Principal Assessor Report 2004

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 2003	19136

Number of entries in 2004	18170

General comments re entry numbers

The number of entries is down by 966 on last year, continuing the fall in uptake that started in 2003.

There does not seem to be the same evidence as was apparent in 2003 of a significant number of candidates being presented for Standard Grade Physics at an inappropriate level.

The fall in uptake in Physics is 5.0%, while the fall in uptake across all Standard Grade subjects is 4.4%. These changes have been largely attributed to a switch by centres away from presenting candidates at Standard Grade to presenting at Intermediate 1 and 2 levels, notably in the case of Physics at Intermediate 2 Level.

Statistical Information: Performance of candidates

Distribution of awards

		Grade 1		Grade 2		Grade 3		Grade 4		Grade 5		Grade 6		Grade 7	
Year	Entries	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.
2004	**18170**	**33.2**	**6035**	**26.4**	**4800**	**23.2**	**4219**	**7.7**	**1404**	**4.6**	**827**	**3.2**	**538**	**0.4**	**68**
2003	19161	27.0	5173	26.4	5059	24.7	4733	9.8	1878	6.1	1169	4.1	786	0.3	57
2002	19730	29.9	5899	26.4	5209	24.2	4775	8.4	1657	5.3	1046	3.4	671	0.4	79
2001	19308	30.4	5870	25.5	4924	25.3	4885	9.3	1796	4.3	830	2.7	521	0.3	58
2000	19232	29.3	5635	20.7	3981	26.5	5096	9.4	1808	2.6	500	5.7	1096	0.2	38
1999	19419	30.2	5865	25.9	5030	25.0	4855	9.9	1922	4.3	835	3.0	853	0.4	78

Comments on any significant changes in percentages or distribution of awards

The percentage of candidates achieving a Credit grade award (grades 1 and 2) is 59.6% - up 6.6% on last year and back to the level of 2002, 2001 and 1999.

The percentage of candidates achieving an award at grades 1 to 4 (i.e. Credit and General grades) is 90.6% - 2.6% up on last year, 1.6% up on 2002, and similar to 2001.

These changes reflect the perceived return of the cohort to be again comparable to the years 2002 and 2001.

Grade boundaries for each subject area included in the report

Standard Grade			
Assessable Element –	**Knowledge and Understanding**		
Grade	**Maximum Mark**	**Minimum Mark for Grade**	**% Mark**
1	50	34	68
2	50	24	48
3	40	25	62.5
4	40	19	47.5
5	40	16	40
6	Grade not available for individual element		

Standard Grade			
Assessable Element –	**Problem Solving**		
Grade	**Maximum Mark**	**Minimum Mark for Grade**	**% Mark**
1	50	35	70
2	50	22	44
3	40	22	55
4	40	18	45
5	40	15	37.5
6	Grade not available for individual element		

Comments on grade boundaries for each subject area

Grade boundaries this year have once again moved towards the '*a priori*' grade boundaries.

A welcome move this year is a noticeable shift of the grade boundaries for the General Level paper towards the 70%/50% of available marks. There had been some concerns expressed in past years about the minimum mark needed to achieve a grade 3 or 4, particularly in Problem Solving. The General Level paper this year has gone some way to addressing these concerns.

Comments on candidate performance

General comments

It was felt that the General Level paper was more accessible to the slightly weaker candidates, especially in the Problem Solving element. Coverage of the syllabus was felt to be good – there were no areas of the syllabus being highlighted as not being addressed adequately.

Similarly, the Credit Level paper gave suitable coverage of the syllabus and seemed to be set at the appropriate level. One or two markers commented that they thought that some parts of some questions were not set at the correct level (being set at too low a level), but this does not seem to be the experience of the candidates who sat the paper.

Candidates seemed to perform marginally better on Knowledge and Understanding than on Problem Solving, as is usually the case. However the difference this year was not as marked as in some previous years.

There was no evidence of candidates performing better in the earlier part of the Course – indeed there were some excellent responses to questions from the Space Physics Unit.

As in previous years, virtually all candidates seemed to have adequate time to answer all questions at both General and Credit Levels.

