

Achievement Standard

Subject Reference	Mathematics and Statistics 3.10		
Title	Use statistical methods to make a formal inference		
Level	3	Credits	4
		Assessment	Internal
Subfield	Statistics and Probability		
Domain	Statistics		
Status	Registered	Status date	4 December 2012
Planned review date	31 December 2020	Date version published	17 November 2016

This achievement standard involves using statistical methods to make a formal inference.

Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
<ul style="list-style-type: none"> Use statistical methods to make a formal inference. 	<ul style="list-style-type: none"> Use statistical methods to make a formal inference, with justification. 	<ul style="list-style-type: none"> Use statistical methods to make a formal inference, with statistical insight.

Explanatory Notes

- 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 objectives:
 - Carry out investigations of phenomena, using the statistical enquiry cycle:
 - using existing data sets
 - seeking explanations
 - using informed contextual knowledge, exploratory data analysis, and statistical inference
 - communicating findings and evaluating all stages of the cycle
 - Make inferences from surveys and experiments:
 - determining estimates and confidence intervals for differences
 - use methods such as resampling to assess the strength of the evidence

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 *Use statistical methods to make a formal inference* involves showing evidence of using each component of the statistical enquiry cycle.

Use statistical methods to make a formal inference, with justification involves linking components of the statistical enquiry cycle to the context, and/or to the populations, and referring to evidence such as sample statistics, data values, or features of visual displays in support of statements made.

Use statistical methods to make a formal inference, with statistical insight involves integrating statistical and contextual knowledge throughout the statistical enquiry cycle, and may include reflecting about the process; considering other relevant explanations.

- 3 Using the statistical enquiry cycle to make a formal inference involves:
- posing a comparison investigative question using a given multivariate data set
 - selecting and using appropriate displays and summary statistics
 - discussing sample distributions
 - discussing sampling variability, including the variability of estimates
 - making an appropriate formal statistical inference
 - communicating findings in a conclusion.
- 4 Conditions of Assessment related to this achievement standard can be found at www.tki.org.nz/e/community/ncea/conditions-assessment.php.
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Replacement Information

This achievement standard replaced unit standard 5270 and AS90642.

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 3.10

Ingoa Te whakamahi tikanga tūhuratanga tauanga hei whakaputa hīkaro ōkawa

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

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 Tūhuratanga Tauanga

1 *Ka whai i ngā tikanga mō te tūhuratanga tauanga:*

- *ka whakahaere tirohanga tauanga, whakamātau tauanga rānei, mā te whakamahi tikanga whakamahere whakamātau tauanga, ka whakamahi rānei i nga huinga rarauanga kua oti kē te kōhi mai;*
- *ka whiriwhiri, ka whakamahi, ka arotake i ngā tauira tauanga e whaihua ana ki te whakatakoto matapae, ki te kimi whakamārama [pērā i te ine hononga taurangi rārangi mō te raraunga matarua, me te tauira tāpiripiri mō te raraunga houanga];*
- *ka whakamahi mōhiotanga ki te horopaki o te tūhuratanga, ka whakamahi tikanga tātari hōpara, ka whakamahi tikanga hīkaro tauanga;*
- *ka whakamārama i ngā whakakitenga, ka arotake i ngā wāhanga katoa o te tūhuratanga;*
- *ka mārama ki ngā tikanga matatika e hāngai ana.*

2 *Ka whakaputa hīkaro mai i ngā tirohanga tauanga me ngā whakamātau:*

- *ka whiriwhiri i ngā whakatauanga tata me ngā whaitua taupono mō te toharite, te hautanga mō te rerekētanga;*
- *ka whakamahi tikanga pērā i te tīpako anō, me te whakamatapōkere, ki te aromatawai i te whaitakenga o te taunakitanga.*

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>Paetae Te whai i ngā tikanga o te tūhuratanga tauanga hei whakaputa hīkaro.</p>	<p>Hei tohu i te paetae:</p> <ul style="list-style-type: none"> • Ka whakahaere i tētahi tūhuratanga tauanga hei whakaputa hīkaro. • Ka whakamahi huinga raraunga matatini kua oti te kohi. • Ka whiriwhiri i tētahi horopaki whaitake hei tūhura. • Ka whakamahi tikanga pērā i te tīpako anō. • Ka whakamārama i ngā whakakitenga, ka arotake i ngā wāhanga katoa o te tūhuratanga.
<p>Kaiaka He kaiaka te whai i ngā tikanga o te tūhuratanga tauanga hei whakaputa hīkaro.</p>	<p>Hei tohu i te kaiaka:</p> <ul style="list-style-type: none"> • Ko te parahau i ngā wāhanga o ngā tikanga tūhuratanga tauanga te mea nui. Nō reira, ka kitea ēnei: <ul style="list-style-type: none"> – ka tūhono i ngā wāhanga o roto i ngā tikanga tūhuratanga tauanga ki te horopaki ki te taupori rānei/hoki. – ka whakaputa kōrero taunaki e hāngai ana ki: <ul style="list-style-type: none"> ○ ngā tātaitanga tauanga whakarāpopoto pērā i te toharite me te tau waenga ○ ngā uara raraunga ○ ngā piki me ngā heke me ngā āhuatanga kōhure o roto i ngā whakaari raraunga hei tautoko kīanga.
<p>Kairangi He kairangi te whai i ngā tikanga o te tūhuratanga tauanga hei whakaputa hīkaro.</p>	<p>Hei tohu i te kairangi:</p> <ul style="list-style-type: none"> • Ko te whakaatu aroā tauanga hōhonu te mea nui. Arā, kia kotahi, nui ake rānei o ēnei: <ul style="list-style-type: none"> – ka kōtuitui i te mātauranga tauanga me te mārama ki te horopaki, i roto i ngā wāhanga o te tūhuratanga tauanga. – ka arohaehae i te tukanga tauanga me ngā whakamārama e hāngai ana ki ngā whakakitenga me ētahi atu whakamāramatanga whaitake.

Kōrero Āpiti

Kia taunga te ākonga ki ngā tikanga o te tūhuratanga tauanga:

- te whakatakoto i tētahi pātai whakatairite e hāngai ana ki tētahi huinga raraunga
- te whiriwhiri me te whakamahi i ngā whakaari raraunga e hāngai ana
- te whakawhiti kōrero hei whakatairite i ngā tuari raraunga, pērā i te hanga o ngā raraunga, ngā rohe hauwhātanga, te neke, te inaki, te hora o ngā raraunga, me ngā āhuatanga kōhure

- te whakaputa hīkaro ōkawa mō te taupori ka hua ake i ngā raraunga
- te mārama ki te pānga o te rahi o te tīpako ki te tōtika, te taurangitanga rānei o tētahi whakatau tata
- te whakamārama i ngā whakakitenga ka hua ake i te tūhuratanga tauanga.

Kuputaka:

aroā tauanga	statistical insight
parahau	justify
tikanga tātari hōpara	exploratory analysis techniques
tūāhua	phenomenon

He Kōrero mō te Whakakapi

Koinei hei whakakapi i te paerewa 5270 me te paerewa paetae 90642.

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