14-19 CHANGES
A LEVEL

Support Materials

AS Level Human Biology H023:

Practical Skills Handbook

AS/A Level Human Biology

Version 1.4

AS/A Level GCE

Practical Skills Handbook

GCE Human Biology

OCR Advanced Subsidiary GCE in Human Biology   H023

This Practical Skills Handbook is designed to accompany the OCR Advanced Subsidiary GCE specification in Human Biology for teaching from September 2008.

A separate handbook entitled '*Teacher Support: Extended Investigation*' for A2 Unit F226 will be available from June 2008.

OCR will update this document on a regular basis. Please check the OCR website (www.ocr.org.uk) at the start of the academic year to ensure that you are using the latest version.

Version 1.4
The only changes made between version 1.2 and 1.3 were the incorporation of updated screenshots on pp. 9 and 10, the inclusion of an Interchange Help Sheet and the removal of FAQs, which are now available as a separate document.

The only change made since version 1.3 is an update to the Health & Safety information in Section 6. No other changes have been made.

Contents

Introduction

New GCE A/AS specifications in Human Biology have been introduced for teaching from September 2008. The new specifications are set out as units, subdivided into teaching modules. Each teaching unit is assessed by its associated unit of assessment. Guidance notes are provided within specifications to assist teachers in understanding the requirements of each unit.

This Handbook plays a secondary role to the Specification itself. The specification is the document on which assessment is based and this Handbook is intended to elaborate on the content of the specification to clarify how skills are assessed and what practical experience is necessary to support an assessment. The Practical Skills Handbook should therefore be read in conjunction with the Specification.

During their study of Human Biology, candidates are expected to acquire experience of planning, carrying-out, interpreting, analysing and evaluating experiments and it is important to recognise that these aspects of practical work require both teaching and continuing practice. Experience has shown that evaluating experiments and suggesting improvements to the procedures employed is a difficult skill for candidates to master.

Planning skills will **not** be directly examined as part of the school-based assessment but may be tested within the theory papers at AS level. Other skills will be internally assessed by the centre using the scheme shown on page 6.

2   The assessment model

2.1   Summary of the Model

Practical and investigative skills developed within contexts encountered during Advanced Subsidiary GCE Human Biology (for Unit F223) are assessed by means of three types of task (Qualitative, Quantitative and Evaluative) at each level.

Thus, candidates are required to carry out **three** tasks at AS:

1.   Qualitative task   [10 marks]

2.   Quantitative task   [10 marks]

3.   Evaluative task   [20 marks]

Tasks will be chosen from a selection provided by OCR via the secure Interchange website. Initially, a choice of three tasks will be offered for each type. All tasks will be refreshed or replaced each year and additional tasks may be made available. They will be available until 15 May in each year. Tasks for the following year will be available from early June.

The Qualitative and Quantitative tasks will test skills of observation, recording and reaching valid conclusions.

The Evaluative task will test the ability to analyse and evaluate the procedures followed and/or the measurements made. Candidates may also be asked to suggest simple improvements that would increase the reliability or accuracy of an experiment. The Evaluative task will be linked to either a Qualitative or a Quantitative experiment but no further data collection will be required. Any additional data required will be supplied within the Evaluative task.

Candidates carry out all of their assessed tasks under direct teacher supervision.

Each task is internally assessed using a mark scheme provided by OCR via the Interchange website.

Candidates may attempt more than one task from each task type with the best mark from each type being used to make up the overall mark. A candidate is only permitted one attempt at each task.

For each candidate, centres will supply OCR with a single mark out of 40.
Each practical skills unit is teacher assessed and externally moderated by OCR.
Although practical tasks can be used throughout the year, entry for the AS unit is available only in the June session of each year.

The mark schemes supplied by OCR will be based on the following criteria:

	Assessable learning outcomes
1. Qualitative Task • Candidates carry out a practical task using instructions supplied by OCR.	Candidates should be able to: (a) demonstrate skilful and safe practical techniques using suitable **qualitative** methods; (b) make and record valid observations.
2. Quantitative Task • Candidates carry out a practical task using instructions supplied by OCR. • The data collected in one of the tasks may form the basis of the assessment in the Evaluative task.	Candidates should be able to: (a) demonstrate skilful and safe practical techniques using suitable **quantitative** methods; (b) make and record accurate measurements to an appropriate degree of precision; (c) analyse, interpret and evaluate experimentally derived results quantitatively to reach valid conclusions.
3. Evaluative Task • This task may extend the quantitative task. • Candidates will analyse and evaluate the quality of the data. • Candidates will evaluate procedures. • Evaluative tasks will **not** require additional data collection.	Candidates should be able to: (a) process results quantitatively; (b) analyse and interpret data, identify anomalies and reach valid conclusions; (c) assess the reliability and accuracy of an experimental task; (d) identify and explain the main limitations of the data collection strategy and identify weaknesses in experimental procedures and measurements; (e) understand and propose simple improvements to experimental procedures and measurements.

