

**A LEVEL**

**Monitors' report**

# **SCIENCE**

**H414/04, H420/04, H422/04, H432/04,  
H433/04, H556/04, H557/04**

For first teaching in 2015

**Endorsed component (04)  
Summer 2023 series**

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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 for the sciences can be found on Teach Cambridge (Quick links > Practical endorsement) and on our [Positive about Practical](#) page.

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## Overview

The requirements for delivery, assessment and monitoring of the practical endorsement reverted to the normal processes for the second year of the fourth monitoring cycle. Notwithstanding that the restrictions on candidates' attendance to places of learning had no longer been in place since the Covid pandemic, the impacts of the pandemic on candidates' GCSE experience and, for some, their confidence in carrying out practical work, still appeared to be evident.

### Practical Endorsement monitoring



The cross-board messaging on the monitoring process for the practical endorsement is published on our [Positive about Practical](#) page and is also available in the Practical Endorsement Guidance area of Teach Cambridge. This guidance is updated at the beginning of each academic year.

In cases of successful monitoring outcomes, there is often further guidance provided by the monitor for the centre to support good practice. The monitoring activity should be seen as useful Continuing Professional Development (CPD) support, and the main outcomes shared to make sure that other subjects within science meet the requirements. Some centres we monitor are not informed of the advice provided during previous monitoring of the other science subjects.

Most centres demonstrated a good understanding of the practical endorsement and its implementation. This resulted in them achieving a 'Pass' outcome of monitoring. 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 of 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; which variables to measure and which to control; the apparatus 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 in order that candidates can provide 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*, teachers 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.

**CPAC 3: Safely uses a range of practical equipment and materials:** Teachers should record during an activity whether or not candidates have observed health and safety requirements and handled apparatus with due care and respect to confirm achievement or otherwise of practical skills 1.2.1(b) *safely and correctly use a range of practical equipment and materials* and 1.2.1(j) *use a wide range of experimental and practical instruments, equipment and techniques appropriate to the knowledge and understanding included in the specification*.

**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 and preferably contain no more than two candidates. If candidates are working in groups, all candidates should be 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*. For guidance, centres should follow the guidance in appendices 4,5 and 6 of the OCR Practical Skills Handbook.

**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 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, challenging candidates to routinely and consistently achieve practical skills 1.2.1(h) *use online and offline research skills including websites, textbooks and other printed scientific sources of information* and 1.2.1(i) *correctly cite sources of information*.

### 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. The online training has recently been revised for September 2023 onwards.

[OCR Practical Endorsement Standardisation Training Site](#)

## Common areas for improvement

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

Several centres lacked clear plans of when it was proposed to carry out sufficient practical activities which meet the requirements of CPAC and which particular practical activities were to be used. 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, before the submission of the Monitor's report. Where the plan is not followed; for example, if planned activities do not take place when expected, it is important that the plan is revised so that the activities planned and the activities completed on the PAG tracker are in agreement. This is important in order to make sure that all groups complete all activities during the 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 4 – 7 (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 Appendix 3 of the handbook, 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.

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 candidate progress***

We have developed our practical endorsement trackers, and a portable version with greater functionality has been available from Interchange for Biology, Chemistry and Physics. This tracker is more readily shared and supported on different applications such as Google Sheets.

We also produced a video containing guidance on the use of the trackers:

[How to use OCR's practical endorsement trackers for A Level Science](#)

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'. 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 presented when centres recorded solely the assessment of CPAC rather than the individual skills in 1.2.1 of the OCR specification which contribute to these. In many cases these centres were actually assessing these skills, as evidenced on the annotation of candidate work, and simply had to change their methods of recording achievement.

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

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.

### ***Candidate 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, please 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. Whereas in many cases the evidence of candidates' achievements and the corresponding teachers' records of these were readily available and easily accessed, in other cases the systems used or 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 the blank or 'not achieved' status where the evidence does not fully meet all aspects of a particular skill.

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. 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.

### ***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, including demonstrating competence in all the skills, apparatus and techniques in sections 1.2.1 and 1.2.2 of each 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', 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 that activity. The candidate can then be confirmed to have achieved that skill or competency.



## Common questions

### ***Can skills only be assessed in OCR suggested practical activities?***

- It is not mandatory to use the OCR 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 the OCR suggested practical activities as part of your delivery of the practical endorsement as long as all the required apparatus and techniques as listed under 1.2.2 are incorporated.
- It is to be noted, however, that if the OCR 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 the OCR 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 the OCR 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 OCR 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.

### ***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.

### ***When can a candidate be deemed as having demonstrated competence and so be assessed as having achieved a skill?***

- Candidates can only be assessed as having achieved a skill during a practical activity if their work fully meets the standards as specified in the Appendix 3 of the Practical Skills Handbook.

