



General Certificate of Secondary Education

Science B 4462 / Physics 4451

PHY1F Unit Physics 1

Report on the Examination

2011 examination – January series

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Set and published by the Assessment and Qualifications Alliance.

Science B / Physics
Foundation Tier PHY1F**General**

Questions 1 to 5 were low demand, targeting grades E to G. Questions 6 and 7 were standard demand, targeting grades C and D.

The majority of candidates attempted all parts of all questions, with few questions being left unattempted.

Some candidates attempted to answer some of the questions by simply rephrasing some of the words in the stem. There was also evidence of increased use of the words 'it' and 'they' in candidates answers. Such use often leaves examiners unsure as to what 'it' and 'they' were referring to. Candidates should be advised to avoid these words in order to make the answer more clear.

In questions where the candidate was asked to 'explain', the answer was often a simple statement or description. Candidates should be reminded that if the question contains the word 'explain' their answer should include the word 'because'...

Question 1 (Low Demand)

- (a) (i) The majority of candidates correctly identified wind and solar as being the two energy sources that do not produce any polluting gases.
- (a) (ii) Most candidates correctly worked the percentage as 37%.
- (b) About two-thirds of candidates correctly identified graph A as the one most likely to represent the output from a wind turbine.
- (c) Almost half of the candidates were able to state that gas is not a renewable energy source. The other half missed the point that there was an incorrect statement in the report, and instead offered their opinion as to why any or all of these power stations should not be built. Often such arguments were based on the pollution from gas burning power stations.

Question 2 (Low Demand)

- (a) The better candidates correctly calculated the answer to be 45 pence. However, many candidates simply multiplied the time (1.5) by the cost per kWh (15) giving an answer of 22.5. Perhaps this was because these numbers were closest to the answer line, and they had not spotted, in the line above the graph, that this was a 2kW kettle.
- (b) Nearly two-fifths of candidates failed even to attempt to draw a line on the graph. Of those who did, most failed to start the line at the origin.

Question 3 (Low Demand)

- (a) Few candidates were able to score all three marks on this question, but the majority were able to score at least one. The most common mistake was to say that gamma radiation is very strongly ionising.
- (b) (i) Most candidates were able to score one mark for realising that the detector reading had fallen significantly at that time.

Few however were able to gain the second mark for explaining the cause of this. Some simply said that this was because the cardboard was thicker, but this information was given to candidates in the question. Some candidates thought that the reading at 8.45 was an anomalous result rather than understanding that it was a true result and that something had happened to cause it.

- (b) (ii) Very few candidates correctly chose six years as a suitable half life; the most common answer was six months.
- (b) (iii) The better candidates realised that alpha radiation would not be able to penetrate cardboard. Many other candidates simply gave general properties of alpha radiation without relating it to this particular situation. There were also many candidates who thought that alpha radiation would simply be too weak.

Question 4 (Low Demand)

- (a) As in previous years, many candidates were confused between conduction, convection and radiation. Slightly more candidates correctly identified convection in part (a)(i) than those correctly choosing conduction for part (a)(ii), but overall only half of the candidates scored both marks.
- (b) (i) Just over three-fifths of candidates correctly selected set of readings 2, but only about one third of these were able to give a suitable reason. There are many candidates who still refer to black surfaces as being best at 'attracting heat'.
- (b) (ii) Only the better candidates realised that the colour of the metal plates was not a control variable.
- (b) (iii) This question was answered well by the majority of the candidates.
- (c) (i) Only the better candidates identified radiation as being the method of heat transfer. Many candidates thought that the wind was responsible.
- (c) (ii) This part produced a better response from the candidates, with many correctly stating that a shiny layer would reflect the heat. Some candidates thought that the shiny layer was to enable the fire fighter to be seen in the dark.
- (d) Just under two-thirds of candidates correctly chose material N and were able to suggest a suitable reason.

Question 5 (Low Demand)

- (a) Most candidates correctly chose kinetic energy, the most common wrong answer being electrical.
- (b) Most candidates correctly chose diagram Z.
- (c) (i) This question was well answered by the majority of candidates with just over three quarters of candidates scoring the mark.
- (c) (ii) Surprisingly only the better candidates correctly chose 'large areas of land are flooded'. The most common answer was 'A constant flow of water is needed'.
- (d) (i) Just over a third of candidates stated that this was the National Grid.

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- (d) (ii) Only the better candidates were able to relate the use of short cables to the idea of energy losses. Common incorrect answers often referred to electricity being lost or to electricity travelling faster in shorter cables.
- (e) This question was answered well by the majority of candidates.

Question 6 (Standard Demand)

- (a) This was a poorly answered question. Many candidates wrote about the uses of the two waves instead of the way in which the waves themselves were different or simply said that the wavelength / frequency was different without stating how.
- (b) Again a poorly answered question, with many candidates believing that the waves would travel at different speeds. Just over one-fifth of candidates did not attempt this part question.
- (c) Only a small percentage of candidates scored both marks for this question, as the majority of candidates failed to refer to what happened to the microwaves when they reached the plastic casing. Of those who did refer to this, many were confused between absorption and transmission.

Many candidates gained one mark for stating that the microwaves would be reflected, but some candidates lost this mark because they used the word 'bounce' or 'deflect' instead of 'reflect'.

- (d) (i) Very few correct answers were seen to this question. Most candidates thought that the waves had to be absorbed in order to stop them escaping from the room and then possibly harming people.
- (d) (ii) A very poorly answered question, with the majority of candidates simply stating that this was in order to make it a fair test.
- (d) (iii) Only the better candidates realised that this was in order to eliminate any possible bias, but many candidates simply repeated their 'fair test' answer.
- (e) (i) Just over half of the candidates were able to score at least one mark here, although some of the weaker candidates thought that as the measurement was in degrees it must be referring to temperature.
- (e) (ii) This question was correctly answered by about half of the candidates.

Question 7 (Standard Demand)

- (a) The better candidates were able to respond correctly to this question in terms of frequency change. Many other candidates simply referred to a possible change in loudness.
- (b) (i) Just over two-thirds of candidates obtained the correct answer to this question.
- (b) (ii) There were very few correct answers to this question. Many candidates did not offer an answer at all, and of those who did the majority of candidates clearly did not understand what they were being asked.
- (c) The majority of candidates correctly identified this as the big bang theory.
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Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the [Results statistics](#) page of the AQA Website.