2.2   Downloading Practical Skills Tasks

Tasks, Mark Schemes, and Instructions for Teachers and Technicians are provided to Centres (as separate PDF files combined into one zip file) via OCR's secure website, Interchange (https://interchange.ocr.org.uk).

Copies of the Practical Skills Handbook and other forms are also available via Interchange and via OCR's public website (www.ocr.org.uk).

(PDF files require the use of adobe acrobat reader. Free copies of acrobat reader are available from http://www.adobe.com/uk/products/acrobat; If you use Windows 95, 98, ME, or NT, a zip program such as WinZip or PKZip can be used to extract the files. Windows XP has a built-in zip extractor.)

2.2.1 How to use OCR Interchange

OCR Interchange is a secure extranet enabling registered users to administer qualifications on-line. Your Examinations Officer is probably using OCR Interchange to administer qualifications already. If this is not the case, then your centre will need to register.

Your Examinations Officer will be able to:
- download the relevant documents for you by adding the role of 'Science Coordinator' to their other roles or
- make you a New User (Science Coordinator role) so that you can access the GCE Human Biology pages and download documents when you need them.

The website address for Interchange is:
https://interchange.ocr.org.uk

The teacher who has downloaded these materials is responsible for ensuring that they are stored securely so that candidates do not have the opportunity to access them. A record should be kept of the dates on which materials are downloaded for possible submission to OCR.

Distribution of the practical tasks is limited to those candidates who are currently undertaking that task. Task sheets should be photocopied and issued to candidates at the start of the task. They must be counted out and in; numbering the documents may help to keep track of them.
All unused tasks and candidates' scripts must be collected after the assessment and stored securely or destroyed.

Candidates must not take tasks out of the room where assessments are taking place.

Under no circumstances can candidates be allowed to see the mark schemes.

Science Materials pages are arranged according to qualification level and subject (see below).

The user simply clicks on the relevant link to access the relevant subject material. Any important notices are shown at the top of the page along with useful supporting materials (e.g. the specification, the Practical Skills Handbook, forms) and a 'Getting started' file (which includes an Abstract and title for each assessment task for the current assessment year). Tasks are arranged according to level and type (Qualitative, Quantitative and Evaluative, see below). Hovering the mouse pointer over a Task or document link generates a summary of the file.

Simply clicking on the Task link allows you to download the zipped material to your desktop. The zip file contains everything you need to complete the task (instructions, task and mark scheme). All files have a unique name so there is no danger of overwriting material on your computer.

Important notices appear in a box here

Additional information regarding registering for e-mail updates

Document summary (activated by hovering the mouse pointer over a link)

Supporting materials for download, e.g. forms, specification, Practical Skills Handbook, Getting Started file

Zipped Tasks for download

E-mail updates

To be notified by e-mail when changes are made to the **GCE Human Biology** page on Interchange please e-mail GCEsciencetasks@ocr.org.uk including your centre number, a contact name and the subject line **GCE Human Biology**. It is strongly recommended that all centres register for e-mail updates.

2.2.2 Registering for Interchange

If your Examinations Officer is not already a registered user of Interchange then he/she will need to register before the Human Biology tasks can be downloaded.

This is a straightforward process:
- Go to the website – https://interchange.ocr.org.uk;
- The first page has a New User section;
- Click on Sign Up to access the OCR Interchange Agreement Form 1;
- Download this document and fill in your details;
- Return form by post to OCR Customer Contact Centre, Westwood Way, Coventry, CV4 8JQ or fax the form back to 024 76 851633;
- OCR will then contact the Head of Centre with the details needed for the Examinations Officer to access OCR Interchange.

2.3   Administration and Regulations

2.3.1 Availability of Tasks

Mark schemes, tasks and Instructions for Teachers and Technicians will be available until **15 May** in each year. Tasks for the following year will be available from early June.

It is intended that tasks should form part of the normal teaching programme and so may be taken by candidates at any time during the year. Where possible, a task should be administered immediately after the knowledge, understanding and skills required for the task have been taught.

Level	Unit & Task	First Tasks on Interchange by	Coursework submission date
AS	F223 Qualitative (×3) Quantitative (×3) Evaluative (×3)	June 2008	15 May each year from 2009
A2	Extended Investigation		15 May each year from 2010

2.3.2. Security

It is the responsibility of the centre to ensure that downloaded tasks, mark schemes, instructions (including any copies made of these documents), and candidates' scripts are stored securely. Any breach in security must be reported to OCR as soon as possible by submitting a written report (a blank report form is available on Interchange) from the Head of Centre to the Subject Officer detailing the circumstances, the candidates concerned and any action taken.

The instructions for each assessed task contain information to allow teachers to check the availability of the necessary apparatus and chemicals and for any solutions to be prepared in advance.

Tasks, mark schemes and instructions can be downloaded at any time throughout the academic year as long as they are kept secure. You will be provided with information that you can provide to the candidate prior to each task.

Candidates' scripts for all completed tasks must be stored securely and they should be available for moderation. Centres should retain Tasks securely until such time as they are clear that candidates will not wish to re-submit work to OCR in future sessions. At this point the work should be securely destroyed.

