Principal Examiner's Report

October 2016

Pearson Edexcel International Advanced Level in Physics (WPH03) Paper 01 Exploring Physics

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Paper Introduction

This paper is designed to test practical skills and understanding for international candidates. As in previous series, some candidates penalised themselves by not using correct scientific terms or quoting inappropriate answers to questions from previous years.
This report should be read in conjunction with the mark scheme which is available from the Edexcel website.

Multiple Choice Questions

Most of the multiple choice items were answered very well.
The mean score for questions 1 to 5 across all candidates was 4.6, with A grade candidates typically scoring 5 and E grade candidates typically scoring 4.

	Subject	Percentage of candidates who answered correctly	Correct response
1	Units	83	A
2	Calculation of the Planck constant	83	D
3	Acceleration of free fall: equations	97	B
4	Acceleration of free fall: timing	84	D
5	Acceleration of free fall: apparatus	92	A

Question 1 was about the SI system. The majority of candidates recognised that A was the required base unit, unlike B and D. Less able candidates chose B or C which is a quantity not a unit.

Question 2 required candidates to calculate the inverse of a wavelength given in nm. This caused problems for less able candidates as 56% did not manage the conversion from nanometres to m^{-1}.

Questions 3, 4 and 5 were concerned with an experiment to measure the acceleration of free fall.

In question 3, 99% of A grade candidates chose the correct equation for use in the experiment, compared to 92% of grade E candidates.

Question 4 required candidates to identify an anomalous result and to select an appropriate number of significant figures in their answer. 94% of A grade candidates did this as compared to 67% of grade E candidates.

Question 5 was well answered by both A and E grade candidates, possibly because the equations which were given in question 3 do not include mass.

WPH03_01_Q06

6(a) - There were many excellent responses with several students giving more than four valid points in their outline. Nearly all students described measuring the total thickness and dividing by 500. Most students mentioned using a ruler or a Vernier calliper, but some suggested incorrectly that a micrometer should be used to measure the thickness of a single sheet of paper. A few students successfully described using a micrometer to measure the thickness of a pile of paper appropriately smaller than 500 sheets.
6(b) - Most of the students scored well here, usually giving the idea of repeating measurements and averaging with some other appropriate technique.

WPH03_01_Q07

7(a) - Some good diagrams could not score the mark due to the omission of labels. Most students drew a workable arrangement of apparatus, although some forgot that the fishing line needed to be secured at one end. A few students drew vertical arrangements that omitted the pulley.
7(b) - Nearly all students included a labelled ruler in the diagram and supplemented it by mentioning the micrometer here. If the micrometer was omitted from the response, it usually signalled an error in the student's understanding of either the Young Modulus or the idea of tensile stress.
7(c) - Some students omitted either the extension or the diameter of the fishing line from this list - more commonly it was the diameter that was missed. Often an omission here was subsequently mirrored by an error of physics in the response to part 7(g)
7(d) - Most of the students gave concise and accurate responses to this part of the question.
7(e) - Very few students were able to give a coherent response here. For instance, the idea of repeating measurements and averaging was either allied with an inappropriate quantity or not fully justified – for instance in the appropriate case of the diameter.
7(f) - Most of the responses included correct identification of the independent and dependent variables, although some mentioned stress and strain which were not measured variables.
7(g) - This part of the question was answered well, with many responses gaining three of the four marks available. Most of the students found the fourth marking point the most difficult. Several students supplied all of the necessary equations except for $W = mg$, which is required to calculate the force.
7(h) - Many students correctly identified an appropriate measurement and went on to name the type of error that would be expected. However, very few went on to provide an appropriate comment - for instance how a parallax error can be avoided.
7(i) - Most of the comments included the correct identification of a hazard and an appropriate precaution to take.

WPH03_01_Q08a

Many candidates gained full marks for this question.
Bullet points are a good way of answering questions like this.

WPH03_01_Q08b

Most of the responses included an appropriate rearrangement of $\varepsilon = V + Ir$ and an explicit comparison to $y = mx + c$. Very few students went on to state that both ε and r are constants.

WPH03_01_Q08c-d

The general standard of graph drawing was good, with most students labelling the axes and using sensible scales that made proper use of the grid supplied. Where students used inappropriate scales this often generated plotting errors.
8(d)(i) - Many students had used a truncated current scale that prevented them from reading ε directly from the graph. Students who plotted current from the origin usually gave an acceptable value. Some students calculated r first and were able to use this value to calculate ε. Most students used a suitably large triangle that allowed them to calculate r properly. However, some of this good work was subsequently wasted through careless omission of the correct unit or use of inappropriate significant figures. Many gave r as 14605 Ω.
8(d)(ii) - There were many good responses to the last part of this question. Most students understood the effects of series connection.

Paper Summary

There were some very good scripts and it was pleasing to see that some candidates had carried out some of the experiments in the paper.

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