CALCULUS

MATHS

LEVEL 2

Strategy Guide

Calculus can be a pretty intimidating external in level 2 maths - particularly because there's a good chance you won't have seen many of the concepts before! Focus on building a strong understanding of what you are doing, and why you are carrying out each of the processes. The good news is, once you get a handle on the core concepts, you will be repeating the same ideas over and over in the exam.

OVERVIEW OF THE STANDARD

- Gradients and differentiation (including sketiching graphs and basic differentiation)
- Turning points
- Rates of change
- Integration
- Kinematics

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!

The exam is likely to be broken into 3 questions - each assessing 1-2 of the key concepts of the standard. The different questions are spread throughout the exam - but the first question usually begins with basic differentiation and gradient/tangent calculation questions, before building up to rates of change and kinematic questions. Expect to sketch functions and gradients on a graph for atleast one of the questions.

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:

Sketching functions and gradients:

Lots of students focus on learning how to differentiate and integrate functions - without really knowing why they are doing it. NCEA tests that you understand the context of the gradients and tangents you are calculating by asking you to draw them on a graph. Make sure you practice drawing out functions, as well as the appropriate turning points and gradients once you have calculated them.

Calculating turning points:

Calculating turning points is a skill that is always assessed in the exam - and something that is quite repetitive, once you get used to it. Make sure you understand the importance of turning points, as well as how to calculate maximum and minimum values. It is equally important that you understand how to tell the difference between maximum and minimum points, and how to locate them on the graph of a function.

Practicing rates of change and kinematic questions:

Although this standard is about building core skills, you are also given context-based questions. These context questions are in the form of rates of change and kinematic questions. Make sure you practice identifying these types of questions, and extracting the key information you are given in the question to help you solve them. It is also helpful to revise how to calculate the area of common shapes (such as circles and triangles), as these will often help be used in rates of change questions.

COMMON MISTAKES:

From the NCEA gods themselves:

Not calculating the constant of integration:

Without a constant, your answers to integration questions will always be wrong! Lots of students either forget to include the constant when integrating, or are unsure of how to calculate it. Make sure you build a habit of writing and calculating the constant every time you answer an integration question.

Not rearranging accurately:

The calculus exam includes a lot of new concepts for you to get your head around - but the crazy thing is, lots of students get marked down for the familiar stuff! It is equally important that you cover the basics, and understand how to rearrange and perform maths skills from previous years in order to gain top marks.

Not understanding how to differentiate terms without coefficients:

Lots of students rote learn how to differentiate terms - so can freak out when something comes along that doesn't fit as easily into the general formula. Make sure you are comfortable with differentiating 'special' terms - such as those without a coefficient, or without a variable attached to them.

Not being able to differentiate terms with fractions or negative numbers:

NCEA can sometimes throw a fraction or negative number into basic differentiation problems - which make them look a lot more intimidating than they need to! Make sure you understand how to apply differentiation principles to these scenarios - so that you don't miss marks avoiding them!

OVERALL STUDY AND EXAM STRATEGY:

This standard brings a whole bunch of new calculations - as well as relying on some old friends. When you are studying, it helps to think about every numerical answer you find as relating back to a graph. Picture how the gradients and values you calculate would translate onto a graph, and how they relate to each other. Understanding the purpose of differentiation and integration will help you go into your exam a lot more confidently!