2.3.3 How to use the Tasks

There are at least three tasks available of each type: Qualitative, Quantitative and Evaluative. These may be used in a variety of ways. For example, candidates may complete all three of the Qualitative tasks and the teacher can then submit the best mark. Alternatively, the teacher may use the first task for formative assessment, the second for submission of marks and keep the third in reserve in case a particular candidate does not perform well on the second task.

A candidate is not permitted to have more than one attempt at a single task, or to re-write or change a task once it has been submitted to the teacher for marking.

2.3.4 The experiments

The experiments used in the tasks have been trialled. The instructions provided should ensure that the candidates are able to collect appropriate data in the time available. However, it is vital that the teacher trials the tasks before they are attempted by the candidates to ensure that:

- appropriate materials and equipment are available;

- the experiment works and generates the expected data.

Please refer to section 6 (Health and Safety).

On some occasions it may be necessary to provide a data set against which candidates' results can be compared. In such cases this requirement will be stated in the Instructions for Teachers and Technicians.

Teachers may make appropriate changes to the materials and apparatus listed in the instructions where these make provision easier/cheaper and they have no impact on the outcome, or demand, of the experiment. Other changes can be made to, for example, volumes/concentrations/amounts in order to make the experiment work as intended and to ensure that candidates are able to make appropriate observations/measurements. **All such changes may be made without OCR's approval**, but details must be retained and made available to the Moderator when work is submitted.

Details of changes made must be notified to OCR by e-mail to **GCEsciencetasks@ocr.org.uk**. Remember to include the centre number on all e-mails.

We will acknowledge all e-mails but will only respond in detail where there are concerns over suggested modifications. OCR may update the materials on the Interchange website where this is appropriate. If there are any issues with any of the experiments **that cannot be satisfactorily resolved by the centre**, details should be provided to OCR using the same e-mail address.

2.3.5 Centres with more than one teaching group

It is recognised that some centres are likely to have more than one group with lessons timetabled at different times. In these circumstances, centres are asked to ensure that a particular task is carried out by all the groups in as short a period as possible.

2.3.6 Absence at the time of an assessment

If a candidate is absent from a centre when an assessment is carried out, the task may be set at an alternative time provided that the centre is satisfied that security has been maintained by keeping all materials secure.

2.3.7 Candidates with access arrangements

Candidates who are eligible for access arrangements and need additional time for the Evaluative task may be given up to 25% extra time and their name should be recorded on the Interchange Access Arrangements site. Where other access arrangements are required, applications should be made to OCR at the beginning of the course using the standard forms and procedures in the Joint Council regulations and guidance document. However, it should be remembered that these tasks are intended to assess practical skills. Credit is given to those skills which the candidate has performed independently. The Disability Discrimination Act lays no duty on awarding bodies to make reasonable adjustments with respect to the application of a competence standard or, in this case, the assessment objective being tested.

2.3.8 Unexpected circumstances

If an unexpected problem (such as a fire alarm or other circumstance beyond the teacher's control) occurs while an assessed practical task is taking place, the task may be resumed subsequently provided the teacher ensures that no candidate is likely to have been advantaged or disadvantaged by doing so.

2.3.9 Support allowed for candidates

All practical tasks will be accompanied by appropriate instructions and any specific advice for candidates. Teachers may provide additional safety instructions (including written advice) if this is felt to be necessary.

Candidates will not be permitted to refer to their class notes, books or the internet during the task (except where specifically indicated on the task cover sheet and Instructions).

If it becomes necessary for a teacher to provide a candidate with assistance during the course of a practical task, the work may still be marked alongside the work of other candidates but the task sheet must be annotated to indicate the assistance given. The teacher should use their professional judgement to award marks appropriately.

2.3.10 Supervision

All tasks must be carried out under the direct supervision of the teacher. However, they are not practical examinations and there is no requirement for 'examination conditions' to be imposed. Candidates may need to interact as they collect materials or use particular pieces of apparatus, but the teacher should set up the tasks so that this interaction is kept to a minimum. The teacher must ensure that candidates do not copy from, or assist, each other so that s/he can with confidence authenticate the work of each candidate.

2.3.11 Authentication

It is the responsibility of the centre to ensure that the work submitted for assessment is that of the candidate involved (using sheet CCS160).

2.3.12 Group work

Candidates must work individually to collect their own data. However, where a task requires the collection of a large data set, instructions may include the pooling of data from a number of candidates and each candidate will then work with the same large data set. It will always be expected that each candidate contributes his/her data to the pool. In some cases candidates may need to share equipment or apparatus and the centre must make arrangements for this to take place without disadvantaging any candidates.

2.3.13 Time allowed for Tasks

Qualitative and Quantitative tasks are not time restricted, but most have been designed to be conducted in a single practical session lasting about an hour. However, there may be circumstances in which it is not possible to complete the work in the time available; for example, there may be difficulties with the experiment, a fire alarm or a shortage of equipment. In all such cases, candidates' work should be collected in and issued to them again at the start of the next lesson. They must **not** take the work away with them or complete it without supervision.

