Mathematics and Statistics Learning Matrix

Curriculum Level 6

Learning Area Whakataukī:

> **Kei hopu tōu ringa ki te aka tāepa,** *Cling to the main vine,*
> **engari kia mau ki te aka matua** *not the loose one*

Big Ideas				
Critical thinking, and mathematical and statistical generalisations, emerge from te hononga of different observations, knowledges, and processes	Tāiringa kōrero allows for elegance, creativity, and exploration of mathematical and statistical ideas	In Mathematics and Statistics, wānanga stimulates logical argument, investigation, analysis, and justification, supporting critical evaluation and reasoned conclusions	Mathematical and statistical concepts, patterns, and relationships can be represented in multiple ways	Mathematical and statistical methods can be used to explore, solve, or model problems while recognising variation, certainty, and uncertainty

Significant Learning

Across all Curriculum Levels, ākonga will…

- use mātauranga Māori to make connections across all the strands of Mathematics and Statistics to help make sense of the world
- understand and appreciate the continuous, evolving history of mathematics and statistics across cultures in a variety of relevant contexts
- engage in meaningful inquiry
- explore digital technologies by using them appropriately.

At Curriculum Level 6, ākonga will…

- fluently and flexibly solve problems
- form, use, rearrange, and solve equations, formulae, and inequations
- collect, explore, analyse, and form conclusions with measured quantities and data
- evaluate mathematical and statistical information, solutions, outcomes, and approaches from a range of perspectives
- make sense of solutions in context, including in different cultural contexts
- explore situations using a variety of representations such as patterns, equations, tables, and graphs, as well as data displays and numerical statistics
- explore, describe, and generalise properties of number, measurement, space, algebra, and probability
- explore and use relative change in two variables represented using equations, tables, and graphs, within linear and quadratic relationships
- calculate probabilities and use them to make predictions
- communicate mathematical and statistical ideas and insights using appropriate mathematical and statistical language, symbols, and representations.

Companion to the Learning Matrix for Curriculum Level 6
Mathematics and Statistics

This is further detail to help support kaiako in specific areas of the Learning Matrix. Not every section of the Learning Matrix will be covered in this companion.
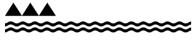
At all times at this level of study, learning needs to weave together relevant contextual information with skills. Ākonga should develop an understanding of the Big Ideas about Mathematics and Statistics through a variety of contexts which are relevant to their lives in Aotearoa New Zealand and the Pacific.

Key: *Italicised text* is content that appears in the Learning Matrix, with the standard type giving the further detail.

- *fluently and flexibly solve problems*
  Consider:
  - use of manipulation to solve problems
  - use of technology to solve problems.

- *form, use, rearrange, and solve equations, formulae, and inequations*
  Consider:
  - forming, rearranging, and using formulae
  - expanding and factorising polynomials
  - accurately solving linear and quadratic equations, showing working
  - algebraically solving systems of two linear equations in two-dimensional space, and geometrically interpreting the solutions
  - linear inequalities.

- *collect, explore, analyse, and form conclusions with measured quantities and data*
  Consider:
  - using a statistical enquiry process – this could include but is not limited to the statistical enquiry cycle Problem, Plan, Data, Analysis, Conclusion (PPDAC), to undertake data-based investigations
  - sourcing, interrogating, and creating new variables for existing multivariate datasets
  - selecting and use appropriate data visualisations to answer investigative questions
  - describe and explain features, patterns, or trends of data in context
  - make informal inferences about populations from sample data for summary and comparison situations.
  - make predictions within the data range for relationship situations (numerical data)
  - justify evidence from the analysis and informal inferences
  - design and conduct experiments or simulations that demonstrate the relationship between combined conditions for events and the probability of individual events.

- *evaluate mathematical and statistical information, solutions, outcomes, and approaches from a range of perspectives*
  Consider:
  - recognise that features of sample distributions of a variable from the same population, which have the same sample size, vary from sample to sample

- o data collection process from an ethical viewpoint, considering the variables to be collected, and how the data is collected, stored, used, and reported
  - o critically evaluate my investigation recognising limitations
  - o critically evaluate the strength of an argument by considering the appropriateness of the plan or simulation, quality of the data collection and analysis, and the evidence to support the claims made (connects to statistics)
  - o evaluating the findings presented and claims made by the media through interrogating phases of the statistical enquiry cycle or relevant mathematical process
  - o proposing possible relevant reasons as to why particular data or mathematical visualisations and calculations were used to support claims.

- *make sense of solutions in context including in different cultural contexts*
  Consider:
  - o make inferences from samples to populations
  - o recognise uncertainty should be taken into account when making informal inferences and predictions
  - o recognise that data is a taonga and care must be taken when recording, handling, storing, and presenting or publishing data
  - o link my statements to the context, reflect on my conjectures and provide interpretations with possible relevant explanations for observations and patterns.

- *explore situations using a variety of representations such as patterns, equations, tables, and graphs as well as data displays and numerical statistics*
  Consider:
  - o graph linear and quadratic functions
  - o find the equation for the line between two points
  - o find equations for parallel lines, including horizontal and vertical lines
  - o graph linear and quadratic functions and interpret x-intercepts, the y-intercept, and key features in relation to the equation or the situation
  - o investigate features, patterns and trends including, where appropriate, clusters, gaps, outliers, measures of centre and spread, shape of distribution, context, position of data, and research relevant reasons and possible explanations.

- *explore, describe, and generalise properties of number, measurement, space, algebra, and probability*
  Consider:
  - o operate with percentages, rates, and ratios
  - o operate on very large and on very small numbers using scientific notation
  - o add, subtract, multiply, divide, and find powers and roots of fractions
  - o use algorithms for prime factorisation of positive integers, including greatest common factors and least common multiples
  - o operate on numbers, with real number exponents by applying exponent rules, including evaluating integer exponents
  - o operate on algebraic fractions with numeric denominators
  - o estimate, accurately measure, and calculate quantities using appropriate tools and formulae
  - o estimate the area or volume of regular, irregular, and compound shapes
  - o use scale factors and properties of similar shapes to estimate length, area, and volume changes

- o explore the fixed relationships between side lengths and angles in right-angle triangles in two and three dimensions.

- *calculate probabilities and use them to make predictions*
  Consider:
    - o calculating with probabilities in discrete situations using systematic lists, 2-way tables, and tree diagrams with counts.

- *communicate mathematical and statistical ideas and insights using appropriate mathematical and statistical language, symbols, and representations*
  Consider:
    - o recognise the complexity of the attribute being measured and use correct units with appropriate precision
    - o preserve units in calculations, including those involving derived measures and metric conversions
    - o communicate my findings in a way that a non-specialist audience can understand