

Achievement Standard

Subject Reference Mathematics and Statistics 1.2

Title Apply algebraic procedures in solving problems

Level 1 **Credits** 4 **Assessment** External

Subfield Mathematics

Domain Algebra

Status Registered **Status date** 9 December 2010

Planned review date 31 December 2016 **Date version published** 12 December 2013

This achievement standard involves applying algebraic procedures in solving problems.

Achievement Criteria

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

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:
 - generalise the properties of operations with fractional numbers and integers
 - generalise the properties of operations with rational numbers including the properties of exponents
 - form and solve linear equations and inequations, quadratic and simple exponential equations, and simultaneous equations with two unknowns.

This standard is also derived from *Te Marautanga o Aotearoa*. For details of the *Marautanga* achievement objectives to which this standard relates, see the [Māori version](#) of the standard.

2 *Apply algebraic procedures* involves:

- selecting and using procedures in solving problems
- demonstrating knowledge of algebraic concepts and terms
- communicating solutions using appropriate mathematical symbols.

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:

- devising a strategy to investigate or solve a problem
- identifying relevant concepts in context
- 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 procedures and methods. The situation will be set in a real-life or mathematical context.

4 Students need to be familiar with procedures related to:

- factorising
- expanding
- simplifying algebraic expressions involving exponents, such as $(2x^4)^3$ or $\frac{12a^5}{8a^7}$
- substituting values into formulae
- manipulating and simplifying expressions such as $\frac{3x}{4} - \frac{x+2}{3}$ or $\frac{3x^2-12}{x-2}$
- rearranging formulae such as $E = \frac{1}{2}mv^2$ or $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$
- solving linear equations or inequations such as $5x + 12 = 3 - 2x$ or $3(x - 2) < 7$
- solving quadratic equations such as $(8x + 3)(x - 6) = 0$, $x^2 + 5x - 6 = 0$, $3x^2 = 10x - 8$ (completing the square and the quadratic formula are not required)
- solving simple equations involving exponents such as $x^3 = 8$, $5^x = 125$
- solving pairs of simultaneous linear equations with two unknowns.

5 Electronic technology is not permitted in the assessment of this achievement standard.

6 Assessment Specifications for this achievement standard can be accessed through the Mathematics and Statistics Resources page found at <http://www.nzqa.govt.nz/qualifications-standards/qualifications/ncea/ncea-subject-resources/>.

Replacement Information

This achievement standard replaced unit standard 5239.

Quality Assurance

- 1 Providers and Industry Training Organisations must have been granted consent to assess by NZQA before they can register credits from assessment against achievement standards.
- 2 Organisations with consent to assess and Industry Training Organisations assessing against achievement standards must engage with the moderation system that applies to those achievement standards.

Consent and Moderation Requirements (CMR) reference

0233

Paerewa Paetae

Aronga	Pāngarau 1.2		
Ingoa	Te whakamahi tikanga taurangi hei whakaoti rapanga		
Kaupae	1	Whiwhinga	4
		Aromatawai	Ā-waho
Marau akoranga	Te Marautanga o Aotearoa		
Kokonga akoranga	Pāngarau		
Mana rēhita	Kua rēhitatia	Te rā i mana ai	9 Hakihea 2010
Te rā e arotakengia ai	31 Hakihea 2016	Te rā i puta ai	12 Hakihea 2013

Te Hononga ki te Marautanga

I ahu mai tēnei paerewa paetae i te Taumata 6 o *Te Marautanga o Aotearoa*, i whakaputaina e Te Pou Taki Kōrero i te tau 2008.

Whāinga Paetae

Te Tau me te Taurangi, Te Whārite me te Kīanga

6 *Ka tuhi, ka whakaoti whārite rārangi, tōrite rārangi, whārite pūrua, whārite taupū māmā, whārite tukutahi, kia rua ngā taurangi.*

Te Tau me te Taurangi, Te Pānga me te Tauira

7 *Ka whakawhānui i ngā tikanga paheko tau, me ngā tikanga taupū.*

E hono ana ki te Papa Whakaako mō Pāngarau kei te pae ipurangi nei:

<http://tmoa.tki.org.nz/Te-Marautanga-o-Aotearoa/Taumata-Matauranga-a-Motu-Ka-Taea>.

Te Hononga ki *The New Zealand Curriculum* (NZC)

I ahu mai hoki tēnei paerewa paetae i *The New Zealand Curriculum*. Mō ngā kōrero e pā ana ki ngā whāinga paetae o te NZC e hāngai ana ki tēnei paerewa, tirohia te putanga [reo Pākehā](#) o te paerewa.

Te Hononga ki ngā Paearu Aromatawai

Kei tēnei pae ipurangi ngā Paearu Aromatawai mō tēnei paerewa paetae:

<http://tmoa.tki.org.nz/Te-Marautanga-o-Aotearoa/Taumata-Matauranga-a-Motu-Ka-Taea>.