Some Quantitative tasks may require the use of two practical sessions. Where this is the case, the task may be divided to allow a convenient point at which the experiment can be set aside for completion in the second session. In such cases the candidate task sheets may be provided in two sections.

Evaluative tasks should be completed within 1 hour.

2.3.14 Submission date for work

Candidates' marks must be despatched to the Moderator and to OCR to arrive by 15 May in the year of the examination.

The following forms (available both from Interchange and www.ocr.org.uk) must be included with the submitted marks:

- Centre authentication sheet (CCS160)*;

- Details of any changes made to the experiments **must** be sent to the moderator with the candidates work.

Please attach a photocopy of any correspondence with OCR to the candidates work.

The Moderator will ask for a sample of work. If there are ten or fewer candidates at the centre, all work submitted should be sent to the Moderator to arrive by 15 May.

* If this sheet is not received, this may delay publication of candidates' results.

2.3.15   Internal standardisation

A centre **must** set up an internal standardisation procedure to ensure that all teachers at the centre are applying the mark schemes in the same way. This procedure could include double marking of a sample of candidates, or the remarking of work by a senior member of staff.

2.3.16   Coursework consultancy

OCR offers a coursework consultancy service whereby centres can send up to four photocopies of marked work to OCR for commentary by a senior Moderator. If a centre wishes to make use of this service, work should be submitted to OCR no less than 8 weeks before the coursework submission date (15 May). The coursework enquiry form is available at www.ocr.org.uk and on Interchange.

2.3.17   Repeating Tasks

Candidates can only attempt a task **once**. If a candidate under achieves on a task, they may take **another** task from within that task-type.

2.4   Marking Advice for Teachers

The marking schemes provided to centres have been made as explicit and as easy to apply as possible. Teachers should note that the mark schemes are not hierarchical. A measure of professional judgement may sometimes be necessary.

Once the work has been collected in, it must be marked by the teacher as it stands. **Under no circumstances can a candidate be allowed to change or elaborate on an answer.**

Teachers are reminded that it is possible for a candidate to be assessed on another occasion using a different task and that the best mark achieved for each task type should be submitted. It is appropriate for the teacher to provide feedback to explain how the work could have been improved although details of the mark scheme **must not** be directly communicated to the candidate.

Mark tasks clearly, in red ink, and in accordance with the task-specific mark scheme. Annotation can help the Moderator and staff in the centre who are checking the marking as part of internal standardisation.

Useful annotations consist of:

- ticks and crosses against responses to show where marks have been earned or not earned;
- bod   = benefit of doubt (where professional judgement has been used)
- ecf   = error carried forward (in consequential marking)
- con   = contradiction (in cases where candidates contradict themselves in the same response)
- specific words or phrases to confirm why a mark has been earned or indicate why a mark has not been earned (e.g. indicate an omission).

Where a candidate has given an answer not covered by the mark scheme, the teacher should use his/her professional judgement to decide whether the answer is worthy of credit. If it is, then the script should be annotated accordingly and the mark(s) awarded.

3   General requirements for AS practical work

Suggested practical activities have been included within the specification at the end of each module. Carrying out these practical tasks during the course is not a requirement. Their purpose is to ensure that the skills required for assessment will have been covered. Alternative experiments may be chosen but centres should be careful to consider whether sufficient experience will have been provided for candidates prior to the use of the assessed tasks.

There are generic skills which should be developed during the study of AS and A2 Human Biology. The sophistication required of candidates should increase throughout the course, partly as their practical experience grows but also through the extra demands expected by more complex experiments.

General

At both levels, the course aims to provide candidates with the opportunity to:

- develop good laboratory technique;
- make and record accurate and precise measurements and observations;
- use and record the correct units for all measurements taken;
- process and present data in an appropriate format;
- construct or interpret appropriate graphs from data collected or provided;
- use a simple statistical test where appropriate;
- interpret the results of experiments and draw conclusions;
- establish whether data collected from experiments is valid and reliable;
- evaluate experimental technique and scientific method in light of practical experience;
- gain knowledge of laboratory safety and safe working.

During teaching, teachers should focus on the key areas above whilst developing the candidates' skills through a coherent practical programme.

In carrying out practical tasks, candidates should acquire the necessary experience to be able to carry out the Qualitative, Quantitative and Evaluative tasks that will be tested by the assessed tasks.

4 Apparatus for Units F223

All candidates will be expected to have access to standard laboratory apparatus. However, for specific tasks, other, more specialised equipment may be required.

Apparatus for candidates eligible for access arrangements

Advice about specialist equipment that may be suitable for candidates eligible for access arrangements (e.g. talking thermometers, talking scales, notched syringes) can be obtained from the RNIB (www.rnib.org.uk) and other specialist organisations. Before using such equipment for an assessed task, the awarding body should be contacted to ensure that it does not interfere with the competence standards being assessed.

5 Resources

General resources

There are many resources available to help teachers provide support to candidates. These include both books and websites.

