

A LEVEL

Examiners' report

SCIENCE

H414, H420, H422, H432, H433, H556, H557

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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 from the Practical Activity Groups (PAGs) defined in the specifications. Either OCR's suggested activities or a centre's own activities can be used. To gain a 'Pass' grade, candidates must demonstrate competence in the requirements of the Common Practical Assessment Criteria (CPAC), in skills common to all sciences (1.2.1 in the specifications) and 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, centres must keep records of when practicals have been carried out and of teacher judgements of candidate competence in the relevant skills, apparatus, and techniques.

Quality assurance of the Practical Endorsement is carried out by visiting monitors. Visits take place in two-year cycles; 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. Any centres new to OCR should notify us that they intend to make A Level entries so that a monitoring visit can be scheduled during the teaching of the first cohort.

Monitoring visits are intended to be supportive, helping centres 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. Teachers are encouraged to plan their programmes of work to integrate practical activities with the acquisition of knowledge and understanding across the course of study.

Further support

Further guidance, support, and resources for delivering the Practical Endorsement can be found on our 'Positive about Practical' page:



<https://www.ocr.org.uk/subjects/science/positive-about-practical/>

Overview

The second year of the second monitoring cycle has found that most centres are continuing to provide candidates with sufficient, suitable practical opportunities to help them to achieve the Practical Endorsement. Most candidates are able to meet the CPAC by the end of the two years and so achieve the Practical Endorsement.

In cases of a successful outcome there is often further guidance provided for the centre and it is important that this is heeded. Subsequent visits will be made on the expectation that this guidance has been implemented.

It is important that information is cascaded within the centre between the different science subjects. Some centres we are visiting have no idea what has been said on previous visits to the other subjects. The visits should be seen as useful CPD support and the main outcomes shared to make sure that other subjects within science meet the requirements.

Most of centres demonstrated a good understanding of the Practical Endorsement and its implementation. This resulted in the award of a Monitoring Visit Outcome of 'Yes'. A minority of centres did not achieve this on the first visit. Further work enabled this to happen at a later stage for most centres in this position. These centres are thanked for their willingness to work with monitors in order to rectify any issues identified.

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 well fail to 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 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 equipment. This can be addressed by using practical activities which require candidates to make a justified choice of what to use from a selection of available equipment. 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.

CPAC 3: Safely uses a range of practical equipment and materials: In almost all cases when observed, candidates treated one another and the laboratory environment with due regard and consideration, and health and safety rules were followed. Many had also carried out thorough risk assessments.

CPAC 4: Makes and records observations: Most but not all candidates made and retained contemporaneous records of their observations. If candidates are working in groups, all candidates should be making and recording observations. In cases where it is necessary to work in groups, these should be changed round periodically and contain no more than two candidates. There is still occasional inconsistency around the number of significant figures recorded and these should be addressed. For guidance, centres should follow the section on significant figures in the OCR Practical Skills Handbook.

CPAC 5: Researches, references and reports: Correct citation continues to be an occasional issue; this can be addressed by teaching candidates to use an established referencing system (e.g. Harvard). Advice on this is given in Appendix 7 of the Practical Skills Handbooks. Opportunities in the OCR

Activities to research and reference were not always taken. Where the opportunities had been taken, the consistency of approach was variable.

Common areas for improvement

Keep an appropriate plan of practical activities to be undertaken, and when

The absence of clear plans of when it is proposed to carry out sufficient practical activities which meet the requirements of CPAC was an issue at several centres. Where the centres concerned could demonstrate through the required teachers' and candidates' records that sufficient practical activities had been undertaken, this issue could be mitigated by the centre providing plans immediately following the visit, prior to the submission of the Monitor's report.

OCR has a model scheme of work on the OCR website. This contains suggested timings for teaching the specification topics, links to relevant delivery guides, and other useful guidance to support scheme of work planning. The timings may be amended to suit individual centres' delivery plans.

