

**ADVANCED SUBSIDIARY GCE****BIOLOGY**

Practical Examination 1 (Part B – Practical Test)

**2803/03/TEST**

Candidates answer on the question paper

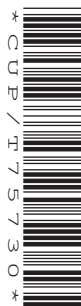
**OCR Supplied Materials:**

None

**Other Materials Required:**

- Slide **K1**
- Candidate's Plan (Part A of the Practical Examination)
- Electronic calculator
- Ruler (cm/mm)

**Thursday 8 January 2009**  
**Morning**

**Duration:** 1 hour 30 minutes

Candidate Forename		Candidate Surname	
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Centre Number						Candidate Number				
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**INSTRUCTIONS TO CANDIDATES**

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use black ink. Pencil may be used for graphs and diagrams only.
- Read the instructions and each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided, however additional paper may be used if necessary.

**INFORMATION FOR CANDIDATES**

- In this Practical Test, you will be assessed on the Experimental and Investigative Skills:  
 Skill I: Implementing  
 Skill A: Analysing evidence and drawing conclusions  
 Skill E: Evaluating.
- You may use an electronic calculator.
- You are advised to show all the steps in any calculations.
- This document consists of **9** printed pages, **2** blank pages and a Report Form.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
<b>Planning</b>	<b>16</b>	
<b>1</b>	<b>28</b>	
<b>2</b>	<b>16</b>	
<b>TOTAL</b>	<b>60</b>	

Answer **all** the questions.

**Question 1** [65 minutes]

Beetroot cells contain the red pigment betalain in their vacuoles. Betalain is water soluble and under normal circumstances, does not diffuse out of vacuoles. Plant cell vacuoles are surrounded by a membrane, known as the tonoplast, which separates the contents of the vacuole from the cytoplasm. The tonoplast is similar in composition to the cell surface (plasma) membrane.

**You are going to investigate the effect of temperature on the release of betalain from fresh beetroot tissue.**

*Proceed as follows:*

- 1 Make up a series of standard solutions of betalain using the 10% betalain solution, the 1% betalain solution and water as shown in **Table 1**.

You will need to make 10.0 cm<sup>3</sup> of each standard solution in the labelled test-tubes provided. Use the two 10 cm<sup>3</sup> syringes and the 1 cm<sup>3</sup> syringe as appropriate.

You will require these standard solutions for step 8.

**Table 1**

volume of 10% betalain solution / cm <sup>3</sup>	volume of 1% betalain solution / cm <sup>3</sup>	volume of water / cm <sup>3</sup>	final concentration of standard solution / %
10.0	0.0	0.0	<b>10.0</b>
5.0	0.0	5.0	<b>5.0</b>
0.0	10.0	0.0	<b>1.0</b>
0.0	5.0	5.0	<b>0.5</b>
0.0	1.0	9.0	<b>0.1</b>
0.0	0.0	10.0	<b>0.0</b>

- 2 You are provided with 60 discs of fresh beetroot tissue in a small dish. Each disc is approximately 3–5 mm thick and they have been washed thoroughly in water.

Place 10 discs into each specimen tube. These tubes have been pre-labelled with the temperatures that you will use in steps 3 and 5.

- 3 Take the specimen tube labelled **room temperature (R.T.)** and rinse the beetroot discs in two changes of water. Pour away the water you have used for rinsing into the container labelled **waste**.
- 4 You are provided with a water bath labelled **room temperature (R.T.)**.

Use a syringe to transfer 10 cm<sup>3</sup> of water from the water bath into the corresponding specimen tube so that the discs are covered. Start the timer and **leave it running** for the duration of the investigation.

Leave this tube to one side whilst you proceed with step 5.

- 5 Raise the temperature of the **water bath** to 40 °C ( $\pm 2$  °C).

Take the specimen tube labelled **40** and rinse the beetroot discs in two changes of cold water. Pour away the water you have used for rinsing in the container labelled **waste**.

Use a syringe to transfer 10 cm<sup>3</sup> of water from the water bath at 40 °C into the specimen tube. Immediately record the time from the timer in the space provided below.

<i>temperature</i>	<b>40 °C</b>	<b>50 °C</b>	<b>60 °C</b>	<b>70 °C</b>	<b>80 °C</b>
<i>time</i>	.....	.....	.....	.....	.....

- 6 Repeat step 5 with water at 50 °C, 60 °C, 70 °C and 80 °C ( $\pm 2$  °C in each case).

When the discs covered with water at 80 °C have been immersed for **at least five minutes**, proceed with step 7.

- 7 Pour off the water from each specimen tube **into the corresponding clean test-tube** labelled **room temperature (R.T.), 40, 50, 60, 70 or 80**.
- 8 Estimate the concentration of betalain in each test-tube by comparing the intensity of the colour against the standard solutions that you prepared in step 1. You may use the piece of plain white paper provided to help you determine the colour intensity.

Depending upon the colours observed, you may **estimate** a concentration between two of the standard solutions.

