

Technical Report # 38
Assessment Tools for Teaching and Learning



Pāngarau Curriculum Framework & Map:

Levels 2—6

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This report reviews the Level 2-4 asTTle Pāngarau framework and identifies and discusses changes that need to be made in order to extend the framework to curriculum Levels 5 and 6 and provides a detailed breakdown of curriculum achievement objectives by curriculum level within the context of the revised asTTle Pāngarau framework. AsTTle is funded by the Ministry of Education to Auckland Uniservices at the University of Auckland to research and develop an assessment application for Reading, Writing, Mathematics, Pānui, Pāngarau, and Tuhituhi for Years 5-7 (Levels 2-4) for New Zealand schools. We acknowledge this funding, and thank the Ministry of Education for their continued assistance in the development of this project.

We especially acknowledge the input of Mr Uenuku Fairhall in outlining his interpretation of how curriculum achievement objectives proceed from levels 2 to 4, and for providing the first pāngarau overview map (Fairhall, 2002). Uenuku informed us that the pāngarau curriculum has its genesis in the equivalent mathematics curriculum and that the achievement objectives and curriculum frameworks are in most cases near equivalent translations

Dr. Ian Christensen (Massey University) and Mr Tony Trinick (Auckland College of Education) provided feedback and critiques on Uenuku's work. Ian has carefully examined the pāngarau map, comparing it with other current work in Pāngarau including the Pāngarau exemplar project and the Pāngarau numeracy projects. Mr. Peter Keegan has worked closely with the development team, responding to their ideas, providing details on the asTTle development, and reflecting on how the curriculum map affects the asTTle development.

This report is the latest in a series of reports on the Pāngarau Curriculum to which a wide range of curriculum experts have responded, whom I would also like to thank for readily providing feedback and analysis.



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June, 2003

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Background

The Pāngarau Curriculum Framework and Map derive from work undertaken in the mapping of mathematics for use in asTTle. Uenuku Fairhall, who developed the first framework (Fairhall, 2002) consulted Ell's (2001) analyses of the strands and achievement objectives of levels 2 to 4 of Mathematics in the New Zealand Curriculum (1992). This produced a framework with 8 major categories and 13 key themes. Ell's work was in turn revised by an independent expert advisory panel prior to the item signature study research (Thomas, Tagg, Holton, & Brown, 2002).

The major concern for developing a Pāngarau Framework was the lack of any research detailing differences between teaching of mathematics and pāngarau in terms of both the classroom practice and curriculum implementation. The writers of pāngarau curriculum attempted to introduce Māori perspectives on mathematics, as do Māori classroom teachers in everyday practice. However, this is an area that requires further research before definitive claims can be made on pāngarau in the classroom.

The Pāngarau Curriculum Framework began with Uenuku's map and overview (see technical report 13). This was revised in light of feedback from external review, especially recommending that the vocabulary should reflect the pāngarau curriculum framework (Ministry of Education, 1996). The revised version appears in the v2 of the asTTle CD-Rom. Following the release of asTTle V2 further revisions were recommended by Dr. Ian Christensen and Mr. Tony Trinick based on their work in the Ministry of Education's Pāngarau Exemplar Project and (Māori implementations) of the Numeracy Project(s). In addition, the Pāngarau Curriculum Framework remains cognizant of insights and improvements suggested by work in asTTle mathematics.

Before detailing the Pāngarau Curriculum Framework is necessary to provide some background on the development of the pāngarau curriculum framework (Ministry of Education, 1996). This document has provided a unique set of challenges for the team working on the Pāngarau Framework.

The Pāngarau Curriculum¹

Pāngarau developments prior to the release of the Pāngarau Curriculum, were ad-hoc, uncoordinated and undertaken by range of groups, some of which were sponsored by the Ministry of Education and its predecessor the Department of Education. As expected in any nascent development, there was a dearth of resources and those available were poorly disseminated. Many teachers developed their own resources and literally their own pāngarau vocabulary and language based on the available documentation and input from various groups including other teachers. Two important aspects of Pāngarau, variation and changes in vocabulary and language use have plagued developments and continue to do so today (see Barton and Fairhall, 1995; Barton et al. 1998, Christensen, 1998).

The Pāngarau Curriculum statement for Māori medium schools was published in 1996, following a trial in 1995. The Minister of Education requested that the Curriculum to contain at least the same achievement objectives as the Mathematics Curriculum for mainstream schools. While this caused some dissension and concern that Māori knowledge was being ignored, the passage of time has perhaps resulted in more acceptance that while the document does not

¹ This section is based on the curriculum description in technical report 13.

make Māori knowledge explicit as part of the curriculum, it does not discount it, and allows communities to include this where they consider it appropriate, according to the environment, context and ability of the school.

The statement was written in a *neo-meta-language* and contained hundreds of new academic and technical Māori vocabulary items. The writers had to create a meta-language, that is a language to describe language itself (and its associated neologisms) to describe technical aspects of the curriculum that had never been written about before in Māori. Not surprisingly, the writers also attempted to standardize some of the existing Pāngarau vocabulary, in particular the academic vocabulary (used by students) currently being promoted in Māori-medium classrooms. The writers worked in isolation from other groups developing Māori curriculum statements. This has resulted in some variation in vocabulary between statements; for example, pāngarau uses the term *taumata* for levels, while the reo Māori statement uses the term *kōeke*. In addition, the pāngarau curriculum statement uses alternative Māori terms for the same concept, for example, both *tau whakahau kore* and *tau kewha* are terms for irrational numbers. Several terms were used for practical problems, (e.g., *hopanga tūwaenga*, *hōpara wā*, *rapanga whaitake*). The statement (as were all Māori curriculum statements) was finally reviewed by Te Taura Whiri, which resulted in further vocabulary changes, some of which the writers did not agree with. Te Taura Whiri published *Te Matatiki: Contemporary Māori Words* in 1996. Some of the mathematic terms in *Te Matatiki* were different to the pāngarau statement, for example, line of symmetry *tuaka hangarite* (curriculum), *rārangi hangarite* (*Te Matatiki*).

The statement has other quirks and inconsistencies, for example, *tauanga* ‘statistics’ has 10 *taumata* ‘levels’; all the other strands have eight. This inconsistency has not been explained in the statement itself.

