Pearson

Examiners' Report

Principal Examiner Feedback

January 2017

Pearson Edexcel International GCSE in
Physics (4PH0) Paper 1P
Science Double Award (4SC0) Paper 1P

Pearson Edexcel Certificate in
Physics (KPH0) Paper 1P
Science (Double Award) (KSC0) Paper 1P

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Examiner Report International GCSE Physics 4PH0 1P

General

Many students demonstrated that they could recall facts and equations but some inevitably recalled 'triangle equations' incorrectly and thus lost calculation marks as well. Generally, students made few numerical mistakes in their calculations apart from power of ten errors. There was evidence that students who had experience of laboratory work gained good marks on questions targeted at AO3 (experimental methods, data processing, variables etc.). However, they should be reminded that S I units are normal, and that **all** quantities involved should be in S I when substituted into equations.

It was noticed that some students did not understand the instruction 'State the relationship between…..'. Rather than giving the expected equation in symbols or words, students attempted to write a pattern sentence such as 'when the current increases then the……' Often these failed to gain credit as constants or other variables were omitted.

Question 1 Ionising radiation

This question proved to be a suitably straightforward start to the paper for most students, with over 85% of candidates gaining two marks or more for part (a). Gamma was radiation most often found to be incorrect.

In part (b), nearly 50% of students repeated the suggested precaution e.g. wear gloves and wear goggles and thus did not gain the second mark.

Question 2 Measurement of density-practical skills

In part (a) it was unfortunate that many students did not know what a set square is. Credit was given wherever the student suggested a viable method for determination of the diameter even when the student used cubes instead of set squares. Similarly, the idea that more than one marble should be used or repeats and averages was poorly known.

Conversely, part (b) was well answered as over 55% of students gained four or more marks. Some students demonstrated poor use of technical vocabulary with terms such as measuring 'jug' instead of measuring cylinder. The displacement method was well known: few students mentioned calculation of volume from the diameter.

Question 3 speed of descent- data analysis

Over 75% of students were able to identify the anomalous time. However, some chose either 'woodpecker B' or ringed more than one time. The consequent calculation of average speed by discarding the anomalous time was quite well done with over 1/3rd gaining full marks. Credit was given to a further 22% of students who omitted this step but otherwise correctly calculated the average speed.

Many students found part (aiv) problematic. Less than 15% gained both marks either by discussion of categoric/ dis-continuous variables or by explaining why a line graph / scatter-graph could be used. The discussion of the prediction in part (b) was similarly challenging with 50% of students failing to make any headway. All too often, student discussed only two of the woodpeckers and/or failed to quote data to support their analysis.

Question 4 Forces and acceleration

The majority of students found this question straightforward as they could identify the criterion for acceleration in (a) and calculate the acceleration in part (b). The discussion of forces in part (c) was marred by poorly differentiated ‘forces’ e.g. friction increases did not gain credit as air friction decreases. Nearly 40 % of students failed to gain a mark in part (c).

Question 5 Current and voltage variation

In part (a), over 75% of students were able to identify the equipment needed. The reason why the wire should be kept at a constant temperature and the methods that could be employed to do so were not generally well known, with just 1/3rd gaining credit. There was some evidence that this was centre-dependent.

The objective question on current voltage graphs was also quite well done with 75% gaining two or more marks. The common error here was to misidentify the two wires. Less commonly, students confused diode and filament bulb.

Question 6 Radio waves and devices

Part (a) proved to be a relatively straightforward introduction into this question as almost 75% of students gained both marks. Similarly, part (b) was found to be straightforward as 89 % of students gained three or more marks. There were almost 30% of students who omitted to change kHz to Hz. The other common error was due to an incorrect equation and consequent mistakes in calculation.

Question 7 Filament lamp

In part (a), it was pleasing to note the improvement in this type of describe question. Over 30% of students gained full marks for a good description which referenced suitable data points.

Many students found the series of linked equations and calculations very straightforward. Just over 15% could not read the current correctly from the graph but were able gain the rest of the marks. A further 50% of students gained full marks.