Alternatively, centres can also use the scheme of work building tool on the OCR website:

<http://www.ocr.org.uk/qualifications/gcse-and-a-level-reform/create-a-scheme-of-work/>



Another occasional issue was where unforeseen circumstances had led to centres being unable to keep to their planned schedule for practical activities. In cases such as this, it is important that centres can evidence a clear plan to remediate any practical activities delayed or missed.

Applying the standards

The Practical Endorsement involves the direct observation and assessment of practical skills. Therefore, it is important that assessment of practical skills by teachers is contemporaneous and not based on work handed in at the end of the practical activity.

Many examples of good practice have been observed with a lot of centres devising systems for recording assessments during practical lessons, often involving tick sheets that are also being used to provide feedback to the candidates.

There was some poor practice in terms of inconsistency around the number of significant figures recorded during practical work across the sciences. Teachers are encouraged to refer to the Practical Skills Handbooks and look carefully at the appendices. The entire handbook, and in particular Appendix 4, can be shared with candidates. It is vital that teachers have a clear understanding of the standards, not only for the purposes of the Practical Endorsement but also so candidates can gain maximum marks in the practical questions on the written papers.

There were some inconsistencies in the application of these standards between different teachers at the same centre. 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.

It is recommended that all teachers complete the lead teacher online training:

<https://practicalendorsement.ocr.org.uk/login/index.php>

Tracking candidates progress

Where centres were using the OCR PAG tracker, and teachers had familiarised themselves with its operation, they found it greatly simplified record keeping. Although some teachers found using the PAG tracker a challenge to begin with, equally they found the benefits of the automation and functionality within the tracker make it worthwhile to persist.



OCR has continued to develop the PAG tracker and a flexible version with greater functionality is available from the OCR website.

<https://www.ocr.org.uk/subjects/science/positive-about-practical/>



Guidance on the use of the OCR Flexible PAG Tracker is available on the OCR website:

<https://www.youtube.com/watch?list=PLtzR6sheDAMG1YtelV5YJuijZHy0xQfna&v=HxaT1M5EaoM>

Some centres experienced difficulties with the use of the OCR tracker (size of cohort, transfer from first to second year and centre IT/hardware difficulties, for example). In many cases, the use of the newer flexible tracker, for 30 candidates, would go some way to solving the difficulties centres experienced with both mapping and tracking of practical work. Please note that there is no requirement for centres to use a single tracker file for all of their candidates; some centres have used individual trackers for different class groups in order to make use of the OCR PAG tracker easier.

There is no requirement to use the OCR PAG 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 achieved competence in certain skills, which is a requirement.

Centres should make sure they are using the latest versions of all documents (including PAG sheets where appropriate) and sign up for email alerts (<http://www.ocr.org.uk/i-want-to/email-updates>) so that these are not missed.

A number of centres used some or all their own 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 requirement of 12 practical activities in their trackers. While this is sufficient for the requirements of the Practical Endorsement, recording all practical activities in the tracker provides further evidence for the development of skills. It is recommended that more of the centre's own practical activities be recorded.

Candidate practical records

Most candidates are keeping records of practical activities in lab books or folders. There has generally been good correlation between practical activities recorded in the lab records and the records of achievement, although there are still instances where the record of skills being achieved does not match the evidence in the lab books.

Candidates have generally found being made aware of the skills that are being assessed in each practical activity and whether or not they have achieved them to be very useful. 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.

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.

Centre practical records

It is a requirement that centres have an accurate record of which candidates did or did not meet the CPAC criteria for each practical activity. Candidates' skills and competencies which are directly assessed should be monitored during each activity. A record of the criteria 'achieved'/'not achieved' should be made during or shortly after the activity.

Some centres left the tracker to show 'achieved' even when candidates clearly did not make observations or record data appropriately. Centres must make sure that any competencies not demonstrated are changed to 'not achieved' 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 observe that they become reliably competent during that activity. The candidate can then be said to have achieved that skill or competency.