The Pāngarau statement, with its meta-language, inconsistencies, and large numbers of new vocabulary items had not been well received by classroom teachers. It is difficult to read, which results in teachers referring to the equivalent English mathematics curriculum. Some teachers, who had been teaching Pāngarau prior in the introduction of the curriculum, continue to use their own preferred vocabulary items. Uenuku Fairhall is an example of a teacher with a long experience and a good rationale for rejecting some of curriculum terminology. More recently trained teachers who have had some background in the new curriculum statements and have not had exposure to earlier developments may more readily accept curriculum recommendations. Finally, the Ministry of Education had commissioned Massey University to review the current curriculum vocabulary. This will result, no doubt, in further changes.

Development and Description of the Pāngarau Curriculum Framework

As mentioned, the asTTle V2 Pāngarau Framework and Map was developed by Uenuku Fairhall (2002). The framework was based primarily on work undertaken in mathematics. The Pāngarau Map was Uenuku’s interpretation of the curriculum and its achievement objective progression from levels 2 to 4. Uenuku used a number of different terms than recommended by the curriculum and wrote in a more traditional style of Māori. The asTTle team then revised some of Uenuku’s terms in line with curriculum recommendations. The revised version was completed in late 2002 and appears in the asTTle v2 CD-Rom.

The asTTle team met with the Pāngarau Exemplar Team in early 2003. Dr. Ian Christensen made a comparison of v2 Pāngarau Framework and Pāngarau Exemplar Map. This highlighted several errors and inconsistencies. Further errors were discovered by the asTTle team. One concern raised was asTTle collapsing of two strands number and algebra in the v2 framework. This was simply done to accommodate a small number of items in both strands. It was agreed that both strands should be made separate in v3.

Under Uenuku's advice the v2 pāngarau framework had followed asTTle mathematics in dividing the both number and geometry strands into *mātauranga* 'knowledge' and *paheko* 'application/processes'. Both teams acknowledged that some objectives clearly have a knowledge and application/process component. It was considered that the distinction is useful and should be retained in Pāngarau in asTTle V3.

The third level groupings in v2 were different to the curriculum classification and derive from asTTle mathematics. *Takotoranga* 'position' appears in measurement in the Pāngarau Framework, but comes under geometry in the curriculum. Although located in measurement within the curriculum, the asTTle team prefer the view advocated by Ell (2001) and supported by Fairhall (2002) that issues of place (e.g., distance, size, area, volume, etc.) are more to do with geometry than measurement.

As with mathematics the Pāngarau Framework contains a number of objectives and details (e.g., understanding simple angles 90° , 180° ; 30° , 45° , 60°) not given in the curriculum. Both teams agreed that the additional objectives were valid, especially as asTTle had successfully trialled items based on those objectives. Nevertheless, this may raise concerns about the place of asTTle to implement a curriculum revision, albeit a minor one.

The asTTle team updated the framework to cover the additional levels of 5 and 6 required for v3 and include insights gained from asTTle mathematics. The Pāngarau v3 framework is presented in Table 1. In addition to providing a one-page summary, which includes summarised objectives in short sentences; we have listed the same sentences in full form, to add clarification on the following pages. The vocabulary and language use attempts to follow curriculum prescriptions.

Table 1.
Pāngarau Curriculum Framework (levels 2-6)

Te Tau		Te Taurangi	Te Āhuahanga		Te Inenga	Te Tauanga	
Mātauranga Tau	Paheko Tau	Taurangi	Mātauranga Āhuahanga	Paheko Āhuahanga	Inenga	Tūponotanga	Tauanga
<p><u>Tau Oti, Tau Tōpū</u></p> <ul style="list-style-type: none"> • Whai, whakamārama, whakaraupapa tau oti • Whakamārama tau oti tōraro • Whakamārama, tātari i ngā pū tau oti <p><u>Hautau, Ōrau, Tau-ā-ira, Tau</u></p> <p><u>Whakahau-Kore</u></p> <ul style="list-style-type: none"> • Whakamārama tikanga mati & Whakaraupapa tau e toru ngā mati whaiira • Whakamārama tau whakahau-kore 	<p><u>Tau Oti, Tau Tōpū</u></p> <ul style="list-style-type: none"> • Mahara, whakamahi tikanga (meka) tāpiritanga, tangohanga, whakarau • Tāpiri, tango, whakarau, wehewehe tau oti • Tito, whakaoti rapanga paki, rapanga whakarite mau tau oti • Whakamahi tikanga paheko <p><u>Hautau, Ōrau, & Tau-ā-ira, Tau</u></p> <p><u>Whakahau-Kore</u></p> <ul style="list-style-type: none"> • Ka huri, whakamahi tau oti hei hautau, tau-ā-ira, ōrau • Tito, whakaoti rapanga whai hautau, tau-ā-ira, ōrau • Huri i ngā hautau ōrite, tau-ā-ira, ōrau <p><u>Whakatau tata</u></p> <ul style="list-style-type: none"> • Whakatau tata, whakamātau otinga 	<p><u>Tauira</u></p> <p><u>-Raupapa</u></p> <p><u>-Tāruarua</u></p> <ul style="list-style-type: none"> • Kimi, whakaroa, whakamārama, tito ture mō ngā tauira tau, tauira āhua • Whakamahi ture hei matapae tauira <p><u>Whawhenga</u></p> <p><u>Taurangi</u></p> <ul style="list-style-type: none"> • Whakamahi, Whakaoti whārite māmā • Mōhio ki te raupapa paheko • Whakarūnā, whakatauwehe, whakawhānui kīanga taurangi • Whakaoti whārite tukutahi <p><u>Kauwhata, Pānga</u></p> <ul style="list-style-type: none"> • Whakamahi, whakaoti whārite rārangi • Whakamahi, tuhi, whakamāori kauwhata 	<p><u>Āhua ahu-2, -3</u></p> <ul style="list-style-type: none"> • Tautuhi āhua, ka kōrero ai i ngā āhuatanga ahu-2, -3 • Tātai paenga, horahanga, kītanga • Kōrero i ngā momo hangarite <p><u>Koki</u></p> <ul style="list-style-type: none"> • Mōhio ki ngā huringa-ā-karaka, huringa kōaro, kia kotahi hauwhā, kotahi haurua • Mōhio ki ngā koki māmā (90°, 180°, 30°, 45°, 60°) 	<p><u>Hangarite & Panoni</u></p> <ul style="list-style-type: none"> • Kōrero, tuhi, hanga tauira āhuahanga ki te nekehanga, huringa, whakaatatanga • Whakarahi, whakaiti āhua ahu-2 <p><u>Koki</u></p> <ul style="list-style-type: none"> • Whakamahi huri • Whakamahi ine-koki hei ine koki <p><u>Hanga & Tuhi</u></p> <ul style="list-style-type: none"> • Tautuhi, kōrero, hanga, whakatauirā, tuhi āhua ahu-2, -3 • Tuhi raumata hei hanga matarau māmā 	<p><u>Ngahuru</u></p> <ul style="list-style-type: none"> • Ineine, whakatau tata ine roa papatipu, rōrahi, horahanga, kītanga, mahana • Ineine, mōhio ki te inenga āwhata ki te tauwhata tata rawa <p><u>Wā</u></p> <ul style="list-style-type: none"> • Whai, huri i te wā ringarua, wāmati • Tātai wā ki te karaka 12 hāora, 24 hāora • Mōhio ki ngā inenga wā • Whai, whakamāori, hanga kōrero āwhata, wātaka, tūtohi wā <p><u>Takotoranga</u></p> <ul style="list-style-type: none"> • Kōrero, whakamāori, tuhi, tautuhi takotoranga ki ngā ahunga, tawhiti, mahere āwhata, taunga tukutuku 	<p><u>Whakamātau</u></p> <ul style="list-style-type: none"> • Whakariterite, whakaraupapa, kohikohi • Matapae pāpono ki te tūponotanga. <p><u>Whakatauirā</u></p> <ul style="list-style-type: none"> • Kimi haurahi nahanaha hei tatau pāpono. • Whakamahi hoahoa rākau hei whakaatu pāpono • Whakarite, matapae tūponotanga me ngā auau o ngā pāpono • Whakatau tata auau o ngā pāpono, ka tuhi ai ki te āwhata 	<p><u>Hōrapa, Whakaari</u></p> <ul style="list-style-type: none"> • Whakarite hōrapa. Kohikohi rāraunga • Kōwhiri, whakaari rāraunga • Kōwhiri, hanga whakaaturanga rāraunga • Tuhi, whakamahi āwhata māmā <p><u>Whakamāori</u></p> <ul style="list-style-type: none"> • Kōrero, pūrongo i ngā āhuatanga kōhure o ngā whakaari rāraunga • Whakarite, whakawā i ngā whakatau mō te whakamāoritanga rāraunga

