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OCR
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A LEVEL

Monitors' report

SCIENCE

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Contents

Introduction

The current A Level specifications for Biology, Chemistry, Physics and Geology are intended to encourage the development of skills, knowledge and understanding in science through teaching and learning opportunities for regular hands-on practical work.

To gain a 'pass' in the practical endorsement candidates must carry out a minimum of 12 practical activities. Either our suggested activities or your own activities can be used. Candidates must also demonstrate routine and consistent competence in the requirements of the Common Practical Assessment Criteria (CPAC), in skills common to all sciences (1.2.1 in the specifications) and competence in apparatus and techniques specific to each science (1.2.2 in the specifications).

Candidates must keep an independent record of their practical work throughout the course. The assessment of the practical endorsement is carried out by teachers as they observe candidates carrying out practical activities. To evidence this, you must keep records of when practicals have been carried out and teachers' judgements on candidates' competence in the relevant skills, apparatus, and techniques.

Quality assurance of the practical endorsement is carried out by monitoring visits. Visits take place in two-year cycles; most individual centres receive a single monitoring visit for a single science subject during the two-year cycle. Exceptions are for large centres, defined as one with more than 140 A Level entries for any one of the A Level sciences, which receive monitoring visits for all sciences. Additionally, Geology visits are separate to those for Biology, Chemistry, and Physics, so centres delivering A Level Geology should expect a Geology monitoring visit once every cycle. If your centre is new to OCR you should notify us that you intend to make A Level entries so that a monitoring visit can be scheduled during the teaching of your first cohort.

Understanding monitoring visit cycles

Our blog explains how monitoring cycles work, when you can expect to receive a visit, and other frequently asked questions about the visits. Read it here: https://www.ocr.org.uk/blog/when-will-our-alevel-science-practical-endorsement-monitoring-take-place-understanding-the-monitoring-cycle/

Monitoring visits are intended to be supportive, helping you to deliver the practical endorsement effectively. They make sure that the CPAC are being correctly applied and that procedures and records are being maintained in order to meet the requirements of the practical endorsement.

All practical work carried out as a part of the programme of study is intended to be used as the basis for demonstration of the competences required, rather than the assessment being limited to discrete assessment opportunities. We encourage you to plan your programmes of work to integrate practical activities with the acquisition of knowledge and understanding across the course of study.

It is important that all teachers sign up to receive updates to ensure that they are kept informed about new information from us. There is also a link on the same page to professional development which highlights upcoming courses and free webinars. The resources to support teaching and assessment are now available via the Teach Cambridge website. You should have a log-in (available from your exams officer) and check that you are using the most recent versions of handbooks and PAG activities. There are on-going revisions made to some of these documents.

Further support

Further guidance, support, and resources for delivering the practical endorsement can be found on our Positive about Practical page.

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Overview

The delivery, assessment, and monitoring of the practical endorsement during the first year of the fifth cycle has enjoyed a greater period of stability in centres. Although some centres have found the echoes of the restrictions in place during the pandemic continue to resonate, the candidates' confidence and independence in carrying out practical activities has returned to pre-pandemic standards

In successful monitoring outcomes, the guidance provided by monitors for the centre to support good practice is often welcomed by centres, but it is important that this is implemented by the time of a subsequent visit where appropriate. For some centres, individual subject departments are not made aware of the advice provided by monitors to the other science subjects. The monitoring visit should be seen as a professional development support, and the main outcomes should be shared with other science subjects as part of internal standardisation.

Most centres demonstrated a good understanding of the Practical endorsement and its implementation, which resulted in a 'pass' outcome of monitoring. Only a minority of centres do not achieve this on the first visit. The advice provided by monitors enabled this to happen at a later stage for most centres in such a position. We commend these centres for their willingness to work with monitors to rectify any issues identified.

CPAC and Practical Skills

CPAC 1: follows written procedures.

As candidates progress through the course, it is expected that the amount of verbal guidance given in addition to the written procedures will decrease. Candidates may not demonstrate this competence at the start of the course, and this is not an issue if they can demonstrate it as they progress. The records of candidate achievement for the Practical Skill 1.2.1 (c) *follow written instructions* should reflect this.

CPAC 2: applies investigative approaches and methods when using instruments and equipment

There was often a lack of evidence of candidates having the opportunity to:

- choose the materials or amounts of materials to use;
- choose which variables to measure and which to control;
- choose suitable apparatus to select and to devise a procedure that is safe and appropriate;
- decide what measurements or observations to make and when to make them.

To incorporate this you can use practical activities which require candidates to make a justified choice of what to use from a selection of available equipment or materials. Candidates could select, for example:

- materials or quantities of materials;
- dependent and independent variables;
- types of apparatus and measuring instruments;
- types of measurements and the ranges of these.

This will help candidates develop evidence of achievement of 1.2.1 (a) (apply investigative approaches and methods to practical work) and 1.2.1 (g) (use appropriate software and tools to process data, carry out research and report findings).

CPAC 3: safely uses a range of practical equipment and materials

During the activity you record whether candidates have followed health and safety requirements and handled apparatus with due care and respect. This helps to confirm achievement in practical skills. Specifically, candidates should be able to:

- safely and correctly use a range of practical equipment and materials (as specified in 1.2.1 (b))
- use a wide range of experimental and practical instruments, equipment, and techniques appropriate to the knowledge and understanding included in the specification (as specified in 1.2.1 (j))
- apply appropriate methods and techniques when using apparatus during the specific activity (as specified in 1.2.2)

CPAC 4: makes and records observations.

Most but not all candidates made and retained contemporaneous records of their observations. In cases where it is necessary to work in groups, these should be changed round periodically. If candidates are working in groups, each candidate should manipulate the apparatus and use the instrumentation, making and recording observations for them to achieve practical skill 1.2.1 (d) make and record observations. There is still occasional inconsistency around the number of significant figures recorded, table construction and graphs and these should be addressed for candidates to achieve practical skills 1.2.1 (e) keep appropriate records of experimental activities and 1.2.1 (f) present information and data in a scientific way. Centres should follow the guidance in appendices 3, 4 and 5 of the updated OCR Practical Skills Handbooks, as well as the blog which provides further clarification on 1.2.1 (d) (e) and (f).

CPAC 5: researches, references and reports.

The use of correct citation continues to be a frequent issue. This can be addressed by teaching candidates to use an established referencing system (e.g. Harvard). Advice on this is given in Appendix 6 of the Practical Skills Handbooks.

Opportunities in the practical activities to research and reference were not always taken, by some centres. Where the opportunities had been taken, the consistency of approach was variable and candidates didn't always demonstrate the 1.2.1 (h) and 1.2.1 (i) skills routinely and consistently.