Common questions

Should I only use the OCR suggested practicals for assessment towards the Practical Endorsement?

- It is not mandatory to use OCR PAG practical activities. Any practical activities that provide candidates with opportunities to demonstrate all the required skills and competencies may be used. There is also no requirement to complete all of the OCR suggested practicals as part of your delivery of the Practical Endorsement.
- Any practical work you do with candidates can be counted towards their progress in the Practical Endorsement. We recommend that you do so, as it provides additional opportunities for candidates to demonstrate competence. Any practical activities you do in addition to the OCR suggest practical activities simply need to be mapped to the criteria – use of the flexible tracker from OCR allows you to do this easily.
- Commercial 'off the peg' practical activities can be used but may be too structured to allow the awarding of certain CPAC criteria. The mapping of these should be checked carefully before use and adjustments to the activity should be made if necessary.
- Some publishers offer lab books for candidates to use through the Practical Endorsement. While these can provide useful scaffolding for candidates early in the course, they may restrict candidates from developing the independence in recording results and designing experimental procedures which are required by the Practical Endorsement. Note that these lab books are not resources formally endorsed by OCR.

Does candidate practical work need to be written up and marked?

- Practical activities do not have to be formally written up and taking results 'in rough' to copy up later should be actively discouraged. Candidate records of practical work should be contemporaneous. Judgements should be made on the primary data and, even if it's later written up, the rough work must be retained in the candidate record.
- All candidate practical work should be dated, as this allows monitors to check for agreement between your tracker and the candidate practical work.
- Candidates do not have to answer the Extension Questions as part of the Practical Endorsement, although the questions can aid them in their preparations for the written examinations. If they are used, there is also no requirement for teachers to mark candidate responses to these questions.
- There is no requirement from OCR for candidates' practical records to be marked. Teachers should keep to their centre's policy on marking. Many teachers and candidates have found marking and providing formative feedback on candidate practical work useful in supporting skill development and providing evidence of assessment of skills.

How can I accurately assess candidate competence during a practical?

- There are some teachers who have assumed that achievement is automatic upon completing activities. This has resulted in candidates recorded as having achieved all skills that could be assessed in each practical activity without assessments having been made. Some teachers have expressed concern about not achieving skills, thinking it could result in candidates not being able to achieve the Practical Endorsement. This is not the case and it is expected that candidates will show progression in their skill acquisition over the two-year course. Not achieving some competencies in earlier practical work is not a problem if they are able to demonstrate competency routinely and consistently later in the course.
- Some skills are assessed very frequently during the course of the Practical Endorsement (for example, following written instructions). It is not necessary to assess every skill on every occasion, and it can be beneficial to just 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 assessed. This can help manage judgements of competence in larger classes.
- If it is necessary for candidates to work in groups during practical work, all candidates must make and record observations. Groups should be changed regularly and contain no more than two candidates.
- Asking candidates to self-assess their competence can be a useful pedagogical tool. However, their competence still needs to be assessed directly by the teacher. If relying on candidates' self-assessments alone, centres are unable to confirm that the evidence is either valid or authentic for each candidate.

How do I know if and when my centre requires a monitoring visit?

- Monitoring visits take place in two-year cycles. This year was the second year of the second cycle, which means that the next academic year will be the first year of the third cycle.
- All centres receive a visit for a single science subject during the two-year monitoring visit. Exceptions are large centres (with more than 140 entries for a single A Level science) and centres that only become known to us after the entries deadline in February of each year. Centres who fail multiple visits in a single subject may also trigger visits for other subjects at their centre.
- Note that, as Geology is monitored separately from Biology, Chemistry and Physics, centres who are delivering Geology A Level will receive a Geology monitoring visit in every two-year cycle.
- Centres can be visited at any point during the two-year monitoring cycle. The year in which you were visited for the previous cycle usually has no bearing on whether you're visited in the first or second year of a cycle. Some centres may find themselves being visited in consecutive years, while others may find they have a larger gap between visits.
- If you are not sure whether or not your centre requires a visit in a particular year, it is best to check directly with us. This avoids the need for last-minute visits at the end of the monitoring cycle which can be inconvenient for both you and your candidates.