Te Tau

Mātauranga Tau

Tau Oti, Tau Tōpū

Ka pānui, ka whakamārama, ka whakaraupapa i ngā tau oti.
Ka whakamārama i ngā tau tōraro.
Ka whakamārama, ka tātari i ngā pū tau oti.

Hautau, Ōrau, Tau-ā-ira, Tau Whakahau-Kore

Ka whakamārama i te tikanga o ngā mati whaiira e toru.
Ka whakaraupapa i ngā mati whaiira e toru.
Ka whakamārama tau whakahau-kore.

Paheko Tau

Tau Oti, Tau Tōpū

Ka mahara, ka whakamahi i ngā tikanga (meka) tāpirihanga, tangohanga, wehewehe, me te whakarau (whakarea).
Ka tāpiri ka tango, ka wehewehe, ka whakarau (whakarea) i ngā tau oti.
Ka tuhi, ka whakaoti i ngā rapanga paki tau oti, i ngā rapanga whakarite tau oti ki ngā momo paheko e hāngai ana.

Hautau, Ōrau, Tau-ā-ira, Tau Whakahau-Kore

Ka whakamahi, ka kimi, ka whakaatu i ngā hautau rānei, i ngā ōrau rānei, i ngā tau-ā-ira rānei mai i te tau oti.
Ka tito, ka whakaoti i ngā rapanga whai tau-ā-ira rānei, whai hautau rānei.
Ka kimi, ka hurihuri i ngā hautau ōrite rānei, i ngā tau-ā-ira ōrite rānei, i ngā ōrau ōrite rānei ki ngā momo paheko.
Ka whakamahi i ngā tikanga paheko.

Whakatau tata

Ka whakatau tata, ka whakamātau i aua whakatau.

Te Taurangi

Tauira Raupapa, Tauira Tāruarua

Ka kimi, ka whakarōa, ka whakamārama, ka tito ture mō ngā tauira tau, mō ngā tauira āhua.
Ka whakamahi ture hei matapae i ngā tauira.

Whawhe Taurangi

Ka whakaoti i ngā whārite māmā.
Ka mōhio ki te raupapa paheko.
Ka whakarūnā, ka whakatauwehe, ka whakawhānui i ngā kīanga taurangi.
Ka whakaoti i ngā whārite tukutahi.

Kauwhata, Pānga

Ka whakamahi, ka whakaoti i ngā whārite rārangi māmā.
Ka whakamahi, ka tuhi, ka whakamāori i ngā kauwhata.

Te Āhuahanga

Mātauranga Āhuahanga

Āhua ahu-2, āhua ahu-3

Ka tautuhi, ka kōrero i ngā āhuatanga o ngā āhua ahu-2 o ngā āhua ahu-3.

Ka tātai i te paenga i te horahanga i te kītanga.

Ka kōrero i ngā momo hangarite.

Koki

Ka mōhio ki te huringa-ā-karaka ki te huringa kōaro, ki te huringa kotahi hau

hauwhā, ki te huringa kotahi haurua.

Ka mōhio ki ngā koki māmā (90°, 180°; 30°, 45°, 60°).

Paheko Āhuahanga

Hangarite & Panoni

Ka kōrero, ka tuhi, ka hanga i ngā tauira āhuahanga e mau ana i te whakaatatanga, i te nekehanga, i te huringa.

Ka whakanui, ka whakaiti i te āhua ahu-2.

Koki

Ka whakamahi i ngā huringa.

Ka whakamahi i te ine-koki hei ine i ngā koki.

Hanga & Tuhi

Ka tautuhi, ka kōrero, ka hanga, ka whakatauiria, ka tuhi i ngā āhua ahu-2, i ngā āhua ahu-3.

Ka tuhi raumata hei hanga i ngā matarau māmā.

Te Inenga

Inenga

Ngahuru

Ka ineine, ka whakatau tata i te ine roa, i te papatipu, i te mahana.

