

Achievement Standard

Subject Reference	Mathematics and Statistics 3.9		
Title	Investigate bivariate measurement data		
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 investigating bivariate measurement data.

Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
<ul style="list-style-type: none"> Investigate bivariate measurement data. 	<ul style="list-style-type: none"> Investigate bivariate measurement data, with justification. 	<ul style="list-style-type: none"> Investigate bivariate measurement data, with statistical insight.

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:

- Carry out investigations of phenomena, using the statistical enquiry cycle:
 - using existing data sets
 - finding, using, and assessing appropriate models (including linear regression for bivariate data), seeking explanations, and making predictions
 - using informed contextual knowledge and statistical inference
 - communicating findings and evaluating all stages of the cycle

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 *Investigate bivariate measurement data* involves showing evidence of using each component of the statistical enquiry cycle.

Investigate bivariate measurement data, with justification involves linking components of the statistical enquiry cycle to the context, and referring to evidence such as statistics, data values, trends, or features of visual displays in support of statements made.

Investigate bivariate measurement data, with statistical insight involves integrating statistical and contextual knowledge throughout the investigation process, and may include reflecting about the process; considering other relevant variables; evaluating the adequacy of any models, or showing a deeper understanding of the models.

- 3 Using the statistical enquiry cycle to investigate bivariate measurement data involves:
 - posing an appropriate relationship question using a given multivariate data set
 - selecting and using appropriate displays
 - identifying features in data
 - finding an appropriate model
 - describing the nature and strength of the relationship and relating this to the context
 - using the model to make a prediction
 - communicating findings in a conclusion.
 - 4 *Measurement data* can either be discrete or continuous in nature. In regression analysis the y-variable, or response variable, must be a continuous variable. The x-variable or explanatory variable can be either a discrete or continuous variable. The relationship may be non-linear.
 - 5 Use and interpretation of R^2 is not expected at this level.
 - 6 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 11119 and AS90645.

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 3.9		
Ingoa	Te tūhura i ngā taurangi matarua		
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 ngā 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.*

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 tūhura i ngā taurangi matarua.</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 matarua kua oti te kōhi. • 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 tūhura i ngā taurangi matarua.</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. – 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 āhuetanga kōhure o roto i ngā whakaari raraunga hei tautoko kīanga.
<p>Kairangi He kairangi te tūhura i ngā taurangi matarua.</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: <ul style="list-style-type: none"> ○ te tukanga tauanga ○ ngā whakamārama e hāngai ana ki ngā kitenga ○ te hāngai o te ture ○ te whakaatu mōhiotanga hōhonu ki ērā atu ture.

Kōrero Āpiti

Kuputaka:

aroā tauanga

statistical insight

tauirā tāpiripiri

additive model

tikanga hīkaro tauanga

statistical inferencing techniques

tikanga tātari hōpara

exploratory analysis techniques

He Kōrero mō te Whakakapi

Koinei hei whakakapi i te paerewa 11119 me te paerewa paetae 90645.

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