Examiners' Report
Principal Examiner Feedback

January 2022

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

This question was answered superbly by nearly all candidates. It was only item **(b)(iv)** that showed any misconceptions, with the most common incorrect answer being 'increasing the KE store of the driver'.

Question 2

The large majority of learners correctly described the arrangement and motions of particles in a solid. The sketch graph was less well answered, with candidates mis-reading the scale – putting the melting at 48 ^{o}C rather than at 44 ^{o}C – or omitting the melting phase entirely.

Question 3

Candidates generally remember the difference between fission and fusion and did so well on this question. In part **(b)** many recognised that the nuclei move apart because they are 'like charges' yet didn't identify the nuclei as both being positively charged. The conditions for fusion to occur in the core of a star were recalled accurately by many.

Question 4

Even though the investigation itself in part (**a)** was an unfamiliar context, the core points were teased out by the scaffolding in the question. Most candidates remembered that the distance should be measured with a ruler or an equivalent measuring device and that measuring the magnetic field strength for different distances was central to the investigation. Higher marks were obtained by those candidates that included details of the independent variable (distance), the dependent variable (magnetic field strength) and the control variables (i.e. current and number of turns of the coil).

Candidates that score well on questions such as item **4(b)** do so because they use readings from the graph as directed. By substituting in values and comparing the ensuing constants, candidates quickly ascertain whether the results support the given relationship.

Question 5

Items **5(a)** and **5(b)** were answered with much skill, with only a tiny number of candidates either forgetting to convert the given quantities into base units or neglecting to give the result of their evaluation to more than 1 significant figure.

Item **5(c)** was a more challenging calculation, requiring some manipulation of standard form as well as proficiency with units and powers.

Item **5(d)** did not get many fully correct responses. Some credit was available for reference to the conservation of energy whereas the second mark was for further application of specification point 4.15.

Question 6

Many candidates produced excellent responses for item **6(a)** as they referred to all three key components of an electromagnet with the addition of a suitable material for the core.

In item **6(b),** determining the period of a wave from an oscilloscope trace is one of the named practicals in the specification (3.27P). Encouragingly, learners appear to have witnessed this or completed the practical themselves.

There were many correct responses or responses that a power of ten error by missing the milli-prefix in the settings box. Once the period was calculated, candidates tended to do well on the rest of the item, especially if they explicitly mentioned their calculated frequency in item **6(b)(iii).**

Item **6(b)(iv)** was less well answered as candidates recalled the definition of alternating current (a.c.) rather than linking that idea to the evidence present on the oscilloscope trace. The symbol for an a.c. power supply, as defined in appendix 8 of the specification, was poorly recalled.

Question 7

In previous examinations, as in this case, vague references to pollution, global warming or cost were rejected. This question was more subtle, however, in that there needed to be comparisons between renewable resources, rather than merely suggesting that both were renewable and hence advantageous.

Energy transfers and stores continues to be challenging for candidates although many are familiar with GPE or the gravitational store reducing when water flows out of a reservoir and subsequently the KE store of the water increasing. After that point in the explanation, answers were generally vague, often without referring to legitimate stores or transfers at all. Care was taken to ensure that marking points should be similar in terms of challenge, regardless of which of the two different approaches to descriptions of energy transfers candidates used. Learners could not conflate explanations from the two approaches.

Question 8

By giving both the speed of light and the speed of the galaxy in km/s, item **8(a)** became more accessible. Candidates performed the calculation well and mostly scored full marks or dropped a mark due to the wrong power of ten in the evaluated answer. Very many fewer candidates picked up the last mark for part **(a)** as they did not add the change in wavelength to the original wavelength.

The astrophysics section of the IGCSE Physics course is new to the specification as of 2017. Since then, more candidates have made better reference to how the evidence supports the Big Bang theory rather than merely quoting what that evidence is. The most successful candidates provided a logically sound argument relating the larger red shifts at larger distances to larger recessional speeds which in turn implies expansion from a single point (rather than expansion from the Earth)

Question 9

Candidates are well-versed in safety precautions when dealing with heating objects. In part **(b),** candidates could substitute the values into the given formula and take the units into account. Most students gained much of the credit for item **9(b)(i)** yet significantly fewer used either their evaluated answer or 3000 J to correctly calculate the temperature change of the nail. Many candidates spotted that the difference between the theoretical and actual temperature change was due to loss of thermal energy to the surroundings either during the transfer process or from the beaker.

Summary Section

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. This is particularly important when dealing with a prefix in front of an SI unit or when dealing with numbers in standard form.
- Signposting working with words may help with structuring calculations clearly.
- 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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