4PH0/KPH0 & 4SC0/KSC0 (2PR) Examiners' Report – Summer 2017

General

Many students scored very well across all aspects of this paper, indicating thorough preparation fully covering the specification. Numerical work was usually handled very well, excluding rearrangement of equations. It was also evident that many students found difficulty in structuring their responses to longer, extended questions. There are strategies that can be used to improve students' performance in these areas.

Question 1 Power stations

This question was proved to be a very straightforward start to the paper with nearly 90% of students identifying the power stations from the data given.

Question 2 Electrostatic effects

It was surprising that 1/3rd of students failed to identity gravitational potential energy in part (a). The objective questions in part (bi) were well done with an over 80% success rate. However, the rest of the question was far more challenging with only about 25% of students gaining full marks. There were a number of common errors; attraction or repulsion from whatever charge was on the child's body in (bii) and movement of positive charges in (c).

Question 3 Half-life of protactinium and practical skills

The term 'isotope' was quite well understood as nearly 2/3^{rds} of students gained full marks in part (a). This was not the case on part (b) were only 1/3rd of students could outline a method to correct for count-rate.
As expected the graph work was well done. Common errors included: using a nonlinear scale, omitting units on the axes and joining the points with straight line sections. Determining the half-life was less well done. Students should be advised to look at the possible marks before attempting the response as many failed to show how they had used the graph nor did they show any numerical working; thus, they lost marks.

Question 4 Particle theory-liquids and gases

Most students found this an accessible question. About 10% failed to gain marks for any part of the question. In Part (aii), some students did not gain the marking point for 'moving more freely' as they used the term 'random' instead. Two thirds of students gained 2 or more marks for this part.

In part (b) the calculation was very well done with over 80% gaining all the marks. Errors where they occurred usually consisted of using Celsius temperature and /or incorrect rearrangement of the equation. The sketch graph in (bii) was interesting in that it showed understanding of the relationship between kinetic energy of particles and the absolute temperature. It was pleasing to note that over 70 of students gained both marks.

Question 5 Sound waves

It was surprising that the only 75% of students knew the normal human hearing range. The calculation of frequency in (bi) was well done with almost 90% gaining two or more marks. Similarly, most students made a good attempt at the wave trace; with just under 65% gaining full marks. The most common error was to keep the frequency constant and vary the amplitude.

Question 6 Mass volume, density and momentum

Part (a) was found to be straightforward and over 80% of students gained full marks. In part (b) the determination of density by finding the volume of the cannon ball was quite well attempted by the majority of students. However some failed to gain a mark because they ignore the instruction about the detail of measurement e.g. students described a displacement method without relating the volume of the water to the volume of the cannon ball.

Part (c) was not well answered as the responses tended to focus on Newton's third law rather than momentum as requested. Less than 20% of students gained two or more marks.

Question 7 Digital signals and the loudspeaker

Nearly 65% of students were able to correctly describe the differences between analogue and digital signals. There were some unlabelled diagrams which did not gain credit. The calculation in part (b) gave a wide range of results; some students forgot that the distance was doubled; others found problems with standard form; some made both errors. However almost 90% of students gained 2 or more marks.

The explanation of how a loudspeaker works also gave a wide spread of results. There was, inevitably, confusion with induction and a lack of precision with terms e.g. 'overlap' instead of 'interact' and a failure to identify which magnetic field or what object the force acts on. Over 30% of students failed to get any marks for this part.

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
- Practice structuring and sequencing longer extended writing questions
- Read the introduction (stem) of each question in order to get the correct context
- Practice using data given in the question in a meaningful way by for example making a comparison or using it further into the question
- Show all working, so that some credit can still be given for answers that are only partly correct
- Be able to comment on data and experimental methods
- Take care to answer the question asked not a similar question on the same topic from a previous exam paper
- Be able to rearrange equations
- Allow time at the end of the examination to check answers carefully and correct basic slips in wording or calculation