Examiners' Report
Principal Examiner Feedback

January 2023

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

January 2023
Publications Code 4PH1_1PR_ER_2301

General Comments
As in examinations for previous specification, most candidates were able to recall the equations and usually they handled the related calculations well. Candidates 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 candidates 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 candidates could give full and accurate answers.

Question 1
Candidates did very well at this question with the majority of them scoring perfectly or nearly so. A minority of candidates mis-interpreted the graph although still gained the rest of the credit available for propagating their time through as 'error carried forward'.

Question 2
Most candidates clearly remembered that moons orbit planets and comets orbit the sun. There was considerable leeway with the shapes and sizes of orbits that candidates drew in part (a). It was not acceptable for orbits to have the Sun at the centre of, rather than the focus of the ellipse. The calculation in part (b) went very well. The most common error here was not converting the time from 1 year into seconds or to not attempt to convert that time at all.
Part (d) yielded some excellent answers which went some distance beyond the intention of the specification. Typically naming the stages with a correct description of the order is sufficient.

Question 3
The most common misconception stemmed from candidates not reading the very first line of the question. This meant that candidates thought that the balloon was rising upwards through the air and not falling through the water. Those candidates, consequently, did not score well in part (a)(ii). Part (b) was done well, with the exception of part (iv) where some candidates did not use the given formula effectively. That said, approximately half of all candidates scored full marks here.

Question 4
The circuit diagram in part (a) was completed perfectly by approximately half of the candidates. The most common mistake was to get the symbol for a variable resistor wrong. The correct symbols are listed in the appendix of the specification.
Point plotting and curve sketching were completed well in part (b). In part (c), it was uncommon for candidates to realise that taking more data at different voltages different to those given would provide more evidence to get the correct trendline. Most candidates did not make the link between a curved current-voltage graph and how the metal filament had become non-ohmic.

Question 5
Parts (a) and (b)(i) were completed very well by the majority of students. At this stage of the paper, correct scientific terminology is important, so referring to combining and fusing of atoms, rather than nuclei will not (and has not) been creditworthy. Part (b)(ii) showed that most candidates did not know that the fission products of uranium are radioactive, as mentioned in the specification.

Part (c) was answered well, especially by those that realised that 48 years corresponded to 4 half-lives and so the activity needed to halve four times.

Question 6
Candidates likely to attain a higher grade overall realised that explaining which method was most likely to be the main method of heat transfer and explaining why the other two were not was a good strategy. In part (a), they made the link between the plastic case and poor conduction, white being a poor absorber and radiator and that there was a fan. In part (b), they made the link between the aluminium case and good conduction, black being a good absorber and radiator and that there was no fan or way for hot air to flow out of the case.
Part (c) was answered well by the vast majority of candidates, only some of whom got the wrong unit of power.

Question 7
Most candidates measured the angle of incidence correctly and could state the formula linking refractive index, the angle of incidence and angle of refraction, although some did miss out the reference to the sine of those two angles. Over half of candidates then went on to complete the calculation for the angle of refraction correctly.
There were similarly successful answers for part (b), which looked at the link between critical angle and total internal reflection.

Question 8
Candidates should be aware that 'a scale' is not an instrument, only part of one. 'Scales' and 'a balance' are legitimate mass-measuring devices. Taking more data without finding an average or checking for anomalous results is also a pointless exercise.
Again, in part (b) the calculation was performed broadly successfully, though candidates should check units of quantities and then use those to assign the unit to a derived quantity such as density. There was no need to convert the mass into grams or the volume into cubic metres, which added a layer of complexity that was unnecessary.
In part (c), provided a candidate remembered that this was about a displacement method, they scored very well here.

Question 9
Most candidates produced a sensible precaution for working with radioactive sources and a suitable instrument to detect that activity. In part (b) it was evident that candidates had missed the reference to 'cannot penetrate' and gave reasonable answers to a question that did not have the 'cannot'. Part (c) showed that most candidates could remember the formula linking KE, mass and speed, although commonly candidates forgot to square the speed or made an error in handling scientific notation. Correct answers to parts (c)(ii) and (c)(iii) were rarer as most candidates did not know that the work done on the alpha particle must equal the reduction in KE and that the paper gains thermal energy as a result.

Question 10
Candidates completed parts (a)(i)-(iii) very well indeed, with good recall of the relevant formula and terminology. In part (a)(iv), however, very few candidates

made the link between a changing resultant force (because of increased drag or reduced weight) and the changing acceleration.
Part (b) was answered considerably better than part (a)(iv). Candidates made the link between an increased wavelength giving a lower frequency. The best answer to this part of the question also included some analysis as to why this was the case i.e., constant wave speed and the implication that has with the equation 'wavespeed = frequency x wavelength'.

Question 11
Candidates completed part (a) well if they had seen or used compasses to map out a magnetic field. Hence approximately two-thirds of candidates deduced that the field line in this case was a circle. There was no expectation to know the field line pattern around a straight wire nor to draw more than a single field line.
Part (b) was completed very well by most candidates. Part (c) requires some correct terminology to score highly, however. Most recognised the need to move the wire up or down (or any component of vertical motion) although considerably fewer knew why, i.e. the idea of cutting field as experienced by the wire. Note that higher level language is not required, such as 'rate of change of flux linkage'. In part (c)(ii), most candidates did not refer to an induced voltage and if they did, even fewer noted the link between a voltage and a complete circuit giving a current.

Summary Section

Based on the performance shown in this paper, candidates and their teachers should:

- Take care when drawing diagrams and learn circuit symbols diligently.
- 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 density or power.
- 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.
- 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.

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom