Examiners' Report

Principal Examiner Feedback

Summer 2018

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.

Question 1

Most candidates were able to answer the multiple-choice questions in parts 1(a) and 1(b) correctly. Part 1(b) was the more challenging of the two, with a third of all candidates incorrectly choosing one of the distractors. The multiple-choice question in part 1(c)(i) was more challenging still and only two thirds of all candidates chose the correct option. The calculation in parts 1(c)(ii)-(iii) was generally well-answered but close to half of all candidates failed to convert the mass value into kilograms. A small number of candidates included “gravitational field strength” and “g” as separate variables multiplied together in the equation.

Question 2

Parts 2(a)(i)-(iii) discriminated well between candidates of differing levels of ability and involved AO3 measuring skills in addition to knowledge recall and its application. Most candidates scored both marks in part 2(a)(i). If they did not, this was mostly because they did not know what the wavelength was and only measured half a wave or more than one wave. However, they usually managed to attain the second mark by multiplying their answer by 200. Most candidates could recall the equation in part 2(a)(ii). However, a significant number then failed to notice that they needed to convert from centimetres to metres in part 2(a)(iii). Otherwise, the calculation was usually completed correctly, even by those who had an error carried forward from their wavelength measurement. It was surprising to see a quarter of all candidates being unable to give an example of a transverse wave in part 2(a)(iv) and the incorrect answer of “sound” was common.

Candidates found part 2(b) challenging and only 75% recognised the phenomenon as diffraction in part 2(b)(i). When discussing how the boat would be affected by changing the opening in part 2(b)(ii) it was common to see candidates who thought the effects were the opposite way around and did not score. Another common answer was that if you increased or decreased the opening to match the size of the wavelength maximum diffraction would occur. Candidates did not then take notice that the opening in the diagram was already larger than the wavelength and hence only making it smaller would increase the extent of diffraction. Some candidates wrote about the effects of increasing *or* decreasing the size of the opening, rather increasing *and* decreasing the size of the opening. Too many assumed that if the gap got bigger the waves got bigger as well. Finally, candidates should be encouraged to use the term ‘diffraction’ rather than ‘spreading out’.

Question 3

Over half of all candidates were able to classify all the variables correctly in part 3(a). Common mistakes were seen in confusing the independent and dependent variables.

It was surprising to see only a third of all candidates score full marks in part 3(b). This should have been a high scoring question, but a large proportion of answers failed to score all three marks due to either including the units with the data values or failing to list the data in ascending (or descending) order in the table. Many just followed the order in the results shown. A small number of candidates put the angles in increasing order but failed to then rearrange the times to match this. Some wrote the 0.50 s reading to only one significant figure.

Most candidates scored all four marks in part 3(c). Very few failed to identify the anomalous point. A majority correctly suggested that the point would be ignored or that they would repeat the measurement for that angle. A significant minority wanted to repeat the experiment which was taken to mean the whole experiment and did not score. Those that identified the anomalous point were usually able to draw an acceptable curve of best fit. However, some tried to draw a best fit straight line, joined the points with straight lines or missed the last part of the graph between the 10° and 20° points. Most could give an acceptable response for not starting the graph from zero on the axes.

Question 4

Part 4(a) discriminated well between candidates, although it was clear that a significant number had never constructed their own electromagnets. However, most answered well, especially those who drew a labelled diagram. The use of a magnet for the core was a common mistake. Some candidates did not say that there was a current in the wire or did not show a cell connected correctly in the diagram and some said there was electricity in the wire, which was too vague.

The terms ‘soft magnet’ and ‘hard magnet’ were seen frequently in part 4(b). Less than 10% of all candidates were able to score full marks in this part of the question as many talked about the steel pieces remaining on or sticking to the electromagnet (which was repeating the question), rather than being *attracted* to it. A few candidates had confused electromagnetism with static electricity, and talked about electron transfer, friction and charges. Many lost marks because they omitted the word ‘magnetic’ and just said hard or soft materials or made comments about steel being a stronger magnet than iron.