How long do we have to keep candidate work and records of their progress in the Practical Endorsement?

- There is no requirement for candidate work to be securely held or formally submitted. We actively encourage candidates to be responsible for it. The only point at which centres are required to hold candidate work is in preparation for a monitoring visit, as it will form part of the evidence for the Practical Endorsement being implemented appropriately.
- During the course, it may be advantageous for candidates' records to be kept centrally. However, at the end of the course candidates will need their work for three reasons:
 - It is the candidate's independent record and belongs to them.
 - They will need their work to revise for practical-based questions in the written assessments.
 - It may be advantageous for them to take it with them to university or refer back to it during future study.
- We recommend that data tracking candidate progress is retained by centres for the lifetime of the qualification. This can be as simple as retaining a copy of the tracker for each year's candidates.

Answers to further common questions are available on the Positive About Practical page here:

<https://www.ocr.org.uk/subjects/science/positive-about-practical/faqs/>

Key recommendations

- Read and act on updates from OCR regarding the Practical Endorsement. Important updates are communicated as Subject Information Updates, while useful information and guidance is communicated via the Science Torchlight newsletter. At least one person in your department should be signed up to receive this newsletter to make sure you don't miss anything. You can sign up to receive the newsletter here: <https://ocr.org.uk/qualifications/email-updates/>.
- As part of the report to your centre after a visit, your monitor may include 'Further guidance for the centre'. It's important that this guidance is discussed in your department and acted upon.
- Make sure all teachers in your centre have a good understanding of the standards. While it is only a requirement that the lead teacher completes the online Lead Teacher Training, it can be useful for the other teachers in your department to complete it too.
- Make sure all record keeping – tracker and candidate records – is up to date and accurate.
- Ask for help if needed. OCR will happily support you if requested.
- Encourage your candidates to take responsibility for their progress – give constructive feedback and signpost the criteria for them.

Helpful resources

Teaching resources, including practical activities and planning:

Biology A:

<http://www.ocr.org.uk/qualifications/as-a-level-gce/as-a-level-gce-biology-a-h020-h420-from-2015/planning-and-teaching/>

Biology B:

<http://www.ocr.org.uk/qualifications/as-a-level-gce/as-a-level-gce-biology-b-advancing-biology-h022-h422-from-2015/>

Chemistry A:

<http://www.ocr.org.uk/qualifications/as-a-level-gce/as-a-level-gce-chemistry-a-h032-h432-from-2015/planning-and-teaching/>

Chemistry B:

<http://www.ocr.org.uk/qualifications/as-a-level-gce/as-a-level-gce-chemistry-b-salters-h033-h433-from-2015/planning-and-teaching/>

Physics A:

<http://www.ocr.org.uk/qualifications/as-a-level-gce/as-a-level-gce-physics-a-h156-h556-from-2015/planning-and-teaching/>

Physics B:

<http://www.ocr.org.uk/qualifications/as-a-level-gce/as-a-level-gce-physics-b-advancing-physics-h157-h557-from-2015/>

Online Lead Teacher Training:

<https://practicalendorsement.ocr.org.uk/login/index.php>

Practical Skills Handbooks:

Biology: <https://www.ocr.org.uk/Images/294468-biology-practical-skills-handbook.pdf>

Chemistry: <https://www.ocr.org.uk/Images/208932-chemistry-practical-skills-handbook.pdf>

Physics: <https://www.ocr.org.uk/Images/295483-practical-skills-handbook.pdf>

A Level Biology Drawing Skills booklet:

<https://www.ocr.org.uk/Images/251799-biology-drawing-skills-handbook.pdf>

Making a final judgement for your candidates:

<http://social.ocr.org.uk/groups/science/resources/practical-endorsement-final-judgement>

