Rewarding Learning

GCE AS Physics Revised
Summer 2009

Chief Examiner's Report

GCE PHYSICS REVISED

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Grade Boundaries

Grade	Uniform Mark
Maximum Mark is 300	
A	240
B	210
C	180
D	150
E	120

ASSESSMENT UNIT AS1 FORCES, ENERGY AND ELECTRICITY

Q1 Explanations of what is meant by a scalar were usually clear, although some candidates omitted to stress that scalars have magnitude *only*. The conditions for equilibrium were well known. The calculation of the resultant of two forces proved more difficult, with many failing to obtain the correct direction of the force.

Q2 This question was well answered. Some candidates found it difficult to calculate the magnitude and direction of the force acting on the wheel of the wheelbarrow.

Q3 The main weakness in this question was confusion of horizontal and vertical components of velocity. This was treated as an error carried forward, so candidates could still score the remaining marks in the question.

Q4 The experiment to measure the Young modulus was well known. A number of candidates referred to measuring the area of cross-section of the wire with a screw gauge, or to measuring the radius of the wire rather than the diameter. The calculations in part (b) were testing. Many candidates ignored the effect of putting three springs in parallel.

Q5 The first part of the question was poorly answered. Many candidates simply gave definitions of electromotive force and terminal potential difference. The required statements about when it is appropriate to use these terms was omitted. In part (b) the circuit diagram was often poorly drawn. Common errors included using the wrong symbol for a variable resistor (or omission of this component entirely) and transposition of voltmeter and ammeter. The description of the experiment was often incomplete. Many candidates used only one set of readings to substitute into the equation, rather than taking a series of values of terminal p.d. and current and plotting an appropriate graph.

Q6 In part (a) most candidates were able to calculate the total resistance of the element and the power generated. In part (b) a very common error was to quote the resistance of one strip as six times the resistance of the heater (instead of one-sixth). Resistivity was well known. In part (c) it was surprising that many candidates should fail to realise that in a series circuit any break would stop all the elements working.

Q7 Parts (a), (b) and (c) were well done. In part (d), few candidates were able correctly

to calculate the current in the 48 □ resistor, a common answer being 200 mA.

ASSESSMENT UNIT AS2 WAVES, PHOTONS AND MEDICAL PHYSICS

Q1 Part 1(a) was well done. In part 1(b) a large number failed to score the mark because they omitted the unit. The principle of the standard calculation in part 1(c) was well known, but many candidates did not know that the abbreviation G (for giga) stands for 10^9.

Q2 In part (a) many candidates concentrated on showing the path of the ray through the glass block, instead of showing the apparatus required, as demanded by the question. The descriptions in part (b) were generally good. In part (c) many candidates used the angles *i* and *r* on the axes, instead of their sines; another error was to ignore the instruction to draw the second graph on the same axes as the first.

Q3 In part (a) most candidates correctly identified the defect and specified the necessary correcting lens. In part (b)(i) many attempts evinced no appreciation of the sign convention.

Q4 Parts (a), (b), (c) and (d) were all well done. Part (e) was unfamiliar and proved testing; many candidates spent much time and space in calculation but failed to score in the end.

Q5 In part (a) diffraction was often confused with refraction. In completing the sketch in part (b) few candidates scored all three marks; a very common error was to fail to maintain a constant wavelength after the wave passed through the aperture. Part (c) was extremely poorly answered, except by the very best candidates. Most started from the assumption that light travels in straight lines.

Q6 Parts (a) and (b) were very well done. Many candidates answered part (c) correctly, but were unable to proceed to part (d) because they seemed not to know the theory.

Q7 In part (a)(i) many candidates showed imagination in stating what the letters MRI and CT stand for. Parts (b) and (c) were well done. In part (d) some aspects of supercooled magnets were not appreciated.

Q8 Parts (a) and (b) were well done. Part (c) allowed candidates to exhibit significant misconceptions, including the emission of photons (rather than electrons) from the plate.

Q9 In part (a), many candidates placed the electrons at positions between the energy levels. The term "population inversion" appears not to be well known, and in part (b) stimulated emission was poorly understood. The calculation in part (c) was more testing than the usual AS2 type of problem on energy levels.

Q10 The straightforward identification of the symbols in the de Broglie equation in part (a) was well done. In part (b) many candidates were unable to give the numerical value for the gradient of the graph, or to state the units. The calculation in part (c) was well done generally, but a number of candidates omitted to include the electron mass.

ASSESSMENT UNIT AS3 PRACTICAL TECHNIQUES

The questions set in Session 2 were very similar to those appearing in the Session 1 paper. The Report below applies equally to responses in both Sessions.

Q1 In part (a) the perimeter of the block and the normals to it were generally drawn correctly. Some candidates measured the angles from the edge of the block to the ray,

and some failed to complete full emergent rays. In part (b) some candidates measured the angles of refraction on emergence from the block, thus obtaining a refractive index of 1.00. A small number of candidates failed to recall the method for calculating the refractive index. Some candidates did not make clear that an average value for the refractive index had been obtained.

Q2 In part (a) most candidates scored highly, reflecting a high level of skill in oscillation experiments. Only a small number of candidates failed to use multiple oscillations, to repeat results or correctly to deduce periodic time. In part (b) most candidates were able to identify the correct value for n, but many failed to provide an adequate explanation excluding both of the other alternatives.

Q3 In part (a) the ranges of the internal and external diameters allowed for in the markscheme were sufficiently generous to allow nearly all candidates to gain credit, regardless of any difficulties encountered by Centres in sourcing the specified tubes. However, candidates often lost marks for failing to divide the difference between the diameters by two in order to obtain the thickness. Another cause of losing a mark was to fail to quote measurements of diameter to 0.1 mm. Some candidates were confused by the requirement to give answers in millimetres. In part (b) most candidates scored the mark for the consideration of absolute uncertainty.

Q4 In part (a) most candidates scored full marks for producing resistance values within the acceptable ranges. A few made a 10^n error through forgetting that their current readings were in mA, not A. In part (b) most candidates identified the correct arrangement. However, the explanation offered by many lacked sufficient detail to gain full credit.

Q5 In part (a) only a few candidates required assistance with the graph. Most identified suitable quantities to plot horizontally and vertically and explained how g should be obtained. A significant number of candidates transposed their axes, but were able correctly to follow through to obtain full marks. In part (b) the column heading was generally very well answered. Very few candidates consistently quoted their processed values to three significant figures. The graph plotting was excellent, with most candidates gaining full credit. In part (c) most gradients fell within the acceptable range, but some candidates used incorrect units. In part (d) a significant number of candidates had difficulty in using the correct expression to calculate percentage difference. Some candidates were able to explain how a limit on the value of g could be found, although some had difficulty in matching their value with the unit given.