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Curriculum Centre

Mathematics and Statistics NCEA NZC Level 1
Subject Learning Outcomes for Assessment

Companion to the Mathematics and Statistics Learning Matrix

What are the Subject Learning Outcomes and how can I use them?

Subject Learning Outcomes identify the knowledge and skills that students need to be ready for assessment. Subject Learning Outcomes are informed by the Achievement Standards. They should be used in conjunction with the full suite of NCEA materials. For guidance on assessment criteria, please also refer to the Achievement Standards, Unpacking, and External Assessment Specifications or Conditions of Assessment as appropriate.

Subject Learning Outcomes do not replace any documents. This includes the External Assessment Specifications and Conditions of Assessment. All NCEA materials need to be used to fully understand the requirements of each Achievement Standard and to plan a robust teaching, learning, and assessment programme. Subject Learning Outcomes should not be used to make assessor judgments. The Achievement Standard and the Assessment Schedule for Internal Assessment Activities are used to make such judgments.

Subject Learning Outcomes, alongside other key documents, make clear to teachers what to include in their teaching and learning programmes and what student capabilities to check for, in the lead up to assessment. Each Subject Learning Outcome does not need the same amount of teaching time.

All learning should connect with students' lives in Aotearoa New Zealand and the Pacific. Teachers or students usually select the contexts. As such, contexts are not always specified in the Subject Learning Outcomes. Examples may be provided to illustrate topics and contexts, but they are not prescriptive.

Students are entitled to teaching that supports them to achieve higher levels of achievement. Subject Learning Outcomes mainly align with outcomes for the Achieved level. However, outcomes for higher levels of achievement are also included.

The knowledge and skills in the Subject Learning Outcomes are the expected learning that underpins each Achievement Standard. Students will draw on this learning during assessment. It is important to note that assessment is a sampling process so not everything that is taught will be assessed.

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Achievement Standard 1.1 (91944): Explore data using a statistical enquiry process (5 Credits)

What is being assessed	Subject Learning Outcomes
Use a statistical enquiry process	Students are able to: • identify which of the four styles of investigation to use with data (comparison, relationship, time series and probability) and identify focus variable or variables • use an established statistical enquiry process such as the Statistical Enquiry Cycle (PPDAC), or, during an investigation, form a purpose which includes an investigative question (that may be given), represent data visually, and describe findings in context o For higher levels of achievement, students will be able to cover all aspects of an enquiry process. For example, justify a visualisation, discussion, and conclusion with reference to original purpose. When reflecting on a process students incorporate statistical insight, which includes strong links between the findings and the context. • communicate findings in context, for example, in a verbal presentation with supporting graphics, or a written report.
Sources of variation	Students are able to: • identify different types of variation and how these may have occurred or been managed in the data collection process. These include natural or real, occasion-to-occasion, measurement, induced, and sampling variation. o For higher levels of achievement, students will be able to consider the impact (the why) of managed or unmanaged sources of variation.
Visualisations and measures	Students are able to: • create or select an appropriate visualisation for existing data, for example, using a dynamic time series graph sourced from a trustworthy website, with enough detail, for a meaningful analysis. o For higher levels of achievement, students will also be able to present appropriate measures for the data, for example, the start and end points of a trend line for a time series graph.
Features of data	Students are able to: • describe and explain visible patterns, variations, trends, and generalisations in context, for example, clusters, gaps, outliers, measures of centre and spread, shape of distribution, and position of data. o For higher levels of achievement, students will use measures to justify these features.

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Achievement Standard 1.2 (91945): Use mathematical methods to explore problems that relate to life in Aotearoa New Zealand or the Pacific (5 Credits)

What is being assessed	Subject Learning Outcomes

Mathematical methods	Students are able to:
	• use at least four different mathematical processes from at least two of number, algebra, measurement, and geometry and space, for example, using Pythagoras' Theorem in solving a problem
	  ○ For higher levels of achievement, students will link different processes together to form logical connections in context.
	• use formulas, equations, or inequalities
	• solve problems using a range of processes, for example, finding the maximum area of an enclosed space using tables, equations or graphs.
	  ○ For higher levels of achievement, students will discuss the impact of decisions made in the problem-solving process, or make generalisations to solve a larger problem.

Communication	Students are able to: • make sense of findings in context, including different cultural contexts within Aotearoa New Zealand or the Pacific • show how an answer is reached, for example, showing how technology or tools were used in a solution • make it clear what an answer represents • use and preserve units in calculations. ○ For higher levels of achievement, students will follow mathematical conventions, including accuracy of rounded answers using decimal places and significant figures appropriate to a problem. Students are likely to make generalisations, predictions, or recommendations, or to explain limitations or assumptions.

Achievement Standard 1.3 (91946): Interpret and apply mathematical and statistical information in context (5 Credits)

What is being assessed	Subject Learning Outcomes
Identifying and interpreting information	Students are able to: • interpret infographics such as data presented in pictures in a newspaper article • make sense of, and interpret, written mathematical or statistical information

	• use a variety of sources to make sense of a context.

Relating findings	Students are able to:
	• use mathematical and statistical literacy to explain an interpretation of data, displays, or infographics
	  ○ For higher levels of achievement, students will consider variation in data as well as justifying decisions or informed judgements made from the extraction of information from mathematical and statistical media. This may include evaluating the validity of a decision or judgement.
	• use personal contextual knowledge or worldviews to make decisions
	• use computation skills to help make a decision or recommendation.
	  ○ For higher levels of achievement, students will need to justify their decisions.

Achievement Standard 1.4 (91947): Demonstrate mathematical reasoning (5 Credits)

What is being assessed	Subject Learning Outcomes
Mathematical methods	Students are able to: • identify useful mathematical processes required to solve a problem • use mathematical processes from number, algebra, measurement, and geometry and space, for example, solving simultaneous equations with two straight lines. ○ For higher levels of achievement, students will engage in problems requiring several methods to reach a solution. The methods required may not be immediately identifiable.
Mathematical reasoning	Students are able to: • communicate the mathematical methods used to solve a problem, for example, showing evidence of finding the volume of a sphere ○ For higher levels of achievement, students may choose from a range of possible approaches or perspectives to solve a problem. Students may also generalise or complete a mathematical proof demonstrating and developing a clear chain of logical reasoning. • follow mathematical conventions.