General Certificate of Secondary Education

Additional Science 4463 / Physics 4451

PHY2F Unit Physics 2

Report on the Examination

2012 Examination – June series

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Additional Science / Physics
Foundation Tier PHY2F

General

Questions 1 to 5 were low demand targeting grades E, F and G. Questions 6 to 8 were standard demand targeting grades C and D.

There was no evidence to suggest that students had too little time to attempt all of the questions. Once again there was an indication that some students were not equipped with a calculator, evidenced by some attempts at lengthy iterative processes for part questions involving multiplication.

Question 1 *(Low Demand)*

(a) (i) This was correctly answered by nearly all students.

(a) (ii) Only just over half of the students scored this mark, many students thought it would be best to ignore the data.

(b) (i) Just over half of the students scored this mark.

(b) (ii) Just over two thirds of students realised the need to add the two numbers given and so scored this mark.

Question 2 *(Low Demand)*

(a) (i) Most students gave the correct answer. Erroneous responses usually involved dividing by 1.5.

(a) (ii) Nearly three quarters of students scored this mark.

(a) (iii) Nearly two thirds of students scored this mark. Incorrect responses were spread equally between the other components joined in series.

(b) (i) Nearly all students now know what an anomalous result is and so scored this mark.

(b) (ii) Just under half of students realised that the most likely reason for the anomalous result was a misreading of the ammeter.

(b) (iii) Many students clearly did not understand what was meant by the term ‘ interval’. Most students interpreted it as the range of p.d.’s or as the number of small squares on the graph paper between readings or as the p.d. represented by the size of a small square on the graph paper. Many students gave descriptions of what happened to the current as the p.d. was changed.

(c) This was well answered with a variety of acceptable phrases. Most students described an increase in p.d. leading to an increase in the current. Some students went for a positive correlation, with a few students giving directly proportional. Those students who tried to answer in terms of numerical values were less successful as they often failed to read the current scale correctly.

Question 3 *(Low Demand)*

(a) It was disappointing that only just over half of students could identify mass and speed as the factors that affect kinetic energy.

(b) (i) This was well answered by nearly all students. Most students recognised that because A was stationary or not moving that there would be no momentum.

(b) (ii) This was correctly answered by nearly all students, with most correctly writing down the numerical values of mass and velocity before completing the multiplication.

Question 4 *(Low Demand)*

(a) (i) Nearly all students scored both marks. Those students that did not often divided by 10 rather than multiplying.

(a) (ii) Only just over a third of students realised that at constant speed the resultant force is zero and so the force T must equal the weight of the person. The most common errors were dividing 720 by 10 to get 72, or simply adding 1 to 720 to give 721.

(b) (i) Most students scored this mark.

(b) (ii) Nearly half of students scored all three marks with a further third scoring two marks for the calculation. It seems surprising that a significant number of students failed to choose a unit at all thereby potentially wasting one mark.

Question 5 *(Low Demand)*

(a) (i) Just over three fifths of students recognised the incomplete circuit. However there was a little confusion over how to express the idea. The switches were often described as not being connected, clearly they are connected but not in a position to form a closed circuit.

(a) (ii) The vast majority of students showed a correct substitution of the two numbers with a subsequent correct calculation.

(a) (iii) Just over three fifths of students scored this mark. Those students that did not usually thought that the total resistance would go down and so divided by two.

(b) Just under half of the students were able to express a clear advantage of using two switches. Weaker students expressed ideas such as ‘it’s safer’ or ‘it wastes less energy’ without giving any further detail. Some students read the question as having two bulbs rather than two switches and gave responses such as ‘if one bulb breaks the other will still work’.

(c) (i) This was well answered by nearly all students. Favourite answers were receiving an electric shock or electrocution. A few students interpreted the question as ‘why’ rather than ‘what’ and wrote ‘the earth wire was unconnected’.

(c) (ii) Just over three fifths of students knew that the earth wire needed connecting. Some students wanted to cover the wires with plastic, whilst others wanted to connect the earth wire to a fuse.

Question 6 *(Standard Demand)*

(a) Most students correctly chose B. Most students then realised that the gradient was the important feature of the graph to consider. Answers needed to be comparative so 'steep line' was not credited. Attempts at describing a gradient were often unsuccessful as no comparison with other sections of the graph was made.

(b) It was disappointing that only two fifths of students could give the difference between velocity and speed. Many students gave velocity as the change of speed or the change of direction.

Question 7 *(Standard Demand)*

(a) Many students found it difficult to cope with three numbers. The main source of error was not calculating the change in velocity. Frequently 23/4 was incorrectly given as the acceleration. Most students either gave no unit or gave m/s. Just over a tenth of students scored all three marks.

(b) This was poorly answered with few students scoring more than one mark. Many students seemed confused over the word 'horizontal' and subsequently gave some novel, but always wrong, reasons why a change in either the reaction or the weight would account for the acceleration. Many students read the question as 'why do the forces change' rather than 'how the forces change'. Of those students who did write about the size of the forces most appreciated that the driving force had to increase. However most went on to write that friction decreased. It was rare to see both forces increasing and an appreciation that the driving force needed to be bigger than friction.

Question 8 *(Standard Demand)*

(a) This straightforward question again caused students to struggle. The fact that it is electrons that transfer onto a substance to give it negative charge continues to be beyond many students. Often students described protons or positive electrons moving. The other area of confusion is that many students thought that the woollen cloth had an initial negative charge. The gain of negative charge by the rod was from this surplus charge on the wool.

(b) (i) Most students found this application of understanding question too challenging. The main area of confusion was what a balance actually measures i.e. the downward force placed on it. The usual attempt was in terms of transfer of extra charge, in a variety of forms, from the top rod to the bottom. This extra charge was detected by the balance as an increase in weight or mass. It was rare to see a correct answer.

(b) (ii) Only about a tenth of students scored 1 mark for recognising that as the distance decreased the force increased. Often this mark was not given because students simply repeated, from the stem of the question, that the reading on the balance increased instead of stating that there was an increase in force. The essential extra bit of information that it was the charges producing the force was very rarely given.

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