Achievement Standard

Subject Reference	CAS Mathematics 2.4				
Title	Demonstrate understanding of straightforward mathematical processes				
Level	2	**Credits**	5	**Assessment**	Internal
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 straightforward mathematical processes without the use of electronic technology (including calculators).

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

Achievement Criteria

	Achievement Criteria	Explanatory Notes
Achievement	• Demonstrate the ability to use straightforward mathematical processes.	• Assessment will involve a selection from: – algebraic manipulation based on: o using fractional and negative indices o using elementary properties of logarithms o solution of quadratics that can be factorised using integers, eg $2x^2 - 11x = 21$ o solution of simple logarithmic equations, eg $\log_x 25 = 2,\ 3^x = 81$ – calculus skills such as finding derivatives and indefinite integrals of expressions given in expanded form with terms that have natural number exponents, eg $3x^4 + 2x^2 - 5x + 2$

	Achievement Criteria	**Explanatory Notes**
		– graphing skills, which may involve sketching of graphs or demonstrating an understanding of their features and includes: o circles with centre at the origin o exponential functions of the form $y = a^x$, $a \in$ N o logarithmic functions of the form $y = \log_a x$, $a \in$ N – transformation of quadratics which may involve functional notation.
Achievement with Merit	• Demonstrate the ability to use mathematical processes.	• Assessment will involve a selection from: – algebraic manipulation that involves simplifying rational expressions – graphing skills involving sketching of graphs, writing equations, and demonstrating an understanding of their features and will be based on: o finding multiple solutions of a trig equation, given one solution o rectangular hyperbolae of the form $y = \frac{a}{x-c} + b$ o circles of the form $(x-a)^2 + (y-b)^2 = r^2$ o exponential functions of the form $y = a^{x-b} + c$ and either b or c = 0 o logarithmic functions of the form $y = \log_a(x-b)+c$, $a \in$ N and either b or c = 0. – expressions which are more complex to manipulate, eg $y = (x+2)(x-4)$ in relation to calculus methods.
Achievement with Excellence	• Demonstrate the ability to use mathematical skills to solve problems.	• When solving a problem the student may be required to: – interpret the solution, which may involve a context from calculus – formulate a proof that could include: o demonstrating an understanding of roots of quadratic equations o multi-step algebraic manipulation – write the equation of a graph involving more than one equation, or piecewise function, in describing a situation. This could include exponential and logarithmic functions where both b and c may have non-zero values.

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, 158
- suggested learning experiences pp. 83, 159
- sample assessment activities pp. 84-85, 160-161
- mathematical processes p. 26.

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

3 An algebraic proof will involve a multi-step manipulation of a given algebraic statement to generate another given expression.

4 Understanding of mathematical processes will be assessed within the contexts of algebra, graphing and calculus, without the use of electronic technology.

5 Understanding of dy/dx, $f'(x)$ and $\int dx$ notations is expected.

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