NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

NCEA Level 2
Assessment Specifications

General Information

Sub-field	Mathematics
Level	2
Mode of Assessment	Written examination
For Year	2008

This document contains the assessment specifications for achievement standards 90284, 90285, 90286, 90287, 90290, 90292, 90806 and 90807.

Format of the assessments

A question may provide the opportunity for candidates to produce evidence for more than one level of achievement. As a result, questions will not necessarily be arranged in increasing order of difficulty.

Holistic decisions will be used in the awarding of a grade by reference to the relevant achievement standard.

The format of the papers for the CAS standards (90806 and 90807) will differ slightly from the format of the other papers. As there are only three CAS standards to be assessed in the three hours these candidates will have more opportunities for achieving excellence.

In the CAS standards, it is the type of problem that is defined and not the method of solution.

Candidates may choose their method to solve a problem.

Equipment to bring

Candidates will require a calculator and a ruler.

Candidates who do not have access to graphing calculators will be disadvantaged.

Resources or information provided

A level 2 Mathematics Formula Sheet will be provided.

Content/Context details

Solutions for problems providing opportunities for achievement with merit and achievement with excellence may incorporate content knowledge across different Level 2 Mathematics achievement standards (algebra in particular).

Special notes

Candidates will be expected to answer questions that demonstrate an understanding of the mathematical concepts rather than directly transferring results from their graphing calculator. This may involve the use of unknown constants.

Minor errors will not be penalised. Sensible rounding with respect to solving problems will be required. This will most likely occur at achievement with merit or excellence level. Units should be provided where appropriate but a grade will not be withheld for lack of units alone.

Candidates and teachers should be aware of the amount of evidence that is required in answering questions. Statements indicating the evidence required can be found in the graphing calculator resource on the NZQA website.

Knowledge of mathematical terms such as indices, exponents, median, and such like is assumed.

Candidates may be required to use skills from other strands of mathematics in order to solve a problem. This applies particularly in relation to solving algebraic equations, but could also involve skills from a lower level of the curriculum, eg using Pythagoras theorem.

Specific Information for Individual External Achievement Standards

Achievement Standard Number		90284	
Title		Manipulate algebraic expressions and solve equations	
Domain		Algebra	
Version	2	**Number of Credits**	4

Content/Context details

Questions for achievement with merit or achievement with excellence may be set in a mathematical context.

Further clarification of the achievement standard

Candidates should be familiar with the concept of modelling a situation using an equation.

Any equations formed by the candidate must be stated in solving a problem.

In answering the question for achievement with excellence, candidates must demonstrate algebraic techniques.

Where an assessment requires the use of algebraic manipulation in solving an equation, candidates are advised to show this as part of their working as it may provide further evidence for achievement.

Changing the subject of a formula may be required as part of solving a problem.

Achievement Standard Number		90285	
Title		Draw straightforward non-linear graphs	
Domain		Algebra	
Version	2	**Number of Credits**	3

Content/Context details

'Drawing' is interpreted to mean that a smooth curve is drawn showing the correct shape, and the key features (intercepts and asymptotes, for example) are to be indicated and labelled.

In assessing drawing a graph, it is expected that the general shape will be correct and the following features correctly positioned where appropriate:

- x intercept(s) and y intercept(s)
- axes of symmetry
- vertex or maximum or minimum value (not for polynomials other than quadratics)
- centre
- radius
- horizontal and vertical asymptote

Care must be taken when drawing graphs not to present them in a truncated form. This can also be an issue for candidates using a graphing calculator for a graph such as $y = \log_{10}(+2)$.

The graphs that candidates are required to draw may be presented in a context, although for both achievement and merit the equation will be given.

Graphs of logarithmic and exponential functions may have integer values for the coefficient of x.

Achievement with Merit

- When drawing a graph candidates may be expected to consider the sensibility of the domain or range when relating the graph to the context.
- 'Interpreting the features of a graph' requires candidates to relate features, such as intercepts and turning points, or solutions of equations, to the real-life situations that the graph represents. Comments made by the candidates must relate to the context.
- Candidates will be required to write equations for graphs that have been given.

