

ADVANCED GCE

BIOLOGY

Practical Examination 2 (Part B – Practical Test)

WEDNESDAY 31 JANUARY 2007

2806/03/TEST

Afternoon

Time: 1 hour 30 minutes

Additional materials:

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



Candidate
Name

Centre
Number

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Candidate
Number

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INSTRUCTIONS TO CANDIDATES

- Write your name, Centre Number and Candidate Number in the boxes above.
- Answer **all** the questions.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Write your answers in the spaces provided on the question paper.
- Read the instructions and questions carefully before starting your answers.
- Do **not** write in the bar code.
- Do **not** write outside the box bordering each page.
- **WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED. ANSWERS WRITTEN ELSEWHERE WILL NOT BE MARKED.**

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.

FOR EXAMINER'S USE		
Qu.	Max.	Mark
Planning	16	
1	30	
2	14	
TOTAL	60	

This document consists of **11** printed pages, an Insert and a Report Form.

Answer **all** the questions.

Question 1 [60 minutes]

The *HAL1* gene in yeast, *Saccharomyces cerevisiae*, codes for a protein that maintains a high internal concentration of potassium ions (K^+) and a low internal concentration of sodium ions (Na^+). This protein makes the yeast salt-tolerant (tolerant to sodium chloride).

You are required to investigate the effect of sodium chloride on the activity of yeast cells.

You are provided with a suspension of yeast cells in glucose that has been kept at around 35 °C to 40 °C for about one hour. During that time, the yeast cells have become active and are respiring to produce carbon dioxide.

You will use five sets of the apparatus shown in Fig. 1.1 to determine the activity of five different yeast suspensions that you will prepare. You will fill each syringe, with a different yeast suspension. You will determine the activity of the yeast cells by measuring how fast the suspension moves down the glass tubing.

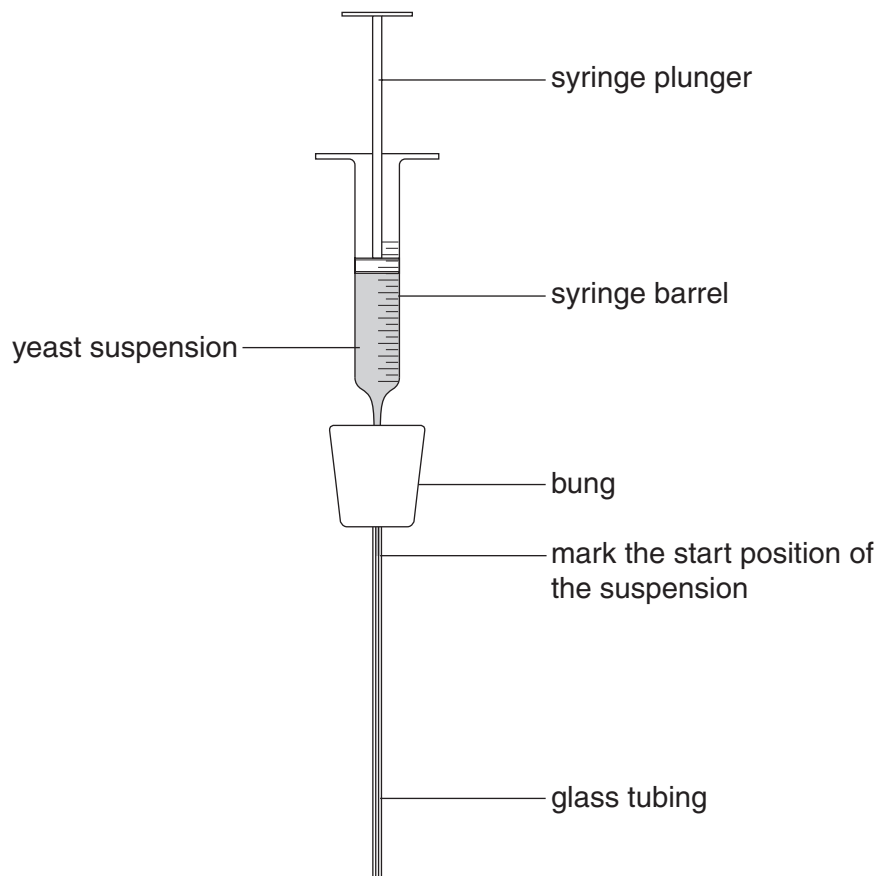


Fig. 1.1

Do not remove the syringes from the bungs.

