CPAC criteria through questions – extracted from the Edexcel, Guide for Lead Teachers

CPAC 1

1a: *Correctly follows instructions to carry out the experimental techniques or procedures.*

- Can the student follow a worksheet, or method?
  (The scaffolding for a worksheet should be appropriate for the experience of the students in the practical techniques covered)
- Is the student able to do so independently (either individually, or within a pair or small group) without intervention from the teacher?
- Can the student carry out the steps in the right order?
- If the technique or apparatus is new to the student, does (s)he seek appropriate guidance?

As with all the CPAC statements, the emphasis is absolutely on the students carrying out the practical work themselves!

CPAC 2

2a: *Correctly uses appropriate instrumentation, apparatus and materials (including ICT) to carry out investigative activities, experimental techniques and procedures with minimal assistance or prompting.*

- Can students use a range of apparatus / instruments (including some ICT, such as a datalogger, an app, or a computer)?
- Do students use apparatus / instruments with confidence and reasonable accuracy?

2b: *Carries out techniques or procedures methodically, in sequence and in combination, identifying practical issues and making adjustments when necessary.*

- Does the student carry out steps in a practical in the correct order?
- Is the student able to carry out steps together e.g. swirl a flask and operate a burette tap; write down a reading whilst still observing the apparatus?
- Can the student 'fine-tune' the apparatus / technique?

2c: *Identifies and controls significant quantitative variables where applicable, and plans approaches to take account of variables that cannot readily be controlled.*

- If appropriate, does the student consider factors that may affect the experiment, so need to be controlled e.g. by using a water bath; or solutions of the same concentration?
- If not, does the student appreciate the importance of independent, dependent and control variables?

Evidence for 2c may come from written work, such as a planning exercise; or may be ascertained by asking students about control of variable during their practical lessons.

2d: *Selects appropriate equipment and measurement strategies in order to ensure suitably accurate results.*

- Can students choose appropriate apparatus? e.g. if the method requires a measuring cylinder to measure 10cm^3 of liquid, do they select one of an appropriate size?
- Can students determine a suitable range / number of results to collect?
- Are students able to use strategies such as repeat readings and identifying anomalies to improve data?
- Do students consider how to improve the quality of the data that they collect when they evaluate their results?

(Students may, of course, make these adjustments as they undertake the work – in which case, this could also provide evidence for CPAC 2b).

Note that CPAC 2 implies a degree of practical work that is investigative, rather than following very prescriptive steps (CPAC 1). If your worksheets are heavily scaffolded, you may wish to remove some of it, or supplement the practical with e.g. a planning activity before issuing worksheets.

CPAC 3

3a: *Identifies hazards and assesses risks associated with these hazards, making safety adjustments as necessary, when carrying out experimental techniques and procedures in the lab or field.*

3b: *Uses appropriate safety equipment and approaches to minimise risks with minimal prompting.*

- Can students identify any risks or hazards associated with the practical activity?
- Do students work with appropriate care and attention for themselves, for others and for their equipment?
- Do students use appropriate safety equipment when carrying out practical work?
- Do students deal with any accident in a calm and effective manner?

Again, you may see students adjust the procedure to make it safer for them e.g. moving a burette down from the lab bench before filling it. Again, this may provide evidence for CPAC 2b.

CPAC 4

4a: *Makes accurate observations relevant to the experimental or investigative procedure*.

- Do students take and record some data / observations?
- Are these appropriate for the task e.g. if investigating the effect of temperature on the rate of a reaction, the data recorded includes temperature and a dependent variable.

4b: *Obtains accurate, precise and sufficient data for experimental and investigative procedures and records this methodically using appropriate units and conventions.*

- Can students draw up an appropriate table for the data to be collected?
- Can students record the data methodically in these tables, with headings and units?
- Do students collect sufficient data, over a suitable range, and with repeats if necessary?
- Is data collected to a suitable number of significant figures? (Note that there is no hard and fast rule here – and a range of sig figs may be appropriate for the technique or apparatus).
- Where appropriate, is the data collected sufficient in number and accuracy to be able to identify patterns or trends in the data?

(We wouldn't expect students to get the Data Book value, of course!)

CPAC 5

5a: *Uses appropriate software and/or tools to process data, carry out research and report findings.*

- Can students process data e.g. by use of a calculator, data logger or apps?
- Can students use word processing or spreadsheets to produce a write-up, or a plan?
- Can students write a short report, including data analysis, for a practical activity?

5b: *Sources of information are cited demonstrating that research has taken place, supporting planning and conclusions.*

- Do students use a range of resources, including both print and digital?
- Do students include some evaluation of data to support conclusions in any write-up of practical activity?
- Can students use an appropriate format for referencing any research undertaken?
- Are you able to use the students' referencing system to find the same information?

Note that CPAC 5 can be met by research activity, as well as by conclusions based on their data. You may, therefore, including some research activities alongside practical activities. This could even be in the style of a Visit – Issue Report, which some of you will have experience of from the previous Biology and Physics specifications.