Question 5

Most candidates identified the graph as a bar chart in part 5(a)(i). However, candidates' understanding of why the bar chart was appropriate was not communicated as effectively. Many candidates described the type of metal as a discrete variable, despite this data not being quantitative.

Most candidates could score the two marks for describing the arrangement and motion of particles in a solid in part 5(b)(i) but were less clear about the behaviour of particles in a liquid. Many students left too large gaps between the particles in the diagram of a liquid and therefore did not communicate that the particles were closely packed together. Occasionally the diagram and description for the liquid was better suited to a gas. There were many good answers in part 5(b)(ii) that scored at least two of the marking points. Some explanations confused boiling with evaporation and so often lost at least one mark. As always, candidates need to remember that particles don't expand when heated; this lost MP3 in a few cases.

Question 6

Less than half of all candidates gained the mark in part 6(a). Many candidates referred to the plum pudding model of the atom rather than Rutherford's model, which the question related to. In part 6(b) most candidates realised that the alpha particle was deflected as the result of the repulsion of like charges but not all of those explicitly said that the alpha particle had a positive charge. Although most could relate the facts to the idea that there was a massive positive charge at the centre of the atom they did not often say that this is called the nucleus. Some candidates used the space to describe the alpha particle scattering experiment rather than answering the question.

Question 7

The best answers kept the requirements of the location in mind and assessed all three proposed methods. They used the information about the fact the houses were on the coast, and there were only 50 of them to gain MP3, MP8 and MP9. Some candidates also realised that if the term 'renewable' was in the stem of the question they needed to be more specific, and correctly stated that the resource wouldn't run out (rather than re-state it was renewable) or produce carbon dioxide (rather than simply pollution).

The lowest scoring answers were factually correct, but used phrases such as 'eco-friendly', 'clean' and 'better for the environment', without further explanation, often repeating the same statements for each resource. These often were more generic answers that could be applied to lots of questions about renewables. For example, costs and maintenance (and sometimes jobs) were often the focus of answers, along with output comparisons with fossil fuel power stations. Another example of this was stating that a large area would be needed for the wind turbines. Very rarely was the fact that only a few turbines would be needed (MP7) recognised. Lots of responses were awarded the marks for identifying possible visual or noise pollution (MP11) and many were concerned for the safety of birds (MP10).

The concept of reliability was well understood but often not linked to each individual resource; for example, stating that wind turbine output was weather dependent, with no mention of wind, or wind speeds and the implications for the

generation of electricity of having too high a wind speed (or no wind at all). A few responses showed a lack of understanding of geothermal energy – some related it to using waste or water. A common disadvantage cited was the cost of drilling down into the Earth. MP13 was often gained by stating that the source is reliable (or not dependent on the weather). Although many candidates had the right idea for MP15 a number did not gain the mark because they just stated that 'hot rocks' were needed, or they could only be built near volcanoes, rather than volcanic or geological activity. MP14 was rarely awarded as most stated that geothermal power stations would need a lot of land space.

Question 8

Slightly more than half of all candidates could recall the principle of moments in part 8(a)(i). Incorrect answers usually only gave the equation for calculating a moment or, in fewer cases, showed confusion between moments and momentum. It was encouraging to see so many candidates make valid attempts at the difficult calculation in part 8(a)(ii). Nearly a third of all candidates were awarded full marks, whilst another third gained two marks, having used an incorrect distance. Weaker candidates usually identified the clockwise moment and sometimes the anticlockwise one but then were unable to rearrange correctly.

Although many candidates realised that Force X decreased in part 8(b), quite often the reasoning was based around the idea of the man's weight shifting rather than using the principle of moments. Too many lost MP2 simply because they did not identify the right-hand pivot if they stated the distance increased. As this was a question about moments, using the word 'distance' was important. A common erroneous line of reasoning involved stating that the moments must be constant and only the strongest answers identified that the clockwise and anticlockwise moments decreased.

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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