

# Examiners' Report/ Principal Examiner Feedback

## January 2010

GCE O

### GCE O Level Physics (7540) Paper 01

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## General Points and Observations

Some candidates still repeat parts of the question before starting their answers and, as the paper consists of short answer questions, they then find it difficult to fit their answers in the remaining space. Where this happened fewer candidates used blank spaces in other parts of the question paper, tending instead to use additional answer sheets. In both cases some candidates did not indicate that they had continued their answers elsewhere, risking that markers would miss their work. The majority of candidates were able to attempt all parts of the paper in the time allocated and there was no evidence that candidates had run out of time. At times it appeared that students were unfamiliar with the ideas behind the question and that, at such times they resorted to more complicated, wrong answers than were actually required. It would have been simpler to know the Physics. A third of the questions involved calculations and these were usually well done although sometimes working was not shown and incorrect units were used or left off altogether.

### Question 1

Parts (a) and (b) were a good first question for most candidates as they were able to fill in the missing words correctly. In part (c) Many candidates ignored the statement in the question that the surface was frictionless and the hint provided by the 2 N arrow being halfway up the block and gave friction as the opposing force rather than the air friction required for the mark. Most calculated the unbalanced force correctly and then calculated the acceleration correctly but about 20% of them then gave an incorrect unit.

### Question 2

It was clear that many candidates had not analysed ticker tapes and so had problems answering this question. In part (a) a majority chose C as the tape showing greatest acceleration but then did not compare the changes in spacing with the other two tapes, simply saying that the gaps got bigger and so failed to score the mark. Most candidates made a stab at part (b) this question but many failed to measure the correct distance or failed to obtain the correct time by multiplying the number of dots by 0.02 s instead of using the number of gaps. Most obtained the third mark by correctly obtaining a speed using their distance and their time but here many then lost it by giving the wrong unit for their speed. They would help themselves by showing the units for each item in their calculations.

For part (c)(i) many candidates realised that the first few dots in tape C overlapped but others just gave vague answers. For part (ii) very few gave a sensible answer, showing that they had not practised calculating acceleration from real tapes.

### Question 3

Most candidates gave a correct answer to part (a) but a few gave convection as one of their answers. Candidates found part (b)(i) of this question easy to answer but it is worrying that many still state that molecules expand or molecules become less dense. In part (b)(ii) Most could write a good definition for specific heat capacity but too many failed to say that it was per unit mass or per kilogram and some confused it with specific latent heat. A lot of guessing went on in part (b)(iii) with many giving land rather than sea. Water was accepted even though the question said land or sea.

#### Question 4(

In part (a) many candidates were able to state that the substance was changing from solid to liquid or that the substance was expanding. Too many had problems identifying DE as the part where the rate of expansion was greatest and those that did often gave vague reasons rather than comparing the gradient of the graph in that section to the other two. A lot guessed incorrectly for part (b) but identified the substance as water or ice in part (c).

#### Question 5

Candidates usually scored well in part (a) with only a few placing their X outside the smoke cell. In part(b) most students remembered that this was Brownian motion. Most of the responses for parts (c) and (d) stated that the motion was random but most had not experienced the experiment or been shown a simulation and stated that they would see smoke particles or molecules rather than bright specks. Candidates should give clear answers such as faster rather than vague ones such as move more.

#### Question 6

In part (a) most candidates knew the charge on the polythene rod. In part b)(i) many candidates were able to give a reasonable explanation of why the leaf deflected. Almost all scored at least one mark for stating that like charges repel. Few stated that electrons carry a negative charge and even fewer that the metal rod was a conductor. Too many ignored the question and answered in terms of charges rather than electrons. A worrying number still think that positive charges can move and an even more worrying number think there are positive electrons. In part (c) many candidates realised that the leaf would still deflect but some thought it would not deflect.

#### Question 7

Candidates still confuse the readings of voltmeters and ammeters. Although most gave the correct answer for  $A_3$  too many just wrote 0.5 A for both ammeters. In part (b) the voltage was usually stated correctly. Most candidates gained both marks in part (c) by dividing their answer to (b) by their answer for ammeter  $A_2$ . Some lost the marks by using their value from  $A_3$ . In part (d) a majority of candidates could give the correct reading for the voltmeter but often thought it was due to the voltmeter having a large resistance rather than the ammeter having negligible resistance.

#### Question 8

All parts of this question scored well. Almost all named iron the most suitable material for the core and could then give a correct reason. Similarly most gave copper as the most suitable material for the wire although not all said it was a good conductor. Most chose the correct direction and gave a suitable way of increasing the strength of the field but some wanted to use an iron core even though they had already given iron as the metal for the rod.

### Question 9

In part (a) many candidates could give a suitable type of radiation and could then give a correct reason. Answers needed to say why it had to be gamma rather than why alpha or beta would not be suitable. This type of question (part (b)) still gives rise to vague or silly safety precautions. Safety clothing or radiation proof clothing or goggles are not acceptable. Their answers need to include something which would stop gamma radiation i.e. lead or distance. It was not sufficient to say that food or drink should not be brought near but instead that it should not be consumed.

In part (c) a majority of candidates calculated the time for the activity to fall to a quarter of its original value but it would be better if they had also stated that it was two half lives. Many divided 5.5 by 2 or 4 showing that they did not understand the idea of half life correctly.

### Question 10

Candidates usually gained the first mark by showing three curved waves but failed to score the second by failing to take care drawing them equally spaced. In part (b) most knew that the waves were transverse. Calculations in part (c) were usually carried out correctly but some candidates divided 0.8 by 4 or gave the unit of wavelength as m/s. Although many stated that both quantities were unchanged in part (d), some may have felt that they should be different and said that one of them was higher or lower.

### Question 11

A majority of candidates gave a correct response to part (a) but some contradicted themselves by saying the ray was travelling at right angles to the normal rather than to the surface of the block. In part (b) too many candidates used the equation incorrectly and ignored the fact that their answer was less than  $30^\circ$  even though the diagram showed that it should be more than  $30^\circ$ . Although there was no penalty for omitting the degree symbol some candidates did not help themselves by adding a different unit such as m/s. In part (c), as for 11(b), candidates who knew the equation for critical angle then used it incorrectly or used 1.5 as the refractive index instead of the 1.8 given.

## PHYSICS 7540, GRADE BOUNDARIES

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Grade	A	B	C	D	E
Lowest mark for award of grade	78	68	59	54	35

**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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