Rangi Ruru Girls' School

# LEVEL 3 CALCULUS - TATOU PROGRAMME OF LEARNING 2024

Welcome to the study of Level 3 Mathematics with Calculus. We hope that you find this course interesting, thought provoking, challenging in a positive way, and that you progress in your ability to successfully solve problems using Mathematical thinking and methods.

Calculus is an important branch of Mathematics that plays a major role in many scientific careers, from engineering to design, and also in business-related fields such as finance.

Students of Calculus also develop the dispositions of thinking creatively, critically, strategically, and logically. They also learn to structure, organise, process and communicate information effectively.

This year you will concentrate on **solving problems** using…

- Algebraic methods
- Trigonometric methods
- Differentiation methods
- Integration methods

**Work Organisation**

A write on Notes booklet is issued for each topic and you will be expected to complete them and keep them carefully for future reference.

An online copy of the Delta Level 3 Calculus textbook will be issued for this course, and you will be given a Nulake Workbook which will be used for important homework revision and reinforcement.

This course can be challenging if you do not complete regular content reinforcement (homework), including completing exercises set during lessons. It is recommended that you complete 1 hour of 'homework' for each teaching class period of Calculus. Attending at least one Mathematics tutorial each week is strongly recommended. The three External Achievement Standards are all strongly linked and so you will need to study and achieve all three to ensure success and an accurate reflection of your Learning from the year

# Achievement Standards offered in LEVEL 3 CALCULUS 2024

**Literacy and Numeracy**

All standards contribute toward Level 3 Numeracy.

| Achievement Standard Number | Version Number | Title | Mode of Assessment | Credits |
|---|---|---|---|---|
| 91575 3.3 | v2 | Apply trigonometric methods in solving problems | Internal | 4 |
| 91577 3.5 | v2 | Apply the algebra of complex numbers in solving problems | External | 5 |
| 91578 3.6 | v2 | Apply differentiation methods in solving problems | External | 6 |
| 91579 3.7 | v2 | Apply integration methods in solving problems | External | 6 |

| Rangi Values | How will ākonga demonstrate these values? | Rangi Graduate Dispositions | How will ākonga develop these dispositions? | Culturally Empowering Pedagogy | |
|---|---|---|---|---|---|
| **Respect/Whakaute** | *Ākonga will show respect for their classmates at all times, understanding the need for differentiation, and differing paces of learning.*<br>*Ākonga will show respect for the subject and Kaiako by completing homework, listening and following all instructions.* | **Be You** | *Ākonga are encouraged to be curious through asking questions.*<br>*Ākonga are encouraged to develop their learning strategies through trying different approaches to see what works for them.* | ***Tikanga, Te Reo Maori and Mātauranga Maori will be woven into this learning through:*** | *Kaiako and Ākonga are encouraged to use te reo maori where they feel appropriate/confident. The environment will demonstrate Manaakitanga for all Ākonga.*<br><br>*Authentic mātauranga maori mathematical contexts will be included where appropriate.*<br><br>*All Ākonga will see where the Mathematics being studied is relevant to them – purpose, how it relates to them and fits into their world (the Kaupapa).* |
| **Aroha** | *Ākonga will support other learners by participating in an inclusive and positive classroom culture* | **Belong** | *Ākonga are encouraged to link their learning to personal experiences and local contexts (e.g. real-life engineering examples)* | | |
| **Enthusiasm & Endeavour**<br>**Rikarika & Ngana** | *Ākonga will strive for their own personal best in learning, and will be encouraged to attempt extension activities, online practice, and attend offered tutorials.* | **Be The Change** | *Ākonga are encouraged to be creative with solutions and developing original solutions.* | ***Opportunities for cultures of other students will be incorporated through:*** | |
| **Generosity of Spirit**<br>**Manaakitanga** | *Ākonga will support each other and provide support for others when needed, helping classmates when appropriate.* | **Be Your Best** | *Ākonga are encouraged to strive for their own personal best in their learning – personalised learning.* | | |
| **Integrity/Tika** | *Ākonga will show integrity by ensuring they submit authentic evidence of their learning.* | | | ***Opportunities to think & connect as a globally minded citizen will include:*** | *Learners will be encouraged to investigate Mathematics in other cultures.* |

