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January 2013

International GCSE
Physics (4PH0) Paper 1P
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International GCSE Physics paper 4PH0 1P

General

Many candidates scored very well across all aspects of this paper, indicating thorough preparation fully covering the specification. Numerical work was usually handled very well, including simple rearrangement of equations. Questions relating to experimental work and other skills covered by AO3 often allowed candidates greater freedom of expression and many responses indicated the candidates had experience of practical physics and were able to describe their ideas clearly. However, a number of blank responses were also seen and some responses to the longer, more extended questions indicated a lack of preparation in depth.

Question 1

The multiple choice parts of the question were generally very well answered, although Q1 (c) caused the most difficulty. For Q1 (d) it was important for candidates to state both the similarities and the differences between nuclei that are isotopes. Since electrons are not in the nucleus, they are irrelevant in this question. In general though, this part of the question was answered very well.

Question 2

The large majority of candidates were able to complete the sentence correctly in Q2 (a) (i).

Many candidates found completing the diagram in Q2 (a) (ii) quite challenging. There were a number of good, clear correct answers drawn with a ruler. Others were generally aware of what should happen, but could not draw the correct diagram. Weaker responses tended to secure one mark either for showing the position of the image or a correct reflection off the face of the mirror.

Q2(a)(iii) - poorly answered question. The idea of a virtual image is not well understood. The “screen” idea scored best, but answers relating to the idea of rays crossing were rare. In most cases lateral inversion of image /object position responses were given.

Q2bi Most candidates drew the ray correctly within the limits set.
Q2bii A number of candidates gave answers that described how the optical fibre was structured. Those who gained credit on this question asked usually scored for the idea of the angle of incidence being greater than the critical angle, but not the optical density mark.
Q2biii Many candidates answered this in term of cost or speed, gaining no marks. Relatively few were able to give responses relating to data transfer or reconstruction reducing the effects of noise, tending to give the rather vague ‘clearer’ instead.

Question 3

Q3(a) Many diagrams were poorly drawn, often looking like sketches rather than circuit diagrams. Ammeter and Voltmeter symbols were best drawn; the cells were less so – often the number was wrong or there was no battery symbol. The connection of the voltmeter in parallel was a problem. In some cases candidates drew the photograph, but in freehand adding the symbols.
In Q3(b)(i) surprisingly few candidates were able to identify the key variables in the investigation.
In Q3(b)ii many candidates scored at least one or two, mainly for the ammeter/voltmeter readings. In quite a few cases further marks were picked up for lengths of wire and for connecting the test wire/circuit. Very few gave responses relating to precautions other than repeating each reading to obtain an average. A number of candidates mentioned keeping the voltage constant, but didn't score as they failed to say they would measure it to check.
Q3(c) - the Ohms law equation should be written out in word or symbol form. It is not acceptable just to draw an equation triangle or give an equation in terms of the units. The answer should have been rounded to 1dp to be consistent with the other numbers in the table.
Q3(d)i Graph drawing was generally good. Most candidates labelled axis and plotted points correctly. Where candidates lost marks it was generally for not drawing a correct best fit line – the examiners were looking for a straight line with an even spread of points either side of the line for those points that did not hit the line exactly. A significant minority of candidates joined the dots to find their line.
Q3(d)(ii) and (iii) were generally well answered with the large majority of candidates able to describe a trend in the results. Linking the trend to the properties of the line was less well described, with few mentioning the passage of the line through the origin (where they had drawn the line through that point).

Question 4

Q4(a) In most cases the correct formula was used but some used a liner motion relationship. A number of errors were made involving powers of ten and converting time scales. Matching the unit to the calculation performed was done quite well in many cases.
In Q4(b)(ii) about a half could draw an acceptable ellipse. Too many drew a circular orbit or an ellipse which either did not pass round the sun or passed through the sun. In Q4(b)(iii) many had some idea that the fastest point was when the comet was nearest the star but careless drawing would place the X too far from an acceptable point.
Q4(b)iv was well answered with most candidates gaining both marks.

Question 5

Q5(a) A significant number of candidates incorrectly identified Christine's ideas as correct, thus losing both marks for this part. Those who chose Kalpana as the response were generally able to score a mark and many two if they quoted the formulae or equivalent. However, a significant number simply restated Kalpana's ideas.
Q5bi The answer should have been A, due to the smallest scale division. Some candidates were thrown by the fact that it was in ml rather than cm^3 (it seemed many candidates did not realise they were the same thing) and thought that at this was the key to answering the question – which it wasn't. Also the capacity of the cylinder was not relevant here. Sadly some candidates misread the scale and identified the intervals as 0.1ml – which was wrong as it is 0.2ml.
Q5bii Too many candidates simply gave "human error" as an answer – considered too vague to be worthy of credit here. The students should have either identified a potential problem with the scale or something specific that may have made it difficult to take a reading. It was insufficient to say 'it was hard to measure'. Again, the units were irrelevant in this question.