Ka ineine, ka mōhio ki te inenga āwhata ki te tauwhata tata rawa.

Wā

Ka whai, ka huri i te wā ringarua, i te wāmati.

Ka tātai wā ki te karaka 12 ngā hāora, ki te karaka e 24 ngā hāora.

Ka mōhio ki ngā inenga wā.

Ka whai, ka whakamāori, ka hanga i ngā kōrero āwhata, i ngā wātaka, i ngā tūtohi wā.

Takotoranga

Ka kōrero ka whakamāori, ka tuhi, ka tautuhi i te takotoranga ki te ahunga, ki te tawhiti, ki te mahere āwhata, ki te taonga tukutuku.

Te Tauanga

Tūponotanga

Whakamātau

Ka whakariterite, ka whakaraupapa, ka kohikohi i ngā raraunga whaihua.

Ka matapae i tētahi pāpono ki te tūponotanga.

Whakatauirā

Ka kimi huarahi nahanaha hei tatau pāpono. Ka whakamahi hoahoa hei whakaatu pāpono.

Ka whakarite ka matapae i ngā tūponotanga i ngā auau o ngā pāpono.

Ka whakatau tata i ngā auau o ngā pāpono, ka tuhi ai ki te āwhata.

Tauanga

Hōrapa

Ka whakarite hōrapa. Ka kimi raraunga.

Ka kohikohi, ka whakaari raraunga.

Ka kōwhiri, ka hanga whakaaturanga raraunga.

Ka tuhi, ka whakamahi i ngā āwhata māmā.

Whakamāori

Ka kōrero, ka tuhi pūrongo mō ngā āhuatanga kōhure o ngā whakaari raraunga.

Ka whakarite, ka whakawā i ngā whakatau mō te whakamāoritanga o ngā raraunga.

Development of the Pāngarau Curriculum Map

The Pāngarau Exemplar Map was referred to for the development of the Pāngarau Curriculum Map. The Exemplar Map lists all achievement objectives, sometimes in summarized form, by strand from level one to level five. Dr. Ian Christensen added the level six objectives and the NCEA objectives. He also allocated the relevant achievement objectives in both number and geometry in both knowledge and application/process subcategories. Some objectives clearly belong to one category; others cover both and therefore appear in both categories.

The asTTle team added the additional achievement objectives and ensured the second level sub categorization matched the curriculum framework and made further changes based on insights gained in asTTle mathematics developments.

Description of the Pāngarau Curriculum Map

The Pāngarau Curriculum Map outlines the content of the five strands of the Pāngarau curriculum statement from Levels 2 to 6, and also shows the progressions across these levels. This is done primarily through summarising and mapping the achievement objectives. Some of the achievement objectives have quite a narrow focus and lend themselves well to being included with other achievement objectives in one summary statement. A small number of achievement objectives are very wide in focus and require two summary statements in the map. Sometimes achievement

objectives have been moved from their curriculum strands into other strands that the asTTle teams believe are more appropriate. It was mentioned that achievement objectives relating to *takotoranga* 'position', listed in *āhuahanga* 'geometry' in the curriculum, were moved to *inenga* 'measurement'. Some *inenga* achievement objectives concerning graphs and their interpretation have been moved to *taurangi* 'algebra'. Other *inenga* achievement objectives concerning the calculation of the perimeters and areas of geometric shapes have been moved to *āhuahanga*.

Achievement objectives are shown by the numbers that appear after each summary statement which refer to the strand, the level, and achievement objective number in curriculum. These are given below by their English equivalents to save space and to avoid using two letter equivalents to distinguish between Māori strand names.

a (algebra) *taurangi*
g (geometry) *āhuahanga*
m (measurement) *ine*
n (number) *tau*
s (statistics) *tūponotanga*

The number following the strand designation indicates the curriculum level; the number following the hyphen indicates the achievement objective number in the curriculum statement, e.g.,

N2-1 means the first level two number achievement objective.

A further designation 'ep' is used to indicate achievement objectives that derive from the Exemplar project. These are listed below:

- Make quarter and half turns (EP-1);
- Know about simple angles including 90° (right angle) and 180°; 30°, 45° and 60° (EP-2);
- Be able to use a protractor to measure angles to the nearest gradation (EP-3);
- Assign numerical probability values to simple events (EP-4);
- Use possible outcomes to assign probabilities (EP-5);
- Accurately describe aspects of the statistical situation represented by a statistical data display drawn by others (EP-6).

Achievement objectives are sometimes given in the map in two strands or in two sub categories (but never in two content areas). This was often due to it being difficult to separating the knowledge and application component without substantially re-writing the achievement objective.

Conclusion

The asTTle V3 Curriculum Map and Framework outlined in this report is adequate to meet the needs of teachers and represent the curriculum document. It should be used as the basis for developing asTTle V3 Pāngarau assessment materials for curriculum levels 2 to 6. This framework represents a revision and modification of

the asTTle V2 Pāngarau Framework to bring greater consistency of terminology with the curriculum, numeracy project, and exemplar project. The splitting of number and algebra content is permitted by the present asTTle structure and further refinement of content into Knowledge and Operations/Application is possible within the present asTTle structure if desired, provided sufficient items are created to support the creation of such tests.

There are a number of wider issues that this report has identified that merit further discussion at a much broader level. Specifically, differences in language, differences in structural alignment, and creation of additional achievement objectives suggest that further work needs to take place in the context of the present curriculum stocktake.

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Appendix 1 asTTle Pāngarau Curriculum Map Levels 2-6

