Pearson Edexcel

Examiners' Report
Principal Examiner Feedback

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Pearson Edexcel International GCSE
Physics (4PH1)
Paper 1P

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Question 1
This question was well answered by students with most achieving at least three marks out of five overall. Students could confidently recall the purpose of the north and south poles of magnets but experienced marginally more difficulty when recalling which materials were magnetic. Students experienced the most difficulty when asked about their knowledge of hard and soft magnetic materials.

Question 2
This question assessed students' understanding of forces and their link to pressure in liquids. Q2(a)(i) was generally answered well by most students with most being able to achieve at least 1 mark. Students typically lost marks for not knowing to draw their arrow equal in length to the given upthrust arrow or for giving an incorrect name for their downward arrow. Students who did not score at all often drew horizontal arrows that were labelled as resistive forces such as drag. It was very encouraging to see nearly three quarters of all students give a correct statement about vector quantities in Q2(a)(ii). Students sometimes lost marks for not stating clearly enough that vector quantities have magnitude, but most knew that they have a direction. Most students were awarded the mark in Q2(a)(iii) for giving a correct vector quantity. The majority of students who did not score had not read the question and gave an answer of “force” or another named force.

In the vast majority of responses to Q2(b)(i)-(ii), students could correctly state the formula for pressure difference. The main errors seen were quoting the GPE formula or use of the word “gravity” instead of gravitational field strength. When completing the calculation, several responses only gained 2 marks as they did not show the final answer to be true as they did not add on 100kPa. The best students set their working out clearly for the examiner to follow and demonstrated a good understanding of a “show that” style question. Students found Q2(b)(iii) much more challenging but it was encouraging to see that more than half of all students knew that the weight of the ship would increase. Only the most able students gained a second mark, usually for recognising that the pressure difference on the bottom of the ship would be greater.

Question 3
Most students knew the definition of current in Q3(a) but the definition of voltage in Q3(b) was less well-known, with less than half of all students choosing the correct response. Q3(c)(i) was a well answered question, with the vast majority of students identifying the correct symbol and drawing it in parallel with resistor S. Those students who did not achieve full marks usually drew their voltmeter in parallel with the resistor. Students found Q3(c)(ii) much more challenging and less than half of all students could demonstrate their knowledge of conservation of current in parallel circuits successfully. However, most students were much more confident in applying the formula linking voltage, current and resistance in Q3(c)(iii) to achieve full marks. Some students substituted the wrong value for current, which limited their response to a single mark in these cases. In Q3(c)(iv), it was

surprising to see that over half of all students did not recognise that this was a parallel circuit. Most students thought that the battery's voltage would be shared between the two resistors and, therefore, did not score any marks.

Q3(d) was challenging but most students were able to gain at least 1 mark, as they recognised that the thermistor's resistance would change. Several students did not communicate that this change in resistance was due to a change in temperature, whilst others linked a lower resistance to a lower current. There was also a misconception seen in several answers that it is the current flowing through a thermistor that causes the resistance, showing a clear misconception surrounding a thermistor's function.

Question 4

Students completed Q4(a) with confidence and most achieved full marks. A small minority lost a mark for the formula due to their use of the word "gravity" instead of gravitational field strength. The weakest students were unable to rearrange the formula in Q4(a)(ii) and, therefore, were only able to be awarded a mark for a valid substitution.

Q4(b) differentiated students very successfully by ability. A valid attempt to evaluate the total area was made by most students, but a common error seen was student calculations involving a general base × height calculation. Centres need to ensure that students can use a counting squares estimation method and that students know when this estimation is valid. Most students could correctly state the relevant formula and substitute appropriately. However, many responses did not consider both feet. A common error also seen was the use of Pa rather than N/cm^2 showing a clear misunderstanding in the correct units when working in different dimensions.

Question 5

Most students gained the mark in Q5(a)(i). A small number of students only gave one section where the bus was stationary and, therefore, did not score. In Q5(a)(ii) the formula was usually quoted in the student's working or could be implied from their use of data. Many students did not realise that the units on the graph scales were not suitable for giving an answer in m/s and failed to convert one or both quantities read from the graph. A small minority of students misread the distance measurement from the graph, but the time measurement was usually made with greater accuracy. Nearly half of all students gained both marks in Q5(a)(iii) and the quality of responses was generally very good.

Students found the velocity-time graph plot in Q5(b) challenging and more than half failed to score at all. The most common eroneous response was a straight line of positive gradient, which demonstrated confusion between velocity-time graphs and distance-time graphs. A small number of students knew to draw a horizontal line (scoring the first mark), but did not evaluate the velocity of 0.5 km/minute.

Question 6
This question discriminated well between students of differing abilities. A significant number of students demonstrated confusion surrounding the term **heat** as they referred to it as a type of energy, rather than a method of transferring energy. This resulted in many responses not gaining any marks as these students just discussed briefly that a vacuum stops heat transfer. It was seen regularly that a vacuum has no medium or a vacuum stops air which also resulted in no marks being awarded. Whilst there was some confusion surrounding which parts of the cup were designed to stop conduction and convection, the general idea that the cup reduces heating by these methods was well known. Some students linked the shiny surfaces being made of metal to being good conductors and these students did not address energy transfer by radiation at all.

