Leaving Certificate Physics Examinations Convenor's Report 2022

Higher level

The ISTA broadly welcomes the higher-level paper. It examines all areas of the syllabus. Students had a large choice. Students were asked to complete two out of five questions in section A and four out of nine questions (with further possible choice within some of these questions) in Section B. Students who had carried out a reasonable amount or preparation should be comfortable with this paper. The examination is reasonably testing and should differentiate students on their physics ability and not on rote learning. A balance needs to be achieved here as when students are picking subjects for their Leaving Certificate, Physics would contain much higher order questions than alternative subjects. The comments made here are meant to be of assistance with drafting the marking scheme.

Section A

Students had a great choice of questions here from across the syllabus. Comments were received asking has it now become the norm that students are going to have to consider multiple ways of carrying out an experiment or playing around with their results to get their answers? For example, 2020: Graph R against l to find resistivity & 2022: Results for pressure varying with length for Boyle's Law

While it is understood that this is to challenge the students (which is necessary) it was mentioned by a member that this change in questioning should have been flagged to allow some preparation of the students to deal with curveballs like this. It is not suggested that students now 'rote learn' a list of ways to deal with the experiments but it would be nice to spend some time on possible alternatives, so they are not spooked by it when it comes up. This may not impact on a higher achieving student but could impact on many. Perhaps this could be done via a chief examiners report.

Question 2: Some novelty here asking why the column of air needed to be of uniform diameter. Where students were asked to treat this data point, we hope that a broad range of interpretations would be accepted, such as do not use it to draw the curve, identify it as an anomaly and do not use, repeat the experiment for this value of length etc.

Question 4: This question is similar to 2007 Q 3 where the student was obliged to draw a specific type of graph to find the focal length of a concave mirror. We have never received so many complaints as we did in that year. It was very poorly answered and students who answered it by equation were given fifteen out of the eighteen marks.

On this occasion since there has been such a large choice in this section, there has been comment but not complaint on this question. The students are guided on what graph to draw. Where students are asked to calculate the speed of sound, they will receive marks for determining the slope. We hope that students who cannot complete the calculation will receive further marks for some appropriate equation such as *c = f λ or ¼ λ= (l + 0.3 d)*. In any case we assume that most students will avoid this question.

Section B

In this section students had a choice of topics from right around the syllabus. **Question 6** examines some basic skills from around the entire course with some appropriately challenging sections.

Question 7: circular motion. Some students may have missed the fact that the body is in the vertical plane even though the maximum tension is asked.

Question 8: is a very fair question on semiconductors.

Question 9: This appears as a straightforward question. Students would not have had much practice at redrafting equations at this level. We believe that some students will not realise that they are limited to only using the symbols stated. We assume that some students will rearrange one equation to make the item asked for the subject of the equation. This will include some terms not listed.

Question 10: This is a reasonable question. Since physics students only have a passing knowledge of the mole it was a wise addition to relate the number of grams to the number of nuclei. While on the course students may still give an imprecise definition of ionisation.

Question 11: A nice question applying the concepts of physics to real world situations.

Question 12: A reasonable question that still tests the students' knowledge of the subject. Students may be confused at which value to use for the mass of the proton as these is one calculate, and one read from the tables. Students should be given credit for either mass used. Part b is very reasonable.

Students may not be familiar about what exactly a nuclide is. This may lead to confusion on the question on the discrepancies in the mass. We hope a range of answers will be accepted here. A comment was received that neither the term nuclide nor hadron are mentioned on the syllabus.

Question 13: A reasonable but testing question that will be liked by students doing applied maths.

Question 14: A nice selection of questions. Section b shows a novel way to approach the Doppler effect.

Ordinary level.

As in the higher-level paper students had a great choice from this paper; Students were asked to complete two out of five questions in section A and four out of nine questions (with further possible choice within some of these questions) in Section B. Some questions had sections that were difficult enough for ordinary level. A student who had

made reasonable preparation should have no problem picking six questions to do. Perhaps more diagrams could help ordinary level students to get a better understanding of the questions. The facts that large sections of physics are no longer covered at Junior Cycle may have an impact on what is known at Senior Cycle, especially at ordinary level. Comments were received on how text heavy pages 2, 4, 12, 13 and 14 were. Even though this was meant to act a guide for the students, this can provide difficulty for the weaker student or students whose first language is not English. Maybe better spacing could have been considered, especially on pages 12 - 14 where there was space at the bottom of the page. For example, in Question 8 students are asked 'Explain the shape of the graph at X'. Students who are challenged by physics need very clear instructions as to what information is expected from the student. For example, 'Explain what is happening in the water to give the shape at X in the graph' or something similar.

Question 1: Even though the students are guided somewhat, asking how to measure acceleration would be challenging enough for a higher-level student.

Question 2: Very fair and the student was guided towards an answer

Question 3 & 4: Though parts could be tricky enough for some of the student cohort.

Question 5: Very fair

Question 6: Most questions are straightforward. In part (h) many students might only draw the magnetic field lines and not describe **how** they were found if they didn't take the time to read the question.

Question 7: A fair question by some students may not have remembered to convert minutes to seconds for some of the calculations in spite of being given a hint earlier on in the question.

Question 8: A fair and appropriately challenging question.

Question 9: Should be reasonable but it will be challenging for the weaker student.

Question 10: Parts of this could be challenging for ordinary level students especially since this topic is no longer covered at Junior Cycle. Ordinary level students may be aware of the experiment to show that sound requires a medium to travel through but may not be aware that this is also the same experiment to verify that it is a mechanical wave. We assume that not many students will do this question.

Question 11: Many parts of this question are straightforward. For part (vi) we don't understand why the current formula is not in the maths tables. This even catches out the higher-level students. (viii) and (x) tricky for the weaker student. A diagram would have helped to clarify the problem.

Question 12: The photoelectric effect is clearly on the syllabus at ordinary level but in reality, is a bit too abstract for many students at ordinary level, particularly the calculations.

Question 13: This is a very reasonable question and relates to information learned at Junior Cycle.

Question 14: Four reasonable questions from which students should be able to pick at least two to do.