TE MĀTAURANGA TAU

Kaupapa Matua	Taumata 2	Taumata 3	Taumata 4	Taumata 5	Taumata 6	NCEA
Te tau oti me te tau tōpū	ka pānui, ka tuhi, ka raupapa, ka whakamārama i ngā tauoti matitoru (n2-1, n2-2, n2-3) ka whakarite i te wāwāhanga moni, i tētahi tapeke moni rānei (ki te uka me te tāra) (m2-2, m2-3)	ka whakamārama i ngā tauoti katoa (n3-1)	ka whakamārama tau tōraro (n4-1) ka whakamārama, ka kimi i ngā taupū (n4-2)	ka huri: tau noa ↔ tau tānga ngahuru (n5-1)	ka mōhio ki ngā momo tau, arā, te tauoti, te tau tōpū, te tau whakahau me te tau whakahau-kore (n6-2)	Pāngarau 1.7 Ka whakaoti rapanga tau ngāwari i roto anō i tētahi horopaki. Ka whai wāhi atu ko te hautau, te tau hanumi, te tau-ā-ira, te ōrau me taupāpātanga.
Te hautau, te tau-ā-ira, te ōrau, me te tau whakahau-kore	ka tuhi, ka whakaoti rapanga hautau (haurua, hautoru, hauwhā, haurima) (n2-5)	ka whakamārama, ka raupapa i ngā tau-ā-ira (e3 ngā mati-ā-ira) (n3-2, n3-3)		ka huri: tau noa ↔ tau tānga ngahuru (n5-1) ka whakaawhiwhi, ka tātai pūtakerua (n5-3)	ka mōhio ki ngā momo tau, arā, te tauoti, te tau tōpū, te tau whakahau me te tau whakahau-kore (n6-2)	

TE PAHEKO TAU

Kaupapa Matua	Taumata 2	Taumata 3	Taumata 4	Taumata 5	Taumata 6	NCEA
Te tau oti me te tau tōpū	<p>ka tuhi, ka whakaoti rapanga whakatairite (n2-4)</p> <p>ka whakaoti rapanga tauoti e whai wāhi mai ana ngā paheko e whā (n2-10, n2-11)</p> <p>ka whakaoti ā-hinengaro tātaitanga tāpiri, tango hoki (n2-8)</p> <p>ka whakamahi meka matua mō te tāpiri, te tango, me te whakarea (n2-7, n2-9)</p> <p>ka whakarite i te wāwāhanga moni, i tētahi tapeke moni rānei (ki te uka me te tāra) (m2-2, m2-3)</p>	<p>ka whakamahi i ngā meka whakarau matua (n3-5)</p> <p>ka tuhi, ka whakaoti rapanga tauoti, tau-ā-ira e whai wāhi mai ana ngā paheko e whā (n3-6)</p> <p>ka kimi hautau o tētahi tauoti, tau-ā-ira rānei hei whakaoti rapanga (n3-7)</p>	<p>ka whakamārama hatepe mō te tāpiri, te tango me te whakarea (n4-10)</p> <p>ka whakamārama i ngā tikanga raupapa paheko (n4-11)</p>	<p>ka whakaoti rapanga e whai wāhi mai ana te tau-ā-ira me te ōrau (n5-5, n5-7, n5-8)</p>		

Pāngarau Curriculum Framework & Map

<p>Te hautau, te tau-ā-ira, te ōrau, me te tau whakahau-kore</p>	<p>ka tuhi, ka whakaoti rapanga hautau (haurua, hauroru, hauwhā, haurima) (n2-5)</p>	<p>ka tuhi, ka whakaoti rapanga tauoti, tau-ā-ira e whai wāhi mai ana ngā paheko e whā (n3-6)</p> <p>ka kimi hautau o tētahi tauoti, tau-ā-ira rānei hei whakaoti rapanga (n3-7)</p>	<p>ka tuhi, ka whakaoti rapanga tau-ā-ira e whai wāhi mai ana te whakarea me te wehe (n4-8)</p> <p>ka kimi hautau ōrite (n4-3)</p> <p>ka huri: hautau ↔ tau-ā-ira ↔ ōrau (n4-4, n4-5)</p> <p>ka kimi i te hautau, i te ōrau rānei o tētahi rahinga (n4-6, n4-9)</p>	<p>ka whakaoti rapanga e whai wāhi mai ana te tau torunga me te tau tōraro (n5-6)</p> <p>ka whakaoti rapanga e whai wāhi mai ana te tau-ā-ira me te ōrau (n5-5, n5-7, n5-8)</p> <p>ka whakamārama, ka whakamahi ōwehenga (n5-9)</p> <p>ka whakaawhiwhi, ka tātai pūtakerua (n5-3)</p>	<p>ka kimi rautaki hei whakaoti rapanga tau (n6-3)</p> <p>ka whakatutuki i ngā paheko matua mō ngā hautau me ngā tau hanumi (n6-1)</p>	
<p>Te whakatau tata</p>	<p>ka whakatau tata, ka tiroiro i te tika o tētahi otinga (n2-6)</p>	<p>ka whakatau tata, ka tiroiro i te tika o tētahi otinga (n3-4)</p>	<p>ka whakatau tata, ka tiroiro i te tika o tētahi otinga (n4-7)</p>	<p>ka whakatau tata, ka tiroiro i te tika o tētahi otinga (n5-4)</p> <p>ka whakaawhiwhi tau (n5-2)</p>	<p>ka whakatau tata, ka tiroiro i te tika o tētahi otinga (n6-4)</p> <p>ka whakamahi tātai hei whakaoti rapanga, ā, ka whiriwhiri i te tika me te tikanga o te otinga (n6-5)</p>	

TE TAURANGI

Kaupapa Matua	Taumata 2	Taumata 3	Taumata 4	Taumata 5	Taumata 6	NCEA
Te tauira raupapa, te tauira tāruarua		ka whakaoti whārite māmā pēnei ($x + 14 = 38$) (a3-5)	ka whakaoti whārite māmā pēnei ($2x + 4 = 16$) (a4-5) ka whakamārama i ngā tikanga raupapa paheko (n4-11)	ka whakaoti whārite rārangi (a5-6) ka whakamahi tikanga whakauru (a5-5) ka whakarūnā kiānga taurangi (te whakakao taurangi tairite, te whakatauwehe, te whakawhānui) (a5-7, a5-8, a5-9) ka whakaatu pūāhua whaitake ki te whārite (a5-10)	ka hanga, ka whakaoti whārite rārangi, whārite tukutahi, whārite pūrua māmā (a6-5) ka whakauru uara ki te ture (a6-6) ka hanga tauira rārangi, tauira pūrua, ka kimi, ka parahau i ngā ture mō ēnei tauira (a6-2)	Pāngarau 1.1 Ka whawhe i ngā kiānga taurangi, ka whakaoti i ngā whārite rārangi, whārite pūrua hoki.
Whawhenga taurangi	ka whakaroa tauira raupapa, ka whakaahua ture mō te raupapa (a2-1)	ka whakaahua ture mō te tauira tau, tauira āhua rānei (a3-1) ka kimi, ka whakamahi ture hei hanga tauira raupapa (a3-2) ka kimi ture mō ētahi rapanga whaitake tairite (a3-3)	ka kimi, ka whakamahi, ka whakaahua ture raupapa tau (a4-1) ka whakamahi ture hei matapae (a4-2) ka kimi, ka parahau ture mō tētahi rapanga whaitake (a4-4)	ka hanga tauira, ka kimi, ka tuhi (ā-kupu, ā-tohu) i te ture mō te tauira (a5-1) ka whakamahi ture hei tuhi tauira (a5-2)	ka mōhio ki te pāpātanga e whakaaturia ana ki te kauwhata, ki te papatau rānei (m6-4) ka hanga tauira mai i tētahi ture (a6-3)	