Q5c The equation is required here either in symbol or word form. It is not acceptable to just have an equation triangle or the equation in terms of the relevant units. The marks are then awarded for the substitution, answer and units. Commonly candidates evaluated to 3significant figures since this is regarded as a default for rounding answers – this would not have scored the evaluation mark. All figures in the question are stated to 2sf and so the answer should also be to 2sf.
Q5(d)i Most candidates gave the idea of comparison, but many talked about comparing with other experiments they had done, rather than in a book or internet. Comparing with other experiments was not a suitable response to this question since it would be insufficient to identify the type of rock.
Q5(d)ii Generally well answered with rock impurities, inaccurate measurements and the possibility of different types of rock having similar values being the commonest answers.

Question 6

Q6a The large majority of candidates correctly named the process as fission.
Q6(b) Many scored the 'releases neutrons' mark, however the use of the term nuclei was not always present so restricting the mark. In some cases students attempted to describe the diagram and did not provide any additional information. Some candidates described the uranium nucleus splitting and then splitting again and again, some seemed to think the daughter products were also uranium.
Q6c The correct answer should be the kinetic energy of the fission product. It was a common mistake to assume that the answer was the heat energy in the reactor or to try and write down the energy transfers in a power station when producing electricity.
Q6d Students often confused the moderator with the control rods. The moderator is needed to slow down the neutrons – which is the correct answer. (The control rods absorb excess neutrons in the reactor). For the

second part of this question required students to fill out the boxes with the appropriate forms of energy. A number of students used terms such as mechanical energy – which would not have scored.

Question 7

Q7a dc is when charge flow in one direction only – answered correctly by a majority of candidates. Stating that the current flows from + to – was insufficient since this also happens when the current changes direction.
Q7bi This question required the candidates to think about how the waves travel eg they are fast and can diffract. It was not acceptable to just make comments about the wavelength or frequency. However, most candidates could give an acceptable response..
Q7bii It was important to be specific about the uses and dangers of the waves. 'causes damage' or 'harmful' or is 'dangerous' is not specific enough. For microwaves, the heating effect to tissue and for the UV its skin cancer or sunburn. Cancer on its own was insufficient.
Q7(c) The better responses seen connected a current in the coil to a magnetic field to a changing field and scored marks quickly. Misconceptions abounded including ideas of electromagnetic induction and spinning coils etc. A lot of vague comments were seen, such as 'forces produced' without reference to what the force was produced on or references to 'magnetic' or 'cutting field lines' (which was clearly inappropriate in this case).

Question 8

Q8(a)i and ii There were well answered with most candidates getting the calculation and the units correct. Some candidates attempted to use formulae rather than the graph.
Q8b. A minority of candidates gave a correct response. A large number many said it was because there was no gravity or air on the moon, because the moon was a long way from the Earth or because the moon was further away from the sun. To gain marks on this question, the candidate needed to compare the masses of the two bodies – references to sizes was insufficient.

Q8(c) Many candidates gained at least one mark for the heavy/light idea. Other marks were harder to obtain, particularly linking the terminal velocity to the relative speeds of the items.

Question 9

Q9(a) This was well answered. Candidates were usually able to read the meters in the photographs (the most common mistake was reading 12 as 12.5) and then use the equation from the equation sheet to show the required result.
Q9bi Well answered but a few candidates got the equation the wrong way up and too many did not use the full wording given in the question – all the necessary words are given in the question for these type of questions and candidates would be wise to use all of them. In this case a number of candidates lost marks because missing out words such as 'useful' or 'input' made their responses too vague to score marks.

Q9biii A majority realised that some energy was wasted but did not specify where it was lost to. In this question, the candidates needed to show an appreciation of the fact that energy is transferred to somewhere other than the block.

Q9biv candidates generally scored quite well but some wanted to use less input energy which missed the point and others wanted to use a smaller block. A few wanted to paint the block black to absorb more energy from the surroundings.

Q9(c) Very few candidates scored marks in any of the three sections here.. In many cases candidates simply described the graphs, rather than explain why the graph had that shape. In others the ideas of heat transfer were not at all well explained. Where marks were scored they normally related to the idea of conduction in (ii) and radiation/ energy loss in (iii)

Question 10

Q10(a) This question usually scored at least one mark and in quite a few cases two or three. The idea of particles hitting was well understood; very few candidates failed to mention particles. However, some confused answers relating to the mechanism of the can were also seen.

Q10b for this question, the students needed to use terminology relevant to the gas laws. When discussing the particles it was the frequency of the collisions not just the number of collisions that was relevant. Some students just stated that the can would explode – this did not warrant marks.
Q10c Few candidates wrote out their equation or showed any working but most could still score both marks for a correct numerical answer.

Question 11

Q11(a) Both sections (i) and (ii) scored well. Students picked up marks here by knowing the relationship and applying it correctly.

Q11(b) (i) was well answered in most cases, however (ii) was not so well done with a surprising number of candidates not making the connection between energy loss and gain. Part (iii) was well answered and clearly this is a well understood equation. The final section was also well answered.

Q 11(c) This last question on the paper yielded good marks. Candidates were usually able to give a reason for both the wind and the rail in most cases.

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