



General Certificate of Secondary Education

Science A 4405 / Physics 4403

PH1FP Unit Physics P1

Report on the Examination

2012 Examination – January series

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Science A / Physics
Foundation Tier PH1FP**General**

This Foundation Tier paper comprised of 60 marks-worth of questions. Questions 1 to 6 were low demand, targeting grades E, F and G. Questions 7 and 8 were standard demand, targeting grades C and D.

The majority of students attempted all parts of all questions, with few questions not attempted.

Those questions involving calculations were generally answered well. However, the standard of English often let students down when answering questions that required extended writing.

In questions where the student was asked to 'explain', the answer given was often a simple statement or description. Students should be reminded that if the question contains the word 'explain' their answer should include the word 'because'.

Question 1 (Low Demand)

- (a) About half of the students correctly identified the dotted line as the normal.
- (b) The majority of students realised that if the angle of incidence was halved the angle of reflection would also be halved.
- (c) Very few students scored both marks for this question. Curiously, many students chose a pair of mutually exclusive terms, eg inverted and upright.

Question 2 (Low Demand)

- (a) (i) Most students recognised that the waves missing from the diagram were X-rays.
- (a) (ii) Most students knew that gamma rays have the most energy.
- (a) (iii) About three-quarters of the students knew that a TV remote control uses infrared.
- (b) Only about a quarter of the students realised that all electromagnetic waves travel at the same speed in a vacuum. The majority believed that microwaves would travel faster than radio waves.
- (c) (i) Although the number of students drawing the arrow in the correct direction was just in the majority, a large proportion of students made no attempt at this question. Many had double headed arrows.
- (c) (ii) About half of the students correctly chose Y as the amplitude, while the majority of the other students chose Z.
- (c) (iii) Fewer than half of the students gave a correct answer. The majority of wrong answers were 'longitudinal' or 'sound'. A large number of students failed to attempt this question.
- (d) (i) Very few students obtained the correct answer for the frequency of the wave, the most common answer being 3.6 instead of 3.

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- (d) (ii) Most students obtained an acceptable answer for this calculation, albeit by multiplying their answer for part (d)(i) by 1.2. It is strange that most of the students who stated in part (d)(i) that the frequency was 3.6 put in a value of 3 in the calculation in this part.

Question 3 (Low Demand)

- (a) (i) Only about half of the students realised that the question required them to name a type of energy, ie light. Many students wrote '4 joules'.
- (a) (ii) Fewer than half of the students realised that the waste energy would warm the air. Many said that the waste energy would cause pollution.
- (a) (iii) About one-third of the students obtained the correct answer of 20 % or 0.2. Some students only scored one mark, either because they failed to show the percentage sign after the number 20, or because they added a unit after the number. Many students showed the correct substitution but could not then correctly complete the arithmetic.
- (a) (iv) This was a poor scoring question, mainly because of the very vague nature of most of the answers. Many students simply repeated the information in the question and stated that mercury is poisonous. Others used phrases such as 'foxes could eat them'.
- (b) Most students realised that the LED bulbs would waste a smaller proportion of the input energy.
- (c) Some students misread the graph, and thought that the CFL would be brighter than the LED. Others ignored the part of the question that stated 'Apart from a higher efficiency' and talked about energy losses. However, about half of the students gave a correct response.
- (d) The most common mistake in this question was the failure to spot the requirement that two boxes should be ticked.

Question 4 (Low Demand)

- (a) (i) The vast majority of students were able to correctly identify the anomalous point, although a significant number made no attempt at this question.
- (a) (ii) Most students realised that a decrease in light intensity would lead to a decrease in output voltage.
- (b) (i) Most students correctly identified the fact that there would be less atmospheric pollution, or less carbon dioxide being emitted. Those who failed to score the mark were either giving very vague general answers such as 'it is environmentally friendly' or 'doesn't cause pollution' or were simply stating that it is a renewable resource.
- (b) (ii) The great majority of students obtained the correct answer to this calculation. The most frequent mistake was to deduct 950 from 7600, thereby arriving at an answer of 6650 years for the pay-back time.

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- (b) (iii) Over half of the students thought that allowing the surface of the solar cells to become dirty would decrease the pay-back time. It would appear that there is a common misunderstanding about what is meant by pay-back time.
 - (b) (iv) Most students were able to score one mark for this question, but only the better students scored both marks. This applied even to those students who thought that the pay-back time would be decreased.

Question 5 (Low Demand)

- (a) (i) Students found great difficulty in drawing a representation of a liquid - many of the diagrams looking like the structure of a gas rather than a liquid.
- (a) (ii) A poorly answered question, with only the very best students scoring both marks. Many students simply stated that there were fewer particles in a gas.
- (b) (i) Students found difficulty in describing the way in which the motion of the ball bearings was similar to that of the gas particles; the difficulty was often with the language rather than the science.
- (b) (ii) Some students referred to the ball bearings in the model instead of to the particles in the gas. Some students simply said that the particles moved 'more'. There were many students who failed to attempt this question.

Question 6 (Low Demand)

- (a) (i) This was generally well-answered, although the most common mistake was to have conduction and convection the wrong way round.
- (a) (ii) Most students chose the correct answer.
- (b) (i) Students coped well with this calculation, the majority obtaining the correct answer of 18.2 kWh.
- (b) (ii) This calculation however was very poorly answered. A very common answer was to write $7 \times 5 = 35$.
- (c) The majority of Students obtained the correct answer to this calculation, although some students were unable to show the correct number of zeroes.

Question 7 (Standard Demand)

- (a) Very few students showed an understanding of evaporation. Many students thought that the fan must be blowing hot air onto the thermometer, and therefore chose thermometer A. Others chose thermometer B but thought that this was because the air from the fan was colder than the surrounding air.
- (b) This part was also badly answered. Many students thought that 'the Sun would not get through the plastic bag'. Many others failed to notice that the towel was hung outside on a day without wind, and were stating that the towel in the bag would remain wet because there was no wind.

Question 8 (Standard Demand)

- (a) Few students scored marks here; there seems to be a general ignorance of the function of transformers in the National Grid. Many students stated that its purpose was to make the electricity travel faster along the cables.
- (b) This six-mark question included assessment of the Quality of Written Communication. Very few students scored more than half marks.
- (c) Students seemed very confused by this question, and only the better students scored any marks. Many students thought that the magnetic field was a way of transmitting electricity over a distance. Many others misread the label on the x-axis and thought that it referred to the length of the cable rather than the distance from the cable.

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