### ***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, ideally no more than pairs.

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

Candidates do not have to formally write up practical activities and taking results 'in rough' to copy up later should be actively discouraged. Candidates' records of practical work should be contemporaneous and if results are written up later the records of results recorded at the time must be included in the candidate records. Candidates must each be observed to make and record measurements and to retain the contemporaneous records of results for each of their activities to provide the basis for the assessment of skills 1.2.1(d), (e) and (f).

- There is no requirement from OCR for candidates' practical records to be marked. Teachers should follow their centre's marking policy. However, providing formative feedback in relation to attainment of the criteria is useful in supporting skill development, providing evidence of assessment, and keeping candidates informed of their progress towards achieving the practical endorsement. This can be achieved through the use of skills tick tables.
- Asking candidates to assess their competence can be a useful pedagogical tool but assessments must be made directly by teachers to confirm that evidence is valid and authentic.

### ***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 do teachers have to provide when claiming the practical endorsement for the candidates?**

- Candidate work does not need to be securely held or formally submitted. It is recommended that candidates are encouraged to take responsibility 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.
- Candidates' practical records should be given to them at the end of their course as these are their independent records belonging to them and they will need this work to revise for practical-based questions in the exams.
- It is recommended that data tracking candidate progress is kept for the lifetime of the qualification, which could be a copy of the tracker for each year's candidates.

**When do centres require monitoring?**

- Monitoring visits take place in two-year cycles. The 2022-23 academic year was the second year of the fourth cycle. 2023-24 will be the first year of the fifth cycle.
- All centres receive a visit for a single science subject during the two year monitoring cycle. Large centres which have more than 140 entries for a single A Level science will be visited for each science each cycle. Centres found to be non-compliant after multiple monitoring visits may then be visited for the other sciences in the same cycle.
- Geology is monitored separately from the other sciences and centres delivering Geology will be monitored each cycle.
- Centres may be visited at any point during the two year cycle. The year in which the visit took place in a previous cycle has no bearing on whether you're visited in the first or second year of the next cycle. Some centres may find themselves being visited in consecutive years while others may find they have a larger gap between monitoring visits.
- If a centre is not sure if they require a monitoring visit, they should contact OCR directly at [science@ocr.org.uk](mailto:science@ocr.org.uk).

## Key recommendations

- 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 teachers involved in delivering the practical endorsement should have a good understanding of the standards required to achieve the skills. 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 do so.
- 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.
- Candidates should be encouraged to take responsibility for their progress through the practical endorsement, so 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 opportunities to develop the higher level skills required for CPACs 2 and 5 throughout the course is very useful in supporting their development of these skills and candidates should be encouraged to provide evidence of their planning choices for CPAC 2.

## Helpful resources

### Teaching resources, including practical activities and planning:

Full planning and teaching materials are now only available on [Teach Cambridge](#).

For each science subject use Quick links > Practical Endorsement to access the following:

#### Practical activity guidance

- Practical skills handbook
- Drawing skills handbook (Biology & Geology)
- OCR trackers
- Skills tick tables

#### Practical activity group (PAG) activities

Monitor reports and more.

## 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 even though there is increasingly more use of alternative activities this cycle. Most teachers appreciate that alternative and extra practical activities may be used to assess candidate competence resulting in more practical work being included in the delivery of A Level Biology. The majority of centres planned to integrate practical activities into the delivery of the subject content throughout the course.

Some of the creative alternative activities used to support practical skill development during the Covid pandemic have been retained and continue to be used to support skill development, such as further planning and researching activities and the use of interactive online simulations.

Some centres continue to only 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](#).

Records of candidate achievement of skill criteria are generally being maintained appropriately. 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.

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, 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 7 for referencing guidance). The use of the [learner checklists](#) that are in the Biological Drawing Skills Handbook has been found to be effective in supporting candidates to develop the skills required to correctly record and present observations and measurements in tables, graphs and drawings.

Many of the records related to the application of investigative skills lacked evidence of the choices candidates had made in developing their plans. As competence in CPAC 2 requires making informed choices about apparatus, practical methods and relevant data to record, candidates should be encouraged to provide evidence of their choices.

CPAC 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.

Other common issues were the drawing of lines of best fit on graphs and the recording of results for qualitative tests. 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. Recording of results for qualitative tests in PAG 9 frequently lacked the required level of detail which should include observations before and after, using appropriate scientific terminology, and an interpretation of the observations.

Where there is more than one teacher delivering the practical endorsement there have been instances where there is inconsistency in interpretation of the standards and assessment decisions being made. It is important that assessment decisions are standardised and that all teachers involved are fully aware of the requirements of the practical endorsement and the standards expected for skills to be assessed as achieved.

