External Assessment Report 2013

Subject(s)	Physics
Level(s)	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.

Comments on candidate performance

General comments

Feedback from markers, teachers and examiners considered the examination as a fair and well balanced assessment. The standard of the paper was deemed to be a suitable combination of challenging and straight-forward questions. In addition to numerical and descriptive questions, candidates were also required to use information from a graph for mathematical processing. Completion of a light ray diagram was also tested.

Questions were set in varying contexts which assessed 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 centres.

Questions requiring candidates to perform calculations were generally answered well, and equations were transposed accurately for the most part. However, there were many who substituted incorrect data (as detailed later in specific questions). 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. This was mainly due to imprecise and careless responses. Some candidates lost marks because of illegible handwriting.

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 11·7. The multiple-choice questions 2, 3, 5,10, 13 and 19 had very high facility values. These covered distance and displacement, gravitational field strength, resultant force, voltage and current calculations, the electromagnetic spectrum and the definition of ionisation. They required an understanding of basic knowledge and skills in problem solving.

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

21(a)	The calculation of acceleration using $F = ma$.
21(b)	The calculation of time using $v = u + at$
22(b):	Using a graph to describe the motion of an object.
23(a)(i)	The calculation of horizontal distance for a projectile.
24	This was well answered in all three parts which involved calculations of work done, potential energy and efficiency.
25(b)(i)	Candidates needed to select the appropriate information from a diagram to calculate current.
27(a)	The calculation of voltage across the secondary coil in a transformer.

29(b) The calculation of the focal length of a lens using $P = \frac{1}{f}$

Areas which candidates found demanding

In the multiple-choice section, Questions 6, 7, 11, 12, 14, 16 and 20 were poorly done. These covered the definition of the specific latent heat of fusion, the calculation of electrical power, the energy conversion in a thermocouple, the reflection of light in a mirror, long sight, and facts about nuclear radiation.

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

22(a) Very few candidates could state the speed of ultrasonic waves. Most answers quoted 3 x 10^8 m/s.

22(b)(ii) Most candidates realised that they needed to calculate the area under the graph to find the distance travelled. However, many calculated the area of the triangle and omitted the area of the rectangle underneath. Many candidates were also careless in taking measurements from the graph.

23(b) Most candidates did not understand that mass has no effect on the speed of falling objects.

25(a) Few candidates gave a correct definition of voltage.

25(c) Most candidates used the correct formula, $v = f\lambda$ to calculate the wavelength of microwaves, but many substituted 230 (voltage) for 'v' instead of 3 x 10^8 m/s.

28(a)(ii) The purpose of the transistor was not explained properly in many cases.

28(b) Candidates had difficulty in explaining the operation of the transistor circuit. This is a standard which occurs frequently.

28(d) There was a poor understanding of the purpose of the variable resistor in the circuit.

29(a) In drawing the ray diagram, most candidates drew the emerging rays from the lens coming to a focus instead of drawing parallel rays. .

29(c) Very few could quote the period as the name given to the time between each flash.

29(e) There was a lot of confusion in describing the motions of transverse and longitudinal waves.

Advice to centres for preparation of future candidates

- Ensure that candidates know and understand the appropriate definitions and explanations given in the content statements.

- Ensure that candidates know and understand how and when to use appropriate formulae with correct symbols.

- Encourage the candidates to read the questions thoroughly, note the information carefully and select the appropriate information.

- Provide time for candidates to draw electrical symbols and circuits, vector diagrams, ray diagrams and graphs. Remind candidates of the rationale for drawing graphs and the

significance of the shape of the line, and the information that can be obtained from the graph, eg the area under a speed-time graph is equal to the distance the object has travelled.

- Candidates should also familiarise themselves with the quantities listed in the data sheet at the beginning of the paper. This would hopefully reduce common confusion in quoting the speeds of sound and light, and the specific latent heats of vaporisation and fusion.

- As in previous years, candidates tend 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 (½), correct substitution (½), 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 totally illegible.

- Candidates should practise using all the prefixes listed in the content statements for the Int 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.

- 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 2012	4369

Number of resulted entries in 2013	4873

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	33.6%	33.6%	1639	69
B	22.4%	56.1%	1093	59
C	19.1%	75.2%	931	50
D	8.1%	83.3%	395	45
No award	16.7%	100.0%	815	-

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, SQA therefore 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 Business Manager 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.