Proceed as follows:

- 1 Use the glass rod to stir the yeast suspension. Use an unlabelled 10 cm³ syringe to put 10 cm³ of the yeast suspension into each of five labelled boiling tubes, **A** to **E**. Use the glass rod to stir the suspension before taking each sample. **Be careful not to draw up froth into the syringe.**
- 2 Use the other unlabelled 10 cm³ syringe to add 10 cm³ of distilled water to tube **A**.
- 3 Use the same syringe to add 10 cm³ of 5% sodium chloride solution to tube **B**, 10 cm³ of 10% sodium chloride solution to tube **C**, 10 cm³ of the 15% sodium chloride solution to tube **D** and 10 cm³ of the 20% sodium chloride solution to tube **E**.
- 4 Shake all five tubes to mix the contents and leave them for at least **five** minutes.

While you are waiting, read the rest of the instructions 5 to 11 and consider how to present your results.

- 5 Shake tube **A** to re-suspend the yeast and wait a few seconds to allow any gas to escape.
- 6 Make sure that the plunger is pushed fully into the barrel of syringe **A**. Hold the rubber bung attached to the syringe and insert it loosely into tube **A**. The glass tubing will be inside the suspension in tube **A**.

Withdraw the plunger until the yeast suspension reaches the 5 cm³ mark on the syringe.

- 7 Hold the bung and lift the apparatus so that the glass tubing comes out of the suspension. Keep the apparatus vertical. Slowly withdraw the plunger so that the suspension rises up the glass tubing until the suspension is just **below** the bung (see Fig. 1.1).
- 8 Mark the position of the suspension on the glass tubing using the marker pen. Insert the bung loosely into an **unlabelled** boiling tube and start a stopwatch or stop clock.

Leave the stopwatch or stop clock running for the whole of the investigation.

The suspension will gradually move from the top to the bottom of the glass tubing. Time and record how long it takes the suspension to reach the bottom of the tubing.

- 9 While you are timing how long it takes the suspension to reach the bottom of the glass tubing, take syringe **B** and set it up in tube **B** using the same procedure that you used for syringe **A** and tube **A**. Record the time from the stopwatch or stop clock. This is the **start time** for syringe **B**.
- 10 Continue to set up the other syringes in the same way. Record how long it takes for each suspension to reach the bottom of the glass tubing. Measure the distance travelled in each case.

If any of the suspensions do not reach the end of the glass tubing, mark the point reached **ten minutes** after you set them up and measure the distance travelled by the suspension.

- 11 Calculate the **rate** at which each suspension moves down its glass tubing and record your results.

(a) Record your results in a suitable form in the space below.

(b) Draw a graph of your results.

(c) Describe the pattern of your results.

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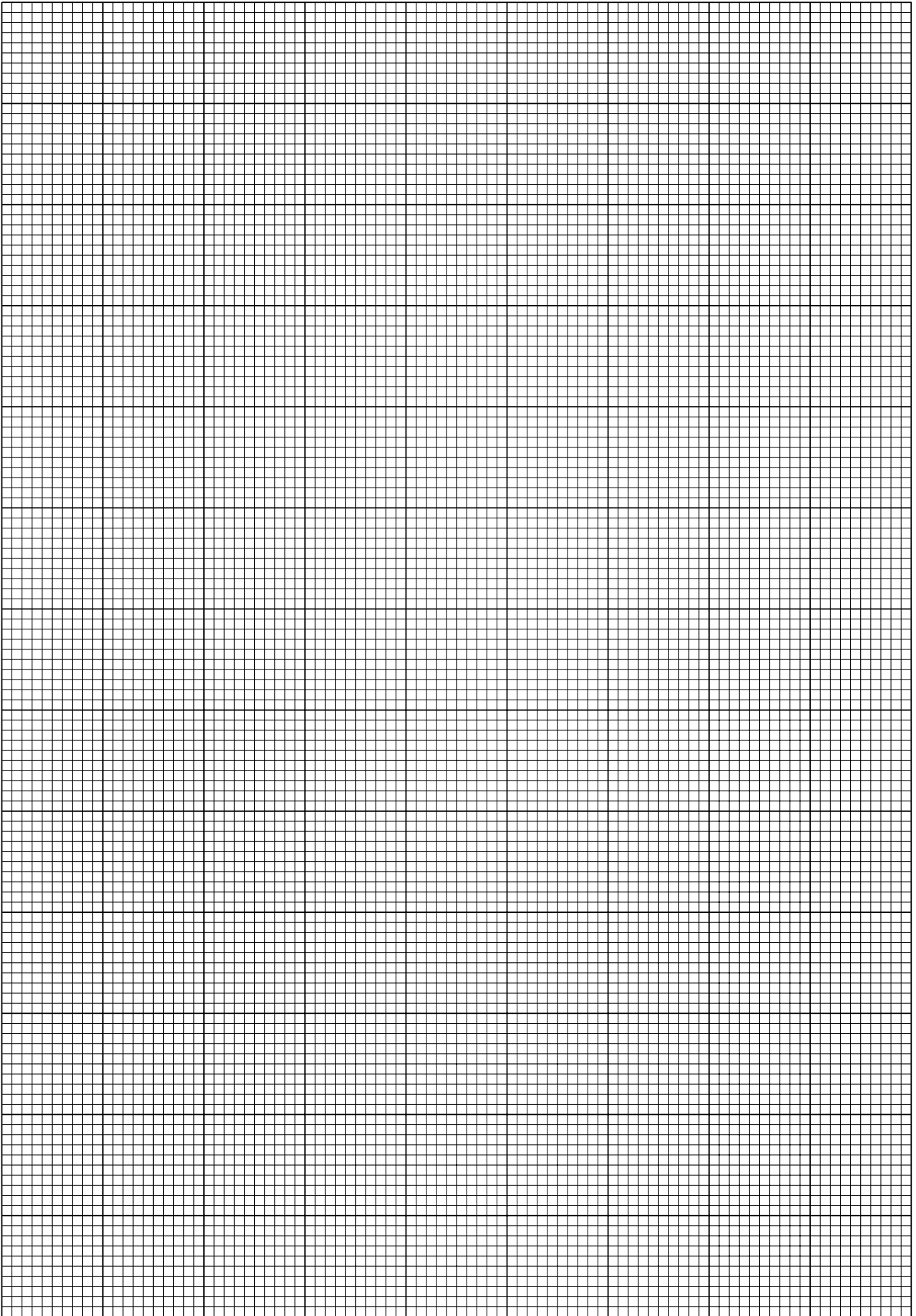
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[Total: 30]