| Progress outcomes typically by the end of year 13 | | |
|---|---|---|
| **Understand/ *kia mārama*** | **Know/ kia mōhio** | **Do/kia mahi** |
| * The world is full of patterns and structures that we use mathematics to understand<br>* The world is characterised by change and variation that we use mathematics to understand<br>* Mathematical logic and reasoning enable us to identify and explain relationships and to justify conclusions.<br>* The interface between mātauranga Māori and mātauranga mathematics offers opportunities for insights that uphold the integrity of each knowledge system<br>* Mathematics has a continuous, evolving human history. | * A formula can include multiple parameters and variables, which are represented in different ways depending on the context in which the formula is being used.<br>*The square root of negative one ($\sqrt{-1}$) is represented by i<br>*Functions can be combined to create new functions by operating on them, including through function composition<br>*use the chain rule to differentiate composite functions<br>*A point on a unit circle at an angle of $\theta$ with the positive x-axis (in standard position) is represented by the coordinates ($\cos\theta$, $\sin\theta$). This demonstrates the periodic and symmetric nature of the sine and cosine functions, visually and algebraically.<br>*The definite integral gives the signed area bounded between the x-axis and a curve over an interval. | Te tūhura pūāhua \| Investigating situations<br>Te whakaata pūāhua \| Representing situations<br>Te tūhono pūāhua \| Connecting situations<br>Te whakatauwhānui i ngā kitenga \| Generalising findings<br>Te whakamārama me te parahau i ngā kitenga \| Explaining and justifying findings |

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|---|---|---|
| | *use simple trigonometric identities (e.g., sin2 ($\theta$) + cos2 ($\theta$) = 1) to simplify calculations ›<br>* apply calculus to trigonometric functions ›<br>*approximate the area under a curve using rectangles or trapeziums, and improve the approximation<br>*use derivatives and integrals to solve kinematic problems involving displacement, velocity, and acceleration.<br>*describe curves and circles using parametric equations<br>*explore and prove conjectures about functions (e.g., about the nature of their graphs, their rates of change, and the area under their curves). | |

## ASSESSMENT PROCEDURES

**4** Achievement Standards will be offered with a total of 21 credits.

**3** Achievement Standards will be assessed by an **external** examination (17 credits).

Tests and task sheets will be given regularly throughout the year to give you practice in answering questions related to the topics being studied. After the Algebra, Differentiation and Integration topics you will sit an examination to obtain a derived grade (DG) which will be used if you cannot sit the NCEA examination at the end of the year.

**1** Achievement Standard will be assessed **internally** during the year (4 credits).

### Important Information for Internal Assessments

- **Absences** – It is important that you do not miss any assessments (Internal or External) except for genuine reasons of sickness, accident or other extreme emergency. Providing a Medical Certificate from your Doctor must cover absence during an assessment. On your return to school you will be given the opportunity to do the task for the particular Achievement Standard. This will NOT be possible if you choose to go on a family holiday, or similar non-school related event, at the time of assessment.

- **Assessment Policies** – Information regarding the school policy on assessment, authenticity and appeal procedures is found on https://hub.rangiruru.school.nz/assessment/. Ensure you read these thoroughly and follow all guidelines. Know your rights and responsibilities.

- **Filing** – When an Internal assessment task has been marked you will be asked to **verify the sighting and acceptance of the grade awarded by signing the cover sheet.** All assessed work will then be filed at school for security and for moderation by NZQA, if required.

- **Assessment** – If a **'Not Achieved'** grade is awarded for an **internally** assessed Achievement Standard, there will be no further assessment opportunities in that Achievement Standard.

- You **may be** offered the opportunity of a **resubmission** if your work requires minor corrections or change that you may have overlooked and should be able to identify within a few minutes. Your teacher will approach you prior to the task being handed back to the class as a whole if this is relevant for you. You will be required to identify and make any changes immediately. Your teacher is **not** able to tell you of the specific change required; you must be able to identify the required change yourself.