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Examiners' Report/ Principal Examiner Feedback

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

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General

This report should be read in conjunction with the question paper and mark scheme which are available at the Pearson Qualifications website.

This paper was designed for students based outside of the UK. It is intended to examine the same skills, knowledge and understanding as the GCE Physics 2008 unit 6PH03, including planning and analysis. Students 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 the UK students.

In general students attempted all questions. There were some common errors particularly where students put themselves at a disadvantage by imprecise use of scientific language and English. For example, it is important that students 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 for a practical context.

Some responses indicated that students had not really understood what was being asked, and they need to be reminded 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(d) where some students tried to describe the use of a graph which was not asked for in the stem.

A major problem this year was in question 8 where many students drew a straight line on their graph rather than the real line of best fit which was a typical hysteresis curve for rubber.

Students are expected to have access to a pencil, ruler and eraser. These would have been particularly helpful in drawing the graph in question 8.

Questions 1 to 5

The multiple choice questions were usually well answered. However, in question 2 it seemed that some students had not practised taking micrometer readings.

Question 6

This was a generally well-answered question, with the majority of students scoring 3 marks.

(a) Most students gave the range correctly as 8500 – 8900 kg m^{-3}. A few gave it as 400 kg m^{-3}. Very few of the students got this wrong.

(b) Nearly all students knew how to calculate the percentage uncertainty, but many gave their answer to an inappropriate number of significant figures. 2.30 % was a very common response and consequently many students received just one mark for this part of the question.

(c) Bronze was correctly identified by most of the students.

Question 7

(a) Most students were able to state at least two of the quantities that needed to be measured. Often a third was given too, however a fourth was required for full marks. In most of these cases, the missing quantity was potential difference. Although this quantity was mentioned in the stem (as part of the description of the motor) potential difference is a quantity that should be measured as part of this experiment.

(b) Nearly all students chose suitable measuring instruments for two of the quantities they identified. Some unnecessarily gave their choice of instrument for a third quantity. Many students were able to comment on the precision or range of the scale of both instruments – but very few related either of these to the size of the measurement that would be made. For instance, 'A metre rule, is suitable because its scale range is appropriate to the length to measure the height of the bench which may be around 90 cm or so.' would have gained two marks.

(c) Many of the students could give a relevant comment about the need for repeating readings. Valid comments were accepted, whether in favour or against. Most of the acceptable responses were about repeating and averaging for a sensible reason, such as improved reliability or identifying anomalous readings. A sizeable minority of students pointed out that the motor would heat up during the experiment and sensibly suggested that repeating the experiment with a warm motor should be avoided – whether by waiting for the motor to cool down or by simply not repeating the readings.

(d) This question required the students to show how they would use the relevant equations. To do this they needed to identify clearly the input power (or energy) and the output power (or energy), and then to show how they would substitute these into the efficiency equation. Most students did this well.

Some students identified the output power from Fv, using a graphical method to determine the velocity. A few omitted to mention that the force, F, is given by mg, in this case.

(e) Many students could identify the main sources of uncertainty or systematic error. Some of them omitted to mention to which measurement a particular source of error applied.

(f) Most students gave a relevant comment on safety, identifying a likely hazard and going on to suggest an appropriate way to minimise it.

Question 8

(a) Most students realised that the results showed some inconsistency, but fewer could state exactly what was amiss. Of those who mentioned the significant figures, only some identified the relevant set of values. Many students realised that the results showed no evidence of repetition (or averaging). Those who studied the data and gave thoughtful responses tended to do well.

(b)(i) Past papers have shown that graph plotting is a skill that most students have mastered. However, the data given in this question seemed to present more of a challenge to all but the most prepared of students. Most responses included graphs that made full and sensible use of the grid provided. Plotting all seven points within the usual tolerance caused many students some difficulty. Common errors were in plotting the second and third points (force co-ordinate) and the fourth and fifth point (extension co-ordinate). The main difficulty that the students encountered was in drawing a line of best fit. A large proportion of students were convinced, despite what they know about the way that rubber will stretch, that a straight line was required on this graph. Some students even went on later to describe a curve, even though they had drawn a straight line.

(b)(ii) Many responses were limited to simple descriptions of the appearance of the graph. The students who offered worthwhile and thoughtful comments usually mentioned the change in the relationship between the variables or the fact that the material did not follow Hooke's law.

(b)(iii) Most students were able to score good marks for this part of the question, regardless of the method they chose. The most frequent error was in the choice of the number significant figures, or the unit, for the answer. Students who drew a straight line on the graph were still able to score some marks here, although their final value was generally out of tolerance.

(c) Many students were able to offer good calculations for the final question. A common error in the stress calculation was the inclusion of an inappropriate area. Some students assumed that the rubber was circular in cross section; others included the length of the rubber in their calculation. Most of the strain calculations were correct. A few of these included an erroneous unit. Few students correctly realised that that the calculation was based on an assumption that the cross-sectional area remained unchanged.

Summary

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

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