Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

January 2022

Pearson Edexcel International GCSE
In Physics (4PH1) Paper 1P and Science (Double Award)(4SD0) Paper 1P

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Question 1

Most students were able to answer all three multiple choice questions about magnetic fields correctly.

Q1(c) also offered little challenge to students and most were able to score the mark; the most common incorrect response was “metal”.

Q1(d) was answered to a high standard and it was clear that students had attempted some variation of this practical themselves. Students sometimes missed out the finer details. For example, not stating that the paper should be tapped or not describing how the marks made from compass directions could be used to draw the field lines.

Question 2

Students sometimes overlooked the demands of Q2(a) and gave a description of how the background count could be measured, rather than corrected for.

Despite Q2(a)(i) being a standard definition and common question, students still struggled with producing an adequate definition of the term *half-life*. The simplest way to do this is to say that it is the time taken for the activity of the sample to halve. However, it was encouraging to see many students use the concept of half-life correctly to determine the half-life of the isotope from the graph. Some students experienced difficulty in reading the scale and lost a mark for giving a final answer of 2.3 minutes.

Question 3

Most students could give a valid difference between the Wi-Fi signals in Q3(a) but found a similarity harder to recall. This was, most likely, due to overlooking the information that they are both electromagnetic waves.

The calculation in Q3(b) was answered to a high standard and most students were awarded full marks. Some students lost marks for using invalid symbols for the formula (for example “ws” for wave speed) or for making power of ten errors in the calculation when working with numbers in standard form.

More able students gave very explicit correct repsonses in Q3(c)(ii). However, many students found this question difficult and confused the types of waves or made no reference to vibrations.

Question 4

Most students knew that a protractor was required in Q4(a).

The ray diagram completion in Q4(b) proved more challenging and it was surprising to see many students identify an incorrect angle for the angle of incidence. However, most of these then went on to measure their angle correctly and error carried forward was applied.

It was pleasing to see students take care over the accuracy of their reflected ray drawing and, consequently, score both marks in Q4(b)(iii).

Question 5

The initial calculation in Q5(a) was answered to a high standard. Almost all students knew the correct formula and went on to rearrange it to complete the calculation. The next calculation was also completed successfully by most students.

However, there were more errors in rearranging the formula in Q5(b)(ii).

The final calculation in Q5(b)(iii) proved to be the most challenging. Weaker students did not know which formula to use and scored no marks. More able students usually selected the relevant formula from the front of the examination paper, but some experienced difficulty when rearranging it.

Question 6

More students opted to use the acceleration formula, rather than the gradient of the graph, to calculate the acceleration in Q6(a)(i) and many were not awarded the final mark for omitting the negative sign with their final answer. It was encouraging to see lots of students understanding that the area under the line is the distance in Q6(a)(ii). However, some students simply multiplied a time by a velocity, which did not score.

Students found the free body force diagram in Q6(b) surprisingly challenging. Although many knew the name of at least one of the forces, the diagram itself was not completed to a high standard. Ignoring the need in this question for the downward arrow to be longer than the upward arrow, students were expected to draw one downward arrow and one upward arrow to represent the forces. A lot of students drew multiple downward and upward arrows, which showed they did not understand how to use arrows to represent forces. In addition, students did not demonstrate an understanding that the arrows should start at the point of origin of the force.

Q6(b)(iii) was, overall, answered to a high standard and some students scored full marks with explanations in a logical sequence. Less able students made little reference to positions or time and responses were in a mixed order. These students had the correct ideas, but found expressing them difficult.

Question 7

Most students knew how to calculate the voltage across the thermistor in Q7(a)(i) and also knew the correct formula in Q7(a)(ii).

Whilst it was encouraging to see students rearranging this formula correctly in Q7(a)(iii), some students lost a mark as they did not know how to (or that they should) convert milliamps to amps. Weaker students used an incorrect voltage in this calculation and could only score the rearrangement mark.

Q7(b)(i) was well-answered and lots of students scored full marks, usually for a simple statement that the two variables are inversely proportional to each other.

However, Q7(b)(ii) was much more challenging. Many students were not awarded the second marking point associated with resistance because they were not specific in saying which component's resistance was increasing. Simple sentences such as "resistance increases" were not awarded a mark. Despite this, students often did score the mark for the voltmeter reading and more able students knew that the current in the circuit would decrease.

Question 8

Students found the context of the accelerating rocket travelling upwards confusing in Q8(a) and many thought that the energy in the gravitational store would decrease if the energy in the kinetic store is increasing. This often meant that students scored much better in Q8(b), which was a more conventional context.

It was very pleasing to see Q8(c) answered to such a high standard; most students knew the name of the force responsible for the orbit and the calculation was attempted successfully in most cases.

In Q8(d), students were frequently awarded marks for their understanding that black is a good absorber or emitter of radiation and also that the black cube would reach a higher temperature than the white cube (when facing the Sun). Other marking points were only scored by the most able students working at the top end of the grade range.

Question 9
Students performed well in Q9(a), showing that many had undertaken this experiment themselves and could recall the basic method. The most able students scored more marks for covering more detail in their method; for example, describing how to reduce parallax error, rather than simply stating that parallax errors should be avoided.

The graph drawing exercise in Q9(b) differentiated well between the different grade ranges. Whilst there were some excellent graphs, there were also a plethora of errors seen. These included omitting the data point at the origin, drawing a line of best fit linking only the first and last points, joining all data points together with straight lines, non-linear scales and failing to label the graph axes. Students should keep practising their graph drawing so as to avoid these common errors.

Question 10
Most students were able to deduce the correct value for the angle of refraction in the prism in Q10(a)(i).

The most common incorrect answer was, unsurprisingly, 61°. Encouragingly, most students could recall the correct formula in Q10(a)(ii) and went on to use it correctly in Q10(a)(iii), albeit with error carried forward in some instances. However, a lot of students overlooked the requirement to give their answer to two significant figures and lost a single mark for this oversight.

In Q10(b), most students deduced the correct link between wavelength and refractive index but the route to their deduction was not expressed clearly in most cases. Students need to set out their line of reasoning and steps in their deduction clearly in questions such as this.

Question 11
Students usually completed the calculation in Q11(a)(i) successfully, but some students used the wrong formula or made errors in rearranging.

The explanation about pressure in Q11(b)(i) usually yielded at least one mark for students for the idea that particles move faster at higher temperatures. More able students were able to score more marks for clear ideas that particle collisions with walls would occur more frequently and with greater force.

The final calculation in Q11(b)(ii) was more challenging, but it was encouraging to see more than half of all students complete it without error.

Question 12

The calculation in Q12(a) was answered to a very high standard, despite it requiring several different steps. Weaker students usually scored at least one mark for correctly calculating the energy transferred from the battery.

Quite a few students gained the first 3 marks in Q12(b)(i). MP4 was missed as "force caused the coil to rotate" was the most comon response. The idea of the forces acting on opposite sides of the coil being in opposite directions to cause the rotation was not considered by the majority. This marking point discriminated well between the higher ability students.

Paper Summary

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

- Attempt all questions even if the student is unsure 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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