Paerewa Paetae

<p>Paetae Te whakamahi tikanga taurangi hei whakaoti rapanga.</p>	<p>Hei tohu i te paetae, hei āwhina i ngā whakataunga aromatawai:</p> <ul style="list-style-type: none"> • ka whiriwhiria, ka whakamahia ētahi tikanga taurangi whānui e hāngai ana hei whakaoti rapanga • ka whakaatu mōhiotanga ki ngā huatau me ngā kupu taurangi e hāngai ana • ka whakamahia te reo matatini o te pāngarau hei whakamārama i ngā otinga.
<p>Kaiaka He kaiaka te whakamahi tikanga taurangi hei whakaoti rapanga.</p>	<p>Ko te whakaaro tūhonohono te mea nui hei tohu i te kaiaka. Arā, kia kotahi, nui ake rānei o ēnei:</p> <ul style="list-style-type: none"> • ka whiriwhiri, ka whakatutuki raupapatanga mahi arorau hei whakaoti rapanga • ka tūhonoa ētahi huatau rerekē, ētahi whakaahuahanga rerekē rānei • ka whakaatu māramatanga ki ngā huatau e hāngai ana. • ka hanga, ka whakamahi tauira; <p>me te tūhono i ngā otinga ki te horopaki o te rapanga, te whakamahi rānei i ngā kīanga pāngarau hei whakawhitiwhiti whakaaro.</p>
<p>Kairangi He kairangi te whakamahi tikanga taurangi hei whakaoti rapanga.</p>	<p>Ko te whakaaro waitara te mea nui hei tohu i te kairangi. Arā, kia kotahi, nui ake rānei o ēnei:</p> <ul style="list-style-type: none"> • ka waihanga rautaki hei tūhura, hei whakaoti rānei i tētahi rapanga • ka tautohua ngā huatau e hāngai ana ki te horopaki • ka whakaputaina tētahi raupapatanga whakaaro arorau, tētahi hāponotanga rānei • ka hanga whakawhānuitanga; <p>me te whakamahi kīanga pāngarau tika, te whakawhitiwhiti rānei i te aroā pāngarau.</p>

Kōrero Āpiti

1 E whai ake nei ko te whakamāramatanga o ngā kupu whai take, kīanga rānei:

rapanga	Ko ngā āhukatanga o ia rā, ngā āhukatanga pāngarau rānei, ka whai wāhi mai te whakamahinga o te mātauranga pāngarau, o ngā huatau pāngarau, o ngā tikanga pāngarau rānei.
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2 Kia taunga te ākongā ki ngā tikanga e whai wāhi mai ana:

- te whakatauwehe kīanga taurangi
- te whakawhānui kīanga taurangi
- te whakarūnā i ngā kīanga taurangi e whai wāhi mai ana te taupū, pērā i te $(2x^4)^3$ me te $\frac{12a^5}{8a^7}$
- te whakauru uara ki te ture tātai

- te rāwekeweke me te whakarūnā i ngā kīanga pērā i te $\frac{3x}{4} - \frac{x+2}{3}$ me te $\frac{3x^2-12}{x-2}$
- te huri i ngā ture tātai pērā i te $E = \frac{1}{2}mv^2$ me te $\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$
- te whakaoti whārite rārangi, tōrite rārangi hoki, pērā i te $5x + 12 = 3 - 2x$ me te $3(x - 2) < 7$
- te whakaoti whārite pūrua pērā i te $(8x + 3)(x - 6) = 0$, te $x^2 + 5x - 6 = 0$ me te $3x^2 = 10x - 8$ (kāore e whai wāhi mai te whakaoti pūruatanga, te ture pūrua rānei)
- te whakaoti whārite māmā e whai wāhi mai ana te taupū, pērā i te $x^3 = 8$ me te $5^x = 125$
- te whakaoti whārite rārangi tukutahi, e rua ngā taurangi.

3 Kāore e whakaaetia te hangarau tāhiko i roto i ngā aromatawai mō tēnei paerewa paetae.

Kuputaka:

whakaaro tūhonohono

relational thinking

whakaaro waitara

abstract thinking

He Kōrero mō te Whakakapi

Koinei hei whakakapi i te paerewa 5239.

Tātari Kounga

- 1 Me mātua whakamana ngā Kaituku Akoranga me ngā Whakahaere Whakangungu Ahumahi e te Mana Tohu Mātauranga o Aotearoa ka rēhita ai i ngā hua ka puta mai i ngā aromatawai ki ngā paerewa paetae.
- 2 Ko ngā Kaituku Akoranga me ngā Whakahaere Whakangungu Ahumahi kua mana, ā, e aromatawai ana i ā rātou hōtaka ki ngā paerewa paetae, me uru rātou ki ngā pūnaha whakarite e tika ana mō aua paerewa paetae.

Ko te tohutoro ki te Mahere Whakamana, Whakaōritenga hoki

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