

**ADVANCED GCE
BIOLOGY****2806/03/INST**

Instructions for the Planning Exercise and Practical Test

To be opened immediately

Planning Exercise – for issue on or after:

Monday 17 November 2008

Practical Test:

**Thursday 22 January 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, 2806/03/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 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 Cultures of *Tribolium confusum* and *Tribolium castaneum*.

These are supplied in specimen tubes and on arrival should be used to make new cultures as soon as possible.

Prepare new cultures as follows: sieve wholemeal flour to remove any bran, add some powdered dried yeast (1 part yeast to 12 parts flour) and heat sterilise the mixture by placing in a hot oven (up to 120 °C) for one hour.

Place approximately 5cm depth of the flour/yeast mixture into sterile jam jars or plastic boxes. Place a small piece of paper towel into the flour/yeast mixture so that it projects above the mixture for the beetles to climb on, as shown in Fig. 1.1. Add beetles to the jar and cover the open top with a piece of muslin secured with an elastic band.

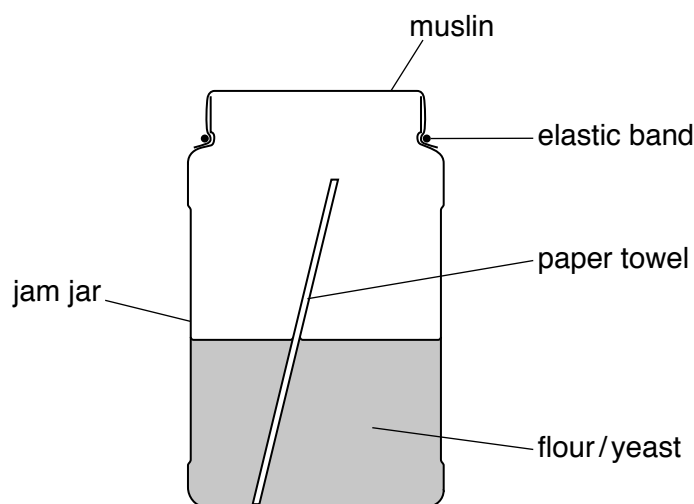


Fig. 1.1

Cultures should be kept in a well ventilated place.

Some people may be allergic to the beetles, so candidates with asthma should take special care.

Cultures should be disposed of by placing in a freezer for at least 24 hours.

- 2 Jam jars, plastic boxes, large specimen (sample) tubes (approximately 12 cm × 4.5 cm). Muslin or other fine cloth and elastic bands or perforated plastic lids.
- 3 Different types of flour, e.g. wholemeal, plain, self-raising, strong white bread.
- 4 Dried yeast, which should be made into a powder in a pestle and mortar before mixing with flour.
- 5 Large plastic trays (for separating the beetles from the flour), sieves and/or tea strainers, forceps, mounted needles and paint brushes.

- 6 Drying agents, such as silica gel or anhydrous calcium chloride.
- 7 Different relative humidities may be prepared by using different concentrations of glycerol in water as follows:

approximate relative humidity/%	volume of glycerol/cm ³	volume of water/cm ³
90	25	75
80	53	47
70	66	34
60	73	27
50	81	19
40	86	14
30	89	11
20	92	8
10	95	5

Note: the actual humidities obtained do not need to be exact, and will be dependent upon the temperature of the room. It can be assumed that in any one experiment, given constant conditions, the humidities will be correct relative to each other. Actual humidities may be checked with a data logger and a humidity sensor.

- 8 Hand lens, microscope and microscope slides.

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.

Suppliers:

Blades Biological, Cowden, Edenbridge, Kent, TN8 7DX; Tel.: 01342 850242; Fax: 01342 850924; e-mail: info@blades-bio.co.uk; web site: www.blades-bio.co.uk.

Tribolium confusum (100 adults LZJ 429 or a culture LZJ 430) and *Tribolium castaneum* (100 adults LZJ 424 or a culture LZJ 425).

Glycerol may be obtained from:

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 (product GL2878/GL2880).

or from:

Scientific & Chemical Supplies Ltd., Carlton House, Livingstone Road, Bilston, West Midlands, W14 0QZ; Tel.: 0845 1650845; Fax: 01902 402343; e-mail: customerservices@scichem.co.uk; web site: www.scichem.co.uk (product PRO15/PRO20).

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.

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) 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 in Appendix B of the 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.

In this examination, microscopes are to be used in Question 2. It may be advisable for some candidates to begin with Question 2.

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

Question 1

Tap water with an approximate pH range of 6.0 to 7.0 may be used in place of distilled water throughout this procedure.

The procedure **must** be trialled well in advance of the examination.

- (i) At least 20 cm³ of potato extract (source of starch phosphorylase) in a small beaker labelled **potato extract**. The small beaker should be provided in a large container of ice-cold water.

Use medium-sized potatoes of the Desiree variety. This variety works well for this procedure. If a variety other than Desiree is used, the procedure **must** be trialled in advanced to ensure that suitable results can be obtained in the time allocated.

The potato extract should be freshly prepared on the day of the examination as follows:

- Cut up 350 g of peeled potato into small pieces and place in a liquidiser.
- Add 250 cm³ of tap water.
- Liquidise for approximately one minute.
- Filter the liquidised potato through three layers of muslin (to remove the starch grains) into a clean container.
- Allow the filtered extract to settle for approximately three minutes.
- Test a sample of the filtered extract (avoiding any sediment at the bottom of the container) with the iodine solution (see (v)). If there is more than a trace of starch, filter again through muslin (it may not be possible to obtain an extract that is *completely* free of starch).
- Test the extract to check that it is between pH 6.0 and 7.0 (if the pH of the extract is found to be outside this range prepare fresh extract using 0.05 mol dm⁻³ citrate buffer at pH 6.5 in place of the tap water).
- Keep the extract cold in a refrigerator or ice-cold water bath until required.
- Provide 20 cm³ of the extract (avoiding any sediment at the bottom of the container) to each candidate in a small beaker stood in ice-cold water. You may wish to place all candidates' beakers in a large container (e.g. washing-up bowl) containing ice-cold water until required.