Books:

Cadogan, A. and Ingram, M. (2002) *Maths for Advanced Biology*. Thomas Nelson and Sons, UK

Clegg, C. J. and Mackean, D.G. (1996) *Advanced Biology Principles and Applications: Study Guide.* John Murray, London

Edmondson, A. and Druce, D. (1996) *Advanced Biology Statistics.* Oxford University Press, UK

Ennos, R. (2006) *Statistical and Data Handling in Biology*. Prentice Hall, UK

Jones, A., Reed, R. and Weyers, J. (2007) *Practical Skills in Biology*. Benjamin Cummings, UK

Geatrell, B., Lowrie, P. and Tilley, A. Series editor: Fuller, F. (2008) *Human Biology – OCR endorsed textbook*. Heinemann, UK

Biological Nomenclature: Standard Terms and Expressions used in the Teaching of Biology. (2000) Institute of Human Biology. Edited by Alan Cadogan.

Useful websites include:

- the ASE at www.schoolscience.co.uk

- http://www.biozone.co.uk

- http://saps1.plantsci.cam.ac.uk

- http://www.ncbe.reading.ac.uk

INSET
OCR runs INSET courses every year, primarily in the autumn term, and these include sessions either wholly or partly to support internally assessed tasks. More details about INSET provision are available at www.ocr.org.uk.

Coursework consultancy
OCR offers a coursework consultancy service whereby centres can send up to four photocopies of marked work to OCR for commentary by a senior Moderator. If a centre wishes to make use of this service, work should be submitted to OCR *no less than 8 weeks* before the coursework submission date (15 May). The coursework enquiry forms are available at www.ocr.org.uk and on Interchange.

6 Health & Safety

Useful information can be found at www.cleapss.org.uk

Candidates are expected to be familiar with one or both of the chemical hazard labelling systems illustrated below. Chemicals provided for assessment tasks should be labelled with the appropriate hazard symbol or pictogram and should take account of the labelling system that candidates will recognise *and* understand. Labels could also include additional information (eg "use a fume cupboard" or "avoid inhalation") if the risk assessment supported the view that this information would contribute to the safety of candidates carrying out the activity.

Oxidising	Toxic	**'CHIP' system (being phased out)**
Highly Flammable	Harmful or Irritant	
Corrosive		

Oxidising	Toxic	**'CLP' system (being phased in)**
Highly Flammable	**Indicates that the chemical could cause serious *long term* health effects.**	**CLP pictograms are also accompanied by a 'signal word' to indicate the severity of the hazard.**
Corrosive	**Indicates less serious health hazards (e.g. skin irritants).**	**'DANGER' for more severe; 'WARNING 'for less severe.**

In UK law, health and safety is the responsibility of the employer. Employees, i.e. teachers, lecturers, and technicians have a duty to cooperate with their employer on health and safety matters. Various regulations, but especially the COSHH Regulations 2002 and the Management of Health and Safety at Work Regulations 1999, require that before any activity involving a hazardous procedure or harmful micro-organisms is carried out, or hazardous chemicals are used or made, the employer must provide a risk assessment. A useful summary of the requirements for risk assessment in school or college science can be found at

http://www.ase.org.uk/resources/health-and-safety-resources

For members, the CLEAPSS® guide, *Managing Risk Assessment in Science** offers detailed advice. Most education employers have adopted a range of nationally available publications as the basis for their Model Risk Assessments. Those commonly used include:

• *Safety in Science Education*, DfEE, 1996, HMSO, ISBN 0 11 270915 X.

> Now out of print but sections are available at

> http://www.ase.org.uk/resources/health-and-safety-resources;

• *Topics in Safety*, 3rd edition, 2001, ASE ISBN 0 86357 316 9;

• *Safeguards in the School Laboratory*, 11th edition, 2006, ASE ISBN 978 0 86357 408 5;

• CLEAPSS® *Hazcards*, 2007 edition and later updates*;

• CLEAPSS® *Laboratory Handbook**;

• *Hazardous Chemicals*, A Manual for Science Education, 1997, SSERC Limited

  ISBN 0 9531776 0 2.

Where an employer has adopted these or other publications as the basis of their model risk assessments, the teacher or lecturer responsible for overseeing the activity in the school or college then has to review them, to see if there is a need to modify or adapt them in some way to suit the particular conditions of the establishment.

Such adaptations might include a reduced scale of working, deciding that the fume cupboard provision is inadequate or the skills of the candidates are insufficient to attempt particular activities safely. The significant findings of such risk assessment should then be recorded, for example on schemes of work, published teachers' guides, work sheets, etc. There is no specific legal requirement that detailed risk assessment forms should be completed, although a few employers require this.

Where project work or individual investigations, sometimes linked to work-related activities, are included in specifications this may well lead to the use of novel procedures, chemicals or microorganisms, which are not covered by the employer's model risk assessments. The employer should have given guidance on how to proceed in such cases. Often, for members, it will involve contacting CLEAPSS® (or, in Scotland, SSERC).