Most centres are demonstrating a greater understanding of what is required and have procedures in place which are being refined to best suit the working of their centres, including developing and using alternative practical activities to the OCR practicals, and using 'standalone' extra activities to develop particular skills particularly for the more difficult to achieve, higher level skills associated with CPACs 2 (1.2.1a) and 5 (1.2.1g, h and i). 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.

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.

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

Evidence from monitoring visits continues to show that, in the majority of centres, high standards in practical work are both expected of and achieved by candidates and that teachers are fulfilling their commitments to operate the practical endorsement in line with requirements. Where this was not found to be the case, Lead Teachers have been able and willing to make the changes necessary for their centre to be approved. It is essential that centres follow through the advice offered in the final section ('Further Guidance') of the report to make sure continued compliance. This information should also be embedded into the departmental culture so that when staff changes occur, the compliance continues. A small number of centres were found to be repeating the same 'errors' in the delivery of the practical endorsement which had been identified in the first visit seven years ago.

Monitors have reported a significant number of teachers who have, for various reasons, not been receiving updates from OCR and thus missing out on important information regarding the practical endorsement, including CPD opportunities - [Subject Updates](#)

Despite the difficulties of the last few years, which have resulted in some A Level candidates initially possessing somewhat limited practical skills, centres have continued to teach and empower candidates to demonstrate routine and consistent competence in the 1.2.1 skills in practical work as well as gaining 'hands-on' experience in all the required apparatus and techniques. In some centres, innovative resources developed during lockdowns are being used to enhance the regular provision for practical work.

Where possible, candidates should carry out practical work on their own rather than in pairs or bigger groupings. It has been pleasing to see some centres embracing this ideal and developing the independence of their candidates in readiness for Higher Education.

Over recent years, many centres have decided to ask candidates to keep their practical records in a laboratory book (some online) rather than on file paper. This avoids the problem of 'written up' work being presented and lost work.

Many centres have explored ideas of supplying candidates with targeted and timely feedback on their skills acquisition by use of a chart or tick list in the front of their lab books. Others have reported this to be too onerous and not used by the candidates. Nevertheless, centres are encouraged to inform candidates of their progress and what they need to do to improve.

Most centres are using the OCR-devised PAG activities. Some are including their own activities which they have mapped for particular skills and are used for assessment purposes. Centres are encouraged to use this other practical work for assessment and to include these in the learner record as evidence of achievement of skills. A very small number of centres are **only** using materials which have not been mapped correctly to the 1.2.1 skills and this has caused problems in the monitoring outcome.

The majority of centres are using one of the trackers provided. Some centres use their own trackers and many of these are fit for purpose. It is pleasing to note that many centres have now switched to using the OCR portable tracker and have found it user friendly.

In most cases, the assessment criteria (see Appendices 3-7 of the Practical Skills Handbook) are being applied correctly and consistently by all teachers involved in the delivery of the practical endorsement at a centre. There does, however, continue to be a small but significant number of cases where this is not so and thus the centre records are found to be inaccurate at the time of the visit. The main issues are discussed here:



- 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* are met in full. The recording should be contemporaneous and not 'written up' later. The absence of raw data in the record for some candidates has been a problem in a few centres. Candidates need to understand the requirement for clear presentation of results recorded in a manner that follows conventions. The resolution of the measuring instruments being used must be reflected in the number of significant figures recorded and these must be consistent. To support candidates in the presentation of their evidence and records of their activities, teachers can refer candidates to the Appendices 4-6 in the Practical Skills Handbook.
- CPAC 2 'Investigative Skills': Teachers are reminded to require candidates to note in their records the decisions and justifications they make in choosing the materials, or amounts of materials, to use; which variables to measure and which to control; what measurements or observations to make; and when to make measurements and the size of the intervals. Planning a whole investigation (for example, in some of activities in PAG groups 4,7 and 12) tends to be much better evidenced than for the activities in groups 9-11. The plan should generally precede the results in the learner record, be unique to an individual candidate and any research carried out could be used for CPAC 5b.
- CPAC 5 'Researches, references and reports': Most centres are requiring candidates to cite their references in accordance with the conventions in Appendix 7 of the Practical Skills Handbook. Most commonly, some candidates did not provide a date of access for websites. Some centres have struggled to get candidates to use software to process rates data for activities in PAGs 9 and 10 in a suitable format. Graphs and tables should follow the same criteria as those for handwritten graphs (see Appendices 4 and 6 of the Practical Skills Handbook).
- CPAC 3a 'Safety': Centres should note that for PAGs 5, 6 and 12, a Risk Assessment is required of candidates and if this is either not submitted by the candidate or the requirement removed by the centre, this should be reflected on the tracker record for skill 1.2.1(b), even if the candidate has worked safely during the practical.

