Examiners' Report

Principal Examiner Feedback

Summer 2017

Pearson Edexcel International GCSE
in Physics (4PH0) Paper 2P

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General Comments

As in previous examinations for this specification, most candidates could recall the equations and usually they handled the related calculations well. Responses to the longer questions showed that the less able candidates tend to struggle when assembling a logical description, explanation or when asked to offer more than one idea. There was a wide range of responses for many of the questions and it was good to see that many candidates could give full and accurate answers. This paper highlighted a good example of when diagrams can be just as powerful a communication tool as writing (part 3(b)).

Question 1

The three multiple choice questions at the start of this examination paper proved to be straightforward for candidates and the majority managed to select the correct answer for each of the three parts. Part 1(a) saw the lowest percentage of candidates gaining the mark as option A (weight) was a common distractor when a scalar quantity was needed.

Question 2

Most candidates correctly recalled the shape of the magnetic field in part 2(a)(i). Marks were often lost by having the direction of the field the wrong way or by only drawing one circle. In some cases, candidates tried to draw the field lines as though it was a bar magnet, although such instances were rare. In part 2(a)(ii) most candidates gained one mark by either using iron filings or a compass. A majority of these gained the second mark if they tapped the card or used multiple compasses. Some candidates said they would bring a magnet near the wire and observe the resulting force; although impractical due to the very small force involved, this was also awarded both marks. When candidates failed to score any marks, it was often because they explained how a left or right-hand rule could be used to work out the direction of the magnetic field.

Part 2(b)(i) offered a challenging application of candidates' knowledge of electromagnetism. Despite this, the closed response nature of the question allowed most candidates to decipher the correct order of the statements and over 70% could gain all 3 marks. The most common error was reversing the order of the fourth and fifth statements. In part 2(b)(ii), when candidates recognised that the electromagnet was no longer magnetised, they generally got full marks. However, a large number just thought that an open switch meant that current wouldn't flow, but with no more explanation, no marks were awarded.

Question 3

Candidates showed a good awareness of what would happen to the water particles in part 3(a) when the water was heated and two thirds gained both the marks available. Some failed to be specific enough with their language and just referred to 'energy' increasing. Some nearly gained the third marking point but instead of describing particles breaking bonds they just referred to bonds weakening.

Almost all candidates scored MP1 but very few identified a surface for water molecules in part 3(b). The relative spacing of particles in a gas, liquid and solid is well known but few candidates recognised the boundary from which liquid particles escape into the gas state. Candidates' diagrams were often the source of the second mark being achieved. It was very common to see students digress into talking about the motion of the particles and therefore not answer the question, which referred just to the particles' arrangement.

Part 3(c) was challenging and many candidates wrote about why the pressure was higher in the can prior to the teacher inverting it into the cold water, which was not relevant to the question. They then did not really have sufficient room for a coherent answer without using an additional sheet or writing outside of the correct area, often without indicating to markers that the answer continued elsewhere. Eventually candidates wrote about what happened when the can was inverted in the cold water. There was some very good physics shown at times, but some responses described the pressure increasing in the can, while others often discussed a vacuum being produced. A significant number of candidates thought that the pressure would increase as the can was inverted.

Question 4

Candidates found part 4(a) straightforward and the majority selected the two correct options from those available to gain both marks. The most popular incorrect response involved positively charged particles being rubbed off the balloon. In part 4(b)(i) most candidates realised that a spark might occur which would then ignite the petrol, although some just thought it would cause a fire or an explosion, which still scored the mark. A minority believed that the charge could cause a shock which would be lethal and these responses were not given credit. Although most candidates realised earthing was necessary in part 4(b)(ii), a significant proportion did not provide the details of what exactly needed to be earthed and therefore were not awarded the mark. Part 4(c) was generally well answered. The most common mistake was to say that the granules and container were oppositely charged and therefore attracted to each other. Also, a small minority referred to an increased force as particles passed through the small hole leading to a diffraction effect.

Question 5

it was disappointing to see that only half of all candidates could correctly give the range of human hearing. More candidates knew the lower limit of human hearing than the upper limit.

Although three quarters of all candidates knew that a microphone should be used in conjunction with the oscilloscope in part 5(b), it was clear that most had no experience of using an oscilloscope themselves. Consequently, only a very small number adjusted the oscilloscope to get a steady trace or to give a whole cycle on screen. Only the most able knew to measure squares or divisions and multiply them by the time-base. Those candidates that scored two marks would simply describe measuring a time period and using the equation. Some candidates tried to give an account using the wave speed equation and thought that the wavelength could be measured from the screen. Others wanted to use two microphones, confusing it with an experiment to measure the speed of sound.

Part 5(b)(iii) was well-answered by many, scoring both marks available. When only one mark was scored it was usually because the candidate drew waves that had a lower amplitude but with frequencies either more than double or less than the original frequency. Many responses showed a lack of care when drawing waves accurately.

Question 6

The quality of graph drawing in part 6(a) was high and most candidates chose the most suitable scale, labelled the axes and plotted the points correctly. Most also drew an acceptable best fit curve which went through all the points. A majority of these could then use the graph to give a value for the half-life within the acceptable range. The best candidates used their graph to determine more than one measurement of the half-life and found the average, even though this was not required for full marks. Common mistakes in this part of the question included misreading the scales and not labelling the graph axes.

In part 6(b)(i) most candidates could apply logical reasoning to calculate the correct power. Slightly more than half of these went on to gain both marks in part 6(b)(ii). However, many candidates lost a mark because they did not state that the alpha particle's inability to penetrate the skin or the block was due to a short range or low penetrating power.

The final part of the question was the most difficult and differentiated clearly across the ability range. Only a quarter of all candidates could gain both marks. Most candidates could communicate the idea of plutonium generating electricity for longer or supplying energy for longer but it was less common to see statements that this was due to the slower rate of decay. It was quite common to see the comment that 'plutonium would last longer' which did not include enough physics to be given any credit.

Question 7

Part 7(a) was generally well-answered and almost all candidates could recall the relevant equation. A significant number of candidates incorrectly chose to convert kilograms to grams and, although this was sometimes corrected using a unit of gm/s, it led to a lot of power of ten errors and lost marks. Other common mistakes involved incorrect units being given. Examples included kg/m/s, kgm/s^2 and kgm/s^{-1}.

Candidates performed well in the following linked calculations and half of them gained full marks. Mistakes were sometimes made when incorrectly converting kilograms to grams in part 7(b)(ii) and for not using the appropriate equation for kinetic energy in part 7(c)(i). In some instances, candidates did not show sufficient working to be awarded full marks in the 'show that' style question in part 7(c)(ii) and it is especially important that candidates set their working out clearly in this type of question.

Candidates generally gained at least one mark in part 7(c)(iii), usually for mentioning air resistance or energy being lost to the surroundings. More able candidates realised that the raindrops reached terminal velocity as the resultant downward force had reduced to zero. However, some were under the impression that the raindrop had been travelling at 150 m/s and had been slowed down or experienced deceleration, rather than knowing that it had never actually reached this speed.

Summary Section

Based on the performance shown in this paper, candidates 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.
- Take note of the command word used in each question to determine how the examiner expects the question to be answered, for instance whether to give a description or an explanation.
- Be familiar with the equations listed in the specification and be able to use them confidently.
- Be familiar with the names of standard apparatus used in different branches of physics.
- Practise 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 able to identify independent, dependent and control variables and be ready to comment on data and suggest improvements to experimental methods.
- Take care to follow the instructions in the question, for instance when requested to draw a specific number of arrows.
- Take advantage of opportunities to draw labelled diagrams 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.

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