Principal Assessor Report 2004

Assessment Panel:	**Physics**

Qualification area

Subject(s) and Level(s) Included in this report	**Physics Higher**

Statistical information: update

Number of entries in 2003	9484

Number of entries in 2004	9286

General comments re entry numbers

There has been a small decrease of 198 (2.1%) candidates from 2003.

Statistical Information: Performance of candidates

Distribution of awards

Higher			
Year	A	B	C
2004	27.8% (2578 candidates)	21.1% (1962 candidates)	23.6% (2193 candidates)

Comments on any significant changes in percentages or distribution of awards

The distribution of awards is not significantly different from 2003.

Grade boundaries for each subject area included in the report

Distribution of awards	%	Cum %	Number of candidates	Lowest mark
A	27.8	27.8	2578	59
B	21.1	48.9	1962	47
C	23.6	72.5	2193	35
D	10.0	82.5	926	29
No award	17.5	100.0	1627	

General commentary on passmarks and grade boundaries

- While SQA aims to set examinations and create mark schemes which will allow a competent candidate to score a minimum 50% of the available marks (notional passmark) and a very well-prepared, very competent candidate to score at least 70%, it is almost impossible to get the standard absolutely on target every year, in every subject and level
- Each year we therefore hold a passmark meeting for each subject at each level where we bring together all the information available (statistical and judgmental). The Principal Assessor and SQA Qualifications Manager meet with the relevant SQA Business Manager and Statistician to discuss the evidence and make decisions. The meetings are chaired by members of the senior management team at SQA
- We adjust the passmark downwards if there is evidence that we have set a slightly more demanding exam than usual, allowing the pass rate to be unaffected by this circumstance
- We adjust the passmark upwards if there is evidence that we have set a slightly less demanding exam than usual, allowing the pass rate to be unaffected by this circumstance
- Where the standard appears to be very similar to previous years, we maintain similar grade boundaries
- An exam paper at a particular level in a subject in one year tends to have a marginally different set of grade boundaries from exam papers in that subject at that level in other years. This is because the particular questions are different. This is also the case for exams set in centres. And just because SQA has altered a boundary in a particular year in say Higher Chemistry does not mean that centres should necessarily alter boundaries in their prelim exam in Higher Chemistry. The two are not that closely related as they do not contain identical questions
- Our main aim is to be fair to candidates across all subjects and all levels and maintain standards across the years, even as syllabuses evolve and change

Comments on grade boundaries for each subject area

The markers considered the 2004 Paper to have a good balance and standard but to be more demanding than the 2003 Paper. Markers commented that a significant number of candidates seemed to have had insufficient time to complete the paper properly.

The mean mark for Section A was 12.1, 0.1 marks lower than last year whereas the mean for Section B was 34.5, 7.2 marks lower, giving an overall decrease of 7.3 marks.

The lowest mark for a grade A was set at 59 (66%) which is 3 marks lower than that calculated from centre estimates.

The lowest mark for a grade C was set at 35 (39%) which is 4 marks lower than that calculated from centre estimates.

The grade boundaries for A, B and C at 66%, 52% and 39% are all below the notional boundaries and reflect the overall difficulty of this years paper.

Comments on candidate performance

General comments

A number of markers reported that some candidates had been unable to complete the paper and had either not attempted the last question or had made a very poor attempt at what was considered to be a straightforward question.
Candidates found the qualitative responses to questions to be the most difficult. Calculations were performed to a good standard while the quality of English was acceptable.
Candidates seemed to perform better with regard to giving an appropriate number of significant figures in final answers compared with previous years.

Areas of external assessment in which candidates performed well

Questions 4, 7, 8, 16 and 17 in the multiple-choice section of the paper were particularly well done.

Question 21 – Candidates generally performed well with parts (a), (b) (i) and (c) of this question.
Question 22 – Most candidates responded well to part (a), which was based on the equations of motion.
Question 23 – Parts (a) and (b) (ii) of this question were generally well done.
Question 25 – In part (a) most graphs were correctly labelled and an origin shown. In part (b) (i) the energy stored in the capacitor was well done.
Question 26 – In parts (a) and (c) most candidates demonstrated good knowledge of the relevant calculations.
Question 27 – The calculations for parts (a) (i) and (b) were generally well done.

Areas of external assessment in which candidates had difficulty

Question 15 in the multiple-choice section of the paper was poorly done.

Question 21 – In spite of the lead in to this question many candidates did not give a direction in (b) (ii) and very few gave a direction in (b) (iii).
Question 22 – In part (b) most candidates worked out the peak current and then used this value in the P = IV calculation.
Question 23 – In part (b) (i) a significant number of candidates used gravity as a label equivalent to 'gravitational force' or 'weight'. In part (c) most candidates did not give sufficient detail for full marks.
Question 24 – In part (a) (i) a large number of candidates calculated the circuit current by dividing 9 by 2. Answers to parts (a) (ii) and (b) suggest that many candidates do not understand the concept of internal resistance and lost volts.
Question 25 – In part (b) (i) most candidates only worked out the voltage across the resistor. In part (c) although most candidates knew that the resistance or resistor value had to be lowered many used imprecise language such as 'use a smaller resistor' or 'lower resistor'. In part (d) most candidates did not give sufficient detail for full marks.
Question 26 – Candidates in 26 (b) (ii) had difficulty explaining, the sequence of events taking place in the circuit to switch on the alarm.
Question 28 – Candidates had difficulty describing what is meant by *stimulated emission* and how amplification is produced in a laser. In part (b) many candidates used $\theta = 37°$ in the calculation.
Question 29 – In part (b) many candidates were under the impression that electron-hole pairs were produced at the junction of a diode. The unfamiliar situation of part (c) confused many candidates.
Question 30 – Reponses to part (b) involved many candidates mentioning reactions. In part (c) some candidates were careless with arithmetic and many truncated the mass values.

Recommendations

Feedback to centres

- Unless a magnitude is asked for, vector quantities such as velocity require a direction.
- Where a question requires a calculation in order to verify the value of a quantity the calculation must show all the steps in the calculation and the final value.
- Candidates should show the origin and label the axes on sketch graphs.
- Care should be taken with the figures involving fusion and fission reactions. The value of masses in these calculations must not be truncated.
- Most candidates require practice in questions requiring a description and an explanation.
- Candidates should not truncate numerical answers e.g. the figure 1.125×10^5 N to three significant figures is 1.13×10^5 N not 1.12×10^5 N.
- When two or more attempts have been made at the same part of a question, candidates should score through the unwanted part(s) of an answer they do not wish to be considered.