Areas of external assessment in which candidates performed well

As is generally the case, candidates performed better in the questions assessing lower-order objectives such as knowledge and comprehension. This often meant that the first parts of multipart questions were answered better than the later parts.

Examples of questions in which candidates performed well are:
In the General paper:
Q2 (thermometer); Q4 (Newton balance); Q5 (ISS) – surprisingly; Q6(a) (energy transformations); Q7(a) (firework); Q8(a)(i) (current in variable resistor); Q9(a),(b) (food mixer); Q10 (camping light); Q13 (LDR); Q14(b) (trolley on slope) – again, surprisingly; Q15(a),(b) (electronic block diagram); Q16(b) (renewable energy); Q18(b) (telescope).
In the Credit paper:
Q1(a) (wavelength); Q2(a) (TV receiver); Q4(a) (car wiring); Q5(a) (amplifier); Q6(b),(c) (lenses); Q8 (digital logic) – better than in the past for logic gate questions, although one candidate thought that the gate was a BUT gate; Q9(c) (speed-time graph); Q11(b) (heat); Q15(b) (EM spectrum).

In general, the straightforward application of a single relationship is well done, as is selecting and presenting information.

Areas of external assessment in which candidates had difficulty

- Units and unit conversions still cause many candidates to lose marks.
  Questions such as:
  General Q11(a) ‘Suggest a frequency …’
  General Q17(c) ‘State the voltage …’
  Credit Q1(b)(ii)(A) ‘State the speed …’

Credit Q11(a) 'State the value of room temperature.'
are all worth one mark if the number and unit is given, zero marks if the number alone is given. Far too often candidates do not pick up these marks because of the unit omission.
In Credit Q3(b)(ii)(B), far too many candidates converted 250 mA to 250 000 A or even 250 000 000 A – showing basic lack of any 'feel' for the work they are doing.

- Some questions that were considered to be relatively straightforward were found not to be so by a large number of candidates. General Q1 and General Q3 were intended to settle candidates at the start of the exam. Surprisingly large numbers of candidates got them wrong.

- Loose language and vague answers were seen frequently.
  General Q7(b) – 'The speed.' Of the firework/of sound/of light?
  Q8(c) – 'In a light.' But to do what in a light?
  Q11(e) – 'Ultrasound scan.' Of what? Or 'To see a baby.' Where? Or 'To see a baby in its mother's stomach.' The general understanding is lost through inaccuracy.
  Q12(c) – 'Don't eat radioactive sources.'
  Credit Q3(a) – 'To produce electricity.' Not acceptable at Credit Level.
  Q9(c)(i) – 'Catching wind.' Seen frequently.
  Q12(a)(ii) – 'Smaller or lower resistor/capacitor' is not acceptable for 'A lower value of resistance/capacitance.'
  Q13(a) – Radiation, as mentioned in the question, does not have to be ionising radiation. Too many answers of 'alpha' or 'beta' being detected by a refracting telescope!
  Q13(c) – 'In the middle.' This is not precise enough; some reference to the focal point is required.
  Q14(b) – 'Gravity.' Again, not precise enough. Does this mean the acceleration due to gravity or the force of gravity?
  Q15(c) – 'Bones.' Not used as a detector of X-rays, except in candidate-speak.

- Explanations again proved to be the most testing type of questions – at both General and Credit Levels.

- Finally, a special mention for the calculation that always attracts a very poor response – that of the resistance of the series resistor with the LED, Q12(b) this year. Only about 5% of all candidates gained the full 3 marks for this straightforward calculation, a figure on a par with the response in every other year that this calculation has been asked.

Recommendations

Feedback to centres

- Encourage candidates to have a 'feel' for the work they are doing. This particularly applies to unit conversions – mA converted as if they were MA is more than just an arithmetical slip – it is a fundamental error in the understanding of Physics.

- On a not too dissimilar theme, encourage candidates to look at a numerical answer and try to decide whether it is feasible.
  Markers were this year asked to report on the largest saving by the farmer in using a wind-powered generator for 8 hours (General question 16(a)(ii) – answer £14.40). Savings ranging from 0.8 p to £540 000 000 were seen by markers.

- Impress on candidates the need to state the unit for all physical quantities.

- As far as possible, ensure that candidates know the difference between questions which ask for an explanation and those which require a description.