

## Achievement Standard

**Subject Reference** Mathematics and Statistics 1.7

**Title** Apply right-angled triangles in solving measurement problems

**Level** 1      **Credits** 3      **Assessment** Internal

**Subfield** Mathematics

**Domain** Trigonometry

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

**Planned review date** 31 December 2020      **Date version published** 20 November 2014

This achievement standard involves applying right-angled triangles in solving measurement problems.

### Achievement Criteria

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

### Explanatory Notes

- 1 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 and Measurement threads of the Mathematics and Statistics learning area are related to this achievement standard:
- use trigonometric ratios and Pythagoras' theorem in two and three dimensions
  - recognise when shapes are similar and use proportional reasoning to find an unknown length
  - select and use appropriate metric units for length and area
  - measure at a level of precision appropriate to the task.

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 right-angled triangles* involves:

- selecting and using a range of methods in solving measurement problems
- demonstrating knowledge of measurement and geometric 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 set in a real-life context which provide opportunities to apply knowledge or understanding of mathematical concepts and methods. For assessment, situations may involve non right-angled triangles which can be divided into right-angled triangles.

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:

- Pythagoras' theorem
- trigonometric ratios (sine, cosine, tangent)
- similar shapes
- measuring at a level of precision appropriate to the task.

6 Conditions of Assessment related to this achievement standard can be found at <http://ncea.tki.org.nz/Resources-for-Internally-Assessed-Achievement-Standards>.

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### Replacement Information

This achievement standard replaced AS90152.

**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 1.7		
<b>Ingoa</b>	Te whakamahi tikanga tapatoru hāngai hei whakaoti rapanga ine		
<b>Kaupae</b>	1	<b>Whiwhinga</b>	3
		<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>	9 Hakihea 2010
<b>Te rā e arotakengia ai</b>	31 Hakihea 2020	<b>Te rā i puta ai</b>	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 Āhuratanga, Te Ine*

1 *Ka whakatutuki inenga kia hāngai tonu te tōtika o te ine ki te horopaki.*

*Te Ine me te Āhuratanga, Te Hanga*

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 Tikanga Aromatawai

Kei tēnei pae ipurangi ngā Tikanga 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 tikanga tapatoru hāngai hei whakaoti rapanga ine.</p>	<p>Hei tohu i te paetae:</p> <ul style="list-style-type: none"> <li>• ka whiriwhiri, ka whakamahi i ētahi tikanga whānui hei whakaoti rapanga ine</li> <li>• ka whakaatu mōhiotanga ki ngā huatau ine, āhuahanga hoki, 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 ai.</li> </ul>
<p><b>Kaiaka</b> He kaiaka te whakamahi tikanga tapatoru hāngai hei whakaoti rapanga ine.</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 tikanga tapatoru hāngai hei whakaoti rapanga ine.</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 whaitake, 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. Mō te mahi aromatawai, ka whai wāhi anō pea ngā tapatoru kāore i te hāngai, engari e taea ana te wāwāhi kia hua mai ai he tapatoru hāngai.
ētahi tikanga whānui	Kia toru, nui ake rānei ngā tikanga.

- 2 Kia taunga te ākonga ki ngā tikanga e whai wāhi mai ana:
- te ture a Pythagoras
  - ngā pānga pākoki (te aho, te whenu me te pātapa)
  - ngā hanga he ōrite te āhua
  - te ine, kia hāngai anō te tōtika o te ine ki te horopaki o te rapanga.

Kuputaka:

whakaaro tūhonohono

relational thinking

whakaaro waitara

abstract thinking

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### He Kōrero mō te Whakakapi

Koinei hei whakakapi i te paerewa paetae 90152.

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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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