



MECHANICS

PHYSICS

LEVEL 2

Strategy Guide

Mechanics is the largest standard in level 2 physics - so it can be a little intimidating to start with! You are introduced to lots of new types of calculations such as ones involving torque, parabolic and circular motion. The good news is that these calculations can be very repetitive - and often just involve you adapting the same working to fit different contexts. With practice, nailing the calculations can quickly accelerate you towards those Merit and Excellence marks!

OVERVIEW OF THE STANDARD

- Linear motion
- Equilibrium/Torque
- Circular motion
- Parabolic motion
- Momentum and energy

STRUCTURE OF THE EXAM

Warning: this section is to help you focus your time/study. Our analysis is based off previous year's exams and is no substitute for understanding the concepts. NCEA can change the exam format without much notice, so the best strategy is to be prepared for anything!

There are generally 3-4 questions in this external. There is often one on parabolic motion, one on torques and equilibrium, and one on linear and circular motion. The linear and circular motion question will often ask you to draw vectors, and the parabolic and torque questions will ask you to perform calculations and explain the concepts in relation to a scenario that is given to you. Questions about energy, momentum and Hooke's law are often dispersed throughout the exam - and can pop up amongst different sections!

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:

Drawing accurate vector diagrams and completing vector calculations:

The concept of vectors is new to level 2 - although it plays on a lot of ideas you would have learnt about in level 1. Remember that the angle and the length of vectors are both important - and that, because they have direction, you can't always add different velocity and momentum values together.





Understanding the difference between vertical and horizontal components:

Vertical and Horizontal components are another level 2 addition to your physics knowledge, and are necessary for properly understanding concepts such as torques and parabolic motion. Spending some time understanding how to explain and calculate horizontal and vertical components will help you gain a much more complete understanding of the mechanics topic as a whole.

Performing calculations with multiple steps:

Mechanics has the longest formula sheet of all of the physics standards. The good news is that, lots of these equations have very specific uses - and are very simple to implement. The trick comes when you have to use multiple formulae to answer a single question in the exam. A good trick to use in the exam, is to write down everything that is given to you in the question, as well as what you are trying to work out. You can then circle all of the equations that you are able to use, and create a sequence of equations to get to your final value!

COMMON MISTAKES:

From the NCEA gods themselves:

Understand what questions are asking for:

Because the mechanics exam has a lot of repeating concepts, students often predict what the questions are asking for, without reading them correctly. It is important to take your time reading questions, and making sure that you give exactly what the exam is asking for. It is equally important that you remember units and answer to the correct number of significant figures!

Be precise with diagrams:

Like most physics externals, drawing diagrams is a very important part of the mechanics standard. When drawing vectors, make sure you are accurate with the length and angles, and that you label everything you need to. Drawing diagrams can also really help answer torque or parabolic motion questions if you get stuck!

Understand concepts such as 'equilibrium':

Although they think they understand them, students often get tripped up when asked to explicitly define terms such as 'equilibrium'. Make sure you practice discussing and defining physics terms - as well as using them in equations.

Attempt every question (especially calculations):

There are a lot of calculation questions in mechanics that, if you nail, can land you some tidy excellence marks. The great thing about them, is that even if you don't quite get the answer, the marking schedule is scaffolded so you can pick up some merit or achieved marks for getting some of the steps down. A common mistake students make is not attempting long calculation questions.

OVERALL STUDY AND EXAM STRATEGY:

This standard involves combining lots of definitions and formulae to answer physics questions of different lengths. These questions are made by combining small building blocks towards a larger physics understanding. Although it can seem like there is a lot to learn, if you tackle each concept one at a time, you will find yourself racing through your study!