Pāngarau Curriculum Framework & Map

<p>Te kauwhata, Te pānga</p>	<p>ka whakaatu pānga ki te kauwhata (a2-2)</p>	<p>ka whakaatu pānga ki te kauwhata (a3-4)</p>	<p>ka tuhi, ka whakamāori kauwhata (a4-3)</p>	<p>ka tuhi whārite mō te kauwhata rārangi (te rōnaki me te haukoti) (a5-3, a5-4)</p> <p>ka whakamāori, ka whakamahi pāpātanga (m5-3)</p>	<p>ka hanga, ka whakamāori kauwhata (a6-1)</p> <p>ka tuhi kauwhata pānga rārangi, pānga pūrua, pānga taipū, pānga porowhita, pānga pūwerewere (a6-4)</p> <p>ka whakaatu raraunga ki te āwhata ahu-2 (m6-2)</p> <p>ka mōhio ki te rōnaki o tētahi kauwhata, me te hononga ki te pāpātanga o te whiti (m6-3)</p> <p>ka mōhio ki te pāpātanga e whakaaturia ana ki te kauwhata, ki te papatau rānei (m6-4)</p>	<p>Pāngarau 1.2 Ka tuhi, ka whakamārama hoki i ngā āhuatanga o te kauwhata rārangi me te kauwhata pūrua.</p>
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TE MĀTAURANGA ĀHUAHANGA

Kaupapa Matua	Taumata 2	Taumata 3	Taumata 4	Taumata 5	Taumata 6	NCEA
Te koki	<p>ka whakaatu i te huri whakatekaraka me te huri kōaro (g2-4)</p> <p>ka mōhio ki ngā huri kia kotahi haurua, kia kotahi hauwhā (ep-1)</p>	ka mōhio ki ngā koki māmā (30°, 45°, 60°, 90°, 180°) (ep-2)	whakamahi ine-koki hei ine koki ki te putu e tata rawa ana (ep-3)	<p>ka whakamahi, ka whakamārama i ngā āhuatanga koki o ngā rārangi whakarara (g5-1)</p> <p>ka whakamahi i ngā tikanga koki o te porowhita (rārangi pātapa - pūtoro, koki porowhita weherua) (g5-3)</p> <p>ka whakamahi i ngā āhuatanga hangarite me ngā āhuatanga koki o ngā taparau (g5-9)</p>	<p>ka kimi i ngā koki me ngā roa i roto i ngā rapanga whitake ka taea te whakatauiria ki te tapatoru (hoahoa āwhata, āhuatanga koki o te tapatoru, Pythagoras, ōwehenga pākoki, ture aho, ture whenu) (g6-2)</p> <p>ka tautuhi, ka kimi tapatoru hāngai i roto i ngā papatipu me ngā hoahoa ahu-3 (g6-3)</p>	Pāngarau 1.8 Ka whakamahi i te ture a Pythagoras me ngā pāpātanga pākoki hei kimi i te rahi o ngā koki me ngā tapa o tētahi tapatoru hāngai kāore e mōhiohia ana.
Te āhua ahu-2, ahu-3	<p>ka hanga, ka whakaingoa, ka whakaahua (āna ake kupu me ngā kupu Āhuahanga) i ngā āhua me ngā taonga o ia rā (g2-1)</p>	<p>ka whakaahua i ngā taonga ahu-2, ahu-3 (reo Āhuahanga) (g3-1)</p> <p>ka whakaahua, ka hanga tauira e kitea mai ana he panoni (whakaata, hurihanga, nekehanga) (g3-6, g3-7)</p> <p>ka whakanui i ngā āhua māmā ki te pepa tukutuku (g3-8)</p>	<p>ka whakamahi i te ahunga me te taunga (g4-5)</p> <p>ka whakamahi i ngā tikanga hangarite o te taparau rite (g4-6)</p> <p>ka whakaatu i te hangarite whakaata me te hangarite huri (g4-7)</p> <p>ka whakanui, ka whakaiti rānei i ngā āhua ahu-2, ka tautuhi i ngā āhuatanga pūmau (g4-8)</p>	<p>ka kimi i te paenga, te horahanga me te rōrahi, ka whakaatu i te tika (ngā tepe) o te otinga (m5-1)</p> <p>ka whakamahi pere hei whakaoti rapanga, hei whakaahua nekehanga (g5-7, g5-10)</p> <p>ka whakamahi i ngā āhuatanga hangarite me ngā āhuatanga koki o ngā taparau (g5-9)</p>	<p>ka tūhura, ka whakaahua huanui (g6-4)</p> <p>ka kimi i ngā koki me ngā roa i roto i ngā rapanga whitake ka taea te whakatauiria ki te tapatoru (hoahoa āwhata, āhuatanga koki o te tapatoru, Pythagoras, ōwehenga pākoki, ture aho, ture whenu) (g6-2)</p> <p>ka tautuhi, ka kimi tapatoru hāngai i roto i ngā papatipu me ngā hoahoa ahu-3 (g6-3)</p>	

