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January 2013

International GCSE Physics (4PH0) Paper 2P

Edexcel Level 1/Level 2 Certificate Physics (KPH0) Paper 2P

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International GCSE Physics paper 4PH0 2P

General

Most of the candidates had prepared well and took care with their responses. All candidates appeared to have adequate time to complete their work and few of them left any blank spaces on their paper. Equations were generally recalled correctly and calculations tended to be completed satisfactorily.

Question 1

Many candidates could recall the charge on an alpha particle, but fewer realised that gamma rays too are emitted by unstable nuclei.

When applying their knowledge to the choice of radiation for the thickness gauge many candidates showed a good appreciation of the relative penetrating abilities of the three types of radiation. However, more were able to discount alpha and gamma radiation as appropriate for this purpose than were able to give good explanations of the suitability of beta radiation. The examiners credited correct ideas about each type of the radiation, whether they were expressed in terms of transmission or absorption. For instance, simple statements such as “gamma radiation would pass straight through” or “the foils stops alpha particles” were both rewarded. The idea that the quantity of beta particles penetrating through aluminium foil depends on its thickness was often poorly expressed, although a minority of candidates were able to show that they understood this relationship.

Most candidates completed the beta decay equation correctly, but fewer were able to relate the figures they obtained to the change in proton number.

Question 2

Part (a) was generally well answered and many candidates gave responses that included more than one acceptable alternative. Some asserted that wind turbines cause no pollution and then went on to list noise or visual pollution as a disadvantage of wind turbines in part (b). Other weak responses included vague statements, such as “good for the environment” or “eco-friendly” without giving further detail as to how this might be achieved.

Most explanations given in part (b) included some relevant environmental concerns and mentioned the unreliability of wind as an energy source. Few candidates made use of the data provided, but those who did were generally successful. Most candidates were able to give creditable responses and there were some excellent explanations that drew on a considered range of arguments.

Question 3

In part (a) the vast majority of candidates completed the table successfully. Graph drawing was generally sound, apart from some poor examples of best-fit lines.

The data set was deliberately scattered to allow the candidates the opportunity to exercise their skills of interpretation when drawing the line. Many of the unacceptable lines resulted from joining the first and last points or drawing through the second and fifth points. Some of these might have been acceptable had the candidate indicated that they were treating an appropriate point as anomalous. Lines through the origin were accepted, even though the data trend did not really indicate this. Some candidates simply joined adjacent points with short lines. A few candidates made plotting errors that appeared to result from transposing their axes part way through the task.

Most candidates were able to offer a basic description of their line but few gave the further detail necessary to receive full credit.

Nearly all candidates gave an estimate of the length of the paperclip that was within the acceptable range for part (b). Many candidates based their response to part (c) on Photograph B instead of Photograph A as expected. Marks were awarded either way, but many comments related to the candidate's own measuring technique, which was usually quite good, rather than the obviously flawed method offered for discussion. Even so, most candidates were able to make at least one sensible suggestion and gain some credit. Some candidates hinted at avoiding parallax errors, but did not clarify how this should be done. For instance, "looking closely" at the scale is not the same as "looking at right angles" to it.

Question 4

Candidates are regularly required to describe a heat transfer process and these questions have often elicited weak responses. It was nice to see a noticeable improvement in the quality of responses offered this time. Most candidates were successful in giving valid points linked in a logical sequence to describe the convection current in the example. The only recurring misconception was the idea that the air particles themselves change density, rather than the air.

Question 5

Most candidates calculated the weight of the hammer correctly in part (a). Far fewer were able to name the centre of gravity, however.

The majority of candidates realised that the force on the nail would be in the opposite direction to the force on the hammer and correctly drew their arrow pointing upwards. However, only about half of these arrows were drawn in line with the downward force shown in the diagram for part (b).

Most candidates were able to suggest one way to increase the moment and the method generally given was to increase the force from the hand. The idea of also moving the hand further from the pivot did not appear as frequently.

Question 6

Most of the candidates gave a good explanation of a digital signal in part (a), but fewer were able to suggest how the signal could be made to carry more information. The most common acceptable suggestion was simply to increase the frequency.

The calculation in part (b) proved to be straightforward for most candidates. Those who omitted to convert the frequency from kHz still received some credit. About half of the candidates found the correct value for the shorter wavelength in part (c).

Very few responses to part (d) included the appropriate ideas in a logical sequence. Most candidates were able to offer at least some explanation of electrical discharge from a storm cloud, but this was usually limited to a single idea such as the electrostatic attraction between opposite charges. Better responses mentioned excess charge flowing to earth.

Question 7

Most candidates seemed to understand the arrangement of a step-down transformer and succeeded with part (a). Candidates who recalled the transformer equation in part (b) usually followed this by calculating the secondary current correctly. In part (c), most candidates realised that thermal energy was being lost, but few went on to describe the effect this has on the output. Those who, instead, thought about the effect of temperature on resistance, usually did well in their response.

Question 8

The majority of candidates could describe how to use the velocity-time graph to find the distance travelled by the ball in part (a). Similarly, responses to part (b) showed that most candidates knew the equation for finding momentum and could calculate the momentum of the ball. Fewer were able to use a correct momentum unit. When analysing the collision, some candidates did not read the correct velocity from the graph, but went on to use their incorrect value appropriately. Most candidates knew that momentum would be conserved, but fewer completed their§ calculation successfully. A common error was to find the total mass (8 kg) instead of finding the mass of the pin.

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