Lead teacher training

Overall, the requirement for the lead teachers to undertake the mandatory training is being met. Where the teaching of a subject is shared between members of staff, the individuals concerned could all undertake the training as a means of standardisation of teachers' assessment.

A Level Biology

Most centres are demonstrating a greater understanding of practical endorsement and of what is required and have procedures in place which are being refined to suit the needs of their centres. Many centres continue to deliver the practical endorsement using the OCR suggested activities and have integrated the practical activities in the subject content throughout the course. Centres are finding that the required amount of practical work can successfully be delivered within the available teaching time, although, where teaching time is less than five hours a week, there have been constraints. Centres limited to lessons of an hour or less, with no double lessons in the timetable, have also had difficulties completing some of the longer practical activities. In this instances it could be possible to split the PAGs into smaller activities to allow candidates to demonstrate specific skills each time.

Most teachers are aware that alternative practical activities can be used to assess competence and most centres include alternative practical activities to support the development of candidates' practical skills. Some centres continue only to record 12 OCR practical activities in the lab books, even when further practical work is being carried out, and are only using those practicals for the assessment of skills. This continues to contribute to a misunderstanding that the practical endorsement is achieved by 'passing PAGs' rather than demonstrating competence in a range of practical skills. Recording all practical activities in the lab books/folders is encouraged as these records can be used to show progression of skill development and may be mapped to the OCR practical skills learning outcomes and used for assessment. Extra practical activities can be easily mapped on the OCR flexible or portable PAG tracker. Many centres are now keeping records of achievement on the portable PAG tracker and finding it effective.

Candidates often have to carry out some practical activities in pairs or small groups due to limitations on resources and equipment. Most teachers and candidates are aware of the requirement for all candidates to be actively involved in all aspects of the practical work, and to record their own results. Individual working is preferable whenever feasible and, where working together is necessary, it is recommended that groupings are changed throughout the course.

Records of candidate achievement of skill criteria are generally being maintained appropriately. Despite this there are still instances when skills are recorded as achieved but not matched by the evidence in the learner records. Assessment of practical skills are often found to be too lenient, and skills are frequently recorded as achieved when the evidence does not match the criteria as specified in the Practical Skills Handbook (PSH). Skills should not be recorded as achieved unless the candidate's work fully meets all the standards as specified in section 6 of the updated PSH. Issues with the incorrect recording of achievement for skills were mainly in relation to biological drawings, investigative skills and referencing. Further guidance about the expected standards for these skill areas are available in the Biological Drawing Skills Booklet and the Practical Skills Handbook (Appendix 6 for referencing guidance).

Contemporaneous records in candidates' records

Candidate records of practical activities are usually being kept appropriately, most commonly in the form of lab books or folders. Records should be dated, and this is generally found to be the case. Some centres continue to expect candidates to write up neat versions of the records of their practical work, which is not required for the practical endorsement. Contemporaneous records of observations and results must be included in the learner records to achieve 1.2.1 (d), (e) and (f). The updated practical skills handbook offer further clarification on how to assess these skills (Blog: A Level science: updated practical skills handbooks).

Recording of results for qualitative tests in PAG 9 frequently lacked the required level of detail such as observations before and after, using appropriate scientific terminology, and an interpretation of the observations. Guidance on the expected standards is to be found in section 6 of the PSH.

Standardisation within the centre

All teachers involved in assessing skills for the practical endorsement must be familiar with the expected standards. In some centres there were inconsistencies in the interpretation of the standards and assessment decisions being made between Biology teachers delivering the practical endorsement.

It is important that assessment decisions are standardised and that all teachers involved are fully aware of the requirements of the practical endorsement. Some centres have addressed this very effectively by writing supporting documents for teachers. The documents outline exactly what the expectations are for candidates to be awarded competence for every practical skill in each activity. This has proved very helpful for teachers who are new to A Level teaching. Many centres also carry out standardisation activities where assessment decisions are reviewed by all teachers involved in making them.

Competency in CPAC 2 and CPAC 5

CPAC 2 and 5 require higher level skills that many candidates have found challenging. Competence in CPAC 2 requires making informed choices about apparatus, practical methods, and relevant data to record. For CPAC 2 candidates should be encouraged to provide evidence of their choices (i.e. why they chose specific apparatus). Many of the records related to the application of investigative skills lacked evidence such as the choices candidates made while developing their plans.

A lot of centres are now using extra 'standalone' activities to develop certain skills particularly for the higher level skills associated with CPAC 2 (1.2.1 (a)) and CPAC 5 (1.2.1(g), (h) and (i)). Activities include planning investigations that may not actually be carried out, evaluating methods, suggesting alternative methods and improvements, and alternative research tasks including referencing. A common reason for candidates not demonstrating competence in 1.2.1 (i) was through not citing references in their text and there being no indication of how their references had informed their work.

Biological drawing skills and graph plotting skills

Many centres provided candidates with alternative specimens to draw that are simpler that the suggested OCR PAG 1 activities. This has helped candidates to develop their biological drawing skills. Examples included kidney cross sections and cross sections of arteries and veins. Some centres have not provided candidates with opportunities to draw low power plans, which is a required skill. Suitable specimens for low power plans include cross sections of stems, roots, and leaves.

It is important to note that annotations and scale bars, are required for biological drawings and these are often not included in students' records. It is important to remember:

- Annotations are different from labels. Annotations may be a descriptive statement about the structure being labelled e.g. the colour a tissue has stained on a microscope slide, or they may be a statement of fact about a structure.
- All drawings should include a scale bar. This should be in addition to the magnification if the drawing is from a microscope.

The use of the learner checklists that are in the Biological Drawing Skills Handbook can be an effective way to support candidates in developing the skills required to correctly record and present observations and measurements in tables, graphs and drawings.

Another common issue was the drawing of lines of best fit on graphs. There were many instances where candidates had not chosen the most appropriate line to draw on their graphs, joining points dot to dot when lines of best fit would be most appropriate or opting incorrectly for free hand dot to dot lines when unsure. According to the maths skills handbook if there is a trend, a line (or curve) of best fit should be

drawn (the points plotted should not be connected). The best smooth line must be drawn that achieves a balance of points above and below the line.

Resources to support centres and students

More centres are routinely recording achievement of skills in feedback to candidates which is recorded in their lab books. This is often in the form of skills tick tables. Candidates and teachers have both found this effective in terms of providing efficient, targeted feedback to support progression, and keeping candidates informed about their progress towards achieving the practical endorsement. These are now included on the new updated OCR instruction sheets for practical activities PAG 1.1, PAG 4.1 and PAG 5.1 which are available on Teach Cambridge. The new sheets have a different format and include a different style of questioning that is designed to further support candidates' understanding of practical procedures. Many teachers have reported finding the new format effective and found applying this style of questioning to other practical activities effective, particularly in developing investigative approaches.