Part (c) required students to link the rapid current rise as shown on the graph to the rapid heating. This was found to be very difficult and only the most able students were successful.

Question 8 Solar system

Students found this question straightforward with 60% of all student gaining full marks. There were the inevitable mistakes with units e.g. failing to convert minutes to seconds and incorrect rearrangement of the equation for orbital speed.

Question 9 Generation of electricity

Part (a) proved to be a suitably straightforward start to the question for most students, with nearly 60% of candidates gaining the mark. Many students found part (b) a difficult question because they attempted to answer a similar question from a previous paper rather than the question asked which was to *describe* how the turbine and generator produce electricity. In some scripts, poor terminology was seen e.g. turbines 'move'' rather than 'rotate'.

Only the most able students linked constant voltage or current or frequency with constant speed in part (c), although there were many good attempts mentioning power or energy.

In part 9(d) the calculation of energy wasted was quite well done with over 50% gaining full marks. A further 25% of students stopped their calculation one stage early and calculated useful energy. It was surprising that only 60 % of students could identify two forms of wasted energy.

Question 10 Pressure and pumps

Nearly 60% of students were successful with the calculations in part (a). In part (ai), a few students misread the question as the pressure is reduced by 10 cm^3 rather than reduced to 10cm^3. The most common error was to attempt to use an incorrect equation for pressure. Parts (aii) and (aii) were not as well answered: the conditions for Boyles law were identified by under 20% of students, and only 40 % of students gained a mark for a sensible suggestion in (aiii). It was disheartening to read that many students considered particle impact with walls to be similar to squash ball collisions, in that the particles became 'hotter' and moved faster after a collision.

In part (b), the equation was well known, but far too many students failed to convert the mass in kg to the weight in N.

Question 11 Inverting prism

Just over 50% of students drew an incorrect 'normal'' at the point of contact, G, in part (ai). Only 33% were able to identify and measure the angles in part (aii).

The explanation in part (b) was much better attempted: the usual error being confusion of 'reflection' as 'refraction'. It was pleasing to note that two thirds of students made a good attempt at showing the path of a second ray.

Question 12 Nuclear fission

The objective question in part (a) showed that many students could identify the correct purpose of the parts of a nuclear reactor with almost 75% gaining three or more marks. Similarly, over 50% of students correctly identified neutrons as a fission product.

In part (c), students still stumbled over the description of nuclear fission often because of poor terminology i.e. uranium atom instead of uranium nucleus. It was disappointing that a third of students failed to gain any credit for this part.

In (d), the vast majority of students found the differences between fission and decay very challenging. Approximately one quarter of students were able to give one or more differences. Some of this was due to incomplete comparisons such as 'decay is random' without explaining that fission is prompted or similar.

Question 13 Cooling of water

About 40% of students did not make any progress in this question. There was no evidence that this was caused by lack of time, rather this was due to poor vocabulary and confusion between emission and absorption and between conduction and convection. There seemed to be no pattern to the mistakes; students to gained marks in part (bi) lost them in (bii) and vice versa. On the whole, there were less errors for (bii) than for(bi).

Recommendations for improvement

1. Wherever possible, centres should ensure that students do the suggested practicals. If this is not possible for whatever reason, students should be encouraged to use good simulations, some of which are available with minimal cost online.

2. While many students are very proficient at substitution into equations, they are less so with transforming the equation. In a similar manner, many students make mistakes when converting power of tens in units. There is no requirement that students work in standard form, but students should know what the standard prefixes mean. It is strongly recommended that this be an area of focus during revision.

3. Students should be reminded that phrases such as 'state the relationship between X, Y and Z' are asking for recall of an equation and not a pattern sentence.

4. Students should practice different types of data analysis e.g. from graphical data and from text or tables. There has been at least one of these on all recent examination papers in this subject as it is forms part of the required AO3 skills.

5. Students should also practice recognising areas where poor technical vocabulary loses otherwise easy marks. This can be done by for example giving students (photo) copied but otherwise unidentified sections from internal examinations where they can try to spot errors. Teachers can discuss why confusing say power and energy loses marks. Teachers can also see such areas by reading the notes section on the mark schemes.

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