Achievement Standard

Subject Reference	CAS Calculus 3.2				
Title	Demonstrate an understanding of equations and expressions when solving problems				
Level	3	**Credits**	7	**Assessment**	External
Subfield	Mathematics				
Domain	Algebra				
Status	Registered	**Status date**		17 December 2008	
Planned review date	28 February 2011	**Date version published**		17 December 2008	

This achievement standard involves demonstrating an understanding of equations and expressions when solving problems.

Note: Candidates cannot use credit for both this achievement standard and either AS90637 or AS90638 (Calculus 3.3 and 3.4) towards a national qualification including a National Certificate of Educational Achievement.

	Achievement Criteria	**Explanatory Notes**
Achievement	• Demonstrate an understanding of equations and expressions when solving problems.	• Equations and expressions will be selected from: – polynomial with real and complex roots – exponential, such as $2^{3x+1} = 5$ – logarithmic, such as log(x + 5) = 1.34 (any base) – trigonometric, such as y= A *trig* B(x + C) + D – surds – complex numbers such as $z^n = r\,\text{cis}\,\theta$, $z^n = a + b$ i where a, b are real and n is a positive integer. • General solution and solutions within a specified domain may be required for trigonometric situations and families of functions.
Achievement with Merit	• Demonstrate a deeper understanding of equations and expressions when solving problems.	• Candidates will be expected to have a knowledge of: – the remainder and factor theorem – the process of completing the square – sine and cosine rules.

	Achievement Criteria	**Explanatory Notes**
Achievement with Excellence	• Demonstrate a comprehensive understanding of equations and expressions when solving problems.	• Candidates will be required to form an equation or expression to model and solve the problems. • Problem solving may include: – manipulation of algebraic or trigonometric expression and equations o reciprocal relationships o Pythagorean identities o compound angle formulae o double angle formulae o sum and product formulae o conversion between polar and rectangular forms of real and complex numbers o simplification of sums, differences, products, and quotients of surds or complex numbers – use of De Moivre's theorem – geometric representation of complex numbers eg loci – 3-D trigonometric problems – modelling and evaluation – identifying and rectifying a flaw in reasoning – proof – binomial expansions for small positive integer exponents.

General Explanatory Notes

1 This achievement standard is derived from *Mathematics in the New Zealand Curriculum*, Learning Media, Ministry of Education, 1992:
- achievement objectives p. 164
- suggested learning experiences pp. 25, 27, 29, 165
- sample assessment activities pp. 166-167
- mathematical processes pp. 24, 26, 28.

2 An *understanding* of equations and expressions would typically include:
– selecting and applying essential concepts and processes
– achieving at least a partial solution.

3 In addition to the requirements for achievement a *deeper understanding* would typically include:
– linking of relevant concepts and processes
– communicating the key steps of a solution.

4 In addition to the requirements for merit, a *comprehensive understanding* would include a solution of a problem, and typically an interpretation or evaluation of that solution. This may involve the linking of different concepts and processes, and generalisation.

5 Computer Algebraic Systems (CAS) technology may be used.

Quality Assurance

1 Providers and Industry Training Organisations must be accredited by NZQA before they can register credits from assessment against achievement standards.

2 Accredited providers and Industry Training Organisations assessing against achievement standards must engage with the moderation system that applies to those achievement standards.

Accreditation and Moderation Action Plan (AMAP) reference 0226