Achievement Standard

Subject Reference   Mathematics 2.2

Title   Draw straightforward non-linear graphs

Level   2   **Credits**   3   **Assessment**   External

Subfield   Mathematics

Domain   Algebra

Registration date   20 October 2004   **Date version published**   20 October 2004

This achievement standard requires drawing of straightforward non-linear graphs.

Achievement Criteria

	Achievement Criteria	Explanatory Notes

Achievement	• Draw straight-forward non-linear graphs.	• Assessment of drawing graphs will be based on a selection from:
		  – quadratics that can be factorised or put in the form $y = \pm (x - a)^2 + b$
		  – factorised polynomials (coefficient of $x^n = \pm 1$)
		  – rectangular hyperbolae of the form $y = \dfrac{a}{bx}$, where a,b $\in$ I, b≠0
		  – circles with centre at the origin
		  – exponential functions of the form $y = a^x$, $a \in$ N
		  – logarithmic functions of the form $y = \log_a x$, $a \in$ N
		• Graphs to be drawn will be from given equations.
		• Graphs will show correct use of relevant features. Relevant features could include intercepts, symmetry, maxima or minima (for quadratics), asymptotes.

	Achievement Criteria	Explanatory Notes

Achievement with Merit	• Draw non-linear graphs.
	
	• Use non-linear graphs to solve problems.
		• Assessment of drawing graphs and identifying features will be based on a selection from:
		  – rectangular hyperbolae of the form $y = \dfrac{a}{x-c} + b$
		  – circles of the form $(x-a)^2 + (y-b)^2 = r^2$
		  – exponential functions of the form $y = a^{x-b} + c$ and either b or c equal to zero
		  – logarithmic functions of the form
		  – $y = \log_a(x - b) + c$, $a \in$ N and either b or c = 0.
		
		• Problems will involve:
		  – writing equations selected from the following types of graphs:
		    ■ any graphs listed for achievement
		    ■ hyperbola as listed above for merit, where b or c = 0
		    ■ circle as listed above for merit
		  – interpreting features.

Achievement with Excellence	• Determine and apply an appropriate model for a situation involving graphs.	• Writing an equation of a graph will be required and may involve more than one equation, or piecewise function, to describe a situation.
		• The application of a model could include:
		  – a situation requiring finding points of intersection
		  – using equations of graphs to solve problems.
		• Polynomials may have coefficients of x^n other than ± 1, and for exponential and logarithmic functions 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 p. 158
   • suggested learning experiences p. 159
   • sample assessment activities pp. 160-161
   • mathematical processes p. 26.

Quality Assurance

1   Providers and Industry Training Organisations must be accredited by the
     Qualifications Authority 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