



**General Certificate of Secondary
Education**

Physics 4451

PHY3H Unit Physics 3

Report on the Examination

2012 Examination – June series

Further copies of this Report are available to download from the AQA Website: www.aqa.org.uk

Copyright © 2012 AQA and its licensors. All rights reserved.

COPYRIGHT

AQA retains the copyright on all its publications. However, registered schools / colleges for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to schools / colleges to photocopy any material that is acknowledged to a third party even for internal use within the school / college.

Set and published by the Assessment and Qualifications Alliance.

Physics
Higher Tier PHY3H**General**

There was no evidence that students had insufficient time to complete the examination paper.

There was evidence that some students were not equipped with or chose not to use a calculator or a ruler.

Question 1 (*Standard Demand*)

- (a) (i) Although nearly three quarters of students scored this mark many of the remainder gave responses such as ‘anticlockwise’ most likely indicating a failure to read the question carefully.
- (a) (ii) Only just under three fifths of students correctly identified the tension/weight/pull of the string as being the provider of the centripetal force. Of the incorrect responses, the most common were: the student turning the string/the string/unqualified gravity.
- (b) (i) This question was poorly answered with few students explaining that radius and mass had to be kept constant so that there would only be one independent variable.
- (b) (ii) Just over three fifths of students were able to give both words and so score the mark. A significant number of students did not identify two variables either because they changed their minds, sometimes more than once, or they chose one, three or all four options.
- (b) (iii) Most credit-worthy responses were in terms of reliability and accuracy with a lesser number of students referring to the timing aspect. There were many incorrect responses which focused on ‘getting up to speed’- ignoring the information in the text.
- (c) Almost all students scored this mark, although it was clear that ‘cause and effect’ were not always clearly understood.
- (d) (i) Almost all students scored this mark.
- (d) (ii) Just fewer than half of students scored this mark. Many failed to score the mark as they simply re-stated that the satellite orbited the Earth twice every 24 hours rather than stating that a geostationary satellite would only orbit once in 24 hours. Other responses such as remaining over a specific point on Earth often then failed to make a comparison with the GPS satellite. A significant number of students gave uses of satellites rather than answering the question asked.

Question 2 (Standard Demand)

- (a) Just under a third of students scored all three marks, with a further third of students scoring two marks. Some responses gave unworkable methods e.g. fixing the card in position so there was no rotation. Diagrams were sometimes poor and unlabelled so did not help with the description of the process. In many cases, students stated that the card would be ‘suspended from a clamp stand’ but failed to state how it would be suspended freely through the hole e.g. by using a pin/nail through the hole. Students scoring two marks usually referred to the use of a plumb line and then to repeating the process through a second hole. However it was clear from some descriptions or diagrams that some students thought a plumb line was simply a piece of string dangling down. In future, students need to be advised that, to score full marks on this type of question, the response needs to be such that a person reading it could easily carry out the experimental procedure.
- (b) Just over half of students scored both marks, with a split between; repeat with 3rd hole, balance on a pivot, suspend the card. Some students, who described ‘balancing the card at the point where the lines cross’, failed to state what they would try balancing it on. Some students thought this was a reliability question and suggested repeating the exercise but with no indication of using a different hole.

Question 3 (Standard Demand)

- (a) (i) Nearly three quarters of students scored this mark. The most common wrong response was ‘volume’.
- (a) (ii) This was very poorly done with only a few students knowing the correct terminology. Most responses simply described the shape or smoothness of the waveform. Some students referred to a.c. / d.c. and analogue / digital signals.
- (b) (i) Just over three fifths of students scored this mark.
- (b) (ii) This was generally well answered with nearly three quarters of students scoring the mark. Incorrect responses often referred to ‘confined’ and ‘free’ sounds. There was some confusion between refraction and reflection. Some students still use the word ‘bounce’ rather than reflect.
- (c) (i) Many responses only scored one mark because students failed to explain that talking louder would increase the sound level above the minimum level of hearing.
- (c) (ii) This was well answered with nearly three quarters of students being able to draw an acceptable audiogram.
- (c) (iii) Many students gave responses in terms of damaging hearing rather than the choices / steps they would take to minimise the risks. Other students simply restated parts of the stem. There were a lot of references to becoming ‘death’.

Question 4 (High Demand)

- (a) Most students were able to name the type of lens correctly.

- (b) (i) The ray diagram produced a multitude of variations of both refracted and reflected rays. Many responses did not score either of the first two marking points. Many diagrams showed a confusion between concave / convex and between mirrors / lenses. Some students spoilt their attempts by not using a ruler. It was pleasing, however, to see some very accurate diagrams drawn with great care and precision from students who had clearly learned the optics of concave lenses thoroughly.
- (b) (ii) Under a third of students were able to use their diagram to correctly calculate the magnification and score both marks. A further third of students scored one mark, usually for correctly measuring the image height from an incorrectly drawn ray diagram.
- (b) (iii) Only a third of students scored this mark, mostly for giving the 'accept' answer 'the image is on same side of the lens as the object'.

Question 5 (High Demand)

- (a) (i) Although many students correctly identified the transformer as step-up, many then failed to score the mark as reference was made to number of 'coils' rather than number of 'turns'.
- (a) (ii) Nearly three quarters of students scored this mark, although a significant number of students made reference to electrical conduction and /or conduction of heat.
- (b) This calculation was well done with most students scoring both marks. A few students scored 1 mark for a correct substitution.

Question 6 (High Demand)

- (a) (i) Students rarely included the idea of the current producing a magnetic field around the wire XY. Some students were clearly confused with the induction process.
- (a) (ii) Just over half of students scored this mark.
- (a) (iii) Just over half of students scored at least one mark. Incorrect responses included: back and forth; spinning; faster; repelled instead of 'up and down'. The frequency of 5 hertz was sometimes interpreted as once every five seconds.
- (b) There was a clear distinction in this question between the students who could do the calculation perfectly and those who struggled. Some answers were left as fractions by students without calculators; there were a number of 1 mark responses for calculating the left hand moment. A number of students did not gain marks because of inconsistent units and moving between cm and m.

Question 7 (High Demand)

- (a) Just over half of students scored this mark. The most common correct response was 'running out of hydrogen'. A significant number of students made an incorrect reference to gases burning or to nuclear fusion stopping.

- (b)** This proved to be a challenging last question with only a few students applying the terms ‘luminosity’ and ‘temperature’ from the diagram to the sequence of red giant to white dwarf. Under half of students scored one mark for identifying the correct sequence without any further explanation.

Grade boundary ranges www.aqa.org.uk/gradeboundaries

UMS conversion calculator www.aqa.org.uk/umsconversion