Alternative approach for PAG 10

The majority of centres are using PAG 10.1 activity to demonstrate competence in skill 1.2.1 (g) (use of software) which also provides an opportunity to demonstrate 1.2.2 (l) (computer modelling or data logging). We are aware that RasMol can no longer work with the most recent Windows versions and Chromebooks. Many centres are using alternative programmes to Rasmol, of which there are a number available including mol* and Jalview.

Because of the flexible approach to practical endorsement, you have the flexibility to complete other practical activities other than the ones suggested by OCR or adapt our current PAG 10 activities. If you are using one of our PAG trackers you can add this as an additional practical activity and match it to the 1.2.1 and 1.2.2 skills.

OCR has published a blog with an alternative PAG 10 that centres can use. The blog was written by a teacher who used an alternative platform for PAG 10. Within the blog you can find the adapted practical activities for PAG 10. Other resources that can be used are also available by the University of Dundee, where a different platform is used.

Some centres are also providing effective further opportunities to use software (practical skill 1.2.1 (l)) to analyse and process data in graph plotting and formatting spreadsheets for statistical tests.

A Level Chemistry

Many more centres this year have started to incorporate individual laboratory working wherever possible and are finding this makes the assessment of candidate competence in the 1.2.1 skills easier to carry out. Teachers are becoming more confident at judging these skills contemporaneously rather than waiting to gather in completed sets of books and this saves valuable teacher time. Where pairs are needed, it is recommended these are changed regularly to avoid dependencies developing.

As last year, lots of centres are finding that laboratory books, rather than loose leaf files, are easier for storing candidate records because candidates cannot make rough notes and then 'copy up' so easily and/or lose sheets.

Some centres have struggled to recruit and retain chemistry technicians. We can only sympathise with this problem and thank teachers who are working as technicians as well as teachers to ensure their candidates can complete the practical endorsement under these far from ideal circumstances.

Using the trackers

Most centres are now using the portable tracker, finding it meets their needs satisfactorily and is quicker to load than the flexible or fixed trackers as well as working in Google classroom and other such platforms.

It has been good to see more centres confidently adding to their trackers their own short or longer assessments to enhance their candidates' practical skills. These have included innovative whole experiments which teachers have expertly mapped to the assessment criteria as well as simple research exercises to underline teaching points from a practical standpoint.

Standardising approach

Those teachers who are clear about what they are expecting to see from their candidates in order for them to achieve a particular skill are much better placed to guide their candidates to meet the assessment criteria. Best practice seen has included teachers showing, very briefly at the start of a session, what a 'good' record might look like and contrasting this with a 'poorer' version, along with highlighting the skills to be assessed during the practical. It is worth noting that the teacher versions of our suggested practicals all have an 'expected results' table/record for reference included and these are excellent guides for the standard teachers might want to guide candidates towards achieving. Large centres were often seen to include a crib sheet for teachers so that everyone knew what to look for in assessing candidates' work, thus aiding standardisation across the department. This was particularly helpful in the induction of new members of staff.

Assessing 1.2.1 (a)

In relation to skill 1.2.1 (a), in some of the PAGs 9-11 where candidates are required to make choices about variables, apparatus, and modifications to procedures, they should record their choices in some way as evidence of this skill. It is always difficult to find this during monitoring visits. We suggest considering how you will encourage candidates to do this before starting these practical activities and ensuring that choices/decisions are being made by individual candidates and can be justified on paper.

In general, centres are becoming more rigorous in their assessment of skill 1.2.1 (a) in PAGs 4.3 and 7.3 for example. Many centres are now choosing these two practicals in place of or as well as 4.1 and 7.1 as they offer more challenge and offer another chance to assess skill 1.2.1 (a). A good strap line seen in use was 'could my Granny follow your plan to identify these solutions?'. Some candidates give vague instructions with, for example, insufficient detail about the relative quantities of the test reagent and solution which is crucial to the result.

Some centres are finding they are having to use some standalone or 'one off' activities to complete their assessment of 1.2.1 (a) for candidates who have not achieved this skill routinely and consistently. These activities are easily concocted from past paper questions and quickly done outside the laboratory and can be inserted into the portable tracker as the extra evidence required.

PAG 12 approaches

A number of centres are no longer using PAG 12.1 to assess skill 1.2.1 (a) as candidates are simply copying plans they have found on the internet. It is still, however, useful for research, referencing and the titration itself. Some centres have found it difficult to get hold of iron tablets. It is possible to give candidates a solution of iron(II) if this is a problem and omit the crushing of the tablets and filtration. The poor solubility of the iron tablets and the time needed for filtration has been a problem but the insoluble particles do not hinder the titration so the filtration stage can be omitted to save time.

Relatedly, many centres have yet to develop a suitable level of rigour in assessing qualitative recording (1.2.1 (d)) as candidates do not include sufficient detail such as 'before and after' and both colour and state of what is seen. In general, centres are securely assessing candidates' quantitative observations for skills 1.2.1 (d), (e) and (f).

Approaches to using software packages to process data

For skill 1.2.1 (g) (use of appropriate software and tools to process data) in PAGs 9, 10 and some 11s, monitors have found some candidates produce graphs which lack titles, labelled axes, are too small to read, have a 'dot to dot' best fit and where the line does not go through the origin when it should. We suggest that in these cases, the awarding of the skill be withheld, and candidates encouraged to re-do the exercise. The consensus is that best fit lines are probably best drawn by hand.

Best practice in these PAGs is to have a device in the laboratory, if possible, and construct the spreadsheet during the practical to enter the data straight into this. In any event, the spreadsheet should be included in the candidate record along with the graph and follow the same conventions as any table as per Appendix 5 in the Practical Skills Handbook. Candidates may need to be taught how to format cells in the spreadsheet with superscripts, powers of ten and suchlike as well as how to get the software to draw the graph.

A common approach to the use of software packages across all the sciences means that a useful video/booklet could be produced by a centre for the use of all A Level science candidates for reference purposes, saving time for all subjects. The teacher versions of these PAGs have sets of data included which can be given to candidates who may need a further attempt at producing a spreadsheet and graph which meet the more aspirational standards referred to above.

