

## Achievement Standard

**Subject Reference** Mathematics and Statistics 1.6

**Title** Apply geometric reasoning in solving problems

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

**Subfield** Mathematics

**Domain** Geometry

**Status** Registered      **Status date** 9 December 2010

**Planned review date** 31 December 2019      **Date version published** 20 November 2014

This achievement standard involves applying geometric reasoning in solving problems.

### Achievement Criteria

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

### Explanatory Notes

Version 2 of this achievement standard was republished to correct an error in the status date.

- 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 Shape thread of the Mathematics and Statistics learning area are related to this achievement standard:
  - deduce the angle properties of intersecting and parallel lines and the angle properties of polygons and apply these properties
  - recognise when shapes are similar and use proportional reasoning to find an unknown length
  - use trigonometric ratios and Pythagoras' theorem in two dimensions
  - deduce and apply the angle properties related to circles.

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 geometric reasoning* involves:

- selecting and using methods in solving problems
- demonstrating knowledge of geometrical 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:

- 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 methods. The situation will be set in a real-life or mathematical context.

4 Students need to be familiar with methods related to:

- Pythagoras' theorem
- trigonometric relationships in right-angled triangles
- similar triangles
- angle properties of intersecting and parallel lines
- angle properties of polygons
- angle properties of circles.

5 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/>.

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### Replacement Information

This achievement standard replaced unit standard 5252.

**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 1.6				
Ingoa	Te whakamahi whakaaro āhuahanga 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 Ine me te Āhutatanga, Te Hanga*

4 *Ka whakaputa, ka whakamahi i ngā tikanga koki o te porowhita.*

5 *Ka aro ki ngā āhua ōrite, ā, ka whakamahi whakaaro pānga riterite hei tātai i tētahi tapa.*

6 *Ka whakamahi ōwehenga pākoki me te ture a Pythagoras, i ngā pūāhua ahu-2, ahu-3 hoki.*

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

**Kōrero Āpiti**

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

rapanga	Ko ngā āhuatanga o ia rā, ngā āhuatanga 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 ture a Pythagoras
- ngā pānga pākoki o te tapatoru hāngai
- ngā taparau he ōrite te āhua
- ngā hononga koki o te rārangi pūtahi me te rārangi whakarara
- ngā hononga koki o ngā momo taparau

- ngā hononga koki o te porowhita.

Kuputaka:

whakaaro tūhonohono

relational thinking

whakaaro waitara

abstract thinking

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### He Kōrero mō te Whakakapi

Koinei hei whakakapi i te paerewa 5252.

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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 whakarite e tika ana mō aua paerewa paetae.

Ko te tohutoro ki te Mahere Whakamana, Whakaōritenga hoki

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