’ table which can be used by teachers and students to record and collate the marks obtained for each of the special features of the Assessment Design Criteria and provide evidence of **Performance Standards** as required in the moderation process. Space is also provided for comments.
- Revised the information in the free copy of the ‘Teaching notes’ which should have come with your school order of the Manuals but is otherwise available from the SASTA website.

We have done our best on the basis of the information available to schools but no doubt some SACE requirements will change over time so we will appreciate some feedback and will make further changes for 2012.

Alan Crierie and David Greig

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Practical C3

RATE OF OSMOSIS

BACKGROUND

All living organisms consist of cells and all cells are surrounded by a membrane. One of the major functions of the membrane is to regulate the passage of materials into and out of the cell. These materials include dissolved gases, sugars, salts and water. Cell membranes are 'partially-permeable' or 'semi-permeable' which means that some substances can easily pass through them, whereas others can not. Most materials move by simple diffusion from high concentration on one side of the membrane to a lower concentration on the other. Some substances may be actively transported, which requires the provision of energy.

Water is the most abundant and one of the most important substances in cells. The diffusion of water across a partially-permeable membrane is called osmosis.

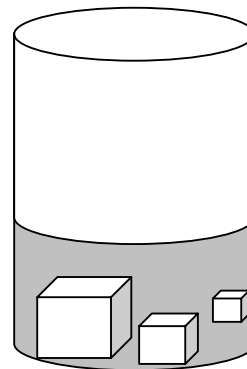
Vegetables are storage organs of plants which consist of cells and the products of cells. The cells are surrounded by a cell wall and, inside that, a plasma membrane. Vegetable tissue provides an excellent model to assist the understanding of the structure and function of membranes.

MATERIALS REQUIRED (per group)

2 large fresh potatoes	knife
spoon	paper towelling
ruler	100 mL 10% NaCl soln
a 250 mL beaker	electronic balance

METHOD

1. Read right through this method and prepare a suitable data table in the space provided on the next page to record the masses.
2. Obtain a large fresh potato, peel it and use a ruler to measure and a knife to cut one cube of each of the following dimensions 1cm, 2 cm, 3cm and use a balance to determine the mass of the cubes as accurately as possible.
3. Place the cubes in the beaker and add the 10% salt solution so that the cubes are fully covered and leave it for 20 minutes, remove excess water and weigh and record the mass again. Calculate the change in mass and calculate % loss or gain and also enter this in the table. Also record any other observations.
4. Calculate the actual surface area, volume and SA/V ratio for each cube and include this in your table.
5. When you have finished with your potato cubes dispose of them as instructed. etc. etc.



(Authors' note: in this and several other Practicals advice will be given about how to conduct and write a report on the required Design Practical for assessment)

ASSESSMENT TABLE (draft)

Practical _____

Date _____

Assessment Design Criteria (A.D.C.) included _____

Report headings and Intended Student Learnings <i>In their laboratory work and their written report, students should provide evidence of how well they have achieved the following student learnings:</i>	A. D. C.	Teacher check and comments (related to Performance standards)	Suggested max. mk	Actual max. mk	Mark obtained
Abstract <ul style="list-style-type: none"> Write a (concise) report of an investigation that includes a description of its purpose and procedure, results, analysis, interpretation, and conclusions. 	KU1 KU3		5		
Introduction <ul style="list-style-type: none"> State the purpose of the experiment. State a testable hypothesis Identify the variables in an experiment Classify the variables as independent and dependent Identify factors to be held constant 	I1		8		
Materials and Methods <ul style="list-style-type: none"> Describe and explain the procedure for an experiment Select an instrument of appropriate resolution <u>Design and carry out an experiment to test a hypothesis</u> Follow instructions accurately and safely Recognize hazards and work safely in an experiment 	I1		6		
	I3				
Results <ul style="list-style-type: none"> Make and record careful and honest observations in an experiment Record and use measurements to an appropriate number of significant figures Present data in correct table format Plot a graph of dependent variable versus independent variable 	I4		8		
Discussion <ul style="list-style-type: none"> Makes connections between data and biological concepts <u>Describes a pattern observed in the results</u> Explain the importance of increasing the number of samples Explain the importance of repeating an experiment Determine which of two or more sets of measurements is most reliable Analyse and evaluate an experiment and suggest improvements 	AE1		10		
	AE2				
Conclusion <ul style="list-style-type: none"> Analyse and evaluate data and other evidence to formulate conclusions and make predictions 	AE3		5		
APPLICATION <ul style="list-style-type: none"> Uses appropriate biological terms, conventions and formulae Demonstrates initiative in applying constructive and focused individual and collaborative work skills 	A2 A3		4		
KNOWLEDGE <ul style="list-style-type: none"> Demonstration of knowledge and understanding of biological concepts Communication of knowledge and understanding of biology 	KU1 KU3		4		
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From the authors

We acknowledge that different biology teachers will have different views and perspectives on how best to gain valid and reliable judgements of student performance. It appears to us that the most important considerations must always come back to the **SACE Performance Standards**. In Biology we have a range of other pointers and indicators ranging from the **Key Ideas** and **Intended Student Learnings** in the SACE Subject Outline to the **Assessment Design Criteria** and their special features.

Some schools may decide that the best way to do this is to use the Performance Standards tables directly and highlight an appropriate grade band for the relevant ADC. Other schools will require teachers to allocate marks and use these to inform their judgments regarding grades for moderation purposes.

In these brief extracts from this new version of the Practical manual you can see that we have incorporated these various syllabus elements into an Assessment Table for each Practical and another table which will allow collation of marks. We believe that this process will make the teacher's task simpler and will be fairer and more transparent to the students. At the time you read this (Term 3) we will be working through each Practical and if you would like to offer comments or suggestions please feel free to contact us on dgreig@bigpond.net.au or bio28@live.com

From SASTA

We are pleased to endorse and recommend this revised edition of the Biology Practical Manual. We have worked on the various versions of this publication with the authors for nearly 20 years and are confident that their experience and this product will meet the needs of SACE 2 Biology teachers and students across the State for the next few years until we see the impact of the National Curriculum. We will be pleased to accept your orders at any time and the books will be printed early in Term 4 when the SACE documents are final and the authors have copyright clearance.

Greg Cole

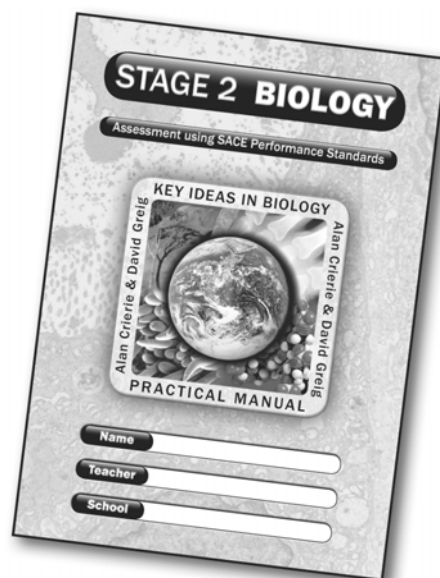
SASTA EO

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