

Achievement Standard**Subject Reference** Statistics and Modelling 3.4**Title** Solve equations**Level** 3 **Credits** 4 **Assessment** External**Subfield** Mathematics**Domain** Algebra**Registration date** 9 November 2005 **Date version published** 9 November 2005

This achievement standard involves solving equations and interpreting solutions.

	Achievement Criteria	Explanatory Notes
Achievement	<ul style="list-style-type: none"> • Solve equations. 	<ul style="list-style-type: none"> • Solving equations will involve a selection from: <ul style="list-style-type: none"> – solving systems of three linear equations in three variables, where there is a unique solution. This may involve re-arrangement of equations and/or interpreting solutions – solving a non-linear equation using the Newton-Raphson method with a given starting value, or the bisection method with a given starting interval (Newton-Raphson method includes derivatives of polynomials only) – optimising an objective function for a situation requiring techniques of linear programming, where the constraints and the objective function for the problem are given.

	Achievement Criteria	Explanatory Notes
Achievement with Merit	<ul style="list-style-type: none"> Solve problems involving equations. 	<ul style="list-style-type: none"> Problems will involve a selection from: <ul style="list-style-type: none"> optimising an objective function for a linear programming problem, which may require <ul style="list-style-type: none"> forming some constraints forming the objective function rounding the solution in relation to the context using a suitable method to find an approximate solution to a non-linear equation (graphical, table, graphics calculator etc) finding appropriate solutions to a non-linear equation using either the Newton-Raphson method or the bisection method to improve the approximation to a stated precision or for a specified number of iterations. Derivatives of functions other than polynomials will be given forming and solving a 3x3 system of linear equations.
Achievement with Excellence	<ul style="list-style-type: none"> Analyse or interpret the outcome or the process used to solve equations or linear programming problems. 	<ul style="list-style-type: none"> The analysis or interpretation may include: <ul style="list-style-type: none"> discussing consistency or non-independence of 3x3 systems of linear equations, including geometric representations determining the effect of varying the constraints or objective function of a linear programming problem considering the possibility of multiple solutions to a linear programming problem giving advantages and disadvantages of the Newton-Raphson method or the bisection method for the problem giving a geometric description of the Newton-Raphson method or the bisection method.

General Explanatory Notes

- This achievement standard is derived from *Mathematics in the New Zealand Curriculum*, Learning Media, Ministry of Education, 1992:
 - achievement objective p. 164
 - suggested learning experiences p. 165
 - sample assessment activities pp. 166–167
 - mathematical processes pp. 23–29.
- The use of appropriate technology is expected.

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