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:

Wednesday **15 MARCH 2006**

Practical Test:

Tuesday **16 MAY 2006** 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 8 printed pages.

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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 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 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 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 Potometers *or* glass tubing/capillary tubing, rubber tubing to fit, and scaled adhesive tape (with a mm scale) or a ruler that will allow candidates to make their own device for measuring water uptake. Scaled adhesive tape is available from Griffin Education (SCJ 350 Q).
Tel: 01509 233344; Fax: 01509 555200; E-mail: griffin@fisher.co.uk;
Web site: www.griffineducation.co.uk

2 Cobalt chloride paper or cobalt thiocyanate paper, silica gel, microscope slides, elastic bands. Clear nail varnish and microscopes with low and high power objective lenses.

3 A balance.

4 Fans, thermometers, bench lamps, etc., so that candidates can change and monitor some environmental conditions.

5 Leafy shoots cut from different plants, such as cherry laurel, *Prunus laurocerasus*, privet, *Ligustrum spp*. and lime, *Tilia europaea*, that are suitable for use in a potometer. Candidates should also be made aware of other species, including those that show xeromorphic features.

6 Test-tubes, boiling tubes, oil *or* clingfilm (to prevent evaporation of water).

7 Graph paper.

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 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.

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 Invigilator for assistance but the extent of this assistance will be reported to the Examiner, who may make a deduction of marks. If the Invigilator becomes aware that a candidate is having difficulty, then the Invigilator 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 should 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) that 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** included on the Report Form.

HEALTH AND SAFETY

Attention is drawn to the section on Health and Safety of Appendix B of the Biology specification. 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 will have to start with Question 2.

Question 1

(i) 50 cm^3 of a 10 g dm^{-3} starch solution* buffered at pH 5.0.

The starch solution should be prepared as follows.

- Prepare 50 cm^3 of a sodium ethanoate / ethanoic acid buffer solution at pH 5.0. Do this by adding 14.8 cm^3 of 0.2 mol dm^{-3} ethanoic acid to 35.2 cm^3 of 0.2 mol dm^{-3} sodium ethanoate solution.

- Use a small quantity of the buffer solution to make a paste with 0.5 g of soluble starch. Warm the rest of the buffer solution. Add the paste to the warm buffer solution and stir. Bring to the boil. Allow to cool and then filter through several layers of muslin or cheesecloth.

- Use a pH meter or pH paper to check that the pH of the solution is 5.0. Adjust if necessary with some 0.2 mol dm^{-3} ethanoic acid.

0.2 mol dm^{-3} ethanoic acid is prepared as follows:

Use 11.55 cm^3 of ethanoic acid  and dilute to 1 dm^3.

0.2 mol dm^{-3} sodium ethanoate solution may be prepared as follows:
either:
27.2 g of sodium ethanoate trihydrate ($CH_3COONa.3H_2O$) made up to 1 dm^3 with distilled water
or:
16.4 g of sodium ethanoate anydrous (CH_3COONa) made up to 1 dm^3 with distilled water.

The buffered starch solution should be provided in a beaker labelled **starch solution**.

(ii) About 10 cm^3 of 1% bacterial amylase. This is prepared by putting 10 cm^3 of bacterial amylase (liquid preparation) in a volumetric flask and making up to 1000 cm^3 with distilled water. This should be provided in a 100 cm^3 beaker labelled **E1**.

(iii) About 10 cm^3 of 0.1% bacterial amylase. This is prepared by putting 1 cm^3 of bacterial amylase (liquid preparation) in a volumetric flask and making up to 1000 cm^3 with distilled water. This should be provided in a 100 cm^3 beaker labelled **E2**.

(iv) About 50 cm^3 of freshly prepared iodine in potassium iodide solution in a beaker or dropping bottle, labelled **iodine solution**. 100 cm^3 of this iodine solution may be prepared as follows:

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

(v) A 50 cm^3 beaker of distilled water labelled **distilled water**.

(vii) A 400 cm ^{3} beaker as a water bath; thermometer; tripod; gauze; Bunsen burner; rack or racks to take three test-tubes and three boiling tubes.

Candidates should be provided with water at a suitable temperature from a hot tap, kettle or a thermostatically-controlled water bath just before they begin Question 1. They may be provided with further hot water to maintain the temperature of their water bath or they may use a Bunsen burner. They are not expected to heat water to 40 °C from cold.

(vii) 3 boiling tubes (e.g. 150 × 24 mm) labelled A, B and C; 3 test-tubes (e.g. 125 × 16 mm) labelled 1, 2 and 3; a 10 cm ^{3} syringe; 2 × 1 cm^3 syringes; 3 glass Pasteur pipettes with teats (230 mm in length to fit into the boiling tubes); 1 disposable plastic pipette; 3 spotting tiles, labelled as shown in Fig. 1.1 (below); stopclock, stop watch or bench timer; glass rod; beaker of distilled water labelled rinsing water ; a beaker to use for waste.

(viii) Paper towels.

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Details: An image of three spotting tiles

*Soluble starch (500 g; B6A71754) is supplied by Philip Harris.

The following amylase must be used.
Bacterial amylase (100 cm ^{3}; B6A01740) supplied in liquid form by Philip Harris.

Philip Harris, Findel House, Excelsior Road, Ashby Park, Ashby de la Zouch, Leicestershire. LE65 1NG.
Tel 0845 1204520; Fax 01530 419 492; Web site: www.philipharris.co.uk

Glass Pasteur pipettes (FB50253) are supplied by:

Griffin Education.
Tel 01509 233344. Fax 01509 555200; E-mail: griffin@fisher.co.uk
Web site: www.griffineducation.co.uk

Sodium ethanoate (SO5436) is supplied by Timstar.
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

Question 2

Candidates must be provided with a microscope with low power and high power objectives e.g. ×4 and ×40. Each candidate must have sole use of a microscope for at least 25 minutes.

(i) Part of a scale leaf from a red-skinned variety of onion. Candidates should be instructed to use the outer or convex surface of the scale leaf when peeling off the epidermis. They may be shown how to do this if necessary.

The material must be provided fresh and should not be allowed to dry out. It may be supplied to the candidates wrapped in damp paper towel or given to the candidates as they require it. Centres should keep a reserve supply in case candidates have difficulty with this part of the practical.

An alternative plant tissue may be used so long as it has a deeply-pigmented epidermis that pulls away from the underlying tissue. Centres should try the material chosen to make sure that it will be possible for the candidates to observe plasmolysis when they apply the 1 mol dm^{-3} potassium nitrate solution.

(ii) About 5 cm^3 of 1 mol dm^{-3} potassium nitrate solution in a suitable container labelled 1 mol dm^{-3} potassium nitrate  .

(iii) 3 microscope slides and cover slips; fine forceps; mounted needle; fine scissors; teat pipette; single-edged razor blade or scalpel (e.g. Swann Morton No. 3 handle fitted with No. 11 blade); a piece of filter paper cut into small squares (approx 2 cm × 2 cm).

(iv) Small beaker of distilled water, labelled distilled water .