

OXFORD CAMBRIDGE AND RSA EXAMINATIONS

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:

Tuesday **15 MARCH 2005**

Practical Test:

Tuesday **17 MAY 2005** Morning 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 documents 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 chemicals 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.

These instructions consist of 7 printed pages and 1 blank page.

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 specification and 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 and, 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 **loosely** together (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 distant 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 which 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 it out for themselves.

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

- 1 Suitable plant material for making squash preparations to see stages of mitosis, e.g. roots growing from cloves of garlic, broad bean seedlings, mung bean seedlings, etc.

(If garlic is used as a source of cells undergoing mitosis, it is a good idea to cut the root tips at mid-day and preserve them until such time as candidates can use them. It is also a good idea **not** to move the garlic too much before taking the root tips, but to keep them in the same place all the time. The roots should not be allowed to grow longer than 1 to 2 cm.)

- 2 Equipment for making squash preparations, e.g. Bunsen or spirit burner; microscope slides, coverslips, mounted needles, filter paper, dilute hydrochloric acid , a suitable stain, such as aceto orcein  (also known as orcein acetic) or toluidine blue.
- 3 Complete nutrient solution and a solution deficient in phosphate. If the solution deficient in phosphate is used as a base, then a fertiliser such as superphosphate could be added to give a range of different phosphate concentrations.
- 4 Plants can be grown over water or can be grown in an inert substance, such as Perlite or Vermiculite.

Suggested suppliers.

Orcein acetic (COA69826) and toluidine blue (COA72084) are available from Philip Harris, who also supply tablets of Sachs' water culture medium – complete (COA23577) and without phosphate (COA23589).

Philip Harris Ltd., Finchel House, Excelsior Road, Abbey Park, Ashby de la Zouch, Leicestershire, LE65 1NG. Tel: 0845 120 4520; Fax: 01530 419 492; Web site: www.philipharris.co.uk

Alternatively, a water culture solution (complete) may be made from laboratory chemicals, as follows:

dissolve the following in distilled water and make up to 1 dm³

calcium sulphate (CaSO ₄ ·2H ₂ O)	0.25 g
calcium dihydrogenphosphate (Ca(H ₂ PO ₄) ₂ ·H ₂ O)	0.25 g
magnesium sulphate (MgSO ₄ ·7H ₂ O)	0.25 g
sodium chloride (NaCl)	0.08 g
potassium nitrate (KNO ₃)	0.70 g
iron(III) chloride (FeCl ₃ ·6H ₂ O)	0.005 g

to make up a solution without phosphate, replace calcium dihydrogenphosphate with 0.16 g calcium nitrate (Ca(NO₃)₂·4H₂O).

PRACTICAL TEST

General Instructions

The attention of teachers is drawn to the details of this examination given in the specification in Appendix E, on page 115.

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.

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 advised to contact OCR well before the date of the examination if, for example, there are difficulties with obtaining materials or particular pieces of apparatus.

Candidates should be informed that, if they find themselves in real difficulty, they may ask the Supervisor for assistance but the extent of this assistance will be reported to the Examiner, who may make a deduction of marks. If the Supervisor becomes aware that a candidate is having difficulty, then the Supervisor is expected to give the minimum amount of help required to enable the candidate to obtain a set of results from the apparatus. A note of the type of help given **must** be made on the Report Form on the last page of the candidate's script. **Under no circumstances should help be given to candidates with the presentation or analysis of experimental data.**

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 given in the comments section 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** included on the Report Form.


HEALTH AND SAFETY

Attention is drawn to the section on Health and Safety on pages 106 and 107 of Appendix B of the Biology (3881/7881) Specification (second edition). This section covers the 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 appropriate hazard symbols.

Each candidate must be provided with the following apparatus and materials:
If microscopes are shared, some candidates may need to start with Question 2.

Question 1

- (i) 50 cm³ of 20 volume hydrogen peroxide solution  supplied in a beaker labelled **hydrogen peroxide solution**.

The beaker should be labelled with the appropriate safety hazard symbol.

- (ii) Five small beakers labelled with the pH values of the buffer solutions shown in Table 1.1.

Each beaker should contain about 20 cm³ of phosphate-citrate buffer.

The buffer solutions should be made up using the volumes of 0.1 mol dm⁻³ citric acid and 0.2 mol dm⁻³ disodium hydrogen phosphate (Na₂HPO₄) shown in Table 1.1.

Table 1.1

pH	volume of 0.1 mol dm ⁻³ citric acid / cm ³	volume of 0.2 mol dm ⁻³ Na ₂ HPO ₄ / cm ³
4.0	61.5	38.5
5.0	48.5	51.5
6.0	36.8	63.2
7.0	17.6	82.4
8.0	2.8	97.2

0.1 mol dm⁻³ citric acid is prepared by dissolving 21.01 g in distilled water and making up to 1000 cm³.

0.2 mol dm⁻³ Na₂HPO₄ is prepared by dissolving 71.63 g in distilled water and making up to 1000 cm³.

- (iii) A cylinder of potato made with a size 8 cork borer. Each cylinder should be about 4 to 5 cm long.

The potato cylinders should be provided to the candidates wrapped in a piece of damp paper towel. Spare potato cylinders should be available in case candidates require them.

- (iv) A beaker of distilled water for washing, labelled **washing water**, and a beaker for waste, labelled **waste**.

- (v) Two 5 cm³ syringes; glass rod; forceps; scalpel (Swann Morton No. 3 handle fitted with No. 11 blade) or single-edged razor blade; stop clock or stopwatch; tile for cutting on.

- (vi) Five flat-bottomed specimen tubes (approx. 25 mm × 75 mm). The tubes must have a diameter of at least 15 mm.

- (vii) A sheet of 1 mm graph paper.

- (viii) Paper towels.

- (ix) Safety goggles or spectacles.

Question 2

Candidates must be provided with a microscope with low power and high power objectives e.g. $\times 10$ and $\times 40$. Each candidate must have sole use of a microscope for at least 30 minutes.

(i) A piece of banana about 15 mm long.

(ii) About 20 cm^3 of banana pulp in a small beaker labelled **banana pulp**.

Make the banana pulp as follows:

- chop up a fresh banana;
- add some lemon juice (to prevent browning);
- add about 150 cm^3 of water;
- liquidise for no more than 30 seconds.

(iii) About 10 cm^3 of iodine solution in a beaker or dropping bottle, labelled **iodine solution**. Prepare the iodine solution as follows:

- dissolve 0.3 g potassium iodide in 70 cm^3 of distilled water;
- dissolve 0.25 g of iodine to the potassium iodide solution and stir for several minutes;
- make up to 100 cm^3 with distilled water.

(iv) Two dropping pipettes.

(v) Two microscope slides and coverslips.

(vi) Two test-tubes (e.g. $12 \times 1.4\text{ cm}$); test-tube rack; filter funnel; two pieces of filter paper; single edged razor blade or scalpel; glass rod; tile.

(vii) 25 cm^3 of Benedict's solution in a beaker labelled **Benedict's solution**.

(viii) A 400 cm^3 beaker or a 250 cm^3 beaker as a water bath; Bunsen burner, tripod and gauze. Candidates should be provided with hot water for their water baths.

To be supplied by OCR

(i) Fig. 2.1 on an insert.

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