Question 2 [30 minutes]

Cells undergoing meiosis can be observed inside each of the four pollen sacs of an immature anther. Slide **S** is a transverse section of an immature anther from the flower of a lily, *Lilium*. You are not expected to have seen this before.

Fig. 2.1 is a plan drawing of a transverse section of an anther showing four pollen sacs.

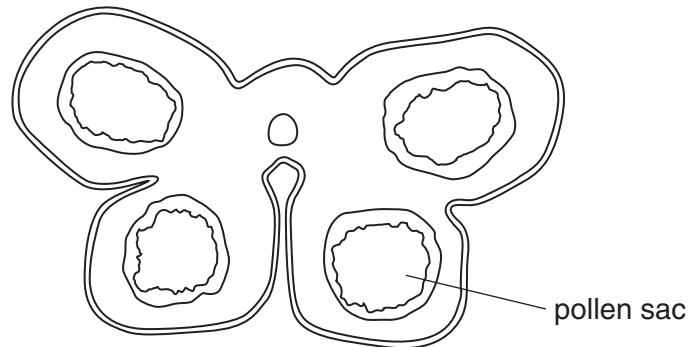


Fig. 2.1

Examine slide **S** using the low power of your microscope. Find an area that contains cells dividing by meiosis in a pollen sac.

- (a) Examine the dividing cells using the high power of your microscope and locate a cell in prophase I of meiosis. Draw this cell in the space below. Label **and** annotate your drawing to indicate features that are **visible** in the cell you have drawn.

(b) The diploid number of the trumpet lily, *Lilium longiflorum*, is 12. Explain why the number of chromosomes seen in a **section** of a cell in prophase I is usually less than this.

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(c) Fig. 2.2 is provided on an insert. It is a photograph taken with a light microscope of a section through a pollen sac in the anther of a lily. The cell labelled **X** is at anaphase I of meiosis.

(i) Describe how the appearance of the dividing cell **X** in Fig. 2.2 differs from that of the dividing cell that you drew from slide **S**.

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(ii) Outline the sequence of events that allows the chromosomes to move from the position visible in prophase I to their new position visible in cell **X**.

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(d) What is the significance of pollen grains containing a reduced number of chromosomes compared to the parent cells from which they are derived?

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[Total: 14]

END OF QUESTION PAPER

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 any results obtained by teacher(s) or technician(s), using the substituted materials, on top of the candidates' scripts.

- (c) Any difficulties experienced by this candidate due to deficient materials or faulty apparatus. If so, give brief details.

- (d) Any assistance given to this candidate with respect to colour blindness or other physical handicap. If so, give brief details.

Other cases of hardship, for example illness or temporary disability, should be reported directly to OCR, by the Examinations Officer, as a normal Application for Special Consideration.

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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