



**General Certificate of Secondary  
Education**

**Physics 4451**

**PHY3H      Unit Physics 3**

**Report on the Examination**

*2012 Examination – January series*

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## PHYSICS

### HIGHER TIER PHY3H January 2012

#### General

Questions 1, 2 and 3 were standard demand, targeting grades C and D. Questions 4, 5 and 6 were high demand, targeting grades A\* to B.

There was no evidence that candidates had insufficient time to complete the paper, with most candidates attempting all part questions.

Some of the questions that involved candidates in applying familiar principles to an unfamiliar application were poorly answered.

#### Question 1 (Standard Demand)

- (a) It was disappointing that only just over 50% of candidates scored this mark. Many answers included the conduction of electricity; there were many instances of aluminium not being 'easily magnetised' and a significant number of candidates made no reference to aluminium, only stating that iron was magnetic.
- (b)(i) Although range seems to be understood, many candidates did not look closely enough at the graph to realise that the first data point is at 10 turns and not zero. Just over 57% of candidates scored this mark.
- (b)(ii) This was well answered with virtually all candidates gaining the mark. The spelling of anomalous was not well known.
- (b)(iii) Only just over 23% of candidates scored both marks. A significant proportion of candidates counted, often incorrectly, the number of turns shown in the earlier diagram rather than using the data presented in the graph. Many candidates still confuse and use 'coils' when they mean 'turns'.
- (c) Candidates seemed more concerned over the appliance not working/blowing up/blowing a fuse rather than the use of the transformer to step-down the voltage.

#### Question 2 (Standard Demand)

- (a)(i) This was well answered although there were many phonetic variations of the word ellipse.
- (a)(ii) Over 90% of candidates were able to score this mark.
- (a)(iii) This was less well answered with approximately 73% of candidates drawing an acceptable arrow. Often the mark was not gained by the candidate being careless in their drawing. This is a good case where using a ruler to line up the planet and the Sun would ensure accuracy and a mark. A small number of candidates drew an arrow in the wrong direction or a double headed arrow.
- (a)(iv) Nearly 50% of candidates gained both marks. Many candidates spoilt their second answer by giving an incomplete or unqualified response. The size of the planet/Sun is not acceptable for the mass of the planet / Sun.

- (b)(i) This was generally well answered with most of the candidates that responded 'Yes' giving an acceptable reason.
- (b)(ii) Many candidates seemed distracted by the statement 'Ceres is not a planet' and used this as a reason to dismiss Bode's law.
- (b)(iii) This was not well answered, with only 23% of candidates gaining the mark. Many candidates focussed on the accuracy / inaccuracy of Bode's law. Misconceptions expressed included planets appearing from nowhere, rather than being discovered; moving orbits; that scientists in the 1700's were just wrong.

### Question 3 (Standard Demand)

- (a) This was poorly answered with only 5% of candidates gaining all three marks and another 11% gaining two marks. Many candidates were unable to apply what should have been a familiar principle in an unfamiliar context. There was considerable evidence that many candidates were confusing the generator effect with the motor effect. Common responses included 'the magnet cut the field lines' and 'an electromagnet was created, causing the magnet to move'
- (b) Only 32% of candidates scored one or two marks. Of those candidates that chose the correct answer many then gave a reason based simply on the shape of the graph line 'it goes up and down' rather using the axes labels to inform an answer.
- (c)(i) This was very poorly answered with only 10% of candidates showing an understanding of this term. Most of the answers given were in terms of precision or accuracy.
- (c)(ii) Yet again, some vague responses cost candidates marks. A 'bigger' magnet is not the same as a 'stronger' magnet.

### Question 4 (High Demand)

- (a)(i) Although over 37% of candidates gained all three marks, 50% of candidates scored zero!  
Those scoring zero clearly had no idea how to draw a ray diagram for a converging lens used as a magnifying glass.
- (a)(ii) Many candidates knew how to use the magnification equation and even candidates that had not scored any marks in part (a)(i) were able to gain these two marks through 'error carried forward'.
- (b) Again poorly answered with 50% of candidates scoring zero. Many candidates failed to gain any marks as there was no comparison made between the camera and the magnifying glass.

### Question 5 (High Demand)

- (a)(i) A disappointing response to this part question with only just over 64% of candidates being able to count the number of waves shown correctly.
- (a)(ii) With the benefit of 'error carried forward' just over 80% of candidates were able to score this mark.

- (a)(iii) This was generally well answered with only a small proportion of candidates (9%) failing to score any marks. Most candidates knew the range of human hearing.
- (b)(i) many candidates failed to score marks because correct terminology was not used: instead of reflection, words used included 'detected', 'repulsed', 'bounced back', 'echoed' and 'transmitted'. There was some confusion between reflection and refraction. Misconceptions included that both pulses A and B resulted from cracks and that from A to B was the extent of the crack.
- (b)(ii) Very few candidates (4%) scored all three marks. However many candidates scored some marks by showing a correct method using an incorrect distance. Others gained a mark for showing a method but forgetting to include the reflected distance. There was some confusion over the appropriate unit to give the numerical answer.

### **Question 6 (High Demand)**

- (a) Most candidates correctly identified 960 Nm but fewer followed this with correct reasoning. Some candidates failed to score a second or third mark because the moments were not directional i.e. 'clockwise moments'.
- (b)(i) This question was well answered with 80% of candidates scoring this mark.
- (b)(ii) This part question proved to be a good end to the paper for the majority of candidates. Just over 71% of candidates gained both marks, few candidates scored just one mark.

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