

Achievement Standard

Subject Reference	Mathematics and Statistics 2.12		
Title	Apply probability methods in solving problems		
Level	2	Credits	4
		Assessment	External
Subfield	Statistics and Probability		
Domain	Probability		
Status	Registered	Status date	19 November 2015
Planned review date	31 December 2018	Date version published	19 November 2015

This achievement standard involves applying probability methods in solving problems.

Achievement Criteria

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

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 objectives
- evaluate statistically based reports
 - interpreting risk and relative risk
 - investigate situations that involve elements of chance
 - comparing theoretical continuous distributions, such as the normal distribution, with experimental distributions
 - calculating probabilities, using such tools such as two-way tables, tree diagrams
- in the Statistics 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.

- 2 *Apply probability methods in solving problems* involves:
- selecting and using methods
 - demonstrating knowledge of probability 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;
- and also relating findings to a context or communicating thinking using appropriate 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
 - making a statistical generalisation;
- and also where appropriate, using contextual knowledge to reflect on the answer.

- 3 *Problems* are situations which provide opportunities to apply knowledge or understanding of mathematical and statistical concepts. Situations will be set in real-life or statistical contexts.

- 4 Methods include a selection from those related to:

- risk and relative risk
- the normal distribution
- experimental distributions
- relative frequencies
- two-way tables
- probability trees.

- 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/>.

Replacement Information

This achievement standard and AS91268 replaced AS90289 and unit standard 5250.

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 2.12		
Ingoa	Te whakamahi tikanga tūponotanga hei whakaoti rapanga		
Kaupae	2	Whiwhinga	4
		Aromatawai	Ā-waho
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	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 Tauanga, Te Tūponotanga

4 *Ka tūhura i ngā pūāhua tūponotanga:*

- *ka whakatairite i ngā tuari tātai (pērā i te tuari hangarite) me ngā tuari whakamātau;*
- *ka tātai tūponotanga mā te whakamahi tūtohi ararua, hoahoa rākau, whaihanga, me te hangarau e hāngai ana.*

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 Paearu Aromatawai

Arā ngā Paearu 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 tūponotanga hei whakaoti rapanga.</p>	<p>Hei tohu i te paetae:</p> <ul style="list-style-type: none"> • Ka whiriwhiri, ka whakamahi i ētahi tikanga pūāhua tūponotanga hei whakaoti rapanga. • Ka whakaatu mōhiotanga ki ngā huatau pūāhua tūponotanga 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 tūponotanga hei whakaoti rapanga.</p>	<p>Hei tohu i te kaiaka:</p> <ul style="list-style-type: none"> • Ko te whakaaro tūhonohono te mea nui. Nō reira, ka kitea ēnei: <ul style="list-style-type: none"> – ka whiriwhiri, ka whakatutuki raupapatanga mahi arorau hei whakaoti rapanga – ka tūhono i ētahi huatau rerekē, i ētahi whakaahuhanga rerekē rānei hei whakaoti rapanga – ka whakaatu māramatanga ki ngā huatau e hāngai ana. • 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 tūponotanga 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 tauanga. • Me he take e hiahiatia ai, ka whakamahi i ngā kīanga pāngarau tika ki te tūhono i ngā otinga ki tētahi horopaki, hei whakawhitiwhiti i te aroā tauanga hōhonu.

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 pūāhua tūponotanga:

- ngā tūpono tauaro me ngā tūpono tauaro whakamātau
- te tuari hangarite
- ngā tuari whakamātau
- te tūponotanga whakamātau
- ngā tūtohi ararua
- ngā hoahoa rākau.

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

He Kōrero mō te Whakakapi

Koinei me te paerewa paetae AS91268 hei whakakapi i te paerewa paetae AS90289 me te paerewa 5250.

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