Note: this will provide sufficient extract for 15–20 candidates.

If required, 0.05 mol dm⁻³ citrate buffer at pH 6.5 should be prepared as follows:

- Prepare 100 cm³ 0.05 mol dm⁻³ citric acid (C₆H₈O₇·H₂O) by dissolving 1.05 g of citric acid monohydrate in a few cm³ of tap water and making up to 100 cm³ with more tap water.
- Prepare 250 cm³ 0.05 mol dm⁻³ sodium citrate solution (Na₃C₆H₅O₇·2H₂O) by dissolving 3.68 g of sodium citrate in a few cm³ of tap water and making up to 250 cm³ with more tap water.
- Add 36 cm³ 0.05 mol dm⁻³ citric acid to 214 cm³ 0.05 mol dm⁻³ sodium citrate solution.

- (ii) 10 cm³ of 0.01 mol dm⁻³ glucose solution.

This should be prepared as follows:

Dissolve 0.18 g of glucose in a few cm³ of tap water. Make up to 100 cm³ with tap water. 10 cm³ should be provided to each candidate in a small beaker labelled **glucose**.

- (iii) 10 cm³ of 0.01 mol dm⁻³ glucose 1-phosphate solution (with added starch, as described below).

This should be prepared as follows:

Dissolve 0.38 g of glucose 1-phosphate in a few cm³ of tap water. Make up to 100 cm³ with tap water. Add 1 cm³ of 1 g dm⁻³ of starch solution prepared as below*. 10 cm³ should be provided to each candidate in a small beaker labelled **glucose 1-phosphate**.

*1 g dm⁻³ starch solution should be prepared as follows:

Measure out 100 cm³ of tap water. Use a small quantity of tap water to make a paste with 0.1 g soluble starch. Warm the rest of the water. Add the paste to the warm water and stir. Bring to the boil. Allow to cool and then filter through several layers of muslin or suitable alternative.

The starch is needed as a 'starter' for the polymerisation reaction and should be sufficiently dilute not to give a positive result with iodine solution in the reaction mixture. The volume of starch solution added to the glucose 1-phosphate can be adjusted if necessary.

- (iv) 10 cm³ of 0.2 mol dm⁻³ potassium dihydrogen phosphate (KH₂PO₄) solution.

This should be prepared as follows:

Dissolve 2.72 g of KH₂PO₄ in a few cm³ of tap water and make up to 100 cm³ with tap water. 10 cm³ should be provided to each candidate in a small beaker labelled **KH₂PO₄**.

- (v) 0.1% iodine solution in a dropping bottle or a suitable container with dropping pipette. This should be labelled **iodine solution**.

This should be prepared as follows:

Add 9 cm³ of tap water to 1 cm³ of 1% iodine solution.

- (vi) Two 1 cm³ syringes; three 5 cm³ syringes; test-tube rack to accommodate three test-tubes; two plastic dropping pipettes.
- (vii) Stop clock, stopwatch or bench timer.
- (viii) Three glass pipettes with teats (a suitable length to fit into test-tubes).
- (ix) Two or three clean spotting tiles (to provide a minimum of 17 wells).
- (x) Three test-tubes (e.g. 120 × 14 mm) labelled **A**, **B** and **C**; three bungs to fit.
- (xi) A beaker of tap water labelled **water**, for use in step 3 of Question 1.
- (xii) Chinagraph pencil or permanent marker pen for labelling spotting tiles (if required).

Chemical Suppliers:

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.

Glucose 1-phosphate (glucose 1-phosphoric acid disodium salt; GL2868/GL2870), iodine solution with 1% potassium iodide (IO3158), citric acid (CI2130) and sodium citrate (SO5550).

or

Scientific & Chemical Supplies Ltd., Carlton House, Livingstone Road, Bilston, West Midlands, W14 0QZ; Tel.: 0845 1650845; Fax: 01902 402343; e-mail: customerservices@scichem.co.uk;
web site: www.scichem.co.uk.

Glucose 1-phosphate (GL025 / GL030), 1% iodine solution in potassium iodide (IO015), citric acid (CI1005) and sodium citrate (SO130).

Question 2

- (i) A microscope with low power and high power objectives ($\times 10$ and $\times 40$).

Each candidate must have sole use of a microscope for at least 35 minutes.

Provided by OCR

- (i) Insert with Fig. 2.2.
(ii) Slide M.

RETURN OF EXAMINATION MATERIALS TO OCR

Please read the following instructions carefully.

Immediately after the examination the slides must be returned to OCR in the containers in which they were received, using the self-adhesive labels for the parcel. They must not be included in parcels of scripts.

Please clearly indicate your Centre number when returning slides.

Slides and containers not returned in good condition will be charged at the rate of £3 per item.

The address for the return of slides is:

Ian Couchman,
Cambridge Assessment DC10,
Hill Farm Road,
Whittlesford,
CAMBRIDGE
CB22 4FZ.

On occasion, it may be possible for OCR to offer certain slides used in the examination for sale to Centres.

BLANK PAGE

