External Assessment Report 2011

Subject	**Physics**
Level	**Intermediate 2**

The statistics used in this report are pre-appeal.

This report provides information on the performance of candidates which it is hoped will be useful to teachers/lecturers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding. It would be helpful to read this report in conjunction with the published question papers and marking instructions for the Examination.

General comments

Feedback from Markers, teachers and students considered the examination as a fair and well balanced assessment. In addition to numerical and descriptive questions, candidates were also required to draw a graph and complete a light-ray diagram. These were generally well done. Questions were set in varying scenarios which tested fundamental principles and Learning Outcomes within the Arrangements for Intermediate 2 Physics. Integration featured widely in appropriate contexts. There was little evidence of poorer performance in any one area, which indicated good preparation of candidates by presenting centres.

Questions requiring candidates to perform calculations were answered well, and equations were transposed accurately for the most part, however, there were many who substituted incorrect data. There were many instances of candidates failing to convert units and ignoring prefixes. Many candidates are also still underperforming in questions requiring definitions, explanations and descriptions.

The paper was accessible to all candidates, and there was no evidence of a lack of time.

Areas in which candidates performed well

In general, the multiple-choice questions were answered well with candidates achieving an average test score of 13·3. The following multiple-choice questions had very high facility values: 1, 2, 3, 4, 5 and 9. These mainly involved an understanding of basic knowledge.

In the written part of the paper, responses to the following questions were particularly good:

Question 21 (a): Most candidates were able to calculate the time of flight.

Question 24 (a) (i) and (ii): These questions generated good responses.

Question 28: This question was generally answered well but some candidates were careless in stating the energy change in a solar cell — some quoted 'solar energy to electricity'. Also, some candidates substituted $v = 0{\cdot}5$ into $v = f \times \lambda$ instead of 3×10^8 m/s. They had confused voltage with velocity.

Question 29: All parts to this question were generally answered well but quite a few candidates forgot to convert km into metres in (a)(ii) and to convert the time into seconds in part (b).

Areas which candidates found demanding

In the multiple-choice section, Questions 6, 8, and 18, were poorly done. These covered Ohm's law (graph), facts about mains electricity and the half-life of a radioactive isotope. Candidates found it difficult to select the appropriate information to answer the questions correctly. In Question 18, the most common option selected indicated that candidates had forgotten to consider that the first count rate was recorded at 10 minutes.

In the written part of the paper, responses to the following questions posed particular difficulties for candidates:

Question 21: This was a straightforward introductory mechanics projectile question involving time of flight (well answered) vertical speed, and distance. However, there were poor responses to part (b) and very few were able to calculate the vertical distance in (d).

Question 22 (a): The correct definition of acceleration requiring the change of velocity with a change in time was very poorly answered. This poor standard was repeated in part (ii) where candidates showed their lack of understanding of the concept of acceleration. In part (b), many candidates correctly calculated the magnitude of the resultant acceleration but failed to provide a direction for the vector.

Question 23 (c): Again, many candidates calculated the correct resultant force on the aircraft but forgot the direction.

Question 23 (d): In defining ionisation, many answers referred to the addition or removal of an electron without mentioning the atom.

Question 24 (b)(i): Few candidates gave a correct explanation as to why the accepted value and the experimental value of the specific heat capacity of water differed.

Question 25 (c): Many candidates did not realise that the voltage across resistors in parallel is the same for each.

Question 26 (a): The explanation of a.c. and d.c. in terms of electron flow was poorly answered.

Question 27 (a): The purpose of the resistor in the LED circuit was not explained properly in many cases.

Question 27 (b): Candidates frequently forgot to subtract the voltage of the LED from the supply voltage which resulted in many candidates only scoring ½ mark for a correct equation $V = I R$.

Question 30 (c): Again another explanation which was not well answered, requiring an understanding of long sight.

Question 31 (c) and (d): Many candidates did not understand the structure of a beta particle and an alpha particle.

Question 31 (f)(i): Many failed to realise that the source could be emitting alpha particles in addition to beta radiation.

Advice to centres for preparation of future candidates

General

- Ensure that candidates know and understand the appropriate definitions given in the content statements.
- Provide time for candidates to draw vector diagrams, ray diagrams and graphs. Also, remind candidates of the rationale for drawing graphs and the significance of the shape of the line.
- As in previous years, candidates tended to provide careless and minimal responses in the 'describe and explain' questions. More opportunities could be given in class for candidates to demonstrate understanding of basic concepts. Remind candidates that they must give full and accurate solutions, especially in answers where two marks are awarded. A standard '2 mark answer' requires a formula (1/2), correct substitution (1/2) and a numerical answer with the correct unit (1). Naturally, a candidate will achieve full marks by supplying the correct answer but is at risk of losing a lot of marks if the full solution is not supplied and an arithmetic error has occurred. Answers must also be clear and legible. Several candidates were disadvantaged because their writing was illegible.
- Candidates should practise using all the prefixes listed in the content statements for the Intermediate 2 Course, and be able to enter them into their calculators correctly. Also, they should not attempt any unnecessary conversions, eg kilograms into grams. Many forgot to convert km into metres.
- Remind candidates to include units in the final answers, and encourage them to check that they are the correct units. Weight is still often answered in kg. Vector quantities must include direction.
- Attention must be also given to the inappropriate rounding of numerical answers and the use of too many significant figures.

Statistical information: update on Courses

Intermediate 2

Number of resulted entries in 2010	3,905

Number of resulted entries in 2011	4,083

Statistical information: Performance of candidates

Distribution of Course awards including grade boundaries

Distribution of Course awards	%	Cum. %	Number of candidates	Lowest mark
Maximum Mark 100				
A	35·7%	35·7%	1,456	70
B	17·3%	53·0%	708	60
C	17·6%	70·6%	718	50
D	8·1%	78·7%	331	45
No award	21·3%	100·0%	870	-

General commentary on grade boundaries

While SQA aims to set examinations and create marking instructions which will allow a competent candidate to score a minimum of 50% of the available marks (the notional C boundary) and a well prepared, very competent candidate to score at least 70% of the available marks (the notional A boundary), it is very challenging to get the standard on target every year, in every subject at every level.

Each year, therefore, SQA holds a grade boundary meeting for each subject at each level where it brings together all the information available (statistical and judgemental). The Principal Assessor and SQA Qualifications Manager meet with the relevant SQA Head of Service and Statistician to discuss the evidence and make decisions. The meetings are chaired by members of the management team at SQA.

The grade boundaries can be adjusted downwards if there is evidence that the exam is more challenging than usual, allowing the pass rate to be unaffected by this circumstance.

The grade boundaries can be adjusted upwards if there is evidence that the exam is less challenging than usual, allowing the pass rate to be unaffected by this circumstance.

Where standards are comparable to previous years, similar grade boundaries are maintained.

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, and the mix of questions, are different. This is also the case for exams set in centres. If SQA has already altered a boundary in a particular year in say Higher Chemistry this 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.

SQA's main aim is to be fair to candidates across all subjects and all levels and maintain comparable standards across the years, even as Arrangements evolve and change.