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Examiners' Report/
Principal Examiner Feedback

Summer 2014

Pearson Edexcel International GCSE
in Physics (4PH0) Paper 1P

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Summer 2014
Publications Code UG039751

Principal Examiners' Report June 2014 International GCSE – 4PH0 1P

General

Many students scored very well across all aspects of this paper, indicating thorough preparation fully covering the specification. Numerical work was usually handled very well, including simple rearrangement of equations. There was evidence that some centres were better at preparing their students for questions relating to experimental work and other AO3 skills. It was also evident that many students found difficulty in structuring their responses to longer, extended questions. There are strategies that can be used to improve students' performance in these areas.

It was noted that some students wrote in such a heavy pen that there was 'bleed through' to the opposite side which caused difficulties in reading the responses.

Question 1

This question proved to be an accessible start to the paper for most students with over 75% gaining at least seven of the nine marks. In part (a) some students were unable to state two sections of the electromagnetic spectrum used for cooking. In part (b) 29% of students were unable to give appropriate S.I. units for speed.

Question 2

The majority of students were able to identify the correct transducer in part (a). In part (b), examiners were surprised that less than 50% of students were able to give a suitable explanation for the term 'energy is conserved': the most common incorrect explanations were given in terms of 'preservation' or 'not wasting energy' rather than energy not being created nor destroyed. There were similar problems in part (c) with an explanation of efficiency. However here responses were incomplete rather than incorrect e.g. '20% is useful energy' rather than '20% of the total input energy is useful'. It was noticed that many students had difficulties with Sankey diagrams: a few showed no familiarity and drew diagrams of a lamp on a desk, while others did not draw their arrows to scale.

Question 3

In part (a) over 80% of students did know the unit for weight, but almost 60% could not identify a suitable device to measure personal weight. Part (b) was similarly poorly answered with only 30% of students gaining 2 or more marks for a simple procedure to estimate the area of a foot. The equation for pressure and the calculation were handled very well with 80% gaining all three marks. It was pleasing to note the increase in the number of students who rounded to 2 significant figures in their final answer.

Question 4

The responses to this question were very variable with some parts being less accessible than others. In general, factual recall questions were well done with applications and practical detail less well known. For example, in part (b) only 1/3 of students were able to name a suitable beta detector and describe how such a detector could be used to identify beta particles.

In part (c) many students did not attempt to use the data given in the stem when they attempted a sketch graph despite the axes having both labels and scales. Other students used the data to plot points but failed to realise either that activity is not linear, or that it would continue beyond the second half life.

Both parts of (d) caused difficulties for most students with about 50 % failing to gain any credit. The most common response that gained credit was measuring the activity at the present time. Many students thought it was necessary to determine the half-life practically rather than from data tables. A few students answered in terms of carbon-14 decay rather than uranium. Part (dii) was somewhat better answered with the idea that the half-life was too short being commonly seen.

Question 5

In part (a) many students were able to make a good attempt at explaining terminal velocity for a falling object. There were some common errors: 'gravity' is not the same as weight, the object accelerates continuously (but not at the same rate) until it reaches terminal velocity, upthrust does not increase with speed, and repeat of the stem i.e. 'the object reaches terminal velocity' is insufficient to gain credit. One error that concerned the examiners greatly was when students equated a force to acceleration e.g. 'terminal velocity is when drag = acceleration'.

The standard of responses was not as good in part (b). Commonly students gained marks for stating what equipment they would use and for giving the relevant equation. However, there was often a confusion or lack of precision as to the detail of the measurement i.e. exactly which length is measured, and exactly when the stopwatch should be started and stopped. Students who used light-gates and data loggers tended to get more of the detail correct, often because of a suitably labelled diagram. Very few students described the condition for achieving terminal velocity (consecutive constant readings of speed).

Question 6

The standard equation and calculation in part (a) was found to be accessible with nearly 90% of candidates gaining full marks. Although part (b) was not an unusual application of switches, it was poorly attempted by most candidates with only 15% gaining both marks.

There was considerable confusion seen in the responses to part (ci): the most common mistake was for students to describe the action of a fuse – not how an earth wire acts as a safety feature. Less than 10% of students were able to gain three or more marks. The responses to part (cii) were better as 70 % of students gained a mark often for shock prevention.