TE PAHEKO ĀHUAHANGA

Kaupapa Matua	Taumata 2	Taumata 3	Taumata 4	Taumata 5	Taumata 6	NCEA
Te koki	<p>ka whakaatu i te huri whakatekaraka me te huri kōaro (g2-4)</p> <p>ka mōhio ki ngā huri kia kotahi haurua, kia kotahi hauwhā (ep-1)</p>		<p>whakamahi ine-koki hei ine koki ki te putu e tata rawa ana (ep-3)</p>	<p>ka whakamahi, ka whakamārama i ngā āhuatanga koki o ngā rārangi whakarara (g5-1)</p> <p>ka whakamahi i ngā tikanga koki o te porowhita (rārangi pātapa - pūtoro, koki porowhita weherua) (g5-3)</p> <p>ka whakamahi pere hei whakaoti rapanga, hei whakaahua nekehanga (g5-7, g5-10)</p>	<p>ka kimi i ngā koki me ngā roa i roto i ngā rapanga whitake ka taea te whakatauiria ki te tapatoru (hoahoa āwhata, āhuatanga koki o te tapatoru, Pythagoras, ōwehenga pākoki, ture aho, ture whenu) (g6-2)</p>	<p>Pāngarau 1.4 Ka whakamahi i ngā tikanga waihanga, te hoahoa inerite, te raumata, te panoni, te huanui rānei hei whakaputa i tētahi tauira, tētahi taonga rānei.</p> <p>Pāngarau 1.9 Ka tiroiro i ngā āhuatanga o te taparau me te rārangi, hei kimi i ngā mea kāore e mōhiotia ana, hei tātari hoki i ngā āhua.</p>
Te hangarite, te panoni	<p>ka hanga i te whakaahua i te tauira e whai wāhi mai ana te nekehanga, te hangarite huri, me te hangarite whakaata (g2-3)</p>	<p>ka whakaahua, ka hanga tauira e kitea mai ana he panoni (whakaata, hurihanga, nekehanga) (g3-6, g3-7)</p> <p>ka whakanui i ngā āhua māmā ki te pepa tukutuku (g3-8)</p>	<p>ka whakamahi i ngā tikanga hangarite o te taparau rite (g4-6)</p> <p>ka whakaatu i te hangarite whakaata me te hangarite huri (g4-7)</p> <p>ka whakanui, ka whakaiti rānei i ngā āhua ahu-2, ka tautuhi i ngā āhuatanga pūmau (g4-8)</p>	<p>ka whakamahi i ngā hangarite me ngā āhuatanga koki o ngā taparau (g5-2)</p> <p>ka whakamahi pere hei whakaoti rapanga, hei whakaahua nekehanga (g5-7, g5-10)</p> <p>ka whakamahi i ngā āhuatanga hangarite me ngā āhuatanga koki o ngā taparau (g5-9)</p> <p>ka kimi, ka whakamahi taurahi (g5-8)</p> <p>ka tautuhi, ka whakamahi i ngā āhuatanga pūmau o ngā panoni (g5-11)</p>	<p>ka tuhi, ka whakaahua i ngā āhuatanga o te porowhita (g6-5)</p> <p>ka whakamahi i te hononga o te taurahi, te roa, te horahanga me te rōrahi (g6-6)</p> <p>ka whakamārama i te whakamahinga o te taurahi tōraro (g6-7)</p> <p>ka whakaahua i te otinga o ētahi panoni e rua nuku atu rānei (g6-8)</p>	

<p>Te hanga, te tuhi</p>	<p>ka hanga, ka whakaingoa, ka whakaahua (āna ake kupu me ngā kupu Āhuahanga) i ngā āhua me ngā taonga o ia rā (g2-1)</p>	<p>ka hoahoa, ka hanga pouaka (g3-2)</p> <p>ka hanga, ka whakaahua i ngā āhua ahu-3 e whakaaturia ana ki te hoahoa (g3-3)</p> <p>ka hoahoa i ētahi taonga ahu-3 māmā (g3-4)</p>	<p>ka whakamahi ruri, ine-koki, tāporowhita ki te tuhi āhua (g4-1)</p> <p>ka hoahoa raumata hei hanga matarau (g4-2)</p> <p>ka whakamahi hoahoa e whakaatu ana i ngā momo tirohanga hei hanga tauira o tētahi papatipu (g4-3)</p> <p>ka hoahoa i ētahi āhua ahu-3 māmā (hoahoa ine-rite, hoahoa o ngā momo tirohanga) (g4-4)</p>	<p>ka hanga koki hāngai, rārangi whakarara, rārangi hāngai, porowhita, taparau ngāwari, weherua tapatoru, rārangi weherua hāngai, teitei, weherua koki (g5-4)</p> <p>ka tuhi hoahoa āwhata o ngā mea i hangaia ki te mataono (g5-6)</p>	<p>ka tuhi, ka whakamārama i ngā whakaahu-2-tānga o ngā mea ahu-3 (g6-1)</p>	
<p>Te āhua ahu-2, ahu-3</p>			<p>ka tātai paenga (porowhita, tapawhā hāngai, tapatoru) (m4-2)</p> <p>ka tātai horahanga (tapawhā hāngai) (m4-2)</p> <p>ka tātai rōrahi (mataono) (m4-2)</p>	<p>ka kimi i te paenga, te horahanga me te rōrahi, ka whakaatu i te tika (ngā tepe) o te otinga (m5-1)</p> <p>ka whakamāori, ka whakamahi pāpātanga (m5-3)</p> <p>ka tātai i te tapa o tētahi tapatoru (whakaahua āwhata, ture a Pythagoras, ōwehenga pākoki) (g5-5)</p>	<p>ka kimi i ngā koki me ngā roa i roto i ngā rapanga whaitake ka taea te whakatauiria ki te tapatoru (hoahoa āwhata, āhuatanga koki o te tapatoru, Pythagoras, ōwehenga pākoki, ture aho, ture whenu) (g6-2)</p>	

Pāngarau Curriculum Framework & Map

TE INE

Kaupapa Matua	Taumata 2	Taumata 3	Taumata 4	Taumata 5	Taumata 6	NCEA
Te wā	ka pānui ka whakamahi i te meneti, te hāora, te rā, te wiki, te marama me te tau (m2-4)	ka pānui, ka whakamāori kōrero mō te wā (m3-3) ka huri: wā ringarua ↔ wā mati (m3-4)	ka pānui, ka hanga wātaka (m4-3) ka whakaoti tātaitanga mō te wā (me te whai wāhi mai o te pūnaha wā 24) (m4-5)			Pāngarau 1.3 Ka whakaoti rapanga e whai wāhi mai ana ngā kaupapa ine o ia rā, tae atu hoki ki ngā āhua me ngā tūporo māmā.
Te ngahuru	ka whakamahi waeine ngahuru mō te roa, te papatipu me te kītanga (m2-1)	ka whakatau tata i te roa, te papatipu, te horahanga, te kītanga me te mahana (m3-1) ka whakatutuki mahi ine e whai wāhi mai ana ngā waeine me ngā āwhata maha (m3-2)	ka ine āwhata ki te tauwhata tata rawa (m4-1) ka pānui, ka hanga āwhata, tūtohi hoki (m4-3)	ka whakaoti rapanga ine (m5-2)	ka hoahoa, ka whakatutuki, ka arotake i ngā mahi ine whitake (m6-1)	
Te takotoranga	ka whakaahua, ka whakamāori i te takotoranga (ngā kupu ake mō te ahunga me te tawhiti) (g2-2)	ka tuhi, ka whakamāori mahere āwhata māmā (g3-5)	ka whakamahi i te ahunga me te taunga (g4-5)			

