

2025 NCEA Assessment Report

Subject:	Physics
Level:	2
Achievement standard(s):	91170, 91171, 91173

General commentary

Candidates who used precise physics language to support their arguments achieved higher grades, as did those who knew what quantity each symbol in a formula stood for and its associated unit. Familiarity with the standard prefixes c , m , and k is essential. Candidates who reproduced answers or solutions from previous examinations without applying them to this year's context were not able to display their understanding sufficiently. Candidates who used running calculations on their calculators without appropriate brackets often failed to achieve higher grades. Candidates who persevered and attempted all the questions often found they could answer some of the later questions.

Report on individual achievement standard(s)

Achievement standard 91170: Demonstrate understanding of waves

Assessment

The examination consisted of three questions.

Question One examined lenses.

Question Two examined refraction.

Question Three examined wave properties and interference.

Commentary

Overall, the exam clearly separated levels of understanding. Candidates who were able to apply formulas and concepts accurately were able to achieve the higher grades, unlike those who showed gaps in calculations and diagrammatic work.

Grade awarding

Candidates who were awarded **Achievement** commonly:

- partially completed simple calculations or diagrams
- demonstrated a basic understanding of wave concepts, such as identifying image characteristics
- correctly identified total internal reflection.

Candidates who were awarded **Achievement with Merit** commonly:

- produced mostly accurate ray diagrams with correct labels
- performed calculations using Snells's law correctly

- correctly linked physics concepts to the given context.

Candidates who were awarded **Achievement with Excellence** commonly:

- used accurate diagrams with precise explanations using correct physics terminology
- showed comprehensive understanding of wave behaviour
- were able to complete multi-step calculations, giving correct units and significant figures
- drew ruled and accurate ray diagrams, and elaborated on the meaning and relevance of other diagrams required.

Candidates who were awarded **Not Achieved** commonly:

- attempted very little of the questions
- drew unclear or unlabelled diagrams
- applied incorrect formula
- gave rote learned answers without linking them to the given context
- showed very little knowledge of light or waves in general.

Achievement standard 91171: Demonstrate understanding of mechanics

Assessment

The examination consisted of three questions.

Question One examined acceleration.

Question Two examined momentum.

Question Three examined energy, circular motion, and torque.

Commentary

Candidates should ensure they copy numbers carefully from the given data, round appropriately, and give a unit with the final answer.

To gain full credit, candidates should explain how the physics concept applies in the given context.

Grade awarding

Candidates who were awarded **Achievement** commonly:

- demonstrated a basic understanding of core mechanics concepts
- solved simple, one-step problems, such as calculating momentum, displacement using equations of motion, and resolving velocity into horizontal and vertical components
- identified relevant equations correctly
- recalled definitions and simple statements
- showed competence in labelling diagrams and drawing vectors
- answered easier single-step questions, but struggled with harder or multi-step problems
- showed partial understanding and recall, but limited application in context.

Candidates who were awarded **Achievement with Merit** commonly:

- demonstrated a good grasp of core mechanics knowledge and were able to apply it to most questions

- solved multi-step problems successfully, though minor or incomplete calculation errors were common
- provided reasonable explanations and justifications, but often missed key ideas or failed to link concepts fully, thus limiting achievement to Merit
- wrote partial or incomplete explanations in extended-response questions
- had difficulty linking velocity, force, and motion consistently for projectile motion
- confused momentum with impulse, and sometimes did not recognise momentum as a vector quantity
- were generally accurate with units, calculator use, and identifying equations
- labelled diagrams and vectors correctly.

Candidates who were awarded **Achievement with Excellence** commonly:

- showed excellent problem-solving skills with multi-step calculations completed accurately
- demonstrated a comprehensive grasp of mechanics concepts and the ability to apply them across varied contexts
- demonstrated strong mathematical skills, including correct use of units and logical calculation sequences
- linked mechanics principles effectively
- interpreted and fulfilled question requirements accurately, including assumptions, calculations and context-specific reasoning
- completed all questions
- communicated understanding clear and logically, including well-labelled diagrams with correct directions and magnitudes
- used scientific language effectively with good justification in explanations.

Candidates who were awarded **Not Achieved** commonly:

- did not attempt many or most questions
- showed poor understanding of basic mechanics concepts
- made incorrect or inconsistent use of equations
- made mathematical errors in substitutions, calculations, and units
- misunderstood questions or failed to address what was asked
- attempted only very simple questions
- used non-physics terminology.

Achievement standard 91173: Demonstrate understanding of Electricity and Electromagnetism

Assessment

The examination consisted of three questions.

Question One examined electric fields.

Question Two examined simple circuits.

Question Three examined magnetic fields.

Commentary

Candidates need to make sure they answer all parts of a question, particularly if it has been separated into bullet points.

Candidates should ensure they correctly use the “exp” key on their calculator to enter numbers given in scientific notation, as this will avoid getting answers that are incorrect by powers of 10.

It is good practice when performing a calculation to, state the formula used, show the values substituted in, and then calculate the answer. This allows the award of partial credit if a minor arithmetical error has been made.

When transferring answers from a calculator candidates should write 2.6×10^{-4} and not 2.6E-04.

Grade awarding

Candidates who were awarded **Achievement** commonly:

- determined the north pole of a magnet, given the force on a current carrying wire
- correctly drew the electric field between parallel plates
- carried out one-step calculations
- used the electric field value as the electric potential energy
- calculated charge by using current multiplied by time.

Candidates who were awarded **Achievement with Merit** commonly:

- could perform two linked calculations
- found the total charge carried by the ink drop by multiplying the number of electrons by the charge of an electron
- gave partial explanations of physics concepts using correct physics terminology
- started by correctly stating what happened to the total resistance of a circuit when a component in a circuit was changed
- equated electric potential energy to kinetic energy to calculate the speed
- changed mm and minutes into m and s before calculating.

Candidates who were awarded **Achievement with Excellence** commonly:

- set out answers in a logical manner
- explained what they were calculating at each step
- demonstrated a full understanding of parallel circuits
- used $P = I^2R$ or $P = \frac{V^2}{R}$ when appropriate
- set up correct physics equations and solved them using the graphics calculator
- knew that for a generator, the wire had to move at 90 degrees to the field
- gave comprehensive explanations using correct physics terminology
- answered all parts of a question
- changed non standard units to SI units before calculating.

Candidates who were awarded **Not Achieved** commonly:

- thought magnets had positive and negative poles
- drew electric field lines from negative to positive
- made generic statements like “current splits in parallel circuits”
- incorrectly applied right hand rules (or equivalent) to determine direction
- mistook V (voltage) for v (velocity)

- talked about adding lamps to circuits when the question asked about what changes could be made to the rheostat
- did not provide directions to accompany calculations when asked for them
- thought that if a component in a circuit changed, that all other quantities remained unchanged
- wrote numbers and calculations everywhere with no indication what they were calculating
- used $P = \frac{\Delta E}{t}$ to calculate charge
- confused electric and magnetic field concepts
- stated that an object with no charge experienced an electrostatic force when in a uniform electric field.