



General Certificate of Secondary Education

Science B 4462 / Physics 4451

PHY1H Unit Physics 1

Report on the Examination

2008 examination - January series

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Physics

Higher Tier PHY1H

General

Most candidates appeared to be able to tackle all of the questions. The weaker candidates however were struggling to express themselves clearly when the question involved extended prose.

The standard of handwriting and spelling appears to be declining. Legibility was sometimes a problem, with many candidates not using a blue or black ink pen as instructed on the front of the paper.

Question 1 (*Standard Demand*)

- (a)(i) Most candidates could name a suitable fuel, the most common response being 'coal'.
- (a)(ii) The majority of candidates were able to complete the calculation of efficiency correctly, although quite a few candidates gave a unit 'J' for efficiency. Of those who answered incorrectly, quite a few had compared the number of squares, but thought the 'heat energy' was useful.
- (a)(iii) Just under half of the candidates knew the term fission.
- (b)(i) Many candidates did not appear to understand what is meant by the term efficient in a scientific context. Quite a number of answers referred to no energy being wasted.
- (b)(ii) Many candidates realised that transformers played a part, but either did not know the specific details or wrote vague statements such as 'it steps up the voltage and then steps it down again'. The majority answered correctly that the voltage was increased, but many failed to link this with a reduction in current, thereby reducing energy loss as heat.
- (c)(i) It was pleasing that many candidates understood the need for a control.
- (c)(ii) Whilst a large number of candidates realised that this was linked to reliability, the majority of candidates confused this term with 'accuracy' or 'fair test'. Of those who used the correct word, most answered correctly in terms of the reader making a judgement about the reliability of the data, or that a larger sample would make the results more reliable.
- (c)(iii) This was answered better, with a majority of candidates scoring both marks.
- (c)(iv) Most candidates opted to tick the second box, and were able to support this choice with a sensible reason. Those candidates who ticked the first box were less successful at providing a satisfactory reason.

Question 2 (*High Demand*)

- (a) Most candidates knew how to answer this, but a significant number failed to realise that their answer of '1500' was pence, not pounds.

- (b)** This proved to be a difficult question for many candidates, a significant number not attempting it. Of those who made an attempt, quite a few realised that there was a saving of 3 years, but did not link the pay-back time to their previous answer.
- (c)** Most candidates opted for the 'yes' answer, gaining some credit for stating that less electricity would be used by the new freezer, but often failing to describe how this would benefit the environment. Of those who chose the 'no' option some credit was usually gained for the ideas that the appliance would need to be disposed of.

Question 3 (High Demand)

- (a)(i)** This was answered correctly by the majority of candidates.
- (a)(ii)** Most answers involved one of three responses: no transfer of energy; transfer of energy from outside to inside; and the correct response that the energy transfer would reduce. Some candidates answered in terms of the air itself being transferred.
- (b)(i)** The majority of candidates realised that electricity was needed, many specifying that it was needed to operate the pump.
- (b)(ii)** This question was not well answered. Many candidates did not respond to the instruction to answer in terms of cost effectiveness. Of those who answered in terms of cost, many gained a mark for saying that money would be saved on the original method of heating the house, but only a minority compared this saving to the cost of running the heat exchanger.

Question 4 (High Demand)

- (a)(i)** This question was answered correctly by the majority of candidates.
- (a)(ii)** This was well answered. However in both this and the previous part, there were candidates who only put one type of radiation, when the question had stressed that two were needed.
- (a)(iii)** This was very well answered, although some candidates gave two types of radiation here, and some left it blank – not a good exam technique.
- (b)** Most candidates realised that temperature had no effect on the activity, but a significant number had a problem in expressing themselves clearly.
- (c)(i)** This question was not well answered. Many candidates knew it had something to do with the nucleus, but many talked in terms of protons or electrons. Those who knew it was to do with the number of neutrons did not usually specify 'one more' neutron.
- (c)(ii)** The majority of candidates were able to work out the half life correctly. Others used the correct method, but made an error reading the value from the graph, often quoting 15 instead of 14.

(c)(iii) Few candidates scored full marks on this question, often because of their inability to express themselves clearly – a common mistake was to say that the phosphorus-32, rather than the radiation emitted from the P-32, would be able to penetrate the plant. Similarly, there was often an understanding that the radiation could be detected for a long enough period of time to trace the progress of the isotope through the plant, but a failure to link this to the half life.

Question 5 (High Demand)

- (a) Although this was answered correctly by the majority of candidates, many did not use the given wavelength of visible light as a clue to obtaining the correct infra red wavelength.
- (b) Most candidates correctly transformed and substituted into the equation, but many candidates did not score the second mark through not converting kHz to Hz.
- (c) Very few candidates scored at all on this question; a small number gained one mark for the heating effect.
- (d) Only a minority of candidates scored the mark for this question. Common misconceptions were that clouds or light pollution would affect the detection of X-rays, or that the X-rays were being sent from the telescope to the star, or that satellite telescopes were much nearer to the stars than terrestrial telescopes.

Question 6 (High Demand)

- (a) On the whole this question was well answered, but a significant number of candidates answered in terms of the Big Bang being the creation of the Earth, rather than the Universe. However a significant number of candidates failed to use the information given to answer the question.
- (b)(i) This was poorly answered. Imprecise use of language resulted in many answers along the lines of the galaxies themselves moving to the red end of the spectrum.
- (b)(ii) As with part (a) a significant number of candidates confused the Earth for the Universe or completely ignored the information given about the 'steady state' theory.
- (c) Generally answered satisfactorily.
- (d) A pleasing number of candidates identified the key idea of the impossibility of finding evidence. However a common incorrect response was to say that the reason the question could not be answered was because nobody was there to see the creation.

Mark ranges and award of grades

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