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General Certificate of Education

Physics 4451

PHY3H Unit Physics 3

Report on the Examination

2009 examination - June series

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Physics
Higher Tier PHY3H

General

Most candidates had been entered for, what was for them, the more appropriate tier. However, centres should note that it is in the best interests of their candidates that they are not entered for the Higher Tier paper unless this choice is justified. This justification needs to be in terms of the particular candidate's general ability and his or her scientific knowledge and understanding of the whole of the content including those parts identified as only for the Higher Tier.

Candidates who are inappropriately entered for PHY3H will be faced with a paper which may not be matched to their abilities and which may not allow them to demonstrate adequately what they know, understand and can do.

Questions 1 and 2 were identical to questions 7 and 8 on the Foundation Tier paper but the other questions only appeared on this paper.

There was a generally good response to the How Science Works features of the paper but there was a less confident response to items based on more traditional content such as Question 6 on centre of mass or Question 7 on a simple generator.

There were a few examples of handwriting which was almost impossible to read and many examples of poor spelling. However, all the question parts were attempted by the great majority of candidates.

Question 1 (Standard Demand)

(a) (i) Nearly all candidates could name the secondary coil.

(a) (ii) The majority of candidates could name the core and knew that it is made of iron.

(a) (iii) The majority of candidates knew that there is a magnetic field in the core, but only about half of these candidates knew that it has to be a changing magnetic field.

Examiners were disappointed to note that a significant proportion of candidates continue to suggest that the core conducts an electric current from one coil to the other.

(b) Nearly all candidates correctly identified the 'step-up' and 'step-down' transformers.

The majority of candidates were able to identify two appropriate suggestions for reducing possible health risks from power lines.

Question 2 (Standard Demand)

(a) Most candidates had the four stages for the torch in the correct order though a minority had the current before the potential difference.

(b) Nearly all of the candidates probably had correct ideas about how to increase the potential difference but some answers eg 'use a bigger magnet' were spoiled by not being precise enough.

(c) (i) Nearly all candidates were able to offer an appropriate general conclusion.

(c) (ii) Nearly half of the candidates were able to give two reasons and a few more candidates were able to score at least one mark by giving one correct reason why the data is not reliable.

Question 3 (High Demand)

(a) Nearly all candidates could name the normal.

(b) Nearly two-thirds of candidates recognised that, on the diagram, *v* is the angle of refraction.

(c) Just over two thirds of candidates knew why refraction has taken place.

(d) (i) Candidates generally secured two marks by comparing the values for 30° and 60° or for 40° and 80°. Credit was also given for other mathematically correct responses such as, 'the angles are not directly proportional because $v \div y$ is different for every pair. For example, it's 1.58 for the first pair and 1.95 for the final pair'.

(d) (ii) Nearly two thirds of the candidates were able to offer a correct conclusion.

(d) (iii) Just over half of the candidates were able to explain that the conclusion is only valid in the range 30° to 80° because there is no evidence outside this range.

Question 4 (High Demand)

(a) (i)&(ii) Most candidates were able to express correctly the relationships between gravity and the mass of the dust and gas and between gravity and the distance apart of the dust and gas.

(b) About half the candidates scored at least one mark as credit was given for an explanation of why the star remains stable or why this period lasts for millions of years. Two marks were given for a response which correctly refers to both aspects, eg 'the forces acting inside the star are balanced and the star has a vast supply of hydrogen'.

(c) Just over a third of candidates obtained at least one mark. However, some candidates demonstrated their lack of understanding by suggesting that, in stage 4, nuclear reactions start or that a star is formed.

Question 5 (High Demand)

(a) (i) The majority of candidates scored a mark.

(a) (ii) Most candidates were able to explain that the diagrams represent different musical instruments because there are differences in detail between their shapes.

(b) (i) Most candidates knew the numerical value of the required frequency but some of them lost the mark because of careless use of units as illustrated by '20 000 kHz'.

(b) (ii) In part (b)(ii) most candidates understood the meaning of the word 'media' in the context of the short passage on ultrasound.

(b) (iii) Most candidates were able to obtain one mark out of the two for stating that some of the ultrasound is absorbed.

Question 6 (High Demand)

(a) (i) Only a minority of candidates located the centre of mass on the part of the vertical line beneath **P** and between the planes. A common error was to select the junction of the supporting strings as the location of the centre of mass.

(a) (ii) Though a third of candidates were able to gain a mark for explaining that **X** must be vertically beneath the point of suspension, only a small minority explained the correct location.

(b) Only a very small minority of candidates realised that it's the combined mass of worker, ladder and device which needs to be considered. However ,over half secured one mark. This was for expressing the idea that the line of action of the weight falls within the base. About a quarter of candidates obtained their second mark by going on to explain what would cause the ladder to topple.

Question 7 (High Demand)

(a) Candidates had to explain the purpose of the slip rings and brushes. A small minority offered two relevant points though nearly half stated that they electrically connect the generator and lamp.

(b) Some candidates were under the impression that it's the direction of the coil which alternates and others seemed to be describing a motor rather than a generator. Only a small minority offered a two mark response.

(c) This part was better answered with half of the candidates correctly suggesting that the magnetic field would need to move relative to the coil.

Mark Ranges and Award of Grades

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