



**ADVANCED SUBSIDIARY GCE
BIOLOGY**

2803/03/INST

Instructions for the Planning Exercise and Practical Test

To be opened immediately

Planning Exercise – for issue on or after:

FRIDAY 13 MARCH 2009

Practical Test:

**Tuesday 12 May 2009
Afternoon**

Duration: 1 hour 30 minutes



This document is for the **Head of Centre** and for the use of the **Biology teacher and/or technician** who prepares the apparatus and materials for the examination.

A packet containing **two** copies of the Biology Practical Test, 2803/03/TEST, accompanies the packet containing these Instructions.

These packets should be issued to the Biology teacher immediately they arrive at the Centre, but they **must be kept in a secure place at all times**.

These documents are provided so that the Biology teacher and/or technician can ensure that the Centre's apparatus and materials are suitable for carrying out the Biology Practical Test.

Great care should be taken that any confidential information given here does not reach the candidates, either directly or indirectly.

This document consists of **12** pages. Any blank pages are indicated.

PLANNING EXERCISE

The Planning Exercise should be issued to candidates on or after the date shown on the front of this document. The candidates' Plans must be collected in, on or before the date of the Practical Test. These arrangements may be made at the discretion and convenience of the Centre.

It should be recognised that each Planning Exercise makes only a small contribution to the overall assessment and candidates should therefore be guided to spend an appropriate amount of time on the work. Candidates should be given **between 7 and 10 days** to complete it.

The mark scheme for the Planning Exercise is based closely on the coursework mark descriptors for Skill P given in the Biology Specification. A copy of these descriptors should be made available to candidates to assist them in their work.

Candidates may be given access, if they request it and at the discretion of the Centre, to laboratory space and facilities in order to be able to carry out preliminary work which will help in constructing their Plan. However, it should be noted that the responsibility for Health and Safety during this period rests with the Centre, and the attention of teachers is drawn to the Health and Safety section in the Specification. Access to suitable library and other resources may also be required. While time at home or in private study will be necessary to complete the task to a high standard, sufficient work must be completed under direct supervision to allow the teacher to authenticate the work with confidence as that of the candidates concerned. Many Centres find that this can best be managed by allowing candidates a set period of time to research the topic but requiring the Plan to be written under supervision. The supervising teacher should complete the statement of authentication for each candidate on the front cover page of the Plan. Details should be provided on the Report Form for the Practical Test of any assistance given to candidates.

After candidates' work has been collected, it must be kept securely until the date of the Practical Test (or must be collected on the day of the Practical Test) and must be included with the scripts for the Practical Test when these are despatched to the Examiner. Please tie together **loosely** (or use a treasury tag) the Planning Exercise and Practical Test for each candidate **with the Practical Test on the top**.

Guidance for Teachers/Tutors on authenticating work

The Work submitted by candidates for assessment must be entirely their own.

Candidates may however:

- quote from books or any other source; this should be referenced in the work and all sources acknowledged;
- receive guidance from someone other than their teacher/tutor; the course teacher must be informed of the name of the person giving external guidance and the nature of the assistance given;
- produce work at a location away from the examination Centre provided that the work remains under the supervision of the teacher/tutor.

In cases of privately entered candidates or distance-tutored candidates, the Centre must ensure that:

- the teacher/tutor has acquainted themselves thoroughly with the general standard of candidates' work before accepting work for assessment;
- sufficient on-going regular monitoring of candidates' work has taken place.

Before authenticating work, the teacher/tutor should ask themselves the following basic questions.

- Has the **Declaration by candidate** been signed by the candidate?
- Was at least part of the work done under your direct supervision?
- Did you check the work during its production?
- Is the standard of finished work consistent with your professional judgement of the candidate's ability?

If you have answered 'YES' to the above questions you may authenticate the work.