TE TŪPONOTANGA

Kaupapa Matua	Taumata 2	Taumata 3	Taumata 4	Taumata 5	Taumata 6	NCEA
Te whakamāori		ka whakarite tūhuranga tauanga mō tētahi tāpaetanga kōrero (s3-1) ka matapae putanga (s3-6)	ka kohikohi raraunga e hāngai ana (s4-2, s4-4)	ka kimi tūponotanga (s5-8, s5-9, s5-11) ka matapae, ka whakamātau, ka whakamārama putanga o tētahi whakamātau tūponotanga māmā (s5-10)		
Te whakatauiria	ka raupapa, ka whakatairite pāpono i runga i te tūpono (s2-4)	ka kimi huarahi nahanaha hei tatau putanga (s3-5) ka matapae putanga (s3-6) Tuhia he tau tūpono mō ngā pāpono māmā (ep-4)	ka whakatau tata i te auau, ka whakaatu ki te āwhata (s4-8) ka whakamahi hoahoa rākau (s4-9) Whakamahi i te hua tērā pea ka puta mai hei tuhi i te tūpono. (ep-5)	ka matapae, ka whakamātau, ka whakamārama putanga o tētahi whakamātau tūponotanga māmā (s5-10)	ka whakamahi papa raraunga taurangi-rau, ka kimi tūponotanga (s6-8) ka whakatau tūponotanga mai i ētahi mahinga tāuke, motuhake hoki (s6-9) ka kimi tūponotanga whakawhirinaki mā te whakamahi hoahoa rākau (s6-10)	Pāngarau 1.6 Ka whakamahi raraunga hei tātai auau ōwehe, hei whakatau tata anō i te tūponotanga, he tātai hoki i te tūponotanga pāngarau.

Pāngarau Curriculum Framework & Map

TE TAUANGA

Kaupapa Matua	Taumata 2	Taumata 3	Taumata 4	Taumata 5	Taumata 6	NCEA
<p>Te horapa, Te whakaari</p>	<p>ka kohikohi, ka whakaatu raraunga ki te kauwhata whakaahua, ki te tūtohi tatau, ki te kauwhata pou rānei (s2-1)</p>	<p>ka whakarite tūhuratanga tauanga mō tētahi tāpaetanga kōrero (s3-1)</p> <p>ka kohikohi raraunga motumotu, ka whakaatu ki te kauwhata rau-tō, kauwhata ira, kauwhata tāhei rānei (s3-2)</p>	<p>ka whakarite tūhuratanga tauanga (s4-1)</p> <p>ka kohikohi raraunga e hāngai ana (s4-2, s4-4)</p> <p>ka kōwhiri, ka hanga i te whakaari raraunga tōtika (tūtohi auau, kauwhata pou, kauwhata pouhere, kauwhata rārangi) (s4-3, s4-4)</p> <p>ka hoahoa, ka whakamahi āwhata mō te raraunga kounga (m4-4)</p>	<p>ka whakarite, ka whakatutuki tūhuratanga tauanga – ka whiriwhiri i ngā taurangi hei tiroiro, ka kōwhiri i te tīpakotanga, ka parahau i te tīpakotanga (s5-1, s5-2)</p> <p>ka kimi inenga raraunga (toharite, tau waenga, tau tānui, ine-whānui) (s5-3)</p> <p>ka kohikohi, ka whakaatu raraunga whakatairite ki te kauwhata rau-tō hiato, kauwhata kauamo, kauwhata pou hiato, kauwhata rārangi hiato rānei (s5-5)</p>	<p>ka whakatakoto pātai tauanga, ka tautuhi tikanga kōhi raraunga, ka kōhi raraunga, ka whakaatu raraunga ki ngā whakaari tauanga e hāngai ana (s6-1, s6-2, s6-3, s6-4)</p> <p>ka tāpae, ka parahau whakatau e pā ana ki ngā taurangi o tētahi tūhuratanga tauanga (s6-5)</p> <p>ka tautuhi āhuatanga motuhake o ngā raraunga tauanga (s6-6)</p>	<p>Pāngarau 1.5</p> <p>Ka whakamahi i ngā tikanga tauanga māmā hei whakautu i tētahi pātai mō ngā raraunga taurangi rua, hei whakamāori hoki i tētahi pūrongo tauanga.</p>
<p>Te whakamāori</p>	<p>ka whakamārama i āna whakaari raraunga (s2-2)</p> <p>ka matapaki whakaari raraunga (s2-3)</p>	<p>ka whakamārama (ki āna ake kupu) i ngā āhuatanga kōhure o tētahi whakaari raraunga (s3-3)</p> <p>ka matapaki i ngā hua ka puta i te tūhuratanga tauanga (s3-4)</p> <p>Āta whakaatu i ngā āhuatanga kōhure o te whakaari raraunga (i tuhia ai e ētahi atu)(ep-6)</p>	<p>ka whakamārama i ngā āhuatanga kōhure o tētahi whakaari raraunga (mōwaho, rāpoi, tuaritanga) (s4-5)</p> <p>ka arotake whakaari raraunga (s4-6)</p> <p>ka tāpae whakaaro ki ngā hua o tētahi tūhuratanga tauanga (s4-7)</p>	<p>ka matapaki raraunga motumotu, motukore hoki (s5-4)</p> <p>ka whakamahi whakaaturanga tauanga hei whakatairite raraunga (s5-5)</p> <p>ka whakaputa whakaaro ki ngā taurangitanga houanga, ngā hē me ngā aukati o tētahi tūhuratanga tauanga (s5-6, s5-7)</p>	<p>ka whakatakoto whakaaro e pai ake ai ngā āhuatanga o tētahi tūhuratanga raraunga (s6-7)</p>	