Examiners' Report/
Principal Examiner Feedback

Summer 2013

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Physics (4PH0) Paper 2P

Edexcel Level 1/Level 2 Certificate
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General comments

As in previous examinations, most students were able to recall the equations and usually they handled the related calculations well. Students who gave the best practical descriptions often appeared to be writing from first-hand experience. Responses to the longer questions showed that the less able students tend to struggle when assembling a logical description or when asked to offer more than one idea. There was a wide range of response and it was good to see that many students were able to give full and accurate answers.

Question 1

Most students chose the correct responses to the multiple-choice questions at the start of the paper. These were designed to provide a straightforward entry to the paper and simply test some basic knowledge.

The experimental description required in Q1(c) proved more difficult for many students. A large proportion of the responses were not fully focused on the task of measuring the activity of the source. A significant minority of students instead provided a detailed, and usually accurate, description of the detector itself. Others described experiments designed to distinguish the type of radiation emitted by the source, or measure the half-life of the source. These alternative responses often received some credit for points also relevant to measuring the activity, for instance taking account of background radiation or ensuring safe handling of the source.

There were also some excellent answers that merited full marks. These responses appeared to be from students who had seen this measurement as a demonstration or had used a computer simulation. They included ideas about controlling a variable (usually the distance between the source and detector) or repeating measurements. However, very few also mentioned the ideas of counts per second, or becquerels.

Question 2

Most of the responses to Q2(a)(i) were rather brief. Few students identified the “W” as an abbreviation for the watt, although most were able to state that 30 joules of energy would be transferred each second. Responses to Q2(a)(ii) tended to be fuller, but many students made just the single point about preventing electric shock. When a question asks students to **explain**, it is usually a cue for them to offer linked ideas. In this case, the better answers linked the ideas of cause and effect, for instance a specific fault that caused current to go to earth, or current going to earth because the earth wire provides a low resistance path.

Responses to Q2(b) were generally good. About half of the students gained full marks for the evaluation in 2(b)(i) and nearly all were able to offer something worth credit. The mark scheme allowed for a variety of approaches, all of which required some appropriate calculation as a starting point. The comment in the response was expected to match this calculation, no matter whether it agreed or disagreed with the statement in the question. Students who did not show their working were sometimes at a disadvantage.

The structure of the transformer is well understood and nearly all students gained at least two marks for Q2(b)(ii). The students who gained full marks were usually those who properly labelled the transformer core on their diagram.

Question 3

For Q3(a), the majority of students were able to convert the temperature successfully and most gave a competent description of the change from liquid to gas. Some used the space below the ruled lines to include a useful diagram. However, other students struggled to include more than the basic idea of a gain in kinetic energy.

There has been a noticeable improvement in the way that students respond to questions asking about energy transfer by conduction, convection and radiation. Answers to Q3(b) showed some good understanding and more than half of the students gave explanations worthy of full marks. Q3(c) was intended to be more difficult and presented students with a less familiar situation. Many students struggled, but there were also some excellent responses that mentioned the insulating effect of still air or the unlikelihood of there being any convection directly above the cold liquid.

Question 4

The majority of students tackled the momentum calculation in Q4(a) effectively. The explanations required for Q4(b) proved more difficult, however.

About half of the students realised that the load in Q4(b)(i) still had some momentum after the lorry had lost its own momentum. However, very few went on to mention a difference the times taken for these two momentum changes. Similarly, with Q4(b)(ii) a large proportion of students began their explanation well, realising either that the centre of mass had shifted, or that clockwise and anticlockwise moments were equal. A sizeable minority of students were able to make both these points, but very few included the idea that the size of a moment depends on both force and distance.

Most students were able to recall the relationship between pressure, force and area, but only about half of them went on to calculate correctly. Many students might have scored better here had they checked their work. They could have noticed that an area in excess of 100 m^2 is unrealistic for a tyre and points to an easily corrected error with powers of ten.

Question 5

Many students chose the correct responses to the multiple-choice questions at the start of the question – Q5(a)(ii) was particularly straightforward. Nearly all the students know how to connect a voltmeter and most of them also recognised the LED symbol in Q5(b)(i).

Graph plotting was generally very good, with most students labelling their graph properly and choosing an appropriate scale. There were many excellent responses to Q5(b)(ii) that received full marks. However, a sizeable minority of students attempted to display the discontinuous data using a line graph. Some of these appeared to realise that the line graph would be inappropriate and sensibly went no further than plotting the points. These students received more credit than those who went on to draw a spurious line.

The evaluation in Q5(b)(iii) was intended to be difficult; for full marks students were required to synthesise information from the table (or from their bar chart) and their knowledge of more than one aspect of the visible spectrum. It was good to see so many worthwhile attempts, with more than a third of the students scoring at least one mark here.

Question 6
Nearly all students recognised the useful energy transfer in Q6(a).

The calculation in Q6(b)(i) gave most students the opportunity to score marks. Those who arrived at the wrong value, but took care to show their working, were still able to achieve some credit for converting the time to seconds or for substituting the values correctly.

Most students found it difficult in Q6(b)(ii) to explain why electricity is transmitted at very high voltages. Most responses were creditable to some extent, but few of the students put together a fully reasoned explanation.

Q6(c) was on last page of the paper and included some of the harder questions. Fewer than half of the students were able to explain the meanings of both 50Hz and alternating current, although most were successful with one of these definitions. Very few students realised that a.c. is necessary because transformers are used in the large-scale transmission of electrical energy.

Summary Section
Based on the performance shown in this paper, students should:

- Take note of the number of marks given for each question and use this as a guide as to the amount of detail expected in the answer
- Be familiar with the equations listed in the specification and be able to use them confidently
- Show all working, so that some credit can still be given for answers that are only partly correct
- Describe experiments in reasonable detail and be ready to comment on experimental data and methods
- Recall the units given in the specification and use them appropriately, for instance when describing the measurements taken in an experiment
- Take care to follow the instructions in the question, for instance when requested to use particular ideas in the answer
- Choose an appropriate format for displaying results, for instance using a bar chart to show discrete data
- Allow time at the end of the examination to check answers carefully and correct basic slips in wording or calculation

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:
http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

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