Apparatus limitations in PAGs 5 and 6

In the activities for PAGs 5 and 6 many centres are limited by either the number of sets of Quickfit/similar apparatus and/or the number of sinks in their laboratories, which means larger group sizes for these activities are necessary. Possible solutions include splitting the group in two and sending half the class away to do another non-practical task or borrowing Quickfit/similar apparatus from another centre. Appendix 2 of the Practical Skills Handbook lists the apparatus required for candidates to be able to carry out individual practical activities for the practical endorsement and these should be available to the candidates.

Some centres find that PAG 6.1 takes several lessons to complete, especially if the lesson times are short. There is no 'quick fix' to this problem other than to, as with any practical, try it out beforehand and note any shortcuts/stopping points which can be made in advance of the candidates doing the practical themselves.

Referencing and risk assessments

It is recommended that extracts of Appendix 6 from the latest version of the Practical Skills Handbook be given to candidates to help them with citing references. Some candidates do not achieve skill 1.2.1 (i) because they omit the date of access and/or do not use a citation **system** of some kind. Books should be used as well as the internet for reference purposes. It would be good to see more centres using skills 1.2.1 (h) and (i) for researching information other than just for assessing risks. Opportunities exist for finding out information in PAGs 4.3, 7.2, 7.3, and the Rf values and melting points in the PAG 6s, for example.

Risk assessments are required for PAGs in groups 5, 6 and 12, unless you choose to use the versions which provide these, in which case 1.2.1 (b) needs to be un-mapped from the tracker. Normally, this skill is awarded simply for working safely in the laboratory but for PAGs 5, 6 and 12, where a risk assessment is required of candidates, unless you provide this opportunity the skill should be withheld.

A Level Geology

In general, there has been an ongoing improvement noted by monitors in the recording of data and drawing of geological diagrams. They have also reported that most centres are including more practical activities than previously in their programmes. In most centres, record-keeping has improved and there have been fewer instances where the assessment of the monitor is not in agreement with that of the teacher.

Many centres are using residential fieldwork to develop the field based practical skills. Most centres are offering candidates more than the minimum 4 days of fieldwork, whether local or residential. For some schools, cost is a factor in deciding to complete the fieldwork locally. In all cases, candidates have been offered appropriate access to fieldwork. Speaking to candidates during visits, this is often the highlight of their course and a factor in informing their choice of subjects for higher education.

Most candidates now record data in line with guidance in Appendices 3 to 6 of the Practical Skills Handbook. Instruments are routinely read to an appropriate resolution and recorded in tables with attention to units, decimal places and appropriate layout. The candidates who achieved well showed secure data recording with due attention to scientific vocabulary, use of SI units and attention to decimal places and resolution. They were expected to adhere to conventions such as the requirements for proper presentation of tables and citation of references (Appendix 5 and 6 respectively of the Practical Skills Handbook) and systematic presentation of drawings (page 4 of the Drawing Skills Handbook). They also showed higher order skills of software use, investigations, research and referencing from the beginning of Year 12.

It is important that teachers check Teach Cambridge for updates. Some PAG activities and the Practical Skills Handbook have been revised, with particular emphasis on revised wording for clarity in the assessment of skills 1.2.1 (d), (e), and (f). It is important that centres are using these updated documents for assessment.

OCR support

Our new portable tracker is now available, though the previous versions of the tracker may still be used. The portable tracker has the advantage of working well on shared drives.

Drawing skills

There continue to be some issues with drawings but in most centres this has seen significant improvement. Most candidates follow most of the conventions outlined on page 4 of the Practical Skills Handbook.

OCR support

Our Drawing Skills Handbook provides the conventions that all candidate drawings should follow. Outlines should be continuous and fine, with no shading. Labels should present observations rather than inferences, so that any inferences may be checked e.g. 'pink crystal' (an observation) rather than 'feldspar' (an inference)

Use of software

Centres are increasingly willing to engage with software and are routinely using geological databases to collect data.

Software use is assessed in terms of data processing. Copying and pasting information from a website does not meet the requirements of skill 1.2.1 (g). To meet this skill they need to use software to process data, for example generating spreadsheets and graphs from data found on a geological database. PAG

2.1 gives scope to evidence this skill. All tables and graphs produced using software should have the same attention to headings, units, decimal places, labels on axes, plotting and presentation as would be expected in hand-written work. See Appendix 6 of the practical skills handbook.

PAG 12

PAG 12 is intended to showcase higher order skills developed throughout Year 13. Some centres have produced excellent examples. Best examples usually start with a question which asks candidates to compare and contrast or process data in order to reach a conclusion. 'Why is X the best place to cite a wind turbine rather than site Y' or 'Why is geology of site X different to site Y'. Best examples present data and process it to draw attention to conclusions based on geological data.

'Topics' with titles such as 'fossils' are not appropriate and do not offer opportunities to evidence higher order skills. A 'copy and paste' of factual information in a 'topic' format is too low demand for an A Level course Some centres have developed more challenging activities for PAG 12 after monitors advised that evidence for this PAG group was previously not always sufficiently demanding to showcase the candidates' skills in investigation, research, referencing, data processing and use of software.

All research needs to be appropriately cited, ideally using a system such as Vancouver or Harvard (see Appendix 6 of the Practical Skills Handbook). In common with other higher order skills, opportunities to do 'mini-tasks' to support the development of these skills throughout Year 13 can be helpful. Many centres leave this entirely to PAG 12, which means that they do not have 'routine and consistent' evidence.

Developing higher order skills

Monitors frequently report that centres visited in term 2 of Year 13 often do not yet have any evidence for higher order skills (use of software, planning investigations, research, and citation of references). In some cases, achievement is nevertheless entered as 'achieved' on the trackers, leading to insecure recording of progress. It is essential that opportunities to evidence investigative work, use of software to process data, research and referencing are offered to candidates throughout Year 13 and assessed securely.

Higher order skills should be developed throughout Year 13 and, if fieldwork is conducted in Year 12, this should include some opportunities to assess investigative skills in line with the guidance in the Practical Skills Handbook, section 6. This should include candidates making their own choices of procedures, perhaps by developing their own approach to representative sampling. It is common for monitors to find no evidence of this skill, even late in Year 13.

Assessment for learning

During lessons, there should be opportunities for 'mini-tasks' to develop investigation planning skills throughout Year 13, for example by noting any modifications they made to the PAG activity procedures to improve the quality of the data they collect or by including some notes of independent planning or sampling procedures.

The development of skills is intended to lead towards more investigative and less scaffolded activities through the course. Some centres adapt the OCR PAG activities, often with the intention of making them more accessible. It is perfectly acceptable to do this, but teachers need to ensure that the demand of adapted activities continues to meet the A Level standard set out in Appendices 3 to 6 of the Practical Skills Handbook, and further ensures the development of higher order skills in increasingly unscaffolded and investigative activities. Many of the centre generated activities are too low demand for candidates to securely demonstrate the required skills.

