



WAVES

PHYSICS

LEVEL 2

Strategy Guide

This standard is one of the shorter ones in level 2 physics. It can be intimidating as there are a lot of formulae and diagrams that you may not have seen before. However, once you get your head around the new terms, and get in lots of practice drawing ray diagrams, you will find that the standard is pretty repetitive - and it's completely possible to get a good mark in it!

OVERVIEW OF THE STANDARD

- Reflection (real and virtual images)
- Refraction
- Interference

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, with one focused on reflection, one on refraction, and the others about interference. The reflection question will ask you to draw ray diagrams, and discuss whether images are real or virtual. Be prepared to discuss diffraction and constructive and destructive interference for the interference questions, and be able to draw wavefronts moving through different media.

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 ray diagrams:

We can't emphasise this one enough! You're almost guaranteed to have to draw a ray diagram or two in your exam. Although they seem confusing at first, once you become comfortable with them, they make up some almost guaranteed Merit marks. Make sure you practice drawing ray diagrams for convex and concave lenses and mirrors - the more prepared you are, the less time you'll spend stressing in your exam! Also, while you're at it, make sure you know how to describe images as real or virtual, as these questions almost always come after a ray diagram.





Using the equations on the formula sheet:

Waves has the shortest formula sheet out of all of the physics externals. This means that it is the easiest external to nail the calculations for. Make sure you practice using each of the equations, and know exactly what each of the letters stand for in each formula. In waves, you will often get asked to complete a calculation and discuss your answer using physics concepts. Therefore, make sure you know how to explain terms such as 'wavelength', 'frequency', and 'refractive index' as well as use them in equations.

Understanding why waves move differently in different media:

This standard will test your ability to adapt your thinking of waves to different scenarios. It is very practical - and will often ask you to either give explanations, or draw a diagram to explain your thinking. Make sure you know how to draw a single wave bending away from or towards the normal, as well as wavefronts bending in different media. Finally, make sure you are comfortable drawing wave pulses moving between heavy and light strings.

COMMON MISTAKES:

From the NCEA gods themselves:

Know the difference between refraction and diffraction:

It may seem obvious, but in the stress of the exam, lots of students get these ones confused! They share a lot of similarities, but getting the words mixed up in your explanations can be one of the most frustrating ways of dropping from an Excellence to Merit grade.

Be able to define terms such as 'frequency', 'wavelength' and 'amplitude':

Lots of students think they have these ones nailed - but in the heat of the moment, realise that they have trouble actually defining each term. Practice writing out definitions for the important jargon in waves, and test your friends to make sure you are comfortable with discussing each term!

Link questions back to the specific scenario:

Because waves is such a repetitive external, it can be tempting to rote learn an answer for questions such as ones asking you to explain refraction. However, if you want to move into Excellence territory, it is important that you are able to link your answer back to the scenario they give you. If the question is about looking at a coin in a swimming pool, make sure you specifically refer to the coin when talking about refraction.

Know the differences between lenses and mirrors:

Once again, this may seem obvious - but it's surprising how many students get marked down for not knowing the differences! Make sure you can clearly draw and explain convex and concave lenses and mirrors, and discuss what sets them apart from each other.

OVERALL STUDY AND EXAM STRATEGY:

This standard combines explanations, equations and diagrams to test you in ways that you may not be super familiar with. The good news is that, there aren't actually too many concepts to define, or calculations to use once you get practicing! The standard is very repetitive - so practicing under exam pressure is key to getting a good mark on exam day!