Question 7
Most students correctly read the pressure guage in Q7(a) to gain the mark. A small minority misread the scale to give an incorrect answer of 20.4 kPa. It was pleasing to see a healthy proportion of students recognising that the pressure increased in Q7(b) but more so to see that many of these students also knew that the pressure would double. Many students opted to use macroscopic gas laws as the basis for their explanation for this and did so by correctly quoting Boyle's Law. Students who chose to refer to the motion of particles often did not gain the final mark due to not being clear that their collisions with the walls would be more **frequent**.

Most students appreciated that the particles would move slower in Q7(c)(i) but some were not awarded the mark since their description of "the motion decreases" was not specific enough. Q7(c)(ii) was challenging and required a microscopic explanation involving the motion of particles. Most students gained the first mark for recognising that the pressure would decrease, but only a third of students went beyond this to gain marks for relevant comments about the motion of the gas particles.

Question 8
Students' quantitative skills were demonstrated impressively in Q8(a) and over three quarters gained full marks for their calculation. Although almost all students knew the correct formula, some students did not use the car's initial velocity in their substitution and, therefore, failed to gain further credit. Rearranging the formula also proved challenging. Students who recognised that Q8(b) was an example of the Doppler effect usually gave competent answers that scored at least 2 marks. Many students were able to identify that as frequency increased, then wavelength decreased. These were the two most frequently seen marks. MP4 was seen together with MP2 most often after that with MP5 being seen in good answers as well. This gave many students the opportunity to score maximum marks. The most common error seen was a discussion of the speed changing and the waves speeding up. Students must be careful and re-read their work to avoid contradicting themselves in their responses, resulting in no marks being awarded.

Question 9
Most students could give a valid radiation detector in Q9(a). Some students did not know the correct name of the detector and referred to ambiguous "radiation detectors", which were not given credit. It was surprising to see only a third of all students be able to name the independent variable in Q9(b). There was clear confusion between this and the dependent and control variables in the investigation. Students found linking the constant thickness to it being a control variable difficult in Q9(c). Many students gained a mark for stating that it would make the investigation fair, but only the best students gained a second mark for explicitly referring to it as being a controlled variable. Approximately half of all students gained the mark in Q9(d). Many students simply stated to repeat the experiment, without referring to repeating it **more** times.

Students found the graph plot in Q9(e)(i) surprisingly difficult. When drawing graphs, students must ensure that they correctly label axes with the full units so that the mark can be awarded. They must also ensure that they accurately plot bars according to the values given, as a common error was plastic being plotted at 230 or wood at 220. However, it was encouraging to see that most students knew why a bar chart was appropriate in their response to Q9(e)(ii). There was a clear misunderstanding in Q9(e)(iii) that plastic must be the best absorber and was absorbing more due to the fact the count was higher, as it was regularly seen in responses. Generally either 2 marks were awarded or 0 marks in this question.

Question 10
Most students could give a valid simple description of refraction in Q10(a)(i) but the question allowed more able students to gain more marks for a more detailed response. It was pleasing to see that a significant majority of students identified the line XY as the normal in Q10(a)(ii). Students were able to score well in Q10(a)(iii), but there were a number that forgot the 'sine' and others that wrote that 'n' was the angle to be found. The calculation that followed in Q10(a)(iv) was answered well, even by those students who quoted the wrong formula in the previous part of the question. Q10(a)(v) proved to be the most demanding for students and most did not appreciate the significance of the critical angle they had previously calculated. A significant number of students drew the ray of light refracting into air and some students who knew that total internal reflection would occur did not take enough care over their diagram to communicate their understanding of the law of reflection. Only a third of all students gave completely correct responses in Q10(b). Most drew the ray either showing total internal reflection or bending towards the normal with a small minority of students drawing rays on the wrong side of the normal.

Question 11
Q11(a) was answered to a high standard by most students. There was a clear understanding that activity decreased over time and that it took the shape of a curve. The best students took the time to calculate subsequent values for the activity at later points in time to ensure the accuracy of their curve. However, some

students then proceeded to join these data points together with straight lines, rather than a curve.

Very few students appreciated why technetium-99m is made in hospitals in Q11(b)(i). Most students thought it was due to health and safety issues posed by the radioactive material. Students very rarely indicated that gamma would pass out of the body or that it could be detected outside the body in Q11(b)(ii) despite recognising that it had a high penetrating ability. The idea of activity falling to a safe level quickly was the most common correct response seen.

Students did not understand the significance of the command word **discuss** in Q11(c). Most students gave three different hazards of ionising radiation and assumed this was sufficient to answer the question. Very few students gained more than one mark in this question by distinguishing the respective risk to doctors from the risk to patients.

Question 12
Q12(a) was a well answered question with both marks being regularly awarded. The most common errors were drawing a circular path or putting the sun directly at the centre of an otherwise correct elliptical orbit. Even though Q12(b) was the last question on the paper and, therefore, suitably challenging, students completed the calculation well with a large number gaining full marks. Some students got as far as calculating the orbital speed for one planet or, occasionally, both planets, but these students did not know how to proceed further with their time period values.

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

- 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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