A Level Physics

Teachers of A Level Physics are generally found to be committed to the use of practical activity during their teaching of the subject as an aid to candidates' engagement and understanding of Physics. The teachers felt that the developmental approach of the practical endorsement was beneficial to the candidates and enhanced their enjoyment of the subject while being an effective aid to teaching and learning.

Most centres made full use of our suggested activities to effectively cover the Common Practical Assessment Criteria (CPAC), the associated practical skills and the Use of Apparatus and Techniques (sections 1.2.1 and 1.2.2 of the specification respectively). Some centres have included extra tasks on the OCR Student activity sheets to increase the opportunities for candidates to provide evidence for particular skills. For example, extra tasks to compare their experimental results with accepted values for research and citation (practical skills 1.2.1(h), 1.2.1(i) and CPAC 5).

A small number of centres are using materials other than those provided by OCR. Some of these materials do not map closely or do not map at all to the practical skills 1.2.1, use of apparatus and techniques 1.2.2 and the CPAC targeted by the OCR activities. Centres need to make sure that their teacher records accurately reflect the skills and CPAC targeted (or otherwise) by the activities and candidates' achievements of these.

Resources to support centres and students

In general, Physics departments have sufficient laboratory resources and effective technician support to deliver the requirements of the practical activity. Centres need to make sure they have sufficient resources to meet the requirements, particularly for 1.2.2 (h) *use of a signal generator and oscilloscope, including volts/division and time-base;* 1.2.2 (i) *generating and measuring waves, using microphone and loudspeaker, or ripple tank, or vibration transducer, or microwave/radio wave source*.

OCR support

For guidance on resources, teachers and technicians should refer to the OCR Practical Skills handbook: Physics, Appendix 2: 'Apparatus list'. This appendix lists the apparatus likely to be required to complete a practical scheme of work that covers all requirements of the qualification.

When Physics teachers are using an OCR-devised practical activity for the first time, it is strongly recommended that the teachers with, if possible, the laboratory technician carry out the activity separately beforehand to confirm that the apparatus and experimental conditions will allow candidates to carry out the activity to achieve a useful set of results.

PAG7 – Investigating ionising radiation

A number of centres are insufficiently resourced to address the mandatory element 1.2.2(l) *using ionising radiation, including detectors* and the associated activities of PAG 7. Centres must ensure that arrangements allow candidates to gain experience of these apparatus and techniques. Guidance on safety and procedures from CLEAPSS is available for members. Centres without existing resources could, for example, contact the outreach team of a university local to the centre to seek a suitable opportunity for an appropriate activity.

Applying investigative approaches and methods

CPAC 2: 'Applies investigative approaches and methods when using apparatus and equipment' requires candidates to identify and explain the principles behind a suitable technique to carry out an activity in which, for example, they choose:

- the materials, or amounts of materials, to use – activities 11.1, 11.2
- which variables to measure and which to control – activities 10.1, 10.3, 11.2, 11.3
- what measurements or observations to make, when to make these and the size of the intervals between them - activities 3.2, 3.3, 9.1, 9.2, 10.1, 10.3
- the apparatus to complete a procedure that is safe and appropriate – activities - 8.3, 9.1, 11.1, 11.2.

Applying investigative approaches should include completing tasks that do not include complete step-by-step instructions, such as those found in Physics textbooks. However, activities may still be structured in some form. For example:

- providing a basic method, with candidates asked to modify this to measure the effect of changing a certain variable – activities 4.1, 6.3, 8.4, 9.3, 10.2
- providing a limited range of equipment, with candidates asked to think about how they can use what they have been given to solve a practical problem – activities 8.3, 11.1, 11.3
- providing a certain amount of information, allowing candidates to consider – activities 9.2, 10.1, 10.2, 10.3.

Safe use of practical equipment and materials

For CPAC 3'Safely uses a range of practical equipment and materials', although not a mandatory requirement, it would be instructive for candidates to carry out a risk assessment for more potentially hazardous activities such as when using a laser or when using radioactive isotopes.

Making records and observations

When confirming achievement of CPAC 4: 'Makes and records observations', teachers should be mindful that the standards for 1.2.1(d) *make and record observations and measurements*; 1.2.1(e) *keep appropriate records of experimental activities* and 1.2.1(f) *present information and data in a scientific way* must be met. Candidates need to be mindful of the need for clear presentation of results recorded in a manner that follows convention:

- the resolution of the measuring instruments being used must be reflected in the number of significant figures recorded and these must be consistent,
- graphs should have an informative title
- the scales on graphs should be linear and allow for ease of interpolation of values.

To consolidate evidence for 1.2.2(c) *Use methods to improve accuracy of measurements,* candidates should note how they have done this as part of their records for their activities to contribute towards exam preparation.

OCR support

To support their candidates in the presentation of their evidence and records of their activities, Physics teachers could usefully issue the appendices from the OCR Practical skills handbook: Physics during their induction, to be retained for the duration of the course.

Researching, referencing and reporting

For CPAC 5: 'Researches, references and reports', although the selected activity from PAG 12 provides the most opportunity for candidates to address this, further opportunities could be provided by introducing additional tasks on the learner instructions for an activity to compare values obtained during an activity with accepted values.

Assessment for learning

It might be helpful, for university progression, if an opportunity can be created for candidates to process data using spreadsheets. For example, the PAG activity 9.1 *Investigating charging and discharging capacitors* would provide a sufficiently large data set to make this worthwhile. Alternatively, the data collected by all of the groups in the whole class for an activity could also be collated and processed via spreadsheets. When using spreadsheets, candidates will need to be reminded to format the data for consistent numbers of significant figures and to ensure that any graphs produced are to the required standards to those produced by hand.

Common areas for improvement

The plan of practical activities to be undertaken, and when

You must keep a written record of plans to carry out sufficient practical activities which meet the requirements of the CPAC, incorporating the skills and techniques detailed in the A Level Sciences specifications - sections 1.2.1 and 1.2.2. Several centres lacked clear plans of when they plan to carry out sufficient practical activities to meet the requirements of CPAC and which particular practical activities were to be used. In this cases, if a centre demonstrated through the teachers' and candidates' records that sufficient practical activities had been undertaken, this issue was mitigated by the centre providing plans immediately following the visit, prior to the submission of the monitor's report. It is important to remember that where the plan is not followed, for example if planned activities do not take place when expected, to revise the plan so that the activities planned, and the activities completed on the PAG tracker are in agreement. It is important to ensure that all groups complete all activities during their course.

