

Examiners' Report/
Principal Examiner Feedback

Summer 2015

Pearson Edexcel GCE
in Advanced Physics (6PH06)
Paper 1A and 1B
Experimental Physics

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General Comments

This specification was introduced for teaching in September 2008, so this year was the sixth series, and this year again, the centres using both assessment routes, 1A (moderated) and 1B (externally marked), presented scripts that showed a steady improvement, probably the strongest rise yet.

In this assessment the students are given a briefing paper and asked to produce a plan for a practical investigation; they are then asked to carry out a plan and analyse the data they produce in order to reach a conclusion about the task introduced in the briefing.

Unlike a practical examination, there are no time limits or specified date so the centre can set the task for the students when they feel that they are sufficiently prepared and similarly the centre can choose the task – rather like coursework – instead of the task being set by an examiner. However, the conduct of the task is much more like an examination since the candidate may bring nothing into the laboratory neither may they take anything out in between sessions. So the centre retains a great deal of control over the process, and unlike coursework there is no draft marking, and what the student produces at the time is what is marked.

The candidates should be given a fresh copy of the criteria whilst doing all aspects of the work and a small amount of the work seen suggested again this year that this was not always the case. There should be a line ruled under the completed plan as no planning marks can be awarded after this. Students should be discouraged from writing unnecessarily; there is very seldom any correlation between length and mark and three one hour sessions is usually sufficient for the whole exercise. Although some candidates insist on making points several times, there was not much of an increase in length this year.

There are two assessment routes for this unit; the work can be marked by the centre and a sample moderated by Edexcel (route 1A) or the work can be submitted in its entirety for marking by Edexcel (route 1B). Candidates fared equally well along either route.

There are three distinct aspects to this unit; planning, measuring and analysing. The standard of work in all three aspects is generally good but often candidates missed marks because they did not address the criteria specifically enough and at the level appropriate for A2 candidates. The criteria are necessarily very short since they must be used for a wide variety of work but they need to be applied in quite specific ways and the candidates are expected to develop their skills from AS in the light of these.

There is a guidance document available from the following address:

<http://www.edexcel.com/quals/gce/gce08/physics/Pages/default.aspx>

The document is called 'GCE Physics 6PH06 Notes on assessment criteria' and is found by clicking on Teacher Support Materials and then on Coursework Materials. This document is to give guidance to teachers in preparing candidates and must not be issued to students. There are also podcasts available for further training.

It was more noticeable this year that scripts from any one centre showed a marked similarity to each other and whilst we expect candidates to be trained the same way it was remarkable how many thought the same way too.

It seemed that more centres used the Edexcel briefings that are available from the website and some are using those in the Tutor Support Materials available from the same place. This has led to a greater variety of practical work and we saw the Diode Thermometer a little more frequently this year.

Specific Comments

When **planning**, the drawing of diagrams is a significant communication skill and these were generally satisfactory and occasionally good but what is needed is an indication of the layout of the apparatus, what is not needed is a depiction of individual items such as a stopclock. Rulers should be drawn very close to what they are measuring and dimension lines should be added where appropriate. The justification of their choice of instrument for P5 & P7 remains an area for development; candidates must consider the likely percentage uncertainty in their measurement using their chosen instrument, this will come from the precision of the instrument or the uncertainty introduced by the method employed.

In considering a fair test for P9 candidates should think about their method as well as any additional factors, so initial conditions are important. Candidates usually follow the criteria when writing their plan and it is surprising how many candidates are not awarded P16 because their plan lacks a description of their method – bullet points in a list is fine but they must clearly say that they will vary one thing and measure another.

Implementing and measuring requires candidates to use the number of significant figures appropriate to their choice of instrument and this is the precision they usually quote in the plan. They must refer to the plan; they cannot be awarded the mark M4 unless they do, if they are not going to alter their plan they must say why they think it is working well or they cannot be awarded M4.

Analysing falls into two parts, there are 8 marks for the graph work and the other 10 refer to the analysis and evaluation. Generally the graph work is very good although it is an area where the better candidates always score more marks. Candidates should check that points distant from the line of best fit have been plotted correctly and that measurements for the gradient have been taken correctly – this is made easier when the scale is simple.

Candidates are then expected to use their results in discussing the uncertainties and their final conclusion. This is the area where marks are often lost; in particular A12 which should be a development of P13, the mark is not awarded for a simple re-statement of P13. Comments should reflect on the work carried out.

Candidates should use their results in considering uncertainties and not the precision they quoted in the plan; the uncertainty should come from the range of repeated readings. If there are no repeated readings then the uncertainty is at least the precision of the instrument. The tolerance of a component is not an uncertainty. This year again A13 was awarded less frequently because results were not used in determining the uncertainty.

Light gates will seldom be a suitable improvement worth the mark A15, candidates would do well to draw a diagram to show how the practical

arrangement of their suggestion will work and then explain why it improves their measurement.

A16 should be a conclusion to the work and should include the final value for the constant found for A5 and for A17 candidates should refer to the quality of the data and consider how clear is their conclusion in relation to the original aim.

For centres choosing route A, it is important to award marks only for a standard of work high enough for A2 and which shows a development from AS. The marks are awarded for how well the student fulfils the criteria and not for simply carrying out the task; this is the largest single reason for a centre to be moderated down.

It is a great help to the moderator if plots on graphs are checked and then underscored to show they are correct, an incorrect plot should be ringed. Similarly gradient calculations need to be closely checked and lines of best fit should not be forced through the origin or simply join the top and bottom plots. Where the criteria use the words *discuss* or *explain* or *comment* then the candidate should only be awarded the mark if they do significantly more than *state* their case. All these should be in the context of their practical work and not simply be generic ideas.

Candidates who scored high marks on this unit had clearly practised on similar tasks. Just as with a theory paper candidates do better when they rehearse the 'real thing'.

Administration comments

It was difficult to give some candidates credit because the briefing sheets were not included, this can sometimes reduce the mark awarded. Each candidate's work should have the candidate's briefing paper attached along with the signed Candidate/Student Record Sheet plus any other papers that were issued such as an Edexcel plan; for route 1A the mark sheet should be with these as well. It is a good idea to check that the marking grid agrees with the mark on the script.

Please ensure your materials are sent to the examiner/moderator by the due date, usually May 15th

Please note that there is a new-ish form for the Student Record Sheet, available

from the coursework materials section at

<http://www.edexcel.com/quals/gce/gce08/physics/Pages/default.aspx>

It is a great help to all if the candidates can write on only one side of the paper in black ink. Each sheet should be named and numbered in order and all the sheets connected with a long treasury tag.

Centres are showing an increased awareness of what is needed to satisfy the criteria, for example in writing about their choice of instrument in P5 & P7 but were frequently optimistic when considering A17 & A18.

Many candidates could improve by looking closely at P13, M1, M2, A12 and A15.

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:

<http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx>