The following notes for guidance are issued to candidates

- 1 Your Plan should have a clear and helpful structure and should be illustrated by diagrams, tables, charts, graphs etc. as appropriate. Remember that these can often be used to replace words in the text. Diagrams should be relevant to the content of your Plan and positioned appropriately. Labels on diagrams, flow charts or tables should be clear and concise. Large blocks of text should be included in the word count.
- 2 You should take care to use technical and scientific terms correctly and to write in clear and correct English.
- 3 Your Plan should be hand-written or word-processed on A4 paper, which should have a hole punched at the top left-hand corner. Pages should be numbered and should have a clear margin on the right hand side. **You should write (or print) on one side of the paper only** and each sheet should be marked with your Centre number and Candidate number.
- 4 You should show that you have consulted an appropriate range and variety of sources. At the end of your Plan you should list clearly the sources you have used. You should refer to these references in your Plan where appropriate. Where you have incorporated material which has been copied directly from a source such as a book or the Internet, this must be acknowledged in your Plan and details included in the references at the end. However, it should be noted that the inclusion of copied material will not in itself gain credit. The list of references should not be included in the word count.
- 5 Your Plan should be based on the use of standard equipment, apparatus, chemicals and other materials available in a school or college science laboratory.
- 6 Your Plan should be between 500 and 1000 words. A Plan that is in excess of 1000 words is likely to have poor structure and unselective choice of material, so that full credit may not be available. You should indicate the number of words in the margin of the Plan at approximately 200 word intervals.
- 7 When you have finished, tie the pages **loosely** together (or use a treasury tag), with this sheet on the top, so that the pages turn over freely. Your Centre will give you the date by which your Plan must be handed in.

PLANNING EXERCISE (continued)

Centres should be reminded that candidates only need to appreciate how to carry out an investigation in sufficient detail for them to write a plan. They do not need to carry out the investigation for themselves.

If candidates wish to try out the procedure they may be provided with the following:

- 1 20 g dm⁻³ starch solution.

100 cm³ of this should be prepared as follows:

Put 2.0 g of soluble starch into a glass beaker. Add a small quantity of distilled water to make a paste. Warm approximately 80 cm³ of distilled water. Add the warm distilled water to the paste and stir. Bring to the boil. Allow to cool and then filter through several layers of muslin or suitable alternative. Make up to 100 cm³ with distilled water in a volumetric flask.

Test the starch to ensure that it is free of reducing sugars.

- 2 The amylase to be used in this Planning exercise is amyloglucosidase (AMG). **No other type of amylase should be used.**

10 g dm⁻³ amyloglucosidase (AMG) solution.

100 cm³ of this should be prepared as follows:

Put 1 cm³ of AMG (liquid preparation) in a volumetric flask and make up to 100 cm³ with distilled water.

Test the AMG to ensure that it is free of reducing sugars.

- 3 Freshly prepared iodine in potassium iodide solution prepared as follows:

- dissolve 0.3 g of potassium iodide in 70 cm³ distilled water;
- dissolve 0.25 g of iodine in the potassium iodide solution and stir for several minutes;
- make up to 100 cm³ with distilled water.

This should be provided in a container labelled **iodine solution**.



- 4 Benedict's solution, Clinistix[®] and/or Diastix[®].
- 5 Test-tubes, test-tube holders, beakers, spotting tiles, pipettes and syringes.
- 6 Beaker for water bath, Bunsen burner; gauze; tripod; thermostatically-controlled water bath; ice or ice cold water; distilled water.

Amyloglucosidase (AMG) is available from the National Centre for Biotechnology Education (NCBE). See page 7.

Centres are advised to use soluble starch (AR). This is available from Timstar.

However, if starch is available that gives a negative result with Benedict's solution then it is suitable to use.

Soluble starch (AR)

Timstar Laboratory Suppliers Ltd.,
Timstar House,
Marshfield Bank,
Crewe,
Cheshire.
CW2 8UY.
Tel: 01270 250459
Fax: 01270 250601
e-mail: sales@timstar.co.uk
web site: www.timstar.co.uk

Clinistix[®] and Diastix[®] are available from high street chemists or from school science suppliers.

However, candidates may wish to use other apparatus not included in this list. If they make reasonable requests for other pieces of apparatus that can be provided by the centre, then they should have access to them.

PRACTICAL TEST

General Instructions

The attention of teachers is drawn to the details of this examination given in Appendix E of the Biology Specification.

