Principal Assessor Report 2002

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 2001	
Pre appeal	19308
Post appeal	19272

Number of entries in 2002	
Pre appeal	19675
Post appeal	Not available

General comments re entry numbers

The entry numbers are higher than they have been for the last four years, 403 up on the number of entries at the corresponding time last year. This reverses the slight downward trend in presentation numbers of the last few years.

General comments

There was some evidence that, although the entry numbers were increased, this increase was largely made up of candidates who eventually achieved only Grades 5, 6 and 7 in the subject.

There was a significant 'tail' of candidates who, while they did poorly in both of the externally-assessed elements of Knowledge & Understanding and Problem Solving, did noticeably better in Problem Solving than in Knowledge & Understanding – often taken as a sign of inappropriate presentation.

Grade boundaries for each subject area included in the report

Grade for element	Lowest mark	
	Knowledge & Understanding	Problem Solving
1	32 (out of 50)	38 (out of 50)
2	22 (out of 50)	28 (out of 50)
3	22 (out of 40)	23 (out of 40)
4	14 (out of 40)	19 (out of 40)
5	11 (out of 40)	16 (out of 40)
6	Grade not available for element	
7	–	–

Comments on grade boundaries for each subject area

Grade boundaries for both externally assessed elements are similar to previous years.

Comments on candidate performance

General comments

General Paper

It was felt that overall this paper was a little on the easy side, although some teachers in one Council area reported that some of their candidates felt that this paper was more difficult than the Credit Paper. This view was not held by other candidates or by the marking team, nor indeed was it evident in the statistics available giving teachers' estimates and actual marks gained in both the General and Credit papers.
Despite being a slightly easier paper, the Examining Team also noted that it was difficult for candidates to gain full marks, because of the requirement for precision in some of the questions.

Credit Paper

It was felt that this paper had a good balance of more searching questions in all of the Units of Physics. Despite having some questions that required candidates to read longer passages (although overall the paper was shorter than in past years), there was no evidence that candidates were disadvantaged.

There was no evidence that candidates ran out of time for this paper, but in a significant minority of scripts there were questions not attempted, usually about 2/3 of the way through the paper. This seemed to indicate that these candidates perhaps had been presented at an inappropriate level and were not able to cope with these more demanding questions.

Areas of external assessment in which candidates performed well

- As in past years, candidates performed best in calculation type questions. General Q 8 (b) and General Q 11 (b) being particularly well done.
- Candidates did well in questions testing basic circuit symbols, as in General Q 10 (a) and Credit Q 8 (c).
- Selecting and presenting information, in particular General Q 12 (a) was very well done, as were General Q 17 (b), General Q 19 (b), Credit Q 3 (b) (ii) (A), Credit Q 8 (a) and Credit Q 10 (a).
- There was a very welcome increase in the number of candidates doing well in the Electronics questions. This was particularly in evidence in General Q 13, on Input and Output devices, and in Credit Q 7, on Input devices and Logic gates. There was a noticeable improvement compared to past years in candidates' responses to the question on the voltage divider.
- Telecommunications questions were generally well done, both in the General paper – Q 8 and Q 9 (a), and in the Credit paper – Q 1 and Q 2 (although unit conversions caused difficulty to some candidates).
- The resistors in parallel calculation, Credit Q 11 (c) (ii) was particularly well done.

Areas of external assessment in which candidates had difficulty

- Candidates too often only have a vague idea of the definitions of the physical quantities that they are using. General Q 9 (b) in particular was very badly done in most cases. Similarly, general Q 14 (b) was badly done.
- In some instances, candidates showed some vague understanding but did not communicate their ideas clearly enough. In Credit Q 5 (a) (i), for example, a lot of candidates tried to explain what is meant by ultrasound, without mentioning 'frequency' – "Sounds above hearing level" is too vague to be acceptable at Credit Level.
- The 'Heat in the Home' section of 'Energy Matters' seemed to cause great difficulty to a large number of candidates. Both General Q 18 (b) and (c) and Credit Q 12 were poorly answered by a lot of candidates. In General Q 18, it was common to see answers in which candidates talked about 'cold heat'; 'cold energy'; 'absorbing the cold'; 'cold air escaping or entering'. In Credit Q 12, many candidates showed that they were unfamiliar with $E = ItV$
- The rocket principle, as assessed in General Q 20, is not understood by the majority of candidates.
- Unit conversions frequently cause problems, for example MHz and km to Hz and m, respectively.
- Candidates continue to gain fewer marks in explanation-type questions, such as Credit Q 4 (d) (ii) and Credit Q 5 (b) (i).
- Credit Q 6 about refraction of light through glass shapes was frequently badly done, mainly because of a lack of basic knowledge, such as an understanding of the normal.

Areas of common misunderstanding

- The distinction between a physical quantity and its unit, as evidenced in the responses to general Q 9 (b) and Credit Q 13 (a) – speed is not defined in terms of the metre, nor is gravitational field strength defined in terms of the kilogram.
- A significant number of candidates confused 'sound level' with 'frequency' in General Q 12 (b), and gave an answer in terms of upper or lower threshold of hearing.
- The inclusion of the word 'minimum' in General Q 15 (b) was to help candidates. In some cases, however, candidates have misinterpreted this and a force of 401 N (i.e. 1 N greater than the weight of the sheep) was a common wrong answer.
- Credit Q 3 (a) (i) (and other questions) showed that most candidates had been 'well drilled' in quoting an answer to an appropriate number of significant figures. However Credit Q 3 (a) (ii) showed that significant figures do not mean much to a lot of candidates – when two calculations gave results that were not exactly equal (except when significant figures were taken into account) a lot of candidates noted a trend where none existed.

Recommendations

Feedback to centres

- While candidates are showing that they can use physical quantities when they appear in 'routine' calculation-type problems, there is evidence to show that with a significant number of candidates there is not an understanding of these quantities. Candidates need to have a basic understanding of the quantities involved in Standard Grade Physics.

- Conversion of units continues to cause problems to significant numbers of candidates. There are two common errors – forgetting to convert, for example MHz to Hz, and doing the conversion incorrectly. Both errors cause the candidate to lose ½ mark. Centres should continue to stress the need to convert quantities correctly, **only** when required (a significant minority of candidates still convert kilograms into grams), and to include a correct unit in the final answer to a calculation question.