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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Additional Science 4463 / Physics 4451

PHY2H Unit Physics 2

Report on the Examination

2008 examination - January series

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Physics
Higher Tier PHY2H

Question 1 (Standard demand)

(a) (i) Less than 50% of candidates scored both marks. The most common error was placing the voltmeter in series or placing it in parallel with the cells.

(a) (ii) The majority of candidates scored this mark. However only a small disappointing number used the variable resistor.

(b) (i) Only a minority of candidates answered this correctly. A common incorrect answer was in terms of 'easier to see a trend'.

(b)(ii) Most candidates gave the correct answer, although 35 and 37 were not uncommon.

(b)(iii) This was generally correct, with many candidates scoring 'error carried forward' from part (b)(ii).

(c)(i) Most candidates scored this mark although weaker candidates often referred to length rather than thickness.

(c)(ii) Although there were a few well thought out responses there were many blanket responses – eg 'human error'.

(c)(iii) There were many correct responses, but some candidates did suggest taking additional readings rather than repeating the original readings.

Question 2 (Standard demand)

(a) Many candidates had the idea of rubbing and friction being involved, but relatively few tied it down to the clothing of the driver and the seat. Many candidates had the idea of electron transfer, and quite a few at least mentioned transfer of charge.

(b)(i) Only the minority of candidates recognised that humidity or water vapour would affect the charge.

(b)(ii) The majority of the candidates that scored credit did so by discussing the conditions of the test, relatively few referred to the limited range of materials tested. Of the former, several mentioned both humidity and temperature, but some lost credit through poor expression of the ideas.

Question 3 (High demand)

(a)(i) Surprisingly only just over half of the candidates gave the correct answer. A fairly large minority gave answers of 12V or 6V. Other candidates showed equations that they were trying to use.

(a)(ii) There were many misconceptions, most commonly that 'the current went directly to the motor', descriptions of series not parallel circuits as 'direct' and answers about not altering or not varying.

(b)(i) This was generally quite well answered and differentiated between students who understood the ideas and those who would mention anything. A fairly common error made was candidates confusing *resistance to motion due to gravity* with *electrical resistance* altering current.

(b)(ii) Most candidates understood the idea of range but a disappointingly large minority clearly didn't.

(c) A small majority of candidates managed to substitute correctly and work out the correct answer. The most common mistakes were not using *total mass of scooter and driver* or not *squaring the value of speed correctly*.

(d)There was a wide variation in the answers given. Lack of knowledge of *units for charge*, inability to *convert time to seconds* correctly, lack of *realisation that time should be in seconds* and forgetting about *both* batteries being major sources of error. There were very few arithmetical errors.

Question 4 (High demand)

(a) (i) This was usually correct, and correctly spelt.

(a)(ii) This was quite well done, with many candidates finding it easier to show diagrammatically what was happening. A large number referred to uranium *atoms rather than nuclei.*

(a)(iii) Less than 50% of candidates scored this mark. There were many vague ‘it goes up’ responses.

(b) A number of candidates did not attempt this question. However many candidates were able to apply their knowledge of a chain reaction and the information given in the question to gain full marks. A common erroneous answer was in terms of an increase in gas pressure due to lowering the rods

Question 5 (High demand)

(a) (i) There were very few correct answers. Many candidates said it was the accelerating force, but ignored that it may equal zero.

(a) (ii) A very common error here was to suggest that a zero resultant force meant that the plane was stationary (despite the question stating that the plane was moving).

(b) To gain full marks here, candidates had to rearrange the equation and substitute the correct values – remembering to convert kN into newtons, and to include the effect of all 4 engines. They also had to quote the correct units. Each of these tasks provided a substantial number of errors and only the better candidates did everything correctly.

(c) This question was poorly answered with the majority of candidates scoring no marks. Candidates stating that the "resultant" force was increased as the plane gained speed. While the idea of forces acting against motion was appreciated, few tried to explain that these increased with an increase in speed. Many candidates thought the plane was lifting into the air and answered in terms of 'because it is lifting off the ground, it doesn't need to accelerate'.

Question 6 (High demand)

(a)(i) Most candidates stated that velocity is speed in a given direction. Few candidates stated that velocity is either speed in a straight line or velocity = speed x time.

(a)(ii) A good proportion of candidates obtained 64 metres but many candidates correctly obtained 16 and 4 from the graph and then divided the two numbers. Some candidates did a longer calculation and obtained the complete area under the graph.

(a)(iii) This question was well done with the majority of candidates scoring both marks. However some candidates either misread the question and redrew graph 1 or were at least one small square out in their accuracy.

(a)(iv) Many candidates were able to score a mark however the majority simply quoted the law of conservation of momentum.

(b) Many candidates did not score any marks here and wrote about whiplash and trying to avoid serious injuries. Some realised that if the force was to be constant over the same time period then it must be smaller. Some candidates were familiar with the equation linking force and rate of change of momentum but were unable to link this with any logical explanation.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the **Results Statistics** page of the AQA Website.