*These, and other CLEAPSS® publications, are on the CLEAPSS website. Note that CLEAPSS® publications are only available to members. For more information about CLEAPSS - go to www.cleapss.org.uk. In Scotland, SSERC (www.sserc.org.uk) has a similar role to CLEAPSS®.

7   Data Presentation

These guidelines are adapted from the Institute of Biology publication: *Biological Nomenclature: Standard Terms and Expressions used in the Teaching of Biology.* (2000) Institute of Biology. Edited by Alan Cadogan.

Tables

The following guidelines should be followed when presenting results in tables.

- All raw data in a single table with ruled lines and border.

- Independent variable (IV) in the first column; dependent variable (DV) in columns to the right (for quantitative observations) OR descriptive comments in columns to the right (for qualitative observations).

- Processed data (e.g. means, rates, standard deviations) in columns to the far right.

- No calculations in the table, only calculated values.

- Each column headed with informative description (for qualitative data) or physical quantity and correct SI units (for quantitative data); units separated from physical quantity using either brackets or a solidus (slash).

- No units in the body of the table, only in the column headings.

- Raw data recorded to a number of decimal places and significant figures appropriate to the least accurate piece of equipment used to measure it.

- All raw data recorded to the same number of decimal places and significant figures.

- Processed data recorded to up to one decimal place more than the raw data.

Graphs

The following general guidelines should be followed when presenting data in graphs.

- The type of graph used (e.g. bar chart, histogram, line graph, pie chart or scattergram) should be appropriate to the data collected.

- The graph should be of an appropriate size to make good use of the paper.

- There should be an informative title.

Guidelines for specific types of graphs follow.

Bar charts and histograms

These are used when the dependent variable on the y-axis is discrete, i.e. whole numbers, fractions are impossible and the data under consideration deal with frequencies.

Bar charts

Bar charts are used when the independent variable is non-numerical, e.g. the number of different insect species found on trees. These data are discontinuous.

- They can be made up of lines, or blocks of equal width, which do not touch.

- The lines or blocks can be arranged in any order, but it can aid comparison if they are arranged in descending order of size.

- Each axis should be labelled clearly with an appropriate scale.

Histograms

These are used when the independent variable is numerical and the data are continuous. They are sometimes referred to as frequency diagrams.

- One axis, usually the x-axis, represents the independent variable and is continuous. It should be labelled clearly with an appropriate scale.

- The number of classes needs to be established. This will largely depend on the type and nature of the data. However, five times the log of the number of observations is one approach.

- The blocks should be drawn touching.

- The edges of the blocks should be labelled, so a block might be labelled '7' at the left and '8' at the right; this is expressed as a class range 7 - 8 units but it is implied that 7.0 is included in this range but 8.0 is not. 8.0 will be included in the next class range, 8 - 9.

- The other axis, conventionally the y-axis, represents the number or frequency, and should be labelled with an appropriate scale.

Pie charts

These can be used when displaying data that are proportions or percentages.

- Sector angles are calculated by dividing their percentage by 100 and multiplying the answer by 360° (if figures are proportions then just multiply by 360°).

- When comparing two or more pie charts, the sequence of segments should be the same.

- The size of the pie circle can be made proportional to the size of the sample.

- Pie charts should not contain more than 6 to 7 sectors, otherwise they become confusing.

- There should be segment labels or a key.

Line graphs

- Straight lines should join points. A smooth curve is only drawn if there is reason to believe that intermediate values fall on the curve.

- The independent variable should be plotted on the horizontal axis (x) and the dependent variable plotted on the vertical axis (y).

- Axis labels should be stated horizontally and in lower case, using SI units or in full.

- Axes should have an arrow end when there is no scale. If the origin (0,0) is not included in a printed graph, the axis should be broken.

- Points should be plotted with encircled dots (⊙) or saltire crosses (x). When multiple curves are being plotted, vertical crosses (+) can be employed.

- If a graph shows more than one curve, then each curve should be labelled to show what it represents.

Scattergrams

These are used when investigating the relationship between two variables of a sample or replicate and observations are in pairs. The data can then be used to establish if there is a relationship between the variables. The relationship can be a positive correlation, a negative correlation or no correlation at all.

- The two axes of the graph are marked out with appropriate scales.

- The two variables are plotted for each sample as a point so that each point on the graph represents an individual.

Annotations

- Whilst a label might be the name of a tissue, an annotation adds a descriptive quality such as shape, size or colour.

Drawings from a microscope

- Single, clear lines drawn with a sharp pencil.

- No shading or colour on the diagram.

- Informative title to be included.

- Scale included (e.g. high power, low power, x80, x10) to show approximate magnification.

- Low power tissue plans may not include cells.

- High power diagrams show a few adjacent cells only; adjacent cells must have complete lines.

- Cells or tissues should be in correct proportions.

- Label lines drawn in pencil using a ruler.

