

## Achievement Standard

<b>Subject Reference</b>	Mathematics and Statistics 1.4		
<b>Title</b>	Apply linear algebra in solving problems		
<b>Level</b>	1	<b>Credits</b>	3
		<b>Assessment</b>	Internal
<b>Subfield</b>	Mathematics		
<b>Domain</b>	Algebra		
<b>Status</b>	Registered	<b>Status date</b>	9 December 2010
<b>Planned review date</b>	31 December 2014	<b>Date version published</b>	9 December 2010

This achievement standard involves applying linear algebra in solving problems.

### Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
<ul style="list-style-type: none"> <li>Apply linear algebra in solving problems.</li> </ul>	<ul style="list-style-type: none"> <li>Apply linear algebra, using relational thinking, in solving problems.</li> </ul>	<ul style="list-style-type: none"> <li>Apply linear algebra, using extended abstract thinking, in solving problems.</li> </ul>

### Explanatory Notes

- This achievement standard is derived from Level 6 of *The New Zealand Curriculum*, Learning Media, Ministry of Education, 2007, and is related to the material in the *Teaching and Learning Guide for Mathematics and Statistics*, Ministry of Education, 2010 at <http://seniorsecondary.tki.org.nz>. The following achievement objectives taken from the Equations and Expressions, and Patterns and Relationships threads of the Mathematics and Statistics learning area are related to this standard:
  - form and solve linear equations
  - solve linear equations and inequations and simultaneous equations with two unknowns
  - relate graphs, tables, and equations to linear relationships
  - relate rate of change to the gradient of a graph.
- Apply linear algebra* involves:
  - selecting and using a range of methods in solving problems
  - demonstrating knowledge of algebraic concepts and terms
  - communicating solutions which would usually require only one or two steps.

*Relational thinking* involves one or more of:

- selecting and carrying out a logical sequence of steps
- connecting different concepts and representations
- demonstrating understanding of concepts
- forming and using a model;

and also relating findings to a context, or communicating thinking using appropriate mathematical statements.

*Extended abstract thinking* involves one or more of:

- demonstrating understanding of abstract concepts
- developing a chain of logical reasoning, or proof
- forming a generalisation;

and also using correct mathematical statements, or communicating mathematical insight.

- 3 *Problems* are situations that provide opportunities to apply knowledge or understanding of mathematical concepts and methods. The situation will be set in a real-life context.
- 4 The phrase ‘a range of methods’ indicates that evidence of the application of at least three different methods is required.
- 5 Students need to be familiar with methods related to:
  - using formulae
  - forming, graphing or manipulating linear models such as  $C = 8 + 0.75t$  when solving problems
  - comparing the rate of change to the gradient of a graph
  - using simultaneous equations, inequations, or graphs when solving problems such as those involving simple linear programming.
- 6 Conditions of Assessment related to this achievement standard can be found at [www.tki.org.nz/e/community/ncea/conditions-assessment.php](http://www.tki.org.nz/e/community/ncea/conditions-assessment.php).

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### Replacement Information

This achievement standard and AS91028 replaced unit standard 5238.

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### 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.