Applying the standards

The practical endorsement involves the direct observation and assessment of practical skills. It is important that assessment by teachers of the practical skills 1.2.1(b), (c), (d) and (j), and the use of apparatus and techniques in 1.2.2 is contemporaneous. Candidate records should include primary data on which the assessment is based.

We observed many examples of good practice, with many centres adopting systems for recording assessments during practical lessons, often involving the OCR tick sheets that are also being used to provide feedback to the candidates.

In some centres, candidates were inconsistent with the number of significant figures they recorded data to during practical work across the sciences. Teachers are encouraged to refer to the Practical Skills Handbooks and look carefully at the appendices. Appendices 3 – 6 (or key excerpts) can be shared with candidates. It is vital that teachers have a clear understanding of the standards of the evidence required to satisfy the practical skills as exemplified in 'Section 6: Guidance on practical skills' of the handbook. This also useful for the candidates as it will help them with questions relating to practical activities in the written examination papers.

Different teachers at the same centre sometimes applied standards differently. It is important that the standards are shared by all teachers with responsibility for carrying out practical activities which are used for the practical endorsement. In these cases, it is recommended that as part of staff development some form of standardisation of assessment is carried out.

Tracking candidates' progress

We have continued to develop our practical endorsement trackers, and a "portable" version with greater ease of access and portability is available from Teach Cambridge for biology, chemistry, physics, and geology. This tracker is more readily shared and supported on different applications such as Google Sheets, OneDrive etc.

There is no requirement to use an OCR tracker to record achievement and a minority of centres are using their own systems. Many of the bespoke trackers were elegantly fit for purpose. They demonstrated evidence of the development of candidates' skills and competencies over time. The design of some did not allow monitors to see which criteria had been 'assessed' or which candidates had achieved these during practical activities. Others did not indicate when candidates had demonstrated competence in certain skills, which is a requirement for the assessment of achievement of the CPAC.

A problem was presented when centres recorded solely the assessment of CPAC rather than at the granular level of the individual skills in 1.2.1. In many cases these centres were actually assessing the 1.2.1 skills, as evidenced on the annotation of learner work, and simply had to change their methods of recording achievement.

A number of centres used some or all their own centre-devised practical activities to show the required skills and competencies but did not map these correctly to the criteria. Many centres have only recorded the minimum number of practical activities in their trackers. While this is sufficient for the requirements of the practical endorsement, recording additional practical activities in the tracker may provide further evidence for the development of skills. Centres are encouraged to include assessment records of their own centre-devised practical activities, where these are used.

Candidates' Practical Records

Most candidates keep records of practical activities in lab books or folders. Some centres found that folders meant that some work was lost whereas this did not happen when lab books were used. If you choose to purchase published practical endorsement worksheets/workbooks, you must evaluate the mapping in these resources carefully and amend when necessary. Some aspects of activities, such as the provision of pre-prepared results tables, are too scaffolded to allow the awarding of some of the skills required for the practical endorsement.

Increasingly, centres are using or encouraging the use of electronic or online storage of candidates' work. In many cases the evidence of candidates' achievements and the corresponding teachers' records of these were readily available and easily accessed. In a few cases though the quality of the scanning of candidates' work made it difficult for teachers to properly assess the evidence and for monitors to confirm that standards had been met.

Practical activities recorded in the candidate lab records and the records of achievement generally correlated well, although there are still a significant number of instances where the record of skills being achieved does not match the evidence in the lab books. It is essential that there is clear match between the candidate's work and the assessment criteria. Use of the blank or 'not achieved' status where the evidence does not fully meet all aspects of a particular skill is required.

Candidates generally were made aware of the skills that are being assessed in each practical activity and whether or not they have achieved them. These are specified in the teacher and technician guidance document for each activity, and they could simply be copied and directly pasted into the candidate instructions document. This would also have the benefit of providing teachers with a checklist during activities. Some candidates were not aware of what they had to do to meet the criteria for some skills, so centres should make sure this is clear before activities take place.

Many centres provide tracking sheets that list which practical activities will be carried out over the course or allow candidates to record the practical activities as they are carried out. These can act as a useful index for the lab records and are often cross-referenced to skills that may be assessed. Most centres are endeavouring to make sure candidates date the work in their lab records.

A very small number of centres were unable to supply an adequate number of candidate practical records. Additionally, some of the records examined by monitors were incomplete and/or did not show the evidence required. It is essential that candidate records are available during monitoring visits, and that they are dated and include primary data.

Centres' practical records

You must have an accurate record of candidates' CPAC competencies for each practical activity, including demonstrating competence in all the skills, apparatus, and techniques in sections 1.2.1 and 1.2.2 of the specification. Candidates' skills and competencies which are directly assessed should be monitored during each activity. A record of the criteria 'achieved'/'not achieved' ('Y' or blank) should be made during or shortly after the activity.

Some centres using the 'fixed' and 'flexible' versions of the OCR PAG tracker left this to default to show 'achieved' when recording candidates' attendance, or on the portable tracker inserted a 'Y', even when candidates clearly did not adequately demonstrate competence. Centres must make sure that any competencies not demonstrated, or which were not required of the candidate are changed to 'not achieved' or deleted/unmapped on the tracker.

It is possible to correct a candidate who does not meet a particular required standard at the start of the activity and to subsequently observe that they become reliably competent during the remainder of the activity. The candidate can then be confirmed to have achieved that skill or competency.

Second visits

A monitor re-visiting a centre after an unsatisfactory first visit will be expecting the centre to act upon all the points highlighted in the guidance of the first report upon before the return visit (second visit). This is important and will help the centre achieve a 'pass' outcome in the second visit. On some occasions, monitors have found that the guidance has not been followed and this has led to a third visit. If a centre requires a third visit then all the other science subjects in the centre have to undergo a monitoring visit as well.

Routine and consistent

It is important to remember that practical skills need to be demonstrated 'routinely and consistently'. The less frequently assessed skills as seen in centres were 1.2.1 (a), (g), (h) and (i). If you only **plan** to assess these twice and a candidate does not achieve on one or both occasions, then you have to provide other opportunities for the candidate to achieve them again. It is best practice to plan to assess these skills at least three times throughout the course, and starting in Year 12, so candidates have plenty of time and opportunity to demonstrate their routine and consistent competence of these higher order skills.

Common questions

Can skills only be assessed in OCR suggested practical activities?

It is not mandatory to use our suggested practical activities. You can use any practical activities that provide candidates with opportunities to demonstrate all the required skills and competencies. There is also no requirement to complete all of our suggested practical activities as part of your delivery of the practical endorsement as long as all the required apparatus and techniques are assessed as listed under 1.2.2.

