

Teacher Resource Bank

GCE Human Biology 2405

Other Guidance:

- Investigative Skills Assessment: HBI3T
Teachers' Notes (specimen ISA)



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The movement of water in and out of cells

Candidates will be required to investigate the effect of sucrose concentration on the diameter of onion rings. Cutting thinly through an onion will provide many complete rings of tissue. Throughout the investigation these will be referred to as onion rings.

Materials

They should be provided with

- 5 different sucrose solutions within the range 0.1M to 0.9M.
- Instrument to cut onion rings - Onions should be of such a size that sufficient whole rings can be obtained for the investigation of a single candidate. [Help may be given for how to obtain an onion ring.]
- Suitable instrument for inserting/removing onion rings into/from solutions
- White tile or other appropriate surface for cutting onion rings
- Suitable instrument for measuring liquid volumes
- Suitable containers for immersing onion rings in sucrose solutions
- Suitable instrument for measuring the diameter of the onion rings
- Suitable material for removing excess solution from onion rings
- Thermostatically-controlled water bath or apparatus which will enable candidate to set up their own water bath [optional]
- Clock for monitoring period of immersion of onion rings

In this investigation, you must not provide candidates with the following information:

- the number of repeats or when additional readings are required
- what variables to monitor or control

Assessment of presentation of raw data (3 marks)

Candidates should be assessed on their ability to present raw data according to the following criteria.

- 1 mark** - Title given which relates the independent and dependent variables.
- 2 marks** - Column headings correctly identify both the independent and dependent variables with independent variable in first column.
- 3 marks** - Institute of Biology unit conventions followed. [Teachers are referred to the Institute of Biology publication, *Biological Nomenclature*, 3rd edition, 2000.]

Assessment of data processing and the graph (7 marks)

Candidates should be assessed on their ability to process raw data and draw a graph according to the following mark scheme (**one mark** for each).

1. Mean diameters (before and after treatment) calculated accurately.
2. (Mean) percentage changes in diameter calculated accurately.
3. Correct choice of graph (line graph, bar chart, histogram or scatter graph)
4. Dependent variable plotted against independent variable with axes the correct way.
5. Axes labelled appropriately with IOB unit conventions followed.
6. Data plotted accurately.
7. Graph is scaled appropriately (including size, proportion of paper that plotted data use and linear)

General Guidance on carrying out ISAs

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Practical work should be carried out after candidates have practiced the necessary skills and after teaching the appropriate of sections of the specification. They should also be familiar with the apparatus they will be using.

It is the responsibility of the centre to ensure that practical activity works with the materials provided to the candidates.

Risk Assessment

It is the responsibility of the centre to ensure that a risk assessment is carried out before candidates carry out the practical work.

Stage 1: The Practical Work

This work should be carried out under controlled conditions in one or more practical sessions. Teachers will be in the best position to judge which is more appropriate for candidates in their own centre.

At the start of Stage 1, you should give each candidate a copy of the Task Sheet together with the appropriate apparatus and materials to carry out the investigation.

Candidates should present their results on the Candidate Results Sheet, which is the last page of the Task Sheet. The ability to present experimental results in an appropriate form is an important part of this assessment. Centres must not present candidates with a blank table for the candidate to complete.

At the end of each practical session the teacher must collect the Task Sheet with the *Candidate Results Sheet* attached and keep it securely until the next stage.

The teacher assesses the candidates' work following the AQA marking guidelines.

Stage 2: Processing raw data

During this stage, candidates will process their raw data and use the processed data to draw a graph. They must do this in a single session, under controlled conditions with no communication with other candidates.

At the start of the session, the teacher should return to the candidate

- their own Task Sheet
- their *Candidate Results Sheet*

It is the Teacher's responsibility to ensure that candidates are aware that they are not permitted to add to or amend their material from Stage 1.

Using these, candidates should be instructed to:

- process the raw data in an appropriate way of their own choosing
- draw a graph of their processed data

Stages 1 and 2 may be done in the same session.

At the end of this session, the teacher must collect and keep secure:

- the Task Sheet
- the *Candidate Results Sheet*
- processed data and graph

The teacher assesses the processed data and graph following the AQA marking guidelines.

Stage 3: The ISA written test 1 hour 15 minutes

Stage 3 should be undertaken as soon as possible after the Stage 2. This stage consists of an ISA written test provided by AQA which candidates must complete under controlled conditions.

At the start of the assignment, you should provide each candidate with the following items.

- their own material from Stages 1 and 2
- a copy of the appropriate ISA written test.

It is the Teacher's responsibility to ensure that candidates are aware that they are not permitted to add to or amend their material from Stages 1 and 2.

Candidates should be instructed when they can begin the assignment and should complete it without assistance.

At the end of the 1 hour 15 minutes, you should collect the work of all candidates.

The teacher assesses the ISA written test following the AQA marking guidelines.

Administration

Candidates must not bring any paper-based materials into any of the session(s) or remove anything from them. Anything they require must be provided during the session. Mobile phones are not allowed.

Redrafting

Redrafting of the ISA is not allowed at any stage.

Modifications

The Task Sheet gives candidates an outline of the investigation. The teacher may modify the Task Sheet to take account of the conditions and equipment available in the centre. Any modification must be discussed and agreed, in writing, with the Assessment Adviser, and must be notified to the moderator.

Discussion of the task

Any discussion must be of a general nature so that candidates are left to make their own decisions about key questions identified in the Task Sheet.

PSA skills

PSA should be assessed over the whole course of study. If, however, you have external candidates in your centre this investigation might be the only time that you will be able to assess their practical skills. Under these circumstances you may assess candidates' practical skills as they carry out the investigation.

Working in groups

Candidates may work in groups provided that any skills being assessed are the work of individual candidates.

- the design of the table, the processing of raw data and the drawing of the graph must be the candidate's own work.

Information provided to candidates

A Supervisor must not give any advice to candidates about the way they are conducting experiments unless it is to prevent personal injury to the candidates or damage to apparatus. Unless specific mention to the contrary is made in the instructions, Supervisors must not give any advice or information to candidates, whether it is asked for or not.

Candidates absent for the practical work

A candidate absent for the practical work (Stage 1) should be given an opportunity to carry out the practical work before they sit Stage 2. This may be with another group or at a different time. Only when this is not possible, can the teacher supply a candidate with real data to be processed at Stage 2. In this instance no marks can be awarded for Stage 1. The use of class data should be notified to the moderator on the *Candidate Record Form*.

Can I discuss a completed 'live' ISA with a candidate?

Completed 'live' ISAs should be treated like examination papers and kept under secure conditions until the publication of results. Teachers may give candidates their unmoderated marks. Candidates must **not** be given access to their completed 'live' ISA.

Teachers may discuss issues relating to completed 'live' ISAs with candidates provided that

- the feedback is of a general nature
- no other candidates from the centre will be attempting the ISA and
- the discussion is with whole teaching groups.

Discussion, with individual candidates, of specific details of questions is not allowed.

Following publication of results ISAs which are no longer 'live' may be used for practice.