The Biology teacher and/or technician **must** be granted access to the question paper in advance of the Practical Test in order to be satisfied that apparatus and materials are in accordance with these Instructions and are fully suitable for the performance of the experiments. To this end, the Biology teacher and/or technician should perform Questions 1 and 2 of the Practical Test and be satisfied that the candidates will be able to collect suitable results with the apparatus and materials provided. **A sample set of results, clearly labelled, should be sent to the Examiner on top of the candidates' scripts.**

The Biology teacher and/or technician should also check **all** the slides supplied by OCR prior to the examination.

If the apparatus or materials that are provided to candidates differ significantly from these Instructions, then full details of the changes must be given on the Report Form. Candidates will not be disadvantaged provided that the nature of the experiments has not been changed. The Biology teacher and/or technician is strongly advised to contact OCR well before the date of the examination if, for example, there are difficulties with obtaining and/or using materials or particular pieces of apparatus.

Candidates should be informed that, if they find themselves in real difficulty, they may ask the invigilator for assistance, but the extent of this assistance will be reported to the Examiner, who may make a deduction of marks.

Where a candidate is unable to collect any results for an experiment, or the results obtained do not allow the candidate to proceed to answer the questions which follow on the examination paper, the invigilator may consider whether to issue sample results to the candidate. The sample results given should be those produced by the centre during the trialling of the experiment before the day of the examination and should not be formatted.

In such cases, the invigilator must be confident that:

- the difficulties experienced by the candidate are not due to the candidate's failure to follow the instructions given, or to carry out the procedures safely and skilfully;
- the candidate has been given an appropriate opportunity to collect his/her own results using the instructions on the examination paper before being given the sample results;
- the sample results provided will enable the candidate to proceed to answer the questions which follow on the examination paper.

The invigilator must write to the Qualification Manager for Biology at OCR as soon as possible after the examination has taken place, detailing the circumstances and the candidate(s) concerned, enclosing the sample results provided and giving the above assurances. Centres are reminded that appropriate deductions of marks may be made in such cases.

In cases of faulty apparatus (not arising from a candidate's mishandling) which prevents the required readings from being taken, extra time must be allowed so that the candidate has a fair opportunity of performing the experiment as though the fault had not been present. Details of such cases of time compensation should be made on the Report Form.

Cases of individual hardship, e.g. illness disability etc. should be reported direct to OCR using the 'Special Considerations' form and **not** on the Report Form.

If microscopes are shared, some candidates must start with Question 2.

Each candidate must be provided with the following apparatus and materials:

Question 1

- (i) Approximately 50 cm³ of a 1% Neutrase[®] solution. This should be made by adding 1 cm³ Neutrase[®] to 99 cm³ distilled water. This should be provided in a 100 cm³ beaker labelled **1% protease solution**.

Neutrase[®] **must** be obtained from the NCBE.

- (ii) Approximately 75 cm³ of a 1% solution of freshly bought Marvel[™] skimmed milk powder. The 1% solution is prepared by dissolving 1 g of milk powder in a small volume of distilled water and making it up to 100 cm³. This should be provided in a 100 cm³ beaker labelled **1% milk solution**.

Marvel[™] **must** be used rather than any other brand of milk powder.

- (iii) Approximately 50 cm³ of distilled water in a beaker labelled **distilled water** (for candidates to make up protease solutions).
- (iv) Thermometer; 2 × 1 cm³ syringes; 1 × 5 cm³ syringe; test-tube rack(s) to accommodate 12 test-tubes; stopwatch, stop clock or bench timer.
- (v) 400 cm³ beaker to act as a water bath.
- (vi) *either*
Bunsen burner, tripod and gauze.

or

Access to hot tap, kettle or water from a water bath (candidates should not use a thermostatically-controlled water bath, but they may have access to one to collect water at approximately 35°C).

- (vii) 7 test-tubes (e.g. 125 × 16 mm) labelled **A** to **G**.
- (viii) 5 test-tubes (e.g. 125 × 16 mm) labelled **1** to **5**.
- (ix) A beaker of distilled water labelled **washing water**; a container for waste water labelled **waste**.
- (x) Paper towels.

Neutrase[®] (a bacterial protease) is supplied by the National Centre for Biotechnology Education (NCBE).

