

# Assessment Report

## New Zealand Scholarship Physics 2021

### Standard 93103

#### Part A: Commentary

The 2021 paper again contained four questions. Many candidates completed the paper within the three-hour period. The performance of the better candidates was significantly improved compared to recent years. However, there was still a large percentage of candidates who performed very poorly.

General performance across all questions was quite similar. Candidates who gained Scholarship with Outstanding Performance found the paper very straightforward and showed outstanding performance across all four questions. They demonstrated a broad and deep understanding of Physics principles, and they have sufficient high-level mathematical skills to enable them to very easily navigate the problem solving questions.

Candidates achieving Scholarship were well prepared and showed a breadth of conceptual understanding across most of the curriculum. They have the necessary mathematical skills and insight to physics principles to consistently show scholarship level performance throughout the paper

Only the better candidates were able to correctly define and explain binding energy in the given context. Many candidates use their mathematics skills to attempt to reverse engineer calculations and derivations. This results in working that is mathematically equivalent, but with no basis in physics concepts. e.g. Q 1(c), 2(b), 2(c). Candidates need to start from the basic physics concepts and then apply appropriate mathematics tools. When asked to explain why a change in one parameter will affect another (e.g. Q 2(d)) many resort to some form of "because the maths says so" as a reason, rather than explaining the linking of physics concepts this involves.

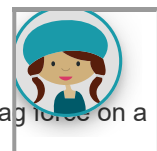
For "show" questions the working needs to be clearly set out with the logic carefully explained, e.g. for Q 3(a) many candidates calculated the time of flight of a projectile by calculating the time for it to reach the top, then sometime later multiplied by two to get the total time, but without explaining that was what they were doing.

The above examples demonstrate that a significant percentage of the candidates would benefit from more direct instruction in terms of how to approach an examination of this nature.

#### Part B: Report on performance standard

Candidates who were awarded Scholarship with **Outstanding Performance** commonly:

- demonstrated their understanding across the entire curriculum
- applied physics concepts correctly in complex situations
- supported and explained their mathematical reasoning with salient comments, including explaining why it was appropriate to apply a particular concept to a problem
- structured their answers in a clear and logical fashion, making the train of thought easy to follow
- applied fundamental concepts in an unfamiliar situation
- derived a formula for distance using the vertical and horizontal components of a projectile
- demonstrated their understanding of, and discussed the validity of, the assumptions in regard to the drag force on a ball and the effects it has on the motion



- defined binding energy correctly, and explained its significance in fission reactions
- explained inductor voltages in terms of "rate of change of current/flux"
- explained the shape of plots of voltage in terms of decreasing rates of change
- applied the conservation of energy principle correctly.

Candidates who were awarded **Scholarship** commonly:

- completed all or nearly all of the paper
- demonstrated understanding of fundamental physics concepts, and were able to identify which concept to apply to a particular problem
- explained basic principles when they applied them
- did not make basic algebraic or mathematical errors
- explained capacitor voltages in terms of charge stored on a capacitor
- defined binding energy correctly
- addressed all aspects that are asked in the question
- stated and applied fundamental physics concepts clearly as a foundation for mathematical derivations
- showed and/or described each step in the derivation of a formula clearly.

Other candidates

Candidates who were **not** awarded Scholarship commonly:

- did not complete the entire paper
- did not demonstrate comprehensive understanding of fundamental physics concepts
- made basic mistakes with numerical working or algebra
- did not completely answer the questions
- did not explain their reasoning
- displayed little or no understanding of binding energy
- did not identify key concepts applicable to the question (e.g. conservation of energy)
- did not review their answers for errors and to check if described physics principles.

---

## [Subject page](#)

### Previous years' reports

[2020 \(PDF, 121KB\)](#)

[2019 \(PDF, 166KB\)](#)

[2018 \(PDF, 95KB\)](#)

[2017 \(PDF, 41KB\)](#)

[2016 \(PDF, 184KB\)](#)

---