- (a) Record your results in the form of a table in the space provided below.

- (b) Explain why it was necessary to rinse the beetroot discs before immersing them in water at different temperatures (steps 3, 5 and 6).

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- (c) Describe **and** explain the results that you have obtained.

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**(d) Evaluation exercise.**

Describe the limitations of the procedure that you have carried out **and** explain how you would improve the procedure to gain accurate and reliable results.

[illegible]

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**[Total: 28]**

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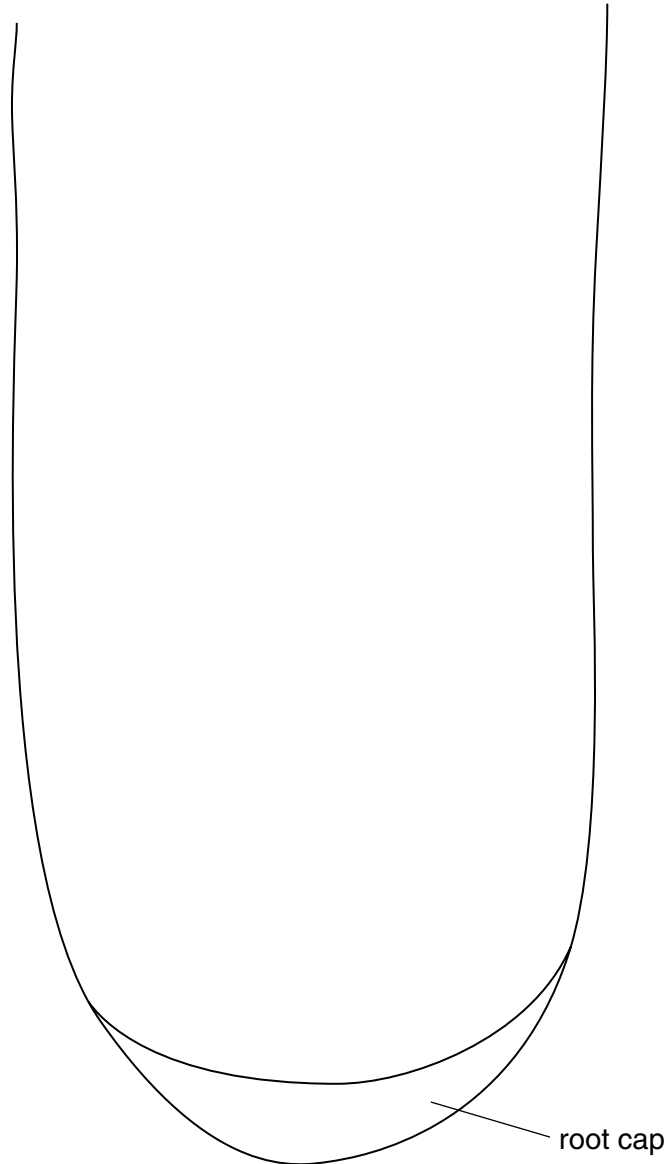
**Question 2** [25 minutes]

Slide **K1** is a stained longitudinal section of a young root tip of broad bean, *Vicia faba*.

Examine **K1** carefully using low, medium and high power objective lenses of your microscope. Note the occurrence and distribution of cells in different stages of **mitosis** in this section.

- (a) Make a plan drawing **within the outline provided in Fig. 2.1** to show the position of the region or regions where there are many dividing cells.

**Do not draw individual cells.**



**Fig. 2.1**



(b) Use the **high power** objective lens of your microscope to find cells that are at various stages of mitosis.

- (i) Make drawings of **four** different cells from **K1** to show the **different stages of mitosis** indicated in the spaces provided below.

*Your drawings should illustrate the observations you make using your microscope.  
Text book diagrams are not acceptable.*

- (ii) **Label** your drawings.

- (iii) **Annotate** your drawings to describe the behaviour of the chromosomes during mitosis.

<b>prophase</b>	<b>metaphase</b>
<b>anaphase</b>	<b>telophase</b>

10

(c) State why chromosomes are **not** visible during interphase of the mitotic cell cycle.

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[Total: 16]

END OF TEST

**11**  
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## REPORT FORM

The teacher responsible for the supervision of the Practical Test is asked to report on the following:

- (a) Any particular difficulties encountered in making preparations for the Practical Test.
- (b) Whether it was necessary to make any substitutions for the materials listed in the Instructions. Submit a copy of the results obtained by a teacher or technician, using the substituted materials, on top of the candidates' scripts.
- (c) Any difficulties experienced by the candidate due to deficient materials or faulty apparatus. If so, give brief details.
- (d) Any assistance given to the candidate with respect to colour blindness or other physical disability. If so, give brief details, and attach a copy of the letter giving permission.

Other cases of hardship, for example illness, should be reported directly to OCR by the Examinations Officer using the Special Consideration form.

Signed .....

Information that applies to **all** candidates should be given on the first candidate's script **only** or supplied on a separate sheet placed on top of the candidates' scripts.

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