Teachers need a clear understanding of **what** is being assessed in a particular practical, and the **outcomes expected**, before candidates are judged to have achieved these skills.

It is important to check that the tracker shows an accurate and up to date record of which candidates did and did not achieve the skills which were required of them during a particular practical activity. The inaccuracy of records continues to be the most common reason for centres having to undergo a second monitoring visit.

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

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 expressed appreciation of and made full use of our suggested activities to effectively cover the 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 in order 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 extra opportunities for research and citation for 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 are not particularly helpful as they either 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.

Similarly, most centres have adopted one of the OCR-devised PAG trackers 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 its use and were able to appreciate its benefits. The most recent portable tracker has already found favour with many centres, particularly for those centres using Google Docs and/or Teams as a platform. Where centres have devised their own tracker, these should be sufficiently rigorous to provide the same mapping to the practical skills 1.2.1, use of apparatus and techniques, 1.2.2 and the CPAC, and preferably to provide the same functionality as the OCR trackers.

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*; and 1.2.2(l) *using ionising radiation, including detectors*. For guidance, teachers and technicians should refer to the OCR Physics Practical Skills Handbook Appendix 2: 'Apparatus list'. This appendix lists the apparatus likely to be required in order 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 the laboratory technician, if possible, carry out the activity 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 A – H414

## Areas of improvement

Monitors report an ongoing improvement in practical skills seen during monitoring visits. The impact of the Covid lockdown has been discussed by many teachers who have said that this has impacted both the practical skills and the learning confidence of candidates, particularly for those who complete their A Levels in 2023. However, monitors have been impressed with the quality of the practical work across several of the assessment areas.

Monitors have reported a general improvement in the candidate skills of recording data and drawing geological diagrams. They have also reported that most centres are including more practical activities than previously in their programmes. Many centres have re-established 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 centres, cost is a factor in deciding to complete the fieldwork locally.

The main areas of improvement have been:

- Most candidates now record data in line with guidance in Appendices 3 to 6 of the Practical Skills Handbook. Measurements from instruments are routinely reported to an appropriate resolution and recorded in tables with attention to units, decimal places and appropriate layout.
- Drawings are improving. Most candidates follow most of the conventions outlined on page 4 of the Practical Skills Handbook. There continue to be some issues with drawings (see below) but in most centres this has seen significant improvement.
- Centres are increasingly willing to engage with software. Candidates are routinely using geological databases to collect data.
- 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.

## Issues and areas of concern

Some centres still do not offer sufficient opportunities to fully develop practical competencies to lead to accurate, routine and consistent evidence for all skills. These are the main areas to consider.

- Monitors 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). Centres typically generate a large amount of evidence for data collection skills but opportunities to develop higher order skills in the practical work are frequently omitted. 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.
- 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 make sure that the demand of adapted activities continues to meet the A Level standard set out in Appendices 3 to 7 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 in demand for candidates to securely demonstrate the required skills.
- The assessment of some specific skills is not always accurate. It is to be noted that:
  - All drawings should follow the conventions given in the Drawing Skills Handbook. 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).

- 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. It should be further noted that 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 handwritten work. See Appendix 6 of the Practical Skills Handbook.
- Investigation skills, 1.2.1(a), need to evidence candidates making their own choices and planning their own approach. During lessons, there should be opportunities for 'mini tasks' to develop this area of skill throughout Year 13. It is common for monitors to find no evidence of this skill, even late in Year 13.
- For research and referencing, a 'copy and paste' of factual information in a 'topic' format is too low demand for an A Level course. All research needs to be formally cited using an appropriate reference system. See Appendix 7 of the Practical Skills Handbook. In common with other higher order skills, there are opportunities to do 'mini tasks' to support the development of these skills throughout Year 13. Many centres leave this entirely to PAG 12, which means that they do not have 'routine and consistent' evidence.
- 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 site a wind turbine rather than site Y' or 'Why is Geology of site X different from 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.

## Practical endorsement outcomes

Student attainment of a pass in the practical endorsement has remained high. The combined percentage of candidates achieving a pass in biology, chemistry and physics, across all exam boards, is shown below:

<b>Academic year</b>	<b>Practical endorsement pass rate (%)</b>
2018-2019	98.7
2019-2020	99.3
2020-2021	98.7
2021-2022	98.5

A slight increase in the pass rate is evident for the 2019-2020 academic year. It is likely that this increase in the number of candidates achieving a pass was due to the relaxation of some of the criteria required for a pass due to the pandemic. These relaxations no longer apply, and the outcomes have fallen slightly since.

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