Required chemicals for A Level Chemistry practical activities:

<http://social.ocr.org.uk/groups/science/resources/required-chemicals-ocr-chemistry-level-pag-activities>

Practical Endorsement FAQs:

<http://social.ocr.org.uk/groups/science/resources/practical-endorsement-faqs>

PAG Tracker Guidance:

<http://social.ocr.org.uk/groups/science/resources/user-guidance-practical-activity-group-tracker>

Flexible Tracker:

Available on Interchange: <https://interchange.ocr.org.uk/>

'Positive about Practical' OCR page:

<https://www.ocr.org.uk/subjects/science/positive-about-practical/>

If centres wish to receive advice about the suitability and the mapping of practical activities, they can contact: pass@ocr.org.uk



A Level Biology A - H420/04, A Level Biology B (Advancing Biology) - H422/04

Most centres are still basing the delivery of the Practical Endorsement around OCR's suggested practical activities. Most teachers appreciate that alternative and extra practical activities may be used to assess candidate competence resulting in the inclusion of more practical work into the teaching of A Level Biology and are beginning to include more centre-devised activities. Most centres have integrated practical activities into the delivery of the subject content where possible.

Some centres are only recording 12 OCR practical activities in the lab books, even when further practical activities are being carried out, and are only using those practicals for the assessment of skills. In some instances, this has contributed 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 recommended 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 PAG Tracker.

Most teachers feel that the Practical Endorsement is resulting in candidates developing a higher level of skill in a wider range of transferable practical skills. Records of candidate achievement of skill criteria are generally being maintained appropriately. There have been some issues with the correct recording of when competence in skill areas has been demonstrated. This is most commonly in relation to skills relating to biological drawings 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 7 for referencing guidance). Candidate records of practical activities are usually being kept appropriately, most commonly in the form of lab books or folders.

Lead teacher training

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

<https://practicalendorsement.ocr.org.uk/>

Most candidates also feel they are developing useful skills and greater confidence working in laboratories. Most candidates say they are enjoying the practical component of A Level Biology and feel it enhances their understanding of theory. Monitoring has generally found that, where sufficient practical opportunities have been provided, candidate's laboratory skills are developing over the two years. Most are able to demonstrate an ability to work competently and confidently, with increasing degrees of independence, as they progress through the course. CPACs 2 and 5 require higher level skills that many candidates have found more challenging to achieve initially. Many centres have been successful in supporting their candidates to develop these skills by providing extra opportunities to develop them throughout both years of the course.

With the delivery of the Practical Endorsement now being in its fourth year most centres feel they have a greater understanding of what is required and have procedures in place that are being refined to best suit the working of the centres. Initially some centres had problems with lack of equipment, but most have now acquired extra equipment or found suitable alternative activities that can be carried out with

what they have available. Most centres are finding that the required amount of practical work can successfully be delivered with available teaching time, although, even though where teaching time is less than five hours a week there have been time constraints. Centres that are 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 the available time.

A Level Chemistry A - H432/04, A Level Chemistry B (Salters) - H433/04

The Practical Endorsement has been embraced with goodwill and enthusiasm by most centres. Many centres are delivering excellent candidate training in practical skills and competencies. Evidence shows that high standards are both expected and achieved. It has been encouraging to see innovative and outstanding work in this important area of A Level Chemistry.

Teachers' perceptions of the Practical Endorsement are largely positive and accurate. Most teachers find this way of assessing practical skills preferable to the earlier centre assessed coursework and that it results in candidates developing a higher level in a wider range of transferable laboratory skills. Centres have generally found that the Practical Endorsement can be easily delivered within available teaching time.

Most centres are using the OCR-devised PAG activities and the tracker provided. They find few issues with equipment and materials required. In addition, other practical work is used to support skill development.