If our suggested practical activities are not used for assessment, it is the teacher's responsibility to make sure that the activities give full opportunities for candidates to demonstrate skills. Furthermore, it is the teacher's responsibility to make sure that assessed criteria entered on the PAG tracker are in full alignment with guidance in the Practical Skills Handbook. Teachers need to check the skills entered, even if the practical activity has come from a reputable published source.

Any practical work done with candidates can be counted towards their progress in the practical endorsement. Any practical activities done in addition to our suggested practical activities can be mapped to the criteria as listed under 1.2.1 and 1.2.2. This can be easily done using the flexible or portable trackers. The mapping of our activities can also be edited if you do not want to assess all the suggested skills in a particular activity.

Practical activities from other organisations can be used but the mapping of these should be carefully checked before use and adjustments made if necessary.

Can the published lab books for the OCR practical endorsement be used in place of the OCR suggested activities?

Activities from these books can be used but it should be noted that these lab books are not endorsed by us and there are caveats to their use.

Some published lab books overly scaffold the provided activities, for example providing candidates with pre-prepared tables, which prohibits candidates from independently demonstrating competence in some aspects of the endorsement. The mapping provided in the published lab books needs to be carefully evaluated and modified if necessary to make sure it is in line with the requirement for the skills as specified under 1.2.1 and 1.2.2 in the Practical Skills Handbook.

How do I measure the students' level of competence?

The teacher must be confident in the ability of their students to successfully complete a practical activity and meet the minimum requirements as stated in the Common Practical Assessment Criteria (CPAC). Our suggested practical activities are already mapped to the appropriate skills, techniques and apparatus and hence allow teachers to easily identify students who are routinely and consistently displaying those skills. This is easily achieved through the use of one of our PAG trackers to log student activities.

Appendix 3 to appendix 6 of the practical skills handbook for each science includes suggestions about how this process of skills development can be managed. They provide guidance which teachers can use to assist how they teach the required skills, as well as things to look out for in assessing whether students are performing the skills competently. However, they are not intended as a 'mark scheme', or statement of the minimum standard required for a pass in individual activities.

The cross-board working group developed a series of pen portraits, which are used as the basis for the on-line training. These CPAC pen portraits are available on the OCR Science positive about practical page. A separate document on making the final judgement as to whether a student should pass or be not-classified is also available on the positive-about-practical page.

If a candidate has fully completed the Practical Activity and handed in all extension questions, does this automatically mean full achievement?

In most cases, the extension questions are designed to support candidates towards preparing for the practical questions which appear on the final examination. They do not 'count' towards the assessment of the practical skills and should be ignored when entering achievement on the PAG tracker. The achievement on the PAG tracker should reflect only their practical skills during the practical session and associated work such as data presentation and processing.

Individual skills should only be recorded as achieved when candidates demonstrate competence in all aspects of the skill, to the standards specified in section 6 of the PSH.

Each skill is assessed separately and it is possible for candidates to demonstrate competence in some skills but not others in a particular activity. Not achieving one or more skills in a particular activity does not mean a practical activity has been 'failed' and that the whole activity needs to be done again. Only skills that have not been achieved need to be addressed again and this can be done in further practical activities. Assessment is of individual skills not complete practical activities.

How can skills be accurately assessed during a practical?

Achievement is not automatic on completing activities and some assessments will need to be made during the practical activity. It is expected that candidates will show progression in their skill acquisition over the two-year course, so not achieving skills in earlier practical work is not a problem.

Some skills are assessed very frequently during the course of the practical endorsement (for example, following written instructions). You don't need to assess every skill on every occasion, and it can be beneficial to concentrate on fewer skills, particularly if they are skills that candidates have less opportunity to practice. The tracker should be adjusted to reflect the skills that are being assessed. This can help with judgement of competence in larger classes.

Can candidates demonstrate competence in practical skills when working in groups?

Whenever possible candidates should work individually. However, if it is necessary for candidates to work in groups, e.g., as a result of limited of equipment, all candidates must make and record observations. All members of the group must be actively involved and have the opportunity to carry out all the required techniques and use all the apparatus. Groups should be changed regularly during the course and should be as small as possible.

Do I have to mark students' work?

No. There is no requirement for students' work to be marked, and there are no mark schemes for the PAG activities we provide.

Teachers may wish to mark students' work in the context of providing feedback, or to comply with the centre's own marking policies. That is fine, but it is a centre decision to do so.

Can candidates make corrections to written work to achieve skills*?*

Skills should only be assessed as having been achieved when the candidate is able to demonstrate competence independently by meeting the standards as specified in Appendix 3 of the Practical Skills

Handbook. This will not have been demonstrated if the required standard is only met as a result of being directed towards the required corrections. This would be helpful in supporting skill development but, if a candidate has not met the standard, they will need to be provided with another opportunity to demonstrate competence in that skill area.

What evidence must the centre submit to OCR?

The centre visit by the visiting monitor is the only quality assurance conducted. You do not need to send any evidence of students' work or detail of your assessment to us. At the end of the A Level course the Lead teacher for each science will have to specify a 'Pass' or 'Not-classified' for their students. These judgements will be based on the record of the on-going judgements made by the teachers against the assessment criteria either in paper format or through the use of the PAG tracker, which is designed to help with this process.

In addition, your head of centre is required to provide a written practical science statement; this is done using the NEA centre declaration form which can be downloaded from any of the OCR Science qualification pages. By signing the NEA centre declaration your centre is confirming that reasonable opportunities have been provided to all students, being submitted for entry in that year for assessment, to undertake at least 12 appropriate practical activities. A digital copy of this form is emailed to centre.auth@ocr.org.uk by 15 May in the year of entry. Failure to provide a written practical science statement may lead to an investigation into suspected malpractice. For further support on NEA submission please use our website.

How do I know when my centre will receive a monitoring visit?

Each centre receives one monitoring visit for one science (Biology, Chemistry or Physics) in each two-year monitoring cycle. (Large centres, who have more than 140 students for any one science, will receive visits in that period for all sciences). Where a centre offers Geology there will be a separate Geology monitoring visit in each cycle. To find out more about how the monitoring cycles work please read our blog.

Examinations officers at centres receiving a monitoring visit in the two-year monitoring cycle will be contacted by one of our monitors directly anytime during the two-year cycle to arrange a visit. If you have received a monitoring visit in for any science in either the first or the second year of the current two-year cycle then this means that your next monitoring visit will be taking place in the next two-year monitoring cycle. If you have neither been visited nor contacted in the current monitoring cycle then you should email us at science@ocr.org.uk.