8   Command Words

Analyse   Separate information into components and identify their characteristics.
Annotate   To provide notes of explanation.
Apply   Put into effect in a recognised way.
Assess   Make an informed judgement.
Calculate   Generate a numerical answer, with working shown.
Comment   Present an informed opinion or infer points of interest relevant to the context of the question.
Compare   Identify similarities.
Complete   Write the information required.
Consider   Review and respond to information provided.
Contrast   Identify differences.
Deduce   Draw conclusions from information provided.
Define   Specify meaning of the word or term.
Demonstrate   Provide clear evidence.
Describe   Provide a detailed account (using diagrams/data from figures or tables where appropriate). The depth of the answer should be judged from the marks allocated for the question.
Determine   The quantity cannot be measured directly but can be obtained by calculation. A value can be obtained by following a specific procedure or substituting values into a formula.
Discuss   Give a detailed account that addresses a range of ideas and arguments.
Distinguish   Recognise and identify difference(s).
Draw   Produce a diagram or to infer.
Estimate   Assign an approximate value.
Evaluate   Judge from available evidence.
Examine   Investigate closely.
Explain   Set out reasons or purposes using biological background. The depth of treatment should be judged from the marks allocated for the question.
Identify   Recognise or select relevant characteristics.
Illustrate   Make clear by using examples or provide diagrams.
Interpret   Translate information provided.
Justify   Present a reasoned case.
Label   To indicate (by using a straight line).
List   Provide a number of points with no elaboration. If you are asked for two points then give only two!
Measure   Establish a value using a suitable measuring instrument.
Name   To provide appropriate word(s) or term(s).
Outline   Restrict the outline to essential detail only.
Plot   Mark out points on a graph or illustrate by use of a suitable graph.
Predict   Suggest possible outcome(s).
Recall   Repeat knowledge from prior learning.
Recognise   To identify.
Record   Report or note.
Relate   Make interconnections.
Sketch   Produce a simple, freehand drawing. A single clear sharp line should be used. In the context of a graph, the general shape of the curve would be sufficient.
State   Produce a concise answer with no supporting argument.
Suggest   Apply your biological knowledge and understanding to a situation which you may not have covered in the specification.
Summarise   Present main points in outline only.
Use   Apply the information provided or apply prior learning.

Additional Clarification:

How: Describe in what way or by what means……
What: Provide specific information……
Why: Explain the reason or purpose……

Accuracy: The accuracy of an observation, reading or measurement is the degree to which it approaches a notional 'true' value or outcome. For example: closeness to a line of best fit; accuracy of apparatus on percentage error.

Precision: The ability to be exact (degree of precision).

Reliability: The measure of confidence that can be placed in a set of observations or measurements. For example: confidence limits of statistical tests or concordance of repeats or standard deviation.

Validity: The implication that the outcome of an activity is not being distorted by extraneous factors.

9   Interchange Help Sheet

Questions and answers

Where can I get the Practical Skills Assessment Tasks?
The live Tasks must be downloaded from Interchange, OCR's secure web portal. Printed copies will not be sent to Centres. Do not confuse the live assessment Tasks on Interchange with the Specimen Assessment Materials (SAMs) on the public OCR website – the SAMs must not be used for live assessment.

What is the web address for Interchange?
https://interchange.ocr.org.uk (Note: do not add 'www.' before the word 'interchange'.)

How do I obtain a username and password to log in to Interchange?
If your Centre is not already registered to use Interchange, your Examinations Officer will need to follow the information about how to register given in the Appendices of the GCE specifications and in the subject specific Practical Skills Handbook. Once registered, your Examinations Officer (or whoever holds the role of 'Centre Administrator') must either set you up as a new user with the role of 'Science Coordinator' to allow you to download the Tasks, or (less preferably) assign the role of 'Science Coordinator' to themselves so that they can download the Tasks and pass them to you.

How does my Examinations Officer set me up as a new user with the role of 'Science Coordinator'?
Your Examinations Officer (or whoever holds the role of 'Centre Administrator') should follow these steps in Interchange:

1. Hover the mouse cursor over 'Admin' in the left-hand menu, and then select 'Manage centre users' from the pop-up menu that appears. A list of all current users at your Centre will be loaded.

2. Click the 'Add New User' link (above the list of current users).

3. Enter user details.

4. Select the 'Roles' tab.

5. Select the role of 'Science Co-ordinator' on the left-hand side of the screen.

6. Click the '>' button. The 'Science Co-ordinator' role moves across to the right-hand side of the screen.

7. Click the 'User' tab.

8. Click 'Add'.

You will receive notification on screen of whether the new user was added successfully or not. Errors are indicated by a red asterisk (*) and are detailed on screen. *Please note that it usually takes approximately 20 minutes for the new user to be able to access Interchange.*

After logging in to Interchange, where can I find the Tasks?
Hover the mouse cursor over 'Coursework and tests' in the left-hand menu, and then select 'Science co-ordinator materials' from the pop-up menu that appears. Near the top of the new page that opens click the 'GCE AS/A2' link. Finally, select the appropriate specification name.

