

MECHANICS

SCIENCE

LEVEL 1

Strategy Guide

This standard is interesting, as it involves a lot of topics you are probably already familiar with - you just didn't know were part of science! The interesting thing about physics, is that it gives explanations for things happening around us. So, be prepared to throw your assumptions aside, and learn the scientific definitions and calculations for the world we're living in!

OVERVIEW OF THE STANDARD/STRUCTURE OF THE EXAM

This standard is broken into three key parts:

1. Motion
2. Force
3. Energy

The exam is likely to have questions on each of these sections - with distance-time and force-time graphs very commonly assessed!

CONCEPTS AND SKILLS TO FOCUS ON

Although every aspect of the exam is equally important, here are some key concepts to focus your study on:

Knowing how to define forces - including the difference between mass and weight:

The entire standard of mechanics is built on the idea of forces. Therefore, it is very important that you not only understand them - but are able to define them in questions. Focus on understanding what a force is, as well as being able to name what the forces are in a given situation. A good example of this, that NCEA will frequently test you on, is the difference between mass and weight. Make sure you know which one is a force, and how to justify your answer.

Drawing diagrams:

Diagrams are a very important part of both understanding mechanics, and being able to answer questions at the achieved level and beyond. Understanding how to draw force diagrams is a key part of this. Make sure you know how to draw different forces, and how to compare them to calculate whether there is a net force. Other questions, such as those involving pressure and energy can also be understood better if you draw a diagram of the situation to help you.



Explaining energy changes:

This is a very common excellence question that doesn't change very much between years. In fact, all that really changes is the context that the question is in! Make sure you are familiar with the law of conservation of energy, and how to relate the kinetic and gravitational potential energy equations to each other.

COMMON MISTAKES:

From the NCEA gods themselves:

Not understanding the formulae:

Many students run into the trap of underestimating the mechanics standard. Because you are given the formulae sheet, it is easy to assume that the calculations will be a breeze! However, keep in mind that you need to be able to work out which formula to use for each question - and you will sometimes need to use multiple formulae to reach your answer. This requires more in-depth knowledge of each of the formulae, and what each of the letters in the equations stand for. Try using our **formulae sheet audit form** to break down the formulae sheet before your exam!

Not including correct units:

On the topic of calculation questions, forgetting to include a unit - or using the wrong unit, is the easiest way to drop from a merit to achieved mark in your exam. A good rule of thumb is to remember that every numerical answer you give **MUST** have a unit after the number. Make sure you remember the units for each of the values you will be asked for in the exam - or, as a back-up, are confident with deriving a unit from a formula!

Not defining key words properly:

Mechanics is the first physics paper you will be introduced to in NCEA. Because of this, there are a lot of new terms to learn! This involves terms such as 'energy' and 'pressure' that you may have heard in everyday language. Make sure that you not only understand these terms, but can provide a scientific definition of them, or explain them in the context of mechanics when asked.

Not understanding the link between forces and acceleration:

The formula $f = ma$ isn't just useful for calculations - but shows us that force and acceleration are actually linked to each other. Make sure you can define a force in regards to how it affects acceleration, and how different net forces influence different levels of acceleration.

OVERALL STUDY AND EXAM STRATEGY:

This paper can freak out a lot of students, as it involves a lot of calculations compared to the other Level One science papers. However, an in-depth understanding of the formulae involved in mechanics can not only help you answer any calculation question that comes up, but can also help you to explain concepts in other questions. On top of this, the questions are very repetitive each year - so practicing past exams in exam conditions is crucial to smashing it on exam day!