Further clarification of the achievement standard

A graphical model may include a number of non-linear functions. In this case, candidates would be required to form the equations of each section and then use those equations to interpret features of the graph in context.

Achievement Standard Number		90286	
Title		Find and use straightforward derivatives and integrals	
Domain		Calculus	
Version	3	**Number of Credits**	4

Content/Context details

Questions providing evidence for achievement with merit and achievement with excellence may require candidates to interpret their solutions in context.

Further clarification of the achievement standard

Derivatives and integrals must be shown as evidence of candidates' ability to differentiate and integrate.

For achievement, candidates may be required to show the relationship between the derivative and the gradient function by the sketching of the gradient function given the graph of the function of a quadratic or cubic function.

For achievement with merit, where a question requires the calculation of composite areas in solving a problem, candidates are advised to give component areas as this can provide evidence for achievement.

Achievement Standard Number		90287	
Title		Use coordinate geometry methods	
Domain		Geometry	
Version	2	**Number of Credits**	2

Further clarification of the achievement standard

Problems may include mathematical contexts.

Equations of lines should be simplified to the form $y = ax + b$ or $ax + by + c = 0$.

Achievement Standard Number		90290	
Title		Solve straightforward problems involving arithmetic and geometric sequences	
Domain		Algebra	
Version	2	**Number of Credits**	2

Further clarification of achievement standard

Candidates may be required to solve different types of equations, eg indicial (index), quadratic or logarithmic, in solving problems in context. Answers should be considered in context and rounded appropriately.

Achievement Standard Number		90292	
Title		Solve straightforward trigonometric equations	
Domain		Trigonometry	
Version	2	**Number of Credits**	2

Further clarification of the achievement standard

Presentation of problems may include a trigonometric graph.

Solutions of problems may be aided by drawing an appropriate graph.

Candidates are expected to correctly answer questions using radians or degrees. Answers in degrees equivalent to the correct radian answer, and vice versa, are acceptable.

Candidates may be required to identify numerical values for models from the description of the context.

While the examples in the explanatory notes all have a positive value as the coefficient of the trig functions, candidates may be expected to solve problems involving functions in which one or more coefficients is negative.

For achievement with merit, candidates may be required to solve equations involving squares of trigonometric functions, eg $\sin^2 x = 0.25$.

Achievement Standard Number		90806	
Title		Demonstrate an understanding of mathematical relationships	
Domain		Algebra	
Version	1	**Number of Credits**	6

Content/Context details

Questions will be set in a context (which could be mathematical) and candidates may be required to interpret their solutions in context, including the use of sensible rounding.

Further clarification of the achievement standard

Candidates may choose their method of solving the problems. These may be numerical, algebraic or graphical techniques in the solution of the problem.

When using graphical techniques, candidates may be expected to consider the sensibility of the domain or range when relating the graph to the context.

For achievement with merit and achievement with excellence, candidates are expected to show evidence of the techniques used. Candidates may be required to use correct mathematical statements and should present their work in a logical manner.

Achievement Standard Number		90807	
Title		Demonstrate an understanding of calculus methods	
Domain		Calculus	
Version	1	**Number of Credits**	4

Content/Context details

Questions will be set in a context (which could be mathematical) and candidates may be required to interpret their solutions in context, including the use of sensible rounding.

Further clarification of the achievement standard

The understanding and use of correct notation is expected.

Achievement Standard Number		90808	
Title		Demonstrate an understanding of processes involving trigonometry and coordinates	
Domain		Trigonometry	
Version	1	**Number of Credits**	4

Content/Context details

Questions will be set in a context (which could be mathematical) and candidates may be required to interpret their solutions in context, including the use of correct units and sensible rounding.

Further clarification of the achievement standard

This standard relates to situations involving points and lines and the shapes formed by them. A problem may be solved using coordinate geometry or trigonometric techniques or a combination of these. Sufficiency will not be required in each of coordinate and trigonometric techniques.

For achievement with excellence, candidates are expected to show a chain of reasoning. Evidence of this reasoning must be shown. Candidates will be required to use correct mathematical statements, and should present their work in a logical manner.