Achievement Standard

Subject Reference	CAS Mathematics 2.1				
Title	Demonstrate an understanding of mathematical relationships				
Level	2	**Credits**	6	**Assessment**	External
Subfield	Mathematics				
Domain	Algebra				
Status	Registered	**Status date**	16 November 2007		
Planned review date	28 February 2009	**Date version published**	16 November 2007		

This achievement standard involves demonstrating an understanding of mathematical relationships.

Note: Candidates cannot use credit for both this achievement standard and any of AS90284, AS90285, AS90290, or AS90292 (Mathematics 2.1, 2.2, 2.7, and 2.9) towards a national qualification including a National Certificate of Educational Achievement.

Achievement Criteria

	Achievement Criteria	Explanatory Notes
Achievement	• Demonstrate an understanding of mathematical relationships.	• Relationships may be given in graphical, algebraic or numerical forms. • Assessment will be based on a selection from: – forming and solving linear/linear simultaneous equations and interpreting results – solving: o linear/non-linear simultaneous equations and interpreting results including circles, polynomials, log and exponential graphs o trigonometric equations which could be in degrees or radians, and would probably include the use of trigonometric graphs such as: ▪ $2\sin(x) = 0.2,\ 0^o \le x \le 360^o$ ▪ $\sin(x) + 3 = 3.5,\ 0 \le x \le 2\pi$.

	Achievement Criteria	**Explanatory Notes**
		• Assessment will involve the use of: – quadratics and other polynomials – rectangular hyperbolae of the form $y = \frac{a}{bx}$, where $a, b \in I, b \neq 0$ – exponential functions of the form $y = a^x$, $a \in N$ – features of graphs.
Achievement with Merit	• Demonstrate an understanding of mathematical relationships in multi-step situations.	• Assessment will be based on situations selected from: – quadratic formula – features of graphs – polynomial, exponential, logarithmic or trigonometric relationships with multiple transformations: ○ $13^{(4x-5)} = 6$ ○ $4\sin(2x) = 0.8, 0^o \leq x \leq 360^o$ ○ $\sin(x - 90^o) = 0.3, -180^o \leq x \leq 180^o$ ○ $3 + 2\sin(5x) = 2, 0 \leq x \leq 2\pi$. • Candidates will be expected to solve problems in contexts such as: – radioactive decay – % increase/decrease, such as compound interest – results of an experiment – using log equations to find *n* in geometric sequences.
Achievement with Excellence	• Demonstrate an understanding of mathematical relationships in more complex situations.	• Situations could include: – long-term effects – sequences – modelling by different relationships over a domain – interpreting the solution – exploring the nature of the roots of a quadratic – forming/completing trigonometric relationships from a given model – complex manipulations of trigonometric equations. • The use of sequences may involve relating the algebraic representation to the graphical representation for situations involving sums to infinity, and the relevance of asymptotes and discontinuities.

General Explanatory Notes

1 This achievement standard is derived from *Mathematics in the New Zealand Curriculum*, Learning Media, Ministry of Education, 1992:
- achievement objectives pp. 82, 116, 158
- suggested learning experiences pp. 83, 117, 159
- sample assessment activities pp. 84-85, 118, 160-161
- mathematical processes pp. 24, 26, 28.

2 The use of the Factor/Remainder Theorem will not be assessed.

3 *Demonstrating an understanding* involves more than the mere demonstration of a method such as writing the equation of a line. The method needs to be applied in a context (which could be mathematical), and may require the candidate to select the model.

4 Knowledge of sine, cosine and tangent forms of trigonometric equations and graphs is required.

5 Context may relate to situations involving an arithmetic or geometric sequence.

6 Candidates may use any appropriate method/process to demonstrate understanding of mathematical relationships.

7 An algebraic proof will involve a multi-step manipulation of a given algebraic statement to generate another given expression. This may be required in the demonstration of understanding at any grade of achievement.

8 For this achievement standard, the problems may be set in a mathematical context.

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