

Achievement Standard

Subject Reference	Mathematics and Statistics 2.2		
Title	Apply graphical methods in solving problems		
Level	2	Credits	4
		Assessment	Internal
Subfield	Mathematics		
Domain	Algebra		
Status	Registered	Status date	19 November 2015
Planned review date	31 December 2019	Date version published	19 November 2015

This achievement standard involves applying graphical methods in solving problems.

Achievement Criteria

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

Explanatory Notes

- This achievement standard is derived from Level 7 of *The New Zealand Curriculum*, Learning Media, Ministry of Education, 2007; and is related to the achievement objectives

 - display the graphs of linear and non-linear functions and connect the structure of the functions with their graphs
 - form and use linear, quadratic, and simple trigonometric equations

in the Mathematics strand of the Mathematics and Statistics Learning Area. It is also related to the material in the *Teaching and Learning Guide for Mathematics and Statistics*, Ministry of Education, 2010 at <http://seniorsecondary.tki.org.nz>.

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.
- Apply graphical methods in solving problems* involves:

 - selecting and using methods
 - demonstrating knowledge of the properties of functions and graphs
 - communicating using appropriate representations.

Relational thinking involves one or more of:

- selecting and carrying out a logical sequence of steps
- connecting different concepts or 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 a situation
- 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 methods. Situations will be set in real-life or mathematical contexts.
- 4 Methods include a selection from those related to:
 - graphs at curriculum Level 7, their features and their equations
 - transformations of graphs
 - connecting different representations of relations
 - properties of functions (may include domain and range).
- 5 Conditions of Assessment related to this achievement standard can be found at www.tki.org.nz/e/community/ncea/conditions-assessment.php.

Replacement Information

This achievement standard replaced AS90285, AS90292, AS90806, AS90809, unit standard 5253, and unit standard 5255.

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

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Paerewa Paetae

Aronga	Pāngarau 2.2		
Ingoa	Te whakamahi tikanga kauwhata pānga hei whakaoti rapanga		
Kaupae	2	Whiwhinga	4
		Aromatawai	Ā-roto
Marau akoranga	Te Marautanga o Aotearoa		
Kokonga akoranga	Pāngarau		
Mana rēhita	Kua rēhitatia	Te rā i mana ai	19 Whiringa-ā-rangi 2015
Te rā e arotakengia ai	31 Hakihea 2018	Te rā i puta ai	8 Hakihea 2015

Te Hononga ki te Marautanga

I ahu mai tēnei paerewa paetae i te Taumata 7 o *Te Marautanga o Aotearoa*, i whakaputaina e Te Pou Taki Kōrero i te tau 2008.

Whāinga Paetae

Te Taurangi me te Tuanaki, Te Taurangi me te Pānga
 2 *Ka tūhura i nga kauwhata pānga rārangi, kauwhata pānga rārangi-kore hoki, ā, ka tūhono i te hanga o te pānga ki te āhua o te kauwhata.*

E hono ana ki te Papa Whakaako mō te Pāngarau kei te pae tukutuku 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 Tikanga Aromatawai

Arā ngā Tikanga Aromatawai mō tēnei paerewa paetae, kei te:
<http://tmoa.tki.org.nz/Te-Marautanga-o-Aotearoa/Taumata-Matauranga-a-Motu-Ka-Taea>.

Paerewa Paetae

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

Kōrero Āpiti

1 E whai ake nei ngā whakamārama o ngā tino kupu, kīanga rānei:

rapanga	Ko ngā āhuetanga o ia rā, ngā āhuetanga 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 ākonga ki ngā tikanga o te kauwhata pānga:

- ngā āhuetanga me ngā whārite o ngā kauwhata i te Taumata 7 o *Te Marautanga o Aotearoa*.
- ngā panonitanga o ngā kauwhata.
- te tūhono i ngā hanga rerekē o ngā pānga.
- ngā āhuetanga o ngā pānga (he wā ōna e whai wāhi mai ana te whānui me te teitei).

Kuputaka:

āroā pāngarau

mathematical insight

kīanga pāngarau

mathematical statement

whakaaro tūhonohono

relational thinking

whakaaro waitara

abstract thinking

He Kōrero mō te Whakakapi

Koinei hei whakakapi i ngā paerewa paetae AS90285, AS90292, AS90806 me AS90809, me ngā paerewa 5253 me 5255.

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 whakaōrite e tika ana mō aua paerewa paetae.

Ko te tohutoro ki te Mahere Whakamana, Whakaōritenga hoki

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