

## Achievement Standard

<b>Subject Reference</b>	Mathematics and Statistics 3.13		
<b>Title</b>	Apply probability concepts in solving problems		
<b>Level</b>	3	<b>Credits</b>	4
		<b>Assessment</b>	External
<b>Subfield</b>	Statistics and Probability		
<b>Domain</b>	Probability		
<b>Status</b>	Registered	<b>Status date</b>	4 December 2012
<b>Planned review date</b>	31 December 2020	<b>Date version published</b>	17 November 2016

This achievement standard involves applying probability concepts in solving problems.

### Achievement Criteria

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

### Explanatory Notes

1 This achievement standard is derived from Level 8 of *The New Zealand Curriculum*, Learning Media, Ministry of Education, 2007; and is related to the achievement objective:

- Investigate situations that involve elements of chance
  - calculating probabilities of independent, combined, and conditional events 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, 2012, 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 concepts 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;
- 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 generalisation;
- and also where appropriate, using contextual knowledge to reflect on the answer.

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

4 Methods are selected from those related to:

- true probability versus model estimates versus experimental estimates
- randomness
- independence
- mutually exclusive events
- conditional probabilities
- probability distribution tables and graphs
- two-way tables
- probability trees
- Venn diagrams.

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/subjects/>.

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### Replacement Information

This achievement standard replaced unit standard 5258, unit standard 5259, and AS90643.

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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

**Aronga** Pāngarau 3.13

**Ingoa** Te whakamahi huatau tūponotanga hei whakaoti rapanga

**Kaupae** 3                      **Whiwhinga** 4                      **Aromatawai**      Ā-waho

**Marau akoranga**              Te Marautanga o Aotearoa

**Kokonga akoranga**              Pāngarau

**Mana rēhita**                      Kua rēhitatia                      **Te rā i mana ai**      4 Hakihea 2012

**Te rā e arotakengia ai**      31 Hakihea 2020                      **Te rā i puta ai**      17 Whiringa-ā-rangi  
2016

### Te Hononga ki te Marautanga

I ahu mai tēnei paerewa paetae i te Taumata 8 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 tātai i te tūponotanga o ngā pāpono wehe kē, pāpono paheko me ngā pāpono whakawhirinaki.*

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><b>Paetae</b> Te whakamahi huatau tūponotanga 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 whānui hei whakaoti rapanga.</li> <li>• Ka whakaatu mōhiotanga ki ngā huatau me ngā kupu e hāngai ana hei whakaoti rapanga.</li> <li>• Ka tūhono i ētahi huatau rerekē.</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 huatau tūponotanga 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 huatau tūponotanga 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 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 ākonga ki te whakamahi tikanga huatau tūponotanga:

- te tūponotanga tūturu, te tūponotanga ā-whakamātautau me te matapae i te tūpono
- te matapōkeretanga
- ngā pāpono wehe kē

- ngā pāpono paheko
- ngā tūponotanga whakawhirinaki
- ngā tūtohinga me ngā kauwhata o ngā tuari tūponotanga
- ngā tūtohinga ara rua
- ngā hoahoa tūponotanga
- ngā hoahoa huinga.

**Kuputaka:**

aroā tauanga hōhonu	statistical insight
parahau	justify
tikanga tātari hōpara	exploratory analysis techniques
tūtohinga ara rua	two-way table

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**He Kōrero mō te Whakakapi**

Koinei hei whakakapi i ngā paerewa 5258 me te 5259, me te paerewa paetae 90643.

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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