



General Certificate of Education
Advanced Subsidiary Examination
June 2013

Physics

PHY3T/Q13/TN

Unit 3 Investigative and Practical Skills in AS Physics

Investigative Skills Assignment (ISA) Q

Instructions to Supervisors

Confidential

- These instructions are provided to enable centres to make appropriate arrangements for the Unit 3 ISA Q test.
- For further details of the administration of the ISA and for information about these instructions, please see the document *Guidance Instructions for the Administration of Investigative Skills Assignment (ISA): GCE Physics*.

ISA (Q) Investigation of LED behaviour

Centre instructions for the investigation

In this ISA, candidates will be expected to measure the current-voltage curve of an LED in the forward and reverse directions, and to plot a graph.

Information for centres

Candidates should be told approximately one week before undertaking Stage 1 of the ISA that the investigation will be about measuring current-voltage characteristics and the quantum nature of light.

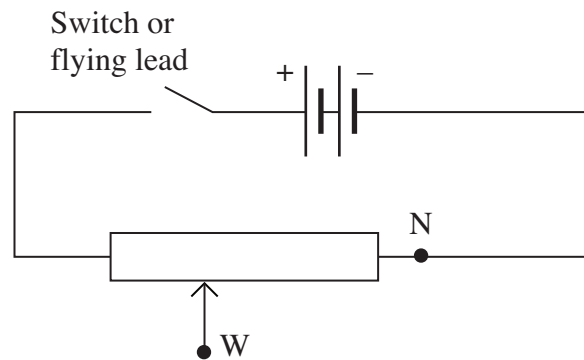
Stage 2 of the ISA (the written test: Sections A and B) should take place as soon as possible after the practical investigation.

Apparatus

Centres should ensure that the apparatus provided can be used safely. Each candidate will need:

- (a) two fresh 1.5 V cells (in series, preferably in a holder) or a stable power supply with output limited to 3 V
- (b) 1 k Ω or 10 k Ω potential divider/potentiometer
- (c) 330 Ω resistor labelled with its value
- (d) a red LED which will operate normally at 10 mA current, suitably mounted for connection into the circuit, with terminals clearly labelled + and – indicating the forward direction
- (e) digital voltmeter
- (f) ammeter, range 0 to 10 mA, with precision 0.2 mA or better
- (g) connecting wires.

The two 1.5 V cells should be connected in series across the potential divider (with a switch or flying lead to limit rundown of the cells). This circuit is shown in **Figure 1** (overleaf). The battery terminals should be labelled ‘+’ and ‘–’ to assist candidates.

Figure 1

The output terminals of the potential divider (wiper and the negative potential end) should be labelled W and N respectively.

The candidates will be required to connect together the rest of the circuit and to reverse the battery connections during the experiment.

The use of cells is preferred to using a power supply so as to reduce the chance of overloading the LED.