SCOTTISH QUALIFICATIONS AUTHORITY

Principal Assessor Report 2003

Assessment Panel:	Physics
Qualification area:	
Subject(s) and Level(s) Included in this report	Physics Standard Grade, General and Credit

Statistical information: update

Number of entries in 2002	
Pre appeal	19,730

Number of entries in 2003	
Pre appeal	19,161

General comments re entry numbers

The number of entries is some 569 down on last year, returning to approximately the numbers that were presented in the period 1999 — 2000.

There seems to be some evidence that a significant number of candidates who were presented achieved only Grades 5, 6 and 7 in the subject. This was particularly noticeable in the Knowledge and Understanding element.

It may be that some centres are presenting some candidates for Standard Grade Physics (which is only examined at Credit and General levels) who in the past may have been presented for Standard Grade Science (examined mainly at General and Foundation levels). This does not appear to benefit many of these candidates.

Grade boundaries at C, B and A for each subject area included in the report

	Lowest mark	
Grade for element	**Knowledge & Understanding**	**Problem Solving**
1	35 (out of 50)	33 (out of 50)
2	24 (out of 50)	23 (out of 50)
3	22 (out of 40)	20 (out of 40)
4	15 (out of 40)	16 (out of 40)
5	12 (out of 40)	13 (out of 40)
6	Grade not available for individual element	
7	-	-

Comments on grade boundaries for each subject area

All the grade boundaries are closer to the '*a priori*' grade boundaries (70% for the upper grade and 50% for the lower grade in each element for each paper) than has been achieved for the last three years. The 1/2 Knowledge and Understanding grade boundary is exactly on the '*a priori*' value, as well as being exactly the same as the teachers' estimate mark.

Comments on candidate performance

General comments

General Paper It was felt that this paper in general was very good and well balanced, if somewhat wordy compared to some previous years. Markers found it easier to mark than some past papers. One adverse comment was that the coverage of the syllabus could have been better, with two questions covering $F = ma$, albeit being taken from different Units of the Course.

Credit Paper This was considered overall to be an acceptable paper, although some commentators felt that there was too much emphasis on energy and efficiency.

Neither the General nor the Credit paper showed any evidence of candidates performing better in the Units of work in the earlier part of the Course (Telecommunication, Using Electricity, Health Physics), in comparison to the latter part of the course, as has been evidenced in the past.

Lack of time did not appear to be a factor for any candidates in either paper.

Areas of external assessment in which candidates performed well

- As would be expected, and has been evident in the past, candidates performed better in the lower-order objectives such as knowledge and comprehension. General Q7, Q8(b), Q9(a), Q11(a), Q12(a), Q13(b), (e), Q14(a), Q19(a) and Credit Q7(a), (d), Q8(a), Q9(a), (b), Q12(a), Q14(b)(i) being examples of knowledge-type questions in which candidates performed well.
- Selecting and presenting information was also well done, in particular in General Q9(a), (c), Q14 and Credit Q14.
- Straightforward calculations, using a single relationship that has been well drilled into candidates, continue to be well done in general, although some other calculations proved to be somewhat challenging (see next section). The calculation-type questions in which candidates generally performed well include General Q9(b) (although not an insignificant number of candidates would have benefited by checking their answers to see if they were reasonable — according to some candidates the saving in replacing one lamp was as high as £8,408,600 per annum!), Q10(a), Q15(b), Q16(a)(i), (b)(i), Q19(b) and Credit Q2(a), Q3(b), Q6(b), Q10(b), Q12(b), Q15(a).

Areas of external assessment in which candidates had difficulty

- The higher order educational objectives (synthesis, description, explanation and evaluation) were the areas in which candidates had most difficulty. For example:
  - General Q8(c) — without being given a word bank, candidates found this question difficult, although it is a straightforward knowledge question.
  - General Q10(c)(i), Q18(b)(i), Q19(c), Credit Q2(d), Q6(d), Q8(c)(i), Q9(c), Q15(b) all asked candidates to give an explanation, and all caused difficulty for a large number of candidates.

- Units, and unit conversions, still cause difficulty to some candidates.
  - General Q10(b) required candidates to convert kilohms to ohms and was poorly done by many.
  - In General Q15(b) and Q19(b), a significant minority of candidates unnecessarily converted kilograms to grams.
  - In Credit Q5(b), the majority of candidates omitted to convert the given focal length into metres, and so obtained the wrong value of lens power.

- Several questions that were considered to be straightforward were in the event poorly answered by many candidates.
  - General Q9(d)
  - General Q11(b) — only a tiny minority of candidates gained full marks for this question. The question was worded in such a way that it was imperative to state that the tester itself had been checked (by, for example, joining the probes together and observing the lamp). Hardly any candidates mentioned this.
  - General Q16(b)(ii) — A lot of candidates did not use the fact that only one mark was allocated and so a simple addition of two, previously obtained, values was all that was required.
  - General Q15(a), Q17 — Perhaps these questions were poorly answered by a lot of candidates because the work examined in them may have been taught in S1/S2 Science classes, and not covered again in Standard Grade Physics.
  - Credit Q1(a) was meant to ease candidates into the Credit paper, with three easy marks! As it was, the most common mark gained was ½ out of 3. It is impossible for candidates to label angles of incidence and reflection without drawing in the normal at the point of contact — yet most of them tried to, by labelling rays as angles, in the majority of cases.
  - Credit Q2(d) — This is a knowledge learning outcome, indeed the only one in Telecommunication at Credit level. The majority of candidates who gained any marks in this question did so by saying that "They are both equal to speed", or similar, without making any attempt to answer the question as asked.

- Once again, questionable Physics thinking was observed, as well as careless reading of the question asked.
  - General Q12(b) — This question is posed in terms of the physical properties of thermometers in general, as is required by the learning outcome. It is a pity that the majority of candidates answered the question that they wanted to answer (in terms of a specific type of thermometer — "has a kink", "is made of glass", etc.) rather than the question that was asked.
  - Credit Q3(a)(i) — A significant proportion of candidates are still quoting the mains voltage as 240 V. (Worryingly, a large number also gave the figure of 170 V for this particular question.)
  - Credit Q7(a) — Half-life defined in terms of 'radioactivity' or 'count rate', not 'activity'.
  - Credit Q 8(c)(ii) — "bigger resistor" meaning "greater resistance".

Recommendations

Feedback to centres

- Encourage candidates to have a 'feel' for the work they are doing and, before carrying out a calculation, have an idea of the sort of answer expected. (eg —— annual saving of £8,408,600 per annum by replacing one lamp is clearly excessive)
- Many candidates make fundamental Physics errors in the units of the quantities used in calculations (for example unnecessarily converting a mass given in kilograms into grams, and then applying $F = ma$ with the answer given as newtons, or failing to convert a focal length given in centimetres into the correct SI unit of metres).
- Encourage candidates to judge how much work is expected for an answer by looking at the total marks allocated.
- All learning outcomes mentioned in the 'Arrangements' document can be assessed. Because a learning outcome has not been assessed in the past is no indication that it will not be assessed in the future.
- Modify any past papers, textbooks etc. that still give the mains voltage as 240 V to the correct value of 230 V. Knowing this value is a learning outcome for Standard Grade Physics.