Many candidates commented that the practical activities are enjoyable and contribute to their understanding and appreciation of Chemistry. They are aware of the importance of the Practical Endorsement and able to state how they have progressed in their practical skills over the two-year course. Candidates cite examples of how practical work underpins the theory and enhances their learning. Some explain how they know they are making progress in practical skills from the feedback provided by their teacher. Candidates are keen to speak of their enjoyment of the practical activities and the benefits of these in relation to the written examinations.

Issues which have caused problems in Chemistry Monitoring are covered earlier in this document on page.....

Lead teacher training

Overall, the requirement for the Lead Teachers to undertake the mandatory training is being met. Where the teaching of A Level Chemistry is shared between members of staff, the individuals concerned could all undertake the training as part of departmental CPD and as a means of standardisation of teachers' assessment.

<https://practicalendorsement.ocr.org.uk/>

Centres are thanked for their professional approach to delivering the Practical Endorsement and engaging positively with the visiting monitors. As a result, we are confident that, in most centres, the Practical Endorsement is equipping our A Level Chemistry candidates with a valuable range of practical skills and competencies both now and for the future.

A Level Physics A - H556/04, A Level Physics B (Advancing Physics) H557/04

Most teachers of A Level Physics were 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 expressed appreciation of and made full use of the OCR-devised activities to make sure effective coverage of 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).

Similarly, most centres had adopted the OCR-devised PAG tracker to maintain and meet the requirements for teachers' records of candidates' progress. Whereas some teachers found the use of the PAG Tracker daunting, the majority persisted with the use of the Tracker and were able to appreciate its benefits.

In general, the Physics departments have sufficient laboratory resources and effective technician support to deliver the requirements of the practical activity.

Lead teacher training

Overall, the requirement for the Lead Teachers to undertake the mandatory training is being met. Where the teaching of A Level Chemistry is shared between members of staff, the individuals concerned could all undertake the training as part of departmental CPD and as a means of standardisation of teachers' assessment.

<https://practicalendorsement.ocr.org.uk/>

For most candidates, the inclusion of practical activities as a part of the Physics course was as expected and many expressed that this is one of the motivations for selecting science subjects for their A Level studies. The developmental approach was also appreciated with candidates commenting:

- The activities were enjoyable and helped them to gain a deeper understanding of the subject. While one or two activities were more challenging to achieve acceptable results in, this also contributed to their understanding of controlling experimental conditions.
- The activities helped to underpin what they had learned through applying this knowledge and helped to make this more concrete.
- The use of observations and measurements of their activities and then producing graphs of their findings helped underpin the understanding of the mathematical relationship between variables.
- They found it enjoyable to put theory into practice and found it is easier to recall things in an examination when they had practical experience of it.

- candidates expressed that it was good to be familiarised with equipment and apparatus when carrying out experiments, helping them visualise principles and to put into practice what had been learned.
- The range of activities provided ample of practice in preparation for different scenarios in the examination.

To support their candidates in the presentation of their evidence and records of their activities, Physics teachers could usefully issue the appendices 4: Measurement, 5: Units and 6: Graphical Skills from the OCR Practical Skills Handbook during their induction, to be retained for the duration of the course; and, Appendix 7: Referencing at the point when candidates are first asked to carry out research.

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.

A Level Geology – H414/04

Most centres are using the OCR suggested practical activities and the OCR practical activity tracker to record their students' achievement. In many centres additional practical activities are being used to support the development of students' practical skills.

Teachers of Geology reported that they have found the change from coursework to the Practical Endorsement positive but challenging. Teachers have changed their approach to teaching and assessment of practical skills, particularly in relation to data collection and using a more critical approach to the collection, analysis and processing of results.

In most centres teachers of Geology have a good relationship with their science department and are able to share or borrow equipment in order to offer the full range of practical activities. Centres where the Practical Endorsement is being implemented most successfully are those that have developed good, active relationships between the teachers of science and Geology and are able to discuss strategies and share good practice across all four sciences.