I don't have the 'Coursework and tests' and/or 'Science co-ordinator materials' options in the left-hand menu…
You need to be given the role of 'Science Co-ordinator'. Your Examinations Officer (or whoever holds the role of 'Centre Administrator') must assign the role of 'Science Co-ordinator' to you, as follows: step 1 above, click on the relevant username, steps 4 – 7 above, then click 'Update').

When I click on the specification name nothing happens / I get an error message / I get a warning about blocked content…
When you click on a subject heading (or click on the 'More detail…' link to the right of the heading), the rest of the page should slide down to reveal the Tasks and other materials available to download for the specification you selected. This works using Javascript, so your browser may alert you to 'active content' or 'blocked content'. Please ensure that you select the appropriate option to allow all content to run. In Internet Explorer, the alert may appear as a pale yellow bar at the top of the page; you will need to click on the pale yellow bar and select 'Allow blocked content'.

Check also that Javascript is enabled in your browser. In Internet Explorer, go to the 'Tools' menu and select 'Internet Options'; select the 'Advanced' tab on the far right; scroll down the list of check boxes to the coffee cup icon next to the heading 'Java (Sun)'; ensure that the 'Use Java for <applet>' check box (or similar) is ticked; click the 'OK' button; close Internet Explorer and then re-open it and log back in to Interchange. You should only ever have to do this once, unless you move to a different computer.

How do I download the Task 'zip' files?
Click on the Task that you want to download. If you are prompted whether to 'Open' or 'Save' the file, select 'Save'. You will be prompted for a location to which to save the file - select an appropriate location on your hard drive or USB stick. It is your responsibility to keep the Tasks strictly confidential after download, so choose a location that only you have access to. Remember that Tasks can only be used for assessment in the period stated on the Task cover (e.g. between 1 June 2009 and 14 May 2010). For future sessions, new Tasks need to be downloaded from Interchange.

What is a 'zip' file? / How to I get the Tasks from the 'zip' file?
The 'zip' file for each Task is a single file that has several PDF documents compressed inside it, namely the candidates' Task sheet, the Instructions for Teachers and Technicians and the Mark Scheme, together with any additional files pertinent to the Task. You will need to extract the compressed PDF files before you can use them.

In Windows XP and Windows Vista you can look inside the 'zip' file by double-clicking it, or by right-clicking it and selecting 'Explore'; once inside the 'zip', click on the 'File' menu, and then select 'Extract all'. If you use an older version of Windows (e.g. 95, 98, 2000, ME, or NT) you will need to download and use third-party 'zip' extractor software such as WinZip or PKZip to extract the files.

Mac OS X version 10.3 ('Panther') and later releases have built-in support for 'zip' files. If you are using an older release, or if you experience difficulty extracting the PDF documents from the 'zip' file, try downloading and using third-party 'zip' extractor software such as StuffIt Expander to extract the files.

I get an error message saying that the 'zip' file is corrupt…
OCR has tested the files to ensure that they can all be downloaded successfully. If you are having problems with one of the files you have downloaded, delete the file and download it again or try downloading it on a different computer. Also check with your IT administrator to ensure that a virus scanner or firewall on your Centre's network is not disrupting the file.
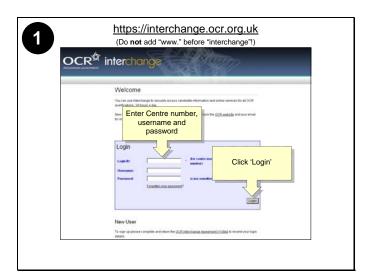
Some of the Tasks / Mark Schemes are missing…
Tasks for all GCE science specifications will be uploaded from 1st June each year. The previous year's Tasks will have been taken down during May, and must not be used for assessment in the current session. If all of the Tasks are not available the first time you log in, check back in subsequent weeks for the latest additions, or register for e-mail updates to be alerted when new Tasks are uploaded (see below). Mark Schemes for all of the Tasks will be uploaded from 1st September each year.

Do I have to keep logging in to Interchange to check for updates?
No. Just above the Tasks for each specification is a notice about 'e-mail updates'. To be notified by e-mail when changes are made to the Task pages, send an e-mail to GCEsciencetasks@ocr.org.uk including your name, Centre number and Centre name, and state the name of the specification(s) for which you wish to receive updates in the subject line.

Is there a way to see titles/summaries the Tasks without downloading them all?
The document called 'Getting Started' in the 'Support Materials' box on each specification page gives titles and summaries for all Tasks that are available for assessment in the current session. Click the 'Getting Started' link to download the document.

1

https://interchange.ocr.org.uk
(Do **not** add "www." before "interchange"!)

Enter Centre number, username and password

Click 'Login'

2

Hover mouse cursor over 'Coursework and tests'

3

Click 'Science co-ordinator materials'

4

Click 'GCE AS/A2'

5

Click specification name
or
click 'More detail'

6

'Getting Started' document gives titles and summaries of all Tasks for easy reference

Click to download it

Sign up to receive email updates whenever Tasks are uploaded or updated

Available Tasks appear here

Hover over a Task and a pop-up box will show the title of the Task

Click a Task to download it