2015 NCEA Assessment Report

Physics Level 2 91170, 91171, 91173

Part A: Commentary

Comment on the overall response of candidates to 2015 examinations for all achievement standards covered by this report.

Able candidates were able to both explain physics and display mathematical skills.

In addition to being able to describe, explain and link Physics concepts, candidates need to know how to use their calculators. Candidates need to understand that units, prefixes and rounding are important parts of physics and candidates need to take more care with them. Candidates need to use units in their calculations or give units in their answers, and not just give numbers.

Part B: Report on standards

1. Assessment Report for 91170: Demonstrate understanding of waves

Achieved	Candidates who were assessed as Achieved commonly: • completed simple diagrams for rays and waves • described images as real or virtual for curved mirrors • identified basic physics concepts such as refraction, diffraction, interference • identified the movement of different types of pulses/waves in various media • substituted into formulae and solved simple one step calculations.
Not Achieved	Candidates who were assessed as Not Achieved commonly: • could not draw ray, pulse or wave diagrams correctly • could not describe image types for curved mirrors • did not know the difference between mirrors and lenses and refraction and diffraction • substituted values incorrectly into formulae • could not do simple calculations.
Achieved with Merit	Candidates who were assessed as Achieved with Merit commonly: • drew correct complex ray diagrams for curved mirrors and reflection • drew correct diagrams for the transmission of a pulse at a heavy to light string boundary • made appropriate links for physics phenomena e.g. amplitude and wave changes at boundaries, diffraction to wavelength and constructive and destructive interference for sound and light • completed more complex calculations correctly.
Achieved with Excellence	Candidates who were assessed as Achieved with Excellence commonly: • wrote coherent statements that were both concise and accurate • completed multistep calculations using two formulae correctly • linked explanations back to the specifics of the question rather than give mere generalisations e.g. apparent depth of coin in water, how a mirage is formed and seen, or how path difference and wavelength are related to antinodes and nodes.

2. Assessment Report for 91171: Demonstrate understanding of mechanics

Achieved	Candidates who were assessed as Achieved commonly: • drew some force or velocity components for projectile motion • calculated initial velocity components for projectile motion • stated velocity components at the maximum height of projectile motion • stated that the law of conservation of momentum applies to a collision • described how to minimise the force experienced on landing • drew some correct vectors in a free body force diagram • showed some understanding of balanced forces • calculated weight from mass • named centripetal force • completed single-step calculations.
Not Achieved	Candidates who were assessed as Not Achieved commonly: • misunderstood what questions were asking • lacked precision when drawing force and velocity vectors • confused the terms horizontal and vertical • did not know how to approach calculations involving more than a single process and took a rote approach to problem solving instead of applying logic • quoted some physics concepts but could not demonstrate understanding.
Achieved with Merit	Candidates who were assessed as Achieved with Merit commonly: • drew correct lengths and directions when drawing force and velocity vectors • explained the reason for velocity components at the maximum height during projectile motion • differentiated between gravitational potential energy and elastic potential energy • demonstrated their ability to complete 2-step calculations and 2 processes in 3-step calculations • showed in-depth understanding of physics concepts in their ability to link at least two ideas in an explanation of phenomena.
Achieved with Excellence	Candidates who were assessed as Achieved with Excellence commonly: • demonstrated their ability to apply their knowledge to complete 3 linked steps in a calculation on any topic • demonstrated comprehensive understanding of physics concepts in their ability to write logical explanations linking several ideas within all topics.

3. Assessment Report for 91173: Demonstrate understanding of electricity and electromagnetism

Achieved	Candidates who were assessed as Achieved commonly: • calculated the electric field strength given the force and distance • realised that adding a cell in series increases the voltage • knew that more voltage was induced if the wire was moved faster • linked electric field lines to the direction of a force on a positively charged particle • applied F=Eq to find a force • used P=IV to find the current in a lamp.
Not Achieved	Candidates who were assessed as Not Achieved commonly: • confused electric and magnetic fields and associated formula • could not convert from non SI units to SI units • demonstrated poor mathematical skills and could not rearrange formula nor use their calculator correctly • could not apply the right hand slap rule to find the force on an electron in wire.
Achieved with Merit	Candidates who were assessed as Achieved with Merit commonly: • explained what happens to the current in a circuit if a parallel component is removed • found the force on the object when in an electric field by finding the total charge on an object • described how adding a battery in series to a circuit increases the supply voltage which increases the circuit current.

Achieved with Excellence	Candidates who were assessed as Achieved with Excellence commonly: • had good mathematical skills, could rearrange formula and use their calculators to perform calculations correctly • described that when a whole loop is in a magnetic field the induced voltages are equal and opposite so cancel and there is no induced current • equated electric potential energy lost to kinetic energy gained to find the speed of a particle • used a series of calculations to find the voltage across a component of a simple circuit.