Examiners' Report/ Principal Examiner Feedback

Summer 2010

GCE O

GCE O Physics (7540) Paper 02

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General Points and Observations

Good candidates found most parts of this paper straightforward and scored high marks. This paper required candidates to answer questions on the spaces provided on the examination paper. A significant minority of candidates still extend their answers beyond the space provided and unless there is a clear indication by the candidate that extra work is to be found elsewhere there is a risk of marks being lost. There was little evidence that candidates ran out of time. When questions required candidates to explain physical principle good candidates scored well but weaker candidates often repeated parts of the question or made general statements that were irrelevant to the question. A third of the marks were gained from calculations and these were generally very well answered. It was pleasing to note that there was a reduction in the number of candidates who lost marks due to incorrect or missing units. When carrying out calculations a few candidates did not always show all steps in their working and could not be given any credit where an incorrect answer was the result of an arithmetical error.

Question 1

This question was fairly well answered and good candidates gained high marks.

Q1(a)(i) Many candidates did not understand that the pressure would be the same just after it was sealed, believing it was higher. The best candidates understood that the increase in pressure on landing was the cause of the bottle collapsing, merely stating that is was greater outside.
Q1a(ii) The cause of pressure exerted by gases was well explained by the majority of candidates although many included collisions between molecules which were ignored.
Q1(a) (iii). Whilst strong candidates scored well too many candidates used vague phrases to describe a liquid, especially when comparing them to either gases or solids, which was not required. Many lost a mark by stating there would be spaces between water molecules.

Q1b(i) The graph was generally well drawn with many candidates scoring full marks. The most common error was the omission of labelled axes.
Q1b(ii) Most candidates interpolated the graph correctly although some lost a mark for not indicating on the graph how they found the value.

Q1c(i) It was pleasing to see a large number of candidates gaining full marks for this question, although a significant minority failed to convert the temperature into Kelvin.
Q1c(ii) The dangers inherent in overheating the high pressure cylinder was appreciated by most candidates but some vague answer were given which were not related to the situation and ignored the fact that they had just calculated the pressure of the gas at a high temperature.
Q1c(iii) Candidates understood that there would be an increase in KE or speed but only the best were able to explain how this would increase the pressure. Many just stated there would be more collisions rather than more frequent or harder collisions.

Question 2

Candidates were able to score well on this question using both familiar equations and with their knowledge of a standard experiment.

Q2(a)(i) Most candidates successfully calculated the distance fallen, the most common error was to mix this calculation of vertical distance with the horizontal distance required in part (v)
Q2(a)(ii) Many candidates were unable to correctly calculate the vertical velocity, not realising that they could ignore the horizontal component.
Q2(a)(iii) Most candidates used this unfamiliar formula to calculate the resultant velocity successfully with few omitting to obtain the square root of the resultant velocity squared. Full credit was given for using an incorrect value carried forward from (a)(ii).
Q2(a)(iv) Many candidates lost marks by not using their answer from their previous calculation in 2a(iii), instead using other velocities from the question in their KE calculation.
Q2(a)(v) Weaker candidates used the vertical speed of the box in their calculations despite being told that the horizontal speed was constant.
Q2(a)(vi) This proved to be more challenging than the calculations for some candidates, the most common error was to draw a straight line if air resistance was not negligible.

2(b) (i) and (ii) This was clearly a familiar experiment to most candidates with many scoring full marks.
2(b) (iii) Most candidates understood the need for the iron to demagnetise quickly, weaker candidates simply said it was a soft magnetic material without explaining why that was important.
2(b) (iv) Candidates scored well on this item, many using an equation to explain their answer.

Question 3

This was a traditional question on electrical circuits.

Q3(a)(i) and (ii) All but the very weakest candidates were able to carry out both calculations correctly.

Q3(b) As the answer was given in the question candidates must explain both steps necessary.
Simply writing 3 x 10 = 30 was insufficient. Some candidates multiplied or divided any numbers which gave 30. Some candidates successfully worked backwards to show that a 30 V supply would result in a current of 3 A.

Q3(c)(i) This proved to be surprisingly challenging with many candidates unable to include both changes. Some realised that each change involved a factor of two but then multiplied the 2 Ω by two and then divided by two instead of multiplying.
Q3(c)(ii) Few candidates were able to calculate the voltage required.
Q3(c)(iii) The lamp getting dimmer was well understood but other consequences such as the wire getting hot were rarely mentioned by candidates.

Q3(d)(i) All but the weakest candidates understood the action of a fuse and were able to score well on this item. A few still believe that a fuse controls the current.
Q3(d)(ii) Very few candidates understood that the sockets were in parallel even though they were told that later. They thought the sockets were in series and so reasoned that since 30 A is greater than 13 A it would be sufficient and consequently were unable to score on this question. Although each socket is rated at 13A it does not draw 13A all the time or would not be used at the same time and so would be unlikely to blow the fuse.
Q3(d)(iii) Generally well answered although many seemed to think that the current would always be the same through parallel components.

Q3(e) For candidates who worked in kWh as indicated by the question this was very straightforward. Candidates who tried to use other units and convert at the end rarely were successful.

Question 4

This question required the application of the knowledge of resonance in a familiar context and then extended the question.

Q4(a)(i) Generally well answered by candidates although the change in amplitude was often omitted.
Q4(a)(ii) Very well answered with all but the weakest scoring both marks.

Q4(b)(i), (ii) and (iii) Weaker candidates confused the amplitude of the wave with the frequency and the wavelength with the pitch. Many just made vague statements not referring to either **A** or **B** in their answer.

Q4(c) Most understood that the magnet would rotate but many did not gain the second mark for explaining its final orientation with the North pole downwards.

Q4(d) Nearly all candidates were familiar with the wave equation but many were unable to convert the quantities successfully in their correct powers of ten and so gained only the first mark.

Q4(e)(i) Most candidates were able to explain the nature of isotopes.
Q4(e)(ii) Candidates had to use the data in the question and not simply quote the stem of the question again. Some stated they both had odd numbers of neutrons or just that both had seven protons.

Question 5

Candidates have become familiar with the design question and scored well in most parts.

Q5(a)(i) Weaker candidates only described the ray as refracting or bending but most were able to give a full answer for the mark.
Q5(a)(ii) Many candidates did not appreciate that the maximum value would be obtained by changes to both angles and consequently lost a mark here. Some quoted a value less than 1.34 and gained no credit.
Q5(a)(iii) Candidates were clearly familiar with both the change of speed and the use of real and apparent depth in this item.

Q5(b)(i) Many candidates seemed to believe that stirring alone would keep the experiment at a constant temperature.
Q5(b)(ii). Candidates scored well needing four pieces of equipment from a list of nine in the scheme. The most common error was the inclusion of a random object, such as a silver coin, probably for use in a real/apparent depth experiment without explaining its purpose.
Q5(b)(iii) Many candidates scored well, explaining clearly what measurements to take.
Q5(b)(iv) Candidates often lost marks here by including calculated quantities such as the refractive index rather than the measurements required.

Q5(c) Few candidates scored well on this item, most commenting on the plotting of the graphs.

PHYSICS 7540, GRADE BOUNDARIES

Grade	A	B	C	D	E
Lowest mark for award of grade	72	62	53	48	28

Note: Grade boundaries may vary from year to year and from subject to subject, depending on the demands of the question paper.

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