

## Achievement Standard

<b>Subject Reference</b>	Mathematics and Statistics 2.5		
<b>Title</b>	Apply network methods in solving problems		
<b>Level</b>	2	<b>Credits</b>	2
		<b>Assessment</b>	Internal
<b>Subfield</b>	Mathematics		
<b>Domain</b>	Geometry		
<b>Status</b>	Registered	<b>Status date</b>	19 November 2015
<b>Planned review date</b>	31 December 2018	<b>Date version published</b>	19 November 2015

This achievement standard involves applying network methods in solving problems.

### Achievement Criteria

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

### Explanatory Notes

1 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 objective

- choose appropriate networks to find optimal solutions in the Mathematics strand of the Mathematics and Statistics Learning Area. It is also related to 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.

2 *Apply network methods in solving problems* involves:

- selecting and using methods
- demonstrating knowledge of concepts and terms
- 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:
- shortest path
  - traversability
  - minimum spanning tree.
- 5 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 replaced unit standard 5249.

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### 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

<b>Aronga</b>	Pāngarau 2.5				
<b>Ingoa</b>	Te whakamahi tikanga rauara hei whakaoti rapanga				
<b>Kaupae</b>	2	<b>Whiwhinga</b>	2	<b>Aromatawai</b>	Ā-roto
<b>Marau akoranga</b>	Te Marautanga o Aotearoa				
<b>Kokonga akoranga</b>	Pāngarau				
<b>Mana rēhita</b>	Kua rēhitatia	<b>Te rā i mana ai</b>	19 Whiringa-ā-rangi 2015		
<b>Te rā e arotakengia ai</b>	31 Hakihea 2018	<b>Te rā i puta ai</b>	19 Whiringa-ā-rangi 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 Taurira me te Pānga*  
5 Ka kōwhiri i nga rauara e hāngai ana hei kimi i te otinga tino whaihua.

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

**Kōrero Āpiti**

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

rapanga	Ko ngā āhutatanga o ia rā, ngā āhutatanga 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 rauara:

- te ara poto rawa
- te āhua o te haere i te ara
- te whānuitanga iti rawa o te rākau.

Kuputaka:	
aroā pāngarau	mathematical insight
kīanga pāngarau	mathematical statement
whakaaro tūhonohono	relational thinking
whakaaro waitara	abstract thinking

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**He Kōrero mō te Whakakapi**

Koinei hei whakakapi i te paerewa US5249.

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**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 0233