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Examiners' Report/ Principal Examiner Feedback

January 2014

IAL Physics WPH03/01

Unit 3: Exploring Physics

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January 2014
Publications Code IA037834

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link: http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

This report should be read in conjunction with the question paper and mark scheme which are available at http://www.edexcel.com/quals/ial/physics/Pages/default.aspx

This paper is taken by candidates based overseas.

It is intended to examine the same skills, knowledge and understanding as the practical work undertaken by home candidates, including planning and analysis. Candidates are expected to be familiar with standard laboratory equipment and to be able to estimate the magnitude of measurements likely to be met within common experiments. Special care has been taken to ensure that marking and grading are done to the same level as for home candidates.

In general candidates attempted all questions. There were some common errors particularly where candidates put themselves at a disadvantage by imprecise use of scientific language and English. For example, it is important that candidates use scientific language and concepts carefully and precisely and must therefore distinguish 'mass' from 'weight', resistance' from 'resistivity', and 'parallax' from 'parallel'. In calculations, numerical answers were sometimes given to too many significant figures in a practical context.

Some responses indicated that candidates had not really understood what was being asked, and they need to be told to read the stem of the question fully to get a clear idea of the context to which their response needs to be addressed. This was particularly noticeable in question 7 where some candidates described an electrical determination of power when the stem clearly stated that the power to be determined was that of a person.

Candidates are expected to have access to a ruler, calculator and protractor. Those without these lost marks in question 8.

Questions 1 to 5

Question	1	2	3	4	5
Mean mark (max 1)	0.88	0.79	0.67	0.67	0.79

These multiple choice questions were usually well answered. However, in question 2 candidates were expected to recognise that there was an error in the final measurement and that it should be omitted when the mean was calculated.

Question 6a

Only very good candidates scored 3 marks, usually for negligible current through the voltmeter, voltmeter connected in parallel, and ammeter reading gives the current in the wire if the voltmeter has a very high resistance. Weaker candidates could often score 1 mark for the idea of low current through the voltmeter. Very weak candidates scored 0, and it was clear that few appreciated that a voltmeter always gives the voltage across the component to which it is connected but that a low voltmeter resistance may alter the total resistance across the combination and hence the current in the circuit.

Question 6b

The best answers linked changes in the total resistance in the circuit to changes in current. Weaker answers sometimes implied that the resistance of the wire changed with varying current or did not make clear whether it was the resistance of the total circuit, the variable resistor or the wire itself they were discussing.

Question 7

Most candidates described an experiment to measure the power of a student running up stairs, although a small minority confused this with measuring the power of an electric motor.

(a) A common error was to omit a weighing machine to measure the mass/weight of the student.

(c) Not many candidates justified their choice of measuring instrument. Good answers gave the precision of the instrument and related this to an estimation of the expected measurement. So good answers related a value for reaction time to the expected time to run up a flight of stairs, or the height of the stairs to the precision of a metre rule.

(d) Many candidates wrote generally about the importance of repeating readings without referring to the experiment described, as required by the question. Good answers recognised that it is difficult to repeat running up stairs at the same rate without a rest.

(e) Most candidates correctly referred to the power equation. A common mistake was not to mention that it is the vertical displacement that is required to calculate work. A minority of candidates showed confusion between mass and weight. Some candidates tried to describe a graphical method although this was not specified in the stem.

(f) Many candidates referred to reaction time errors in the timing. Sometimes ‘parallax errors’ and ‘zero errors’ were stated baldly without any further detail about which measuring device was being referred to.

(g) Both the hazard and the precaution were needed, so “wear a helmet” (precaution) or “don’t trip” (hazard) gained no marks on their own but would have gained the mark if they had been combined.

Question 8

In general candidates were able to gain marks on most parts of this question if they read the stem carefully.

(a) This part was not answered well. Many candidates suggested what could be done to make the calculated result as accurate as possible and not techniques to improve the measurements themselves as required by the stem.

(b) In contrast this was very well done on the whole. Many students made several valid comments about the results table, although only a few noticed the lack of units.

(c) Many answers gained full marks although a few were left blank. Most used a ruler for the normal. Some candidates measured the wrong angles and there were a few mistakes in working out the values of the sines to 3sf.

(d) There were only a few perfect graphs (most candidates used a sensible scale) but many candidates drew a line that went through two points in the table which they then used in their calculation of the gradient even though it was not the line of best fit. Candidates are expected to balance the points either side of the best fit line to gain the mark.

(e) Most candidates calculated the refractive index from the gradient, although it was not always clearly stated that the value of μ was the gradient of the line. Some common errors were to use points that were not on the graph line, to use the origin even if the line was not extended to see if it went through the origin, and to fail to round the answer to 2 or 3 sf. Candidates are expected to demonstrate that they have used a large triangle when calculating a gradient. The best candidates drew lines on their graph to show this.

It was pleasing to see that most candidates had some knowledge of practical skills and a good awareness of how to make an experiment reliable and valid. We would encourage future candidates to develop these theoretical links with practical applications.

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