National Centre for Biotechnology Education,
The University of Reading,
2 Earley Gate,
Whiteknights Road,
Reading.
RG6 6AU
Tel: 0118 9873743
Fax: 0118 9750140
e-mail: ncbe@reading.ac.uk
website: www.ncbe.reading.ac.uk

Question 2

- (i) Radish seedlings e.g. *var. French Breakfast*. These should be grown in Petri dishes on filter paper. A suitable way to do this is as follows:

Cut some filter paper to fit the lid of a Petri dish. Add a few drops of water until the filter paper is completely wet and then add a row of radish seeds as shown in Fig. 2.1.

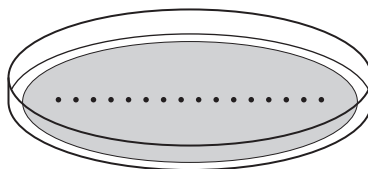


Fig. 2.1

Replace the bottom of the Petri dish and leave for a few minutes to ensure that the seeds stick to the filter paper. Gently move each Petri dish to a vertical position and carefully place in the plastic drinks bottle holder, cut to provide a space to hold the Petri dishes, as shown in Fig. 2.2.

The seedlings should be grown in the dark in a cool place (not refrigerated). The seedlings must not be allowed to dry out and should be about 4 to 5 days old.

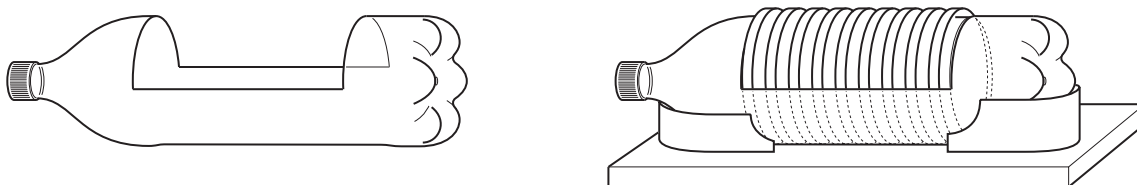


Fig. 2.2

Further details are given in the SAPS Student Sheet No. 5 Investigating Seed Germination at: <http://www-saps.plantsci.cam.ac.uk/worksheets/ssheets/ssheet5.htm>

The seedlings should then be treated as follows:

Three seedlings showing lateral roots with good root hairs on the main root should be provided in a Petri dish labelled **K1**. Very small root hairs should be visible using a $\times 10$ hand lens. The seedlings should be placed on damp filter paper. The seed coats should be removed.

Three seedlings should be placed into a beaker containing 0.5% 2, 3, 5-triphenyltetrazolium chloride (TTC) solution. These should be soaked in this solution for 30 minutes, removed and then provided to the candidates in a Petri dish labelled **K2**.

Three seedlings should be placed into a beaker containing iodine in potassium iodide solution. These should be soaked in this solution for a few minutes, removed and then provided to the candidates in a Petri dish labelled **K3**.

The K2 and K3 seedlings should be prepared on the same day as the examination.

The TTC solution should be prepared as follows:

- dissolve 0.5 g of 2,3,5-triphenyltetrazolium chloride in 100 cm³ water.
- (ii) Hand lens (×10).
- (iii) White tile; blunt forceps.

Radish seeds are available from garden centres or seed merchants.

Tetrazolium salt (2,3,5-triphenyltetrazolium chloride (TTC)) is available from:

Philip Harris Education,
Hyde Buildings,
Ashton Road,
Hyde,
Cheshire.
SK14 4SH.
Tel: 0845 120 4520
Fax: 0800 138 8881
e-mail: sales@philipharris.co.uk
web site: www.philipharris.co.uk

Timstar Laboratory Suppliers Ltd.,
Timstar House,
Marshfield Bank,
Crewe,
Cheshire.
CW2 8UY.
Tel: 01270 250459
Fax: 01270 250601
e-mail: sales@timstar.co.uk
web site: www.timstar.co.uk

HEALTH AND SAFETY

Attention is drawn to the section on Health and Safety in Appendix B of the Biology Specification. This section covers Practical Tests as well as coursework. Centres are reminded that, in UK law, the responsibility for Health and Safety lies with the employer.

Materials used in the examination should display their appropriate hazard symbols.

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