



**General Certificate of Secondary
Education**

Science B 4462 / Physics 4451

PHY1H Unit Physics 1

Report on the Examination

2012 Examination – January 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.

SCIENCE B / PHYSICS

HIGHER TIER PHY1H January 2012

General points

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

Most students attempted all parts of the paper, suggesting that time was not a problem in completing the paper.

Some of the numerical questions were poorly answered. Whilst students generally seem to be able to substitute figures into a given equation, they are often unable to complete the arithmetic correctly.

There were indications that students did not always read the question carefully, and also did not read through their answers to check that they made sense.

Question 1 (Standard Demand)

- (a)(i) Answers were fairly evenly divided between conduction (correct), convection and radiation.
- (a)(ii) More than half of the responses referred to particles, but even so students often failed to score marks. Common mistakes were referring to the particles as 'moving about' or 'starting to vibrate'. 'Heat particles' and 'free electrons' were also referred to.
- (b)(i) This was correctly answered by most students.
- (b)(ii) Many students were able to answer this correctly gaining both marks.
- (b)(iii) Many students obtained a correct rate of heat transfer from the graph, but then did not multiply by the area of the window. A significant number of students tried to involve the number of seconds in a day into their calculation.
- (c) The majority of responses gained both marks for either calculating the pay-back time, or the total savings on energy bills and relating this to the lifetime of the windows or the purchase and installation cost.

Question 2 (Standard Demand)

- (a) The majority of students seem to know the essential points of the 'big bang' theory, although a significant number of students were unable to relate these to the correct graph. A few responses referred to the expansion of Earth rather than the Universe.
- (b)(i) Answers were almost evenly divided between both theories (correct) and just the 'big bang' theory.
- (b)(ii) Many students referred to further evidence arising, but often failed to say that it might support one theory rather than the other. A common wrong answer was that there was 'no evidence' for the discarded theory.

Question 3 (Standard Demand)

- (a)(i) Most students chose only one appliance to match the criteria given, rather than the two appliances required.
- (a)(ii) Most students chose only one appliance to match the criteria given, rather than the three appliances required.
- (b) Many students were able to gain one mark for realising that the heater had a higher power than the lamp. Few students were then able to link this with power stations generating more electricity and therefore burning more fossil fuels. A common misconception is that when the appliance transforms energy as heat, carbon dioxide is also given off at the same time.
- (c)(i) Responses were fairly evenly divided between 'precise' (correct), 'accurate' and 'reliable'.
- (c)(ii) There were many pleasing answers relating to how the homeowner could make use of the data collected to reduce energy consumption and lower their energy bills. However, there were also a large number of responses which merely copied the information given in the question; students should realise that this will not gain them marks.

Question 4 (High Demand)

- (a) Many students were able to give one correct property, but few were able to give two.
- (b) A large number of students were able to transform the equation correctly, but common mistakes were either not converting MHz to Hz or converting it incorrectly.
- (c) Although this answer merely required recall of a statement given in the specification, very few correct answers were seen.

Question 5 (High Demand)

- (a) Students made heavy weather of this calculation, often converting the time into seconds, and failing to realise that the 5600 kilowatt-hours was the energy rather than the power. Hence very large values (several hundred thousand), obtained from these calculations, were quoted as being the wind speed. Even students who correctly calculated the power output as 1400kW often seemed unable to relate this to the graph to obtain a corresponding wind speed.
- (b)(i) As with a similar question in last year's paper, very few correct responses were given. Transformers rarely featured, but many students seem to think that pylons carry electricity.
- (b)(ii) Many students knew that transformers were involved here, but answers were often not specific enough, for instance 'step up and step down transformers are used'.
- (c) Again, answers often failed to be specific enough, for example 'use another way of producing electricity'. A significant number of answers referred to using wind turbines, indicating that students had not read the newspaper extract carefully.

Question 6 (High Demand)

- (a) This question was quite well answered.
- (b)(i) Just over 33% of students gained at least one mark.
- (b)(ii) Whilst many students had some idea that they were supposed to halve a number, a large number of them halved either the half-life or the nucleon number of 226. Another common mistake was to double the time as the count rate halved. Just over 55% of students scored zero.
- (c) Whilst about half of the students correctly chose 'ethical', few were able to give a reason, often just quoting the information given in the question that the women were given no protection.
- (d) Despite the question referring to 'the evidence suggesting that radium was harmful', a large number of answers stated that there was 'no evidence'.

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

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