



General Certificate of Education

**Additional Science 4463 /
Physics 4451**

PHY2F Unit Physics 2

Report on the Examination

2009 examination - June series

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Set and published by the Assessment and Qualifications Alliance.

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

All questions on the paper were attempted by most candidates suggesting that there was sufficient time to complete the paper. There were a number of 'don't know' type responses, but pleasingly only a few.

This year there seemed to be more candidates whose standard of handwriting was so poor as to be almost illegible. There also seemed to be an increase in the number of candidates whose writing was so faint or so small that it was almost impossible to read. Candidates should be reminded to use a black pen for writing.

As in previous years many candidates did not realise that the correct answers to numerical questions are realistic. Many candidates still seem happy to accept whatever number is displayed on a calculator without thinking about it. The instruction 'show clearly how you work out your answer' is intended to allow candidates who made a numerical error to gain credit for a correct method. Candidates that write 'I did it in my head', show no working out and arrive at a wrong answer need to understand that they will gain no marks. Incomplete calculations suggest that a significant number of candidates did not have access to a calculator.

Question 1 (Low Demand)

- (a) Most candidates were able to score 1 mark, with just under half of the candidates scoring both marks.
- (b) Few candidates scored this mark. Although most candidates rejected the option where the diode directions were opposed, many candidates seemed unaware of the importance of the cell polarity

Question 2 (Low Demand)

- (a) Most candidates that correctly chose the skier with the greatest mass as the person with greatest momentum also supplied the appropriate reason for their choice. However a significant minority of candidates chose X or Z and gained no marks.
- (b) The majority of candidates were aware that acceleration would produce an increase in the momentum of the three skiers. However there was a large number of candidates that clearly had not read the question correctly and gave answers in terms of an increase in speed.

Question 3 (Low Demand)

- (a) More than half of the candidates did not score this mark. The most usual reason was that the answer gave no comparison with the other parts of the journey. 'The line has a small gradient' or 'the bus took a long time to travel 150m' were common answers that gained no credit.
- (b) Although over half of the candidates scored this mark many candidates failed to gain credit by ticking two of the available boxes.
- (c)
 - (i) Nearly all candidates were able to read the distance correctly from the graph.
 - (ii) Again most candidates were able to extract the correct information from the graph.
- (d)
 - (i) Most candidates drew a straight line from the origin, but many candidates did not recognise that the distance would still be 500m and so did not draw the line through (200, 500).

- (ii) The failure of many candidates to choose the correct co-ordinates for the termination of the cyclist's journey meant that less than half of the candidates found the point where the cyclist overtook the bus and thus identified the time at which this event occurred.

Question 4 (Low Demand)

- (a) (i) Although the majority of candidates scored this mark there was a wide variety of other answers. It was often very difficult if not impossible to understand the logic behind these answers, particularly those above 6V.
- (ii) Fewer candidates realised that in a parallel circuit the reading on the voltmeter would have the same numerical value as the answer to part (a)(i).
- (b) The understanding of the addition of currents in this type of circuit was not widely understood with only just over half of the candidates scoring the mark.
- (c) Although a majority of candidates chose the correct completion from the box to determine the resistance of the lamp, there were very few correct reasons produced to justify the candidate's choice.

Question 5 (Low Demand)

- (a) (i) Although most of the answers for the force were correct, there were a surprising number of incorrect answers of 400N.
- (ii) Most candidates ringed the correct description of the force from the terms supplied.
- (iii) Most candidates were able to use the equation provided to calculate the work done in pushing the trolley. However a significant number of candidates either did not have a calculator or did not know how to use one; answers of $50 \times 80 = 400$ were not uncommon.
- (b) (i) Surprisingly only just over half of the candidates know the unit for work done.
- (ii) Most candidates identified the correct answer 'heat'. However a large number of candidates seemed to have missed the word 'most' in the question and gave the answer 'sound', presumably first hand experience of supermarket trolleys led to this response.

Question 6 (Low Demand)

- (a) (i) Most candidates were able to describe the relationship between the maximum height from which a child could fall without serious head injury and the appropriate thickness of rubber safety tiles in a playground.
- (ii) The identification from the graph of the correct thickness for a fall of 2m was well done with the second marking point being scored most often by an answer that referred to use of the graph.
- (b) (i) Few candidates scored this mark. The vast majority of candidates chose the answer 'the work done to stop'.
- (ii) Just over half of the candidates knew that 'the force on' the child would reduced.

Question 7 (Standard Demand)

- (a) The relative mass and relative charge of the subatomic particles was not well known by most candidates with few scoring both marks. Some candidates clearly did not understand the question giving answers of '-1' or '2' for relative mass.

- (b) This question was poorly answered. Very few candidates scored both marks. In most cases, where one mark was scored, candidates were able to get over the idea of positive cancelling negative in some way but very few gained the mark for stating that the number of protons and electrons was equal.
- (c) (i) The variety of answers given meant that the vast majority of candidates did not score this mark. Many candidates only said that uranium-235 or uranium-238 contained a different number of neutrons rather than being more specific and stating that uranium-235 had fewer neutrons.
- (ii) Few candidates knew which subatomic particle caused the splitting of atoms in a nuclear reactor. The variety of answers seemed to indicate a lot of guesswork taking place.
- (iii) Very few candidates knew the correct scientific name for the process. Many candidates named chemical processes and nearly 20% of all candidates left the answer space blank.

Question 8 (Standard Demand)

- (a) (i) Most candidates were aware that an insulated object gained electrons to become negatively charged.
- (ii) Although most candidates had some idea of what to do few scored the mark as most answers were incomplete. Answers such as 'put it near paper' did not score as the answer does not indicate what the outcome of doing this would be if the ruler were or were not charged.
- (b) (i) The idea of plastic as an insulator was commonly seen, however less common was the idea that it was to stop the person from discharging before the measurement could be taken. A significant number of candidates seemed to be confused about the properties of plastic and said that it would help the drivers to become earthed.
- (ii) Just under half of the candidates scored this mark, realising that the type of clothing would affect the results and so needed to be controlled. The majority of candidates simply repeated 'to make it a fair test' without going into any explanation of what they meant by this.
- (iii) Very few candidates scored this mark. Most candidates seemed not to understand the meaning of 'precise'. Common incorrect answers were 'the numbers are already precise enough' and 'the results were all bigger than 0.1kV'.
- (iv) Many candidates wrote responses that were lengthy but lacking clarity. Candidates gave answers in terms of what happens now but did not go on to say why the material should be changed. Those candidates who did score one mark often mentioned a reduction of charge or less likely to be shocked. Some candidates realised the potential to sell more cars. Those candidates who mentioned an affect on people seemed to be obsessed with suing, customer complaints and shocks causing heart attacks.

Mark Ranges and Award of Grades

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