Question 7

This extended writing question showed that many students have difficulty with structuring and sequencing a causal or mechanistic explanation. In addition the content was also poorly understood: almost 30% of students gained no marks in part (a), with less than 20% gaining full marks. In both part (bi) and part (bii), the responses were better with nearly 70 % of students gaining both marks, however a few did lack precision e.g. 'change the voltage' and thus did not gain credit.

Question 8

This AO3 question exposed a great lack of understanding of experimental skills; in particular the terms independent variable and control variable were not understood, nor was there evidence of the importance of control variables. Less than 40% gain a mark for (a), with less than 15% gaining full marks and about 1/3rd not gaining any of the marks in (b).

The less abstract sections (c) and (di-dii) allowed more students to gain credit, but despite the prompts in the stem of the question in (diii), a third of students could not make sensible suggestions to correct the stated mistake in experimental technique. Centres are advised to download the teachers support materials from the Edexcel web site for guidance on AO3.

Question 9

In part (a), which asked for an explanation of convection currents at the coast, many students were able to make valid points and gain credit. Students who structured their work tended to gain more marks. The most common errors included inappropriate inclusion of particles with phrases such as 'the air particles expanded' instead of 'the air expanded', or 'the spaces between the air particles expanded' or 'air particles become less dense'.

Brownian motion was not well known in part (b) with nearly 60 % of students failing to gain any of the three marks.

Question 10

Part (a) proved to be an accessible start to this question with over 50% gaining both marks. The calculation in (b) was also well done (approximately 2/3rds gained full marks); where marks were lost it was usually due to non-matching unit or incorrect conversion of 27 days into seconds.

The other calculations (cii and diii) were not quite as well done (less than 30% with full marks in either calculation) often because students failed to convert the mass into kg. There were some other common errors; in (ci and cii) students omitted the 'square' in '1/2 m v^2' and in (diii) students used g_{Earth} rather than g_{Moon}. Part (di) caused major difficulties as less than 20% of students realised that this was essentially conservation of energy and added 12 J to 56 J. In part (e) answers were incomplete rather than incorrect.

Question 11

It was pleasing to find that many students made a good attempt at balancing the nuclear equation for fission, as over 75% gained one or both marks. There was one common error: not realising that there were three neutrons not just one which led to an incorrect 'top line'. Slightly more students failed to make progress with part (b). Here many students just described fission without explaining how this fission leads to a chain reaction. It was unfortunate that some students gave unlabelled (or only partially labelled) diagrams where it was impossible to judge which 'blobs' were neutrons and which were daughter nuclei. Another common mistake was to use incorrect terminology: nuclear fission involves nuclei not atoms and daughter products are also nuclei not cells.

In part (ci), most students were able to identify the control rods, but some were unable to identify the shielding and labelled the reactor vessel instead. In part (ci) not many students realised that the reason shieling is needed is because the material inside the reactor is radioactive. Most students appeared to answer the wrong question 'What does shielding do?', hence only 25% of students gained credit.

Question 12

The majority of students were able to make a good attempt at the circuit diagram in part (a) with over 55% gaining three or more marks. The need for some means to vary the voltage (either using a variable resistor or using a 'power pack') was often overlooked.

In part (bi), over 40% of students correctly interpreted the change of gradient with change of resistance. The reason for the resistance change was not well known as over 55 % of students failed to gain any marks in part (bii).

Based on the performance shown in this paper, students should:

- Take note of the number of marks given for each question and use this as a guide as to the amount of detail expected in the answer
- Be familiar with the equations listed in the specification and be able to use them confidently
- Recall the units given in the specification and use them appropriately, for instance speed
- Be familiar with the names of standard apparatus used in different branches of physics
- Practice structuring and sequencing longer extended writing questions
- Show all working so that some credit can still be given for answers that are only partly correct
- Be familiar with the list of suggested practicals given in the specification and be able to describe these experiments in reasonable detail
- Be able to identify independent, dependent and control variables and be ready to comment on data and improving experimental methods
- Take care to answer the question asked, not a similar question on the same topic from a previous exam paper
- Take advantage of opportunities to draw labelled diagram as well as or instead of written answers.
- Allow time at the end of the examination to check answers carefully and correct basic slips in wording or calculation.

Grade Boundaries

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