All centres provide rich and varied opportunities for students to participate in fieldwork. Some centres do this through individual days using their local Geology, others take their students away to field study centres for residential trips. The best practice seen is where field work is split across at least two sessions, thus allowing their students time for reflection, feedback and development of skills. When external tutors are used centres should be aware that most field study tutors are not conversant with the requirements of the Practical Endorsement and are only standardised if they have received the training from the visiting centre's lead teacher. It is the responsibility of the visiting centre's teachers to make sure that their students collect and analyse data in line with the required skills, apparatus and techniques, and to a standard that will allow students to demonstrate competence against the practical assessment criteria.

All students were very positive about their practical work and are keen to talk about their experience of field work. Many are hoping to continue with some form of earth science qualification at the end of their A Level Geology course.

Where teachers of Geology also teach in the science department they report that the new endorsement requirements are the same as those for the other science subjects and so standards and good practice may be shared across all four sciences. For teachers who are not regular members of a centre's science department, it is strongly recommended that a dialogue should be opened with members their centre's science department. Outcomes and advice from Practical Endorsement monitoring visits to other sciences is invaluable in ensuring good practice and in benefitting from the advice offered.

A common issue identified in is that many teachers have not accessed the skills handbooks and other guidance documents or have downloaded the handbooks but are not making use of them in practical Geology lessons. During the visits to all centres the visiting monitor showed the lead teacher for Geology how to register for updates to make sure that they are contacted when new versions of documents are published.

The application of drawing in technical subjects is not comparable to the students' prior experience of drawing as a creative process in art lessons. In particular all scientists use drawing as a way to record qualitative data and process information. It will help students to develop the appropriate drawing skills if they are taught and assessed using the Drawing Skills Handbook.

[Drawing] is not an innate scientific skill for most people and being told to “draw what you see” can be confusing. Students associate drawing with a creative process in art rather than a scientific skill. Research shows that it is more important for students to be able to apply conceptual geological models when developing drawing skills, rather than prior artistic ability. Therefore teacher need to model the process to their students, using a large sketch pad or portable white board, and allow their students to see how conceptual understanding informs the construction of a [drawing].

Students cannot “draw what they see” until they can relate their conceptual understanding to the Geology in front of them. It takes practice and experience to “see the Geology.” Understanding how each student’s ability in [drawing] develops will help [teachers] to provide appropriate guidance and support.

Drawing Skills Handbook, page 7.

Teachers may find that the instructions on page four of the handbook are particularly helpful to share with students. This includes practical advice on what to include in a scientific drawing and how to improve the quality of their drawing and annotations.

The handbooks and the 36 OCR suggested practical activities have recently been updated, based on feedback from teachers. All the essential documents may be accessed from the main [OCR Geology qualification web page](#) or the [Positive about practical](#) web page. In particular teachers are encouraged to follow the guidance in the [Practical Skills Handbook](#) (particularly the advice in appendices 3 to 7) and the [Drawing Skills Handbook](#).

2017-19 outcomes

This year marks the end of the second two-year monitoring cycle since the introduction of the reformed Biology, Chemistry and Physics A Levels, and the end of the first two-year cycle for Geology A Level monitoring visits. As in the first monitoring cycle, most centres passed their initial monitoring visit, with a minority of centres requiring further visits. After additional visits had taken place, only 1% of centres did not pass a monitoring visit.

The cross-board figures for monitoring visits for Biology, Chemistry, and Physics are shown in the table below:

	Cross board
Centre first time pass rate	89%
Centre pass rate (after additional visits)	99%
Biology first time pass rate	89%
Chemistry first time pass rate	89%
Physics first time pass rate	89%
Student pass rate	99%

99% of candidates entered for A Level Biology, Chemistry, Physics and Geology qualifications achieved a 'Pass' in the Practical Endorsement. Considering the period of time over which practical work is completed during A Level study, it is not surprising that most candidates achieved a 'Pass'.

The OCR figures for monitoring outcomes for the Geology Practical Endorsement are shown below:

	Geology
Centre first time pass rate	96%
Centre pass rate (after additional visits)	100%

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