Achievement Standard

Subject Reference CAS Calculus 3.3

Title Demonstrate an understanding of patterns and relationships when solving problems

Level 3 **Credits** 5 **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 patterns and relationships when solving problems.

Note: Candidates cannot use credit for both this achievement standard and either AS 90635 or AS90636 (Calculus 3.1 and 3.2) towards a national qualification including a National Certificate of Educational Achievement.

	Achievement Criteria	Explanatory Notes
Achievement	• Demonstrate an understanding of patterns and relationships when solving problems.	• Patterns and relationships will be selected from graphs, tables, algebraic (including parametric) representations and ordered pairs for: – conic sections – trigonometric functions – inverse and reciprocal functions. Completion of the square or binomial expansion for small positive integers may be required.
Achievement with Merit	• Demonstrate a deeper understanding of patterns and relationships when solving problems.	• Understanding of graphical situations may involve: – features of graphs (eg asymptotes, directrix, eccentricity, turning points, discontinuities and intercepts) – transformations – relationships between graphs and their inverses or reciprocals.

	Achievement Criteria	Explanatory Notes

Achievement with Excellence	• Demonstrate a comprehensive understanding of patterns and relationships when solving problems.	• Problems may involve:
		  – tangents and normals
		  – intersections of graphs
		  – implicit or parametric differentiation
		  – modelling
		  – a chain of reasoning
		  – proof
		  – loci
		  – optimisation.

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. 124, 164
  • suggested learning experiences pp. 125, 165
  • sample assessment activities pp. 126, 166-167
  • mathematical processes pp. 24, 26, 28.

2   An *understanding* of patterns and relationships 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 representations
  – 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 representations of concepts 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