Centre monitoring visit allocations are based on candidate entries in the previous year. If all of your A Level science entries were with OCR, then you will already be on our list of centres requiring a monitoring visit. If you make A-level entries with different awarding organisations across the three sciences, you will receive a monitoring visit from one of these awarding organisations. Large centres, who have more than 140 students for any one science, will receive visits for all sciences from the relevant awarding organisations.

Key recommendations

- All teachers involved in delivering the practical endorsement should have a good understanding of the standards required to achieve the skills. Ensure all teachers are referring to the updated Practical Skills Handbook released last year. Only the lead teacher is required to complete the online lead teacher training, but it is recommended that all teachers involved in the delivery of the practical endorsement also do so.
- Read and act on updates regarding the practical endorsement available through the subject updates. At least one person in the science department should be signed up to receive these updates.
- Any further guidance included in monitoring reports should be acted on and shared with all science subjects.
- All record keeping, tracker and candidate records should be kept up to date and be an accurate reflection of practical work completed and assessments made.
- In centres where more than one teacher is delivering the practical endorsement, standardisation procedures should be in place to ensure all teachers are assessing to the same standard.
- Candidates should be encouraged to take responsibility for their progress through the practical endorsement; it is recommended they are made aware of the skills being assessed in practical activities and their achievements.
- It is recommended that all practical activities undertaken are kept in the candidates' practical records as all practical activities may be mapped to the criteria and used for assessment. There should be no distinction between PAG and non-PAG practical work.
- Giving candidates frequent and early opportunities to develop the higher level skills required for CPAC 2 and 5 throughout the course is very useful in supporting their development of these skills.
- Candidates should be encouraged to provide written evidence of their planning choices for CPAC 2; they may well need scaffolded help to do this initially in Year 12.
- Ensure the monitoring reports for science visits are stored securely and centrally so they can be accessed by all staff who teach A Level sciences and are available to new members of departments at handover times when lead teachers move on.

Helpful resources

- **Positive about Practical website useful FAQs:** https://teachcambridge.org/item/4324ba46-8669-473b-9788-8ec4a7221e99

- **Practical endorsement teacher training:** https://practicalendorsement.ocr.org.uk/login/index.php

- **Practical activities support guide**:
  - Biology https://teachcambridge.org/item/8e6079a4-b081-4db9-bb88-1e89d584ccd4
  - Chemistry https://teachcambridge.org/item/d4d1731a-9879-4ba6-b12b-c83f6056256a
  - Physics https://teachcambridge.org/item/88326faa-8417-4cf8-83b5-712fa24351a1
  - Geology https://teachcambridge.org/item/c8d36a0b-5fa6-489c-891c-8f8f74efe3d6

- **Practical endorsement skills tick table:**
  - Biology https://teachcambridge.org/item/e206eaa7-1d79-4e84-98ea-bbd79d53ce61
  - Chemistry https://teachcambridge.org/item/26b462ba-8ea2-4818-9609-e570171f3706
  - Physics https://teachcambridge.org/item/cc550ff7-ed0f-4a33-8039-73de847fb0d9

- **Student checklist Graphs, Drawings and Tables:** https://www.ocr.org.uk/Images/346170-graphs-tables-and-drawings-student-checklists.doc

- **Updated PAG templates**:
  - Biology – PAG 1.1, 4.1, 5.1
  - Chemistry – PAG 1.2, 2.1, 8.3
  - Physics – PAG 1.2, 3.1, 6.1
  - Geology - PAG 1.1, 4.1, 9.1

- **CPD sessions:**
  - Ask the monitor: A level Geology H414 – Practical endorsement
  - Ask the monitor: A level Chemistry H432, H433 – Practical endorsement
  - Ask the monitor: A level Biology H420, H422 – Practical endorsement
  - Ask the monitor: A level Physics H556, H557 – Practical endorsement

- **Practical skills Handbook:**
  - Biology https://teachcambridge.org/item/dca16011-69e1-435b-97d5-89496a544c30
  - Chemistry https://teachcambridge.org/item/893f9546-a82d-4867-97f5-a00f96de7f31
  - Physics https://teachcambridge.org/item/50f454a4-2cf3-4f36-8d7c-7ea0ec9add28
  - Geology https://teachcambridge.org/item/3fbe6331-57ca-4a3d-992b-bc8a7bdc6b1a

- **Drawing skills handbook:**
  - Biology https://teachcambridge.org/item/6fbb3afc-3493-44dc-9cba-d16ebc29bf74
  - Geology https://teachcambridge.org/item/73d71cc5-84ee-48bf-9209-ca589cf28911

- **Practical support guide:**
  - Geology https://teachcambridge.org/item/c8d36a0b-5fa6-489c-891c-8f8f74efe3d6
  - Biology https://teachcambridge.org/item/8e6079a4-b081-4db9-bb88-1e89d584ccd4
  - Chemistry https://teachcambridge.org/item/d4d1731a-9879-4ba6-b12b-c83f6056256a
  - Physics https://teachcambridge.org/item/88326faa-8417-4cf8-83b5-712fa24351a1

Blogs to support you with delivery of practical endorsement:

- A Level science: updated practical skills handbooks: https://www.ocr.org.uk/blog/alevel-science-updated-practical-skills-handbooks/
- Practical endorsement: our principal monitors share their insight: https://www.ocr.org.uk/blog/practical-endorsement-our-principal-monitors-share-their-insight/
- When will our A Level Science practical endorsement monitoring take place? Understanding the monitoring cycle: https://www.ocr.org.uk/blog/when-will-our-alevel-science-practical-endorsement-monitoring-take-place-understanding-the-monitoring-cycle/
- The practical endorsement: switching to OCR for A Level sciences: https://ocr.org.uk/blog/the-practical-endorsement-switching-to-ocr-for-alevel-sciences/
- Making practical work accessible for SEND students: https://ocr.org.uk/blog/making-practical-work-accessible-for-send-students/
- Introducing the new portable tracker for A Level Biology, Chemistry and Physics: https://ocr.org.uk/blog/introducing-new-tracker-alevel-science/

A Level Biology blogs:

- Developing a connected approach to A Level Biology A through the Daffodil DNA Project: https://ocr.org.uk/blog/developing-a-connected-approach-to-a-level-biology-a-through-the-daffodil-dna-project/
- A Level Biology - using the flexibility of OCR's PAGs (with resources): https://www.ocr.org.uk/blog/alevel-biology-using-flexibility-ocr-pags/
- The common pitfalls of biology practical endorsement: https://www.ocr.org.uk/blog/common-pitfalls-of-biology-practical-endorsement/
- Incorporating climate change into A Level Biology: https://ocr.org.uk/blog/incorporating-climate-change-into-alevel-biology/

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Access to Scripts

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