



General Certificate of Secondary Education

**Additional Science 4463 /
Physics 4451**

PHY2F Unit Physics 2

Report on the Examination

2010 examination – June series

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Science B / Physics
Foundation Tier PHY2F**General**

Questions 1 to 5 were low demand, targeting grades E to G. Questions 6 and 7 were standard demand, targeting grades C and D.

There was no evidence that candidates were unable to finish the paper due to time restrictions. There were clear indications, either by candidate annotation or by attempts to multiply by iterative processes, that a disturbingly high number had attempted calculations without the use of a calculator. These candidates were rewarded with some marks through showing their working out but many candidates ignored the instruction and simply supplied a final, incorrect answer. Clearly some candidates failed to read the questions carefully and often answered a slightly different one of their own.

Question 1 (Low Demand)

- (a) Most candidates were able to draw the conventional symbol for a lamp. The most common error was to draw a circuit giving the examiner a choice of several symbols to select from. Only those candidates who made their intention clear by labelling the bulb were given credit.
- (b) (i) This part question was answered well with most candidates remembering to use the time in seconds. There were a number of cases where candidates did not use the joulemeter reading provided.
- (b) (ii) Surprisingly only just over three fifths of candidates were able to identify the correct unit.
- (c) This was correctly answered by just over two thirds of candidates.

Question 2 (Low Demand)

A large majority of candidates gained at least two marks for this question, with approximately one third gaining full credit.

Question 3 (Low Demand)

- (a) Surprisingly, only just over half of the candidates scored this mark. The most common errors being references to the time taken to come to a stop, or to the speed of the car.
- (b) About two thirds of candidates correctly identified that an increase in speed produced an increase in thinking distance. A small proportion of candidates incorrectly referred to thinking time instead of distance. It was rare for candidates to go further and give a measure of how much the thinking distance would go up for a particular increase in speed. The alternative statement of direct proportionality was extremely rare.
- (c) (i) Just under two thirds of candidates scored this mark.
- (c) (ii) Many candidates commented on why music would affect reaction time, giving reasons for both increasing and decreasing the reaction time. Those candidates who attempted to answer the question usually explained they would try the

experiment with music playing but often forgot to repeat the experiment without music or say the results would need to be compared.

Many of the candidates who received no reward for this part question described experiments where the volume or genre of the music had become the independent variable or wrote generalised responses involving the impact of music listening on driving situations.

- (d) Unfortunately, although candidates seemed aware that the driver's reaction time would be affected by drowsiness, many did not state that the time would increase. There were many answers in terms of distances which received no credit.
- (e) Almost all candidates gave the correct answer.

Question 4 (Low Demand)

- (a) (i) Nearly all candidates gave negative and positive charge although many
& (ii) transposed the type of charge on the ruler and duster.
- (b) Most candidates were able to alter the false statement to be correct. The simplest way was to alter 'same' to 'opposite' or 'different'. Some candidates, unfortunately, altered 'attract' to unacceptable words such as detract, neutralise, deflect, etc.
- (c) Many candidates correctly placed the correct word from the box in sentence 3 and a healthy majority achieved credit for their response in sentence 4. However, the incorrect answer of 'insulating' was the most common answer in sentence 1.
- (d) Just over a third of candidates supplied a suitable use for electrostatic charges although many, erroneously, gave a response in terms of common electrostatic phenomena produced by friction or vague answers such as 'painting'.

Question 5 (Low Demand)

- (a) (i) It was comforting to know most candidates were aware of the potential hazards shown in the incorrectly fitted three-pin plug. However, credit was not given for simply identifying the two faults as the question specifically asked for what remedial action was needed to make the plug safe.
- (a) (ii) Most candidates were able to identify the correct wire, either by name or colour code, the most common incorrect response was to give the live wire.
- (a) (iii) Most candidates were able to achieve one mark in this part question. However candidates often tended to exaggerate the effect of an excess current. Many candidates referred to 'explosions', 'blowing up', 'spectacular sparking' and the fuse going 'pop'. For those who didn't use the word melt the idea of a fuse blowing was accepted. Some candidates seem to think that a fuse, in itself, causes sparking to occur.
- (b) There were many long winded responses produced with few blank answers. The most common error was to identify the danger as being due to the hairdryer being plugged into a socket or the wall rather than to state that the hairdryer operated at mains voltage. Candidates could not explain that mains voltage would cause a potentially fatal current while the radio's low voltage would not. A common response was that the hairdryer

contained a fuse and would cause sparking if it fell in the water, while the radio had no fuse and was therefore safe. A worrying number stated that the radio did not use electricity.

Question 6 (Standard Demand)

- (a) (i) The calculation was completed successfully by most candidates although few gave the correct unit. Many candidates ignored completely the invitation to supply a unit.
- (a) (ii) Few candidates were able to score any marks in this part question, the commonest errors being to simply multiply the 800 meters by 7 minutes or to use mass from part (a)(i) instead of their calculated force.
- (b) (i) Only just over a third of candidates identified the correct direction. Many candidates gave at least two arrows in different directions. Some candidates labelled them 'air resistance'.
- (b) (ii) Most candidates seemed to misread this question and provided a restatement of the stem which stated that the kinetic energy would change rather than stating how and why the kinetic energy changed, ie if it would increase or decrease. There were also many responses referring to the changing levels and directions of the forces eg friction, air resistance, acting during the skier's descent and eventual stopping. The statement that the skier was accelerating, given in the stem of the question, was normally ignored.
- (c) The number of correct responses to this part question were in a very small minority (a tenth) with most candidates simply restating the possible fate of those skiers who were either unaware of the dangers or chose to disregard the possible benefits of wearing a helmet. The correct answer to this part question is about making an informed choice based on available information.

Question 7 (Standard Demand)

- (a) (i) Just under three fifths of the responses were correct. Many incorrect responses indicated the lack of a calculator or overlooking the 0.01 mSv source.
- (a) (ii) Just under half of the candidates scored this mark.
- (b) (i) Just under half of all candidates responded well to this part question and were able to provide valid reasons why the number of deaths could not be exactly given. The most common incorrect answer was to attribute the uncertainty to the daily variation in concentrations of radon gas.
- (b) (ii) Just over a third of candidates realised that taking the radiation readings over 3 months would increase the reliability of the data. The idea of smoothing out fluctuations was less common.
- (b) (iii) Many candidates read the question and concluded that the homes were responsible for making the radiation, and as there were fewer houses in areas C and D more homes would be needed in the sample to increase the overall level of radiation. Incorrect references to size of samples were commonly seen. Many

candidates did realise that levels of radiation were higher in C and D, but few referred to both the average level and the maximum level being higher.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the [Results statistics](#) page of the AQA Website.