Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

January 2022

Pearson Edexcel International GCSE
Physics (4PH1) Paper 2PR

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Question 1

Students generally scored well in **Q1(a)(i)**; the key error seen appeared to be commenting that hydroelectric was kinetic energy. Students must also ensure they have read the question properly and only tick one box per row.

Most students were also able to choose the correct method of generating electricity in **Q1(a)(ii)** that does not use a renewable resource.

In **Q1(b)**, many responses were seen that discussed start-up costs or maintenance costs, which resulted in no marks being awarded. There was often repetition of the same point in terms of the reliability of using wind to generate electricity and several were vague by stating that is simply dependent on the weather. Students must be specific in their response; harm to animals or pollution are too vague for a mark to be awarded.

Question 2

Those students who used the formula given in the paper could usually score two marks in **Q2(a)(i)** because they did not realise that the two values of momentum acted in opposite directions and had to be added to find the change in momentum. However, most students knew that the force acted to the right.

In **Q2(a)(ii)** too many students failed to realise that the same size force acted on the bat but in the opposite direction.

In **Q2(b)**, many students realised that they could use the previously used formula to explain that the time of collision would be longer and that the momentum would change and hence reduce the force on the player. Many students thought that the momentum would be constant and very few referred to rate of change of momentum. A small number of students used the idea of pressure as the equipment would spread the force over a larger area.

Question 3

Q3(a) assessed a method from one of the required practicals. It had 8 marking points and a very large number of students scored five marks. Marks were lost by those who thought they could use an oscilloscope and those who thought they would measure the time it would take by throwing the blocks at one another and measure the time of travel between them. Other common mistakes were being too vague about how to do the timing and not taking a mean of repeats.

Most students could calculate the mean correctly in Q3(b)(i), but the common error seen in this question was the incorrect rounding to 0.86, not 0.87.

The mark in Q3(b)(ii) was commonly awarded, however students must be specific in their response and not just state “repeat the experiment” but repeat the anomalous reading.

In Q3(b)(iii), although many students chose 300m and gave an acceptable reason, too many chose one of the other distances and did not appreciate the effect of reaction time on the accuracy of the method. Many students had learned that the speed of sound is 330 m/s, rather than the correct value of 340 m/s at room temperature in air. However, these students could still gain both marks for saying that 200 m gave a value closest to this number.

Question 4

It was encouraging to see most students perform well in Q4(a) despite the calculation involving handling data in standard form and a rearrangement of a formula. Most errors arose from rearranging, but many students still scored one mark for a valid substitution of the data.

Most responses in **Q4(b)(i)** indicated that the current travels in one direction or the same direction. Some students stated it had one constant value, which was insufficient for a mark to be awarded.

Many of the students were unfamiliar with the terms brushes and commutator in **Q4(b)(ii).** Some thought that brushes removed dust or held the coils in place. Others talked in terms of charges rather than current. More able students were aware that the commutator reversed the current in the coil every half turn to keep the motor turning in the same direction. Very few students mentioned that the field reversed or that the force was always in the same direction.

Students found **Q4(c)** very difficult. Few students understood from the stem of the question that the kinetic energy was being used to charge the battery, even though it said so in the first paragraph. Very few mentioned conservations of energy or that the rotating wheels were a store of kinetic energy. Those that did usually scored all three marks. Too many thought that the MGU would charge the battery so much that it would cause it to explode without mentioning kinetic or chemical energy.

Question 5

Most students gained at least one mark in **Q5(a)(ii).** However, students must ensure they have read the question and quote their answer to one significant figure, as requested in the question.

Most of the responses seen in **Q5(a)(iii)** were in terms of high pressure, rather than the reverse scenario presented in the question. Better answers mentioned the repulsive forces, which needed high kinetic energy, so there would be more frequent collisions. Some students confused fusion with fission or the breaking of chemical bonds.

In **Q5(b)(i),** many students thought that the hydrogen nucleus was moving *because of* the force and so assumed the movement would be to the left. Only the most able students knew that the force was caused by the movement, and that the direction of the movement must be downwards to produce the force shown.

Question 6

Very few students could not give a suitable definition of a galaxy in **Q6(a).** Similarly, students demonstrated a high level of knowledge in the following multiple-choice question, choosing the correct answer in almost all cases.

It was pleasing to see many students score at least one mark in **Q6(c)(i)** for saying that B moved faster or two marks if they said A was moving towards Earth and B moving away. Only the most able students connected both these ideas together in their responses.

Students made some excellent attempts at the calculation in **Q6(c)(ii),** but often made minor errors and lost some marks. The most common of these was not using the correct source wavelength in the formula or using an incorrect change in wavelength.

Question 7

Students found **Q7(a)** very challenging. Although most attempted to draw a tangent to the curve at the correct place, the subsequent gradient determination proved too difficult. Most of those students who did calculate the gradient correctly did not score full marks as they usually omitted the minus sign with their final answer.

Students performed much better in **Q7(b)**; most knew that the temperature would remain higher than that shown by the previous curve, but some students lost a mark as their curves were not drawn with enough care and sometimes showed a later increase in temperature.

Question 8

Q8(a)(i) was generally well answered, but there was a misconception seen in several responses that electrons are positive, or that positive charge moves.

Q8(a)(ii) also scored well, although some students did not convert kV to V.

Students also performed well in Q8(b)(i) and most knew that the upwards movement was due to the repulsion between like charges.

Q8(b)(ii) was much more challenging, and many students repeated the arguments from the previous question whist talking about continually winding the handle. They did not pick up on the idea of maximum height involving the consideration of other forces. A few students discussed balanced forces and the case being suspended, whilst others opted for an energy-focused route in their response.

Paper Summary

Based on their performance in this examination, students are offered the following advice:

- Attempt all questions in the examination, even if they are unsure of the quality or accuracy of their response.
- 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 formulae listed in the specification and be able to use them confidently.
- Know the SI units for physical quantities and be able to convert from non-SI units to SI units when required.
- Show all working so that some credit can still be given for answers that are only partly correct.
- Take advantage of opportunities to draw labelled diagrams as well as, or instead of, written answers.
- Be ready to comment on data and suggest improvements to experimental methods.

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