

## Achievement Standard

<b>Subject Reference</b>	CAS Calculus 3.1		
<b>Title</b>	Demonstrate an understanding of calculus concepts when solving differentiation and integration problems		
<b>Level</b>	3	<b>Credits</b>	7
		<b>Assessment</b>	External
<b>Subfield</b>	Mathematics		
<b>Domain</b>	Calculus		
<b>Status</b>	Registered	<b>Status date</b>	17 December 2008
<b>Planned review date</b>	28 February 2011	<b>Date version published</b>	17 December 2008

This achievement standard involves demonstrating an understanding of calculus concepts when solving differentiation and integration problems.

Note: Candidates cannot use credit for both this achievement standard and either AS90635 or AS90636 (Calculus 3.1 and 3.2) towards a national qualification including a National Certificate of Educational Achievement.

	Achievement Criteria	Explanatory Notes
<b>Achievement</b>	<ul style="list-style-type: none"> <li>Demonstrate an understanding of calculus concepts when solving problems.</li> </ul>	<ul style="list-style-type: none"> <li>Types of functions will be selected from:               <ul style="list-style-type: none"> <li><math>ax^n</math>, where <math>n \in \mathbb{R}</math>,</li> <li>logs (base e only)</li> <li>polynomials</li> <li>exponential functions of the form <math>ae^{bx+c}</math> (base e only)</li> <li>trigonometric functions</li> <li>rational functions such as <math>\frac{ax+b}{cx+d}</math>, <math>\frac{f'(x)}{f(x)}</math>.</li> </ul> </li> </ul>
<b>Achievement with Merit</b>	<ul style="list-style-type: none"> <li>Demonstrate a deeper understanding of calculus concepts when solving problems.</li> </ul>	<ul style="list-style-type: none"> <li>Problems may include:               <ul style="list-style-type: none"> <li>choosing and applying appropriate trigonometric relationships (knowledge of the sine and cosine rules may be required)</li> <li>modelling</li> <li>proof.</li> </ul> </li> </ul>

	Achievement Criteria	Explanatory Notes
Achievement with Excellence	<ul style="list-style-type: none"> <li>Demonstrate a comprehensive understanding of calculus concepts when solving problems.</li> </ul>	

### General Explanatory Notes

- This achievement standard is derived from *Mathematics in the New Zealand Curriculum*, Learning Media, Ministry of Education, 1992:
  - achievement objectives p. 86
  - suggested learning experiences pp. 25, 27, 29, 87
  - sample assessment activities pp. 88-89
  - mathematical processes pp. 24, 26, 28.
- An *understanding* of calculus concepts would typically include:
  - selecting and applying essential concepts
  - achieving at least a partial solution.
- In addition to the requirements for achievement a *deeper understanding* would typically include:
  - linking of relevant concepts
  - communicating the key steps of a solution.
- 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 representations of concepts and generalisation.
- Computer Algebraic Systems (CAS) technology may be used.

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### Quality Assurance

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