Pearson Edexcel

# Examiners' Report

# Principal Examiner Feedback

## November 2020

## Pearson Edexcel International GCSE In Physics (4PH1) Paper 2P

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**General Comments**
As in examinations for previous specification, most students were able to recall the equations and usually they handled the related calculations well. Students who gave the best practical descriptions usually appeared to be writing from first-hand experience. Responses to the longer questions showed that the less able students tend to struggle when assembling a logical description or when asked to offer more than one idea. There was a wide range of responses and it was good to see that many students could give full and accurate answers.

**Question 1**
Item 1(a) showed that while most candidates are aware of the differences between solid and fluid states of matter, the ideas separating liquids from gases are less distinct. The most successful candidates showed that the particles in a liquid are in a less ordered structure but do not have large gaps between the particles or highly uneven surfaces.

Item 1(b) was much more successfully answered by the majority of candidates, who remembered that 'scale' or 'meter' is insufficient for any instrument. The mass of liquid nitrogen was calculated well, as was the density in item 1(b)(v). Candidates introduced an unnecessary hurdle by trying to give the density in units other than in terms of the supplied g or $cm^3$.

Candidates did well in response to item 1(c), often remembering at least two out of the three core ideas.

**Question 2**
Nearly all candidates correctly identified that metal objects become positively charged because of the loss of electrons in item 2(a). It is still a common misconception that positive electrons move in electrical circuits. Item 2(b) was equally well answered by most candidates.

Item 2(c) again was answered very well, provided that the candidate remembered the formula linking charge transferred, current and time. Item 2(c)(iii) was significantly more challenging and was only answered correctly by those candidates that could link the beginning of the question's reference to the link between current and charge to the increase in voltage. References to Ohm's law gained no credit. Very nearly all candidates correctly identified the ammeter and the apparatus to measure current.

**Question 3**
Virtually all candidates correctly identified point G as either the centre of mass or the centre of gravity. The common misconception between mass and weight persists, with significant numbers of candidates identifying the weight of the bin in kilograms, whereas in Physics, the weight of an object is the gravitational force it experiences, in this case, 230N.

Even so, the majority of candidates correctly stated the principle of moments and attempted to use it in item 2(b)(iii). The pivot point was labelled clearly in the diagram, so it was expected that the candidates should correctly identify either or both of the two relevant distances and hence the expression for the correct moments. Item 2(b)(iv) tested the idea of Newton's Third Law, with the magnitude of the force on the person the most common part correctly answered.

**Question 4**
The mark scheme for item 4(a) concentrates on the Physics reasons underpinning the advantages and disadvantages of solar power compared with fossil fuel approaches to large-scale generation. Hence arguments regarding initial start-up costs were ignored as were ideas centred on using land for other economic purposes. Furthermore, basic or unqualified ideas regarding the Sun did not gain much credit. It was encouraging to see the majority of candidates take care to include comparisons or to structure their responses in a considered manner.

Candidates continue to improve their descriptions of alternating current(a.c.) and direct current (d.c.) , as required in item 4(b), with each series.

**Question 5**
Item 5(a) was answered accurately and clearly by the majority of candidates, with many showing their working in a highly presentable fashion.

Item 5(b) was less successfully answered, partly to do with the wavelength change being presented in standard form. The most common misconception was confusing the change in wavelength given in the question with the actual wavelength of the received waves. If a candidate used the actual wavelength, they were still given the rest of the credit if they showed that they had propagated this error correctly through the rest of the item. Others neglected to use the speed of radio waves given in this item and used the speed in km/s given in item 5(a).

**Question 6**
Items 6(a)(i) and 6(a)(ii) showed that candidates have, overall, improved their understanding of which heat transfer processes are relevant to the discussion. If a candidate got that far, by identifying radiation as the correct process in item 6(a)(i) and conduction and convection being appropriate to discuss in item 6(a)(ii), then they would often score all four marks available for item 6(a).

Ideas about specific heat capacity are new to the specification and broadly speaking they are well understood. Item 6(b) is an example of a multi-step calculation. Successful candidates tended to use the formula supplied to calculate the temperature change and then added the temperature change to the initial temperature in a separate line of working. Those that chose to express the temperature change as (T - 35) in an attempt to calculate the final temperature directly often made an algebraic or arithmetic slip, commonly giving the final temperature below the initial temperature. Candidates that ignored the conversion from kJ to J only suffered a single mark penalty.

**Question 7**
Item 7(a) elicited mostly excellent responses from the overarching majority of candidates. The investigation to find the shape of a magnetic field is named explicitly on the specification and it is evident that most candidates have either witnessed this investigation or performed the experiment themselves.

The magnetic field pattern for a loop of wire is challenging to reproduce for item 7(b). The central ideas to remember are that close to the wire, the field lines are approximately circular and that between the two sectors of wire given in the diagram there is a single, straight field line that runs from bottom to top. Finally, the field gets weaker the further away the point is from the wires.

Item 7(c) tested the ideas behind Fleming's Left Hand rule. Item 7(c)(ii) was poorly answered in general, with most responses repeating the question that there was no effect on the direction of the force. The crucial point is that both the current direction and the field direction are both reversed in this case.

**Question 8**
A very high proportion of candidates correctly identified the transformer as a step-down transformer in item 8(a). In item 8(b), the formula should be quoted as it is represented in the specification or as a correct re-arrangement of that formula. Responses with the term 'turns ratio' were rejected.

Item 8(c)(i) was another challenging multi-stage calculation. A large fraction of the responses showed that the correct formula in item 8(b) yielded an output voltage of 57.5V yet many candidates could not further into the calculation than that. Use of the formula linking input power and output power was required - an incorrect output voltage could still be used to arrive at a creditworthy output current. The choice of the appropriate fuse in item 8(c)(ii) was trivial to most candidates.

**Summary**

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

- Take care when drawing diagrams to add labels and draw accurately.
- Either build or simulate circuits in which the number of components changes and noting the effect on the currents and voltages in or across those components.
- Ensure that they have either seen or performed the practicals named in the specification where possible.
- 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.
- Structure multi-step calculations as simply as possible to facilitate checking at each stage.
- Recall the units given in the specification and use them appropriately, for instance frequency.
- 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 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 use particular ideas in the answer.
- 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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