



He Taonga Tonu te Rāpihi



He Kōpaki Hangarau - Taumata 1

He rauemi hei ako i te Hangarau i te taumata 6 o
Te Marautanga o Aotearoa, i te taumata 1 hoki o NCEA.

He Mihi

He mihi tēnei ki a koutou, e ngā ākonga, e hāpai ana i te reo rangatira. Tēnā koutou katoa.
Kei roto i tēnei huinga rauemi tētahi kōpae ataata, tētahi kōpae hikohiko, ngā pukapuka e rima mā ngā ākonga, me tētahi pukapuka hei āwhina i ngā pouako rātou ko ngā ākonga e whai ana i te ara hangarau.

He mihi tēnei ki ērā mātanga hangarau katoa nā rātou i whai wā ki te āwhina, ki te tautoko i a mātou i te hanganga o tēnei rauemi. Kua aro hoki mātou ki ētahi pepa kua whakaputaina e Te Tāhuhu o te Mātauranga hei āwhina, hei tautoko i ngā kura, i ngā kaiako ki te whakaako i te marautanga hangarau. Ka taea e te katoa te aro atu ki ēnei pepa kei te Ipurangi kei te paetukutuku *Techlink*.
Kei www.techlink.org.nz/curriculum-support/links.htm te ara toro atu.

Nā Deanne Thomas ngā kōrero mō te mātaitanga i tēnei pukapuka.

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I hangaia tēnei rauemi hei tautoko i
Te Marautanga o Aotearoa



He Taonga Tonu te Rāpihi

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Te Whakamahi i Tēnei Rauemi

Te whāinga

Māu tēnei pukapuka, arā, mā ngā ākonga e whai ana i te Hangarau i tētahi akoranga o te taumata 6 o te wāhanga ako hangarau o *Te Marautanga o Aotearoa*. Ko te nuinga o ēnei ākonga kei te tau 11, engari kua te katoa.

Koinei tētahi o ngā pukapuka e rima mā ngā ākonga, he kōpae ataata, he kōpae hikohiko anō e haere ana i te taha. Kia noho tēnei hei tūāpapa mō ētahi akoranga hangarau kotahi tau te roa.

Anei ngā ingoa o ngā pukapuka:

1. Te Whare Tautaiāo, Tū Ana, Tau Ana
2. **He Taonga Tonu te Rāpihi**
3. Nō Hea Koe, Ko Wai Koe?
4. He Kai Kei Aku Ringa
5. Te Kaha o te Hau

Ko te ingoa o te kōpae ataata, ko He Kōpaki Hangarau Taumata 1. E rima ngā mātaitanga e whakaataria ana ki te kōpae, ko tētahi mō tēnā, mō tēnā o ngā pukapuka e rima.

E whakamahia ana te kupu mātaitanga i konei hei whakaahua i te tirohanga hōhonu ki tētahi āhuatanga koia e whakaahua ana, e whakatauiria ana i tētahi kaupapa whānui e arotahia ana.

Mā te kaiako koe e ārahi ki te āta wherawhera i te pukapuka nei me te kōpae ataata.

He maha ngā wāhanga o te pukapuka. Ka whakamāramatia takitahitia tēnā me tēnā:

- Te Mātaitanga
- Te Marautanga o Aotearoa
- Te Whakawhanaketanga o te Otinga Hangarau
- Te Anga Whakaū Māramatanga ki te Tukanga Hangarau
- Te Whakaharatau Hangarau
- Ngā Āhuatanga Hangarau
- Te Aromatawai

Te mātaitanga

Kua tū mai te mātaitanga kia kite ai, kia whāwhā ai koe, te ākonga, i ētahi tauria tūturu o ngā whakaharatau hangarau – o neherā, o nāianeī anō hoki. Ka whakaaturia ētahi āhuatanga o te tukanga hangarau i roto i ngā mahi whakaharatau hangarau o te mātaitanga. Nā te āhua tonu o te whakaharatau hangarau, kāore tonu pea koe e whai wā, e whai rānei i ngā rawa e taea ai ēnei mahi te kawhe ake i te kura. Engari mā te mātaitanga ka kite wheako koe i ngā mahi e mahia ana, me ētahi mahi iti ake e āhua rite ana ka taea te kawhe i te kura.

E hāngai pū ana te mātaītanga i tēnei pukapuka ki ngā kōrero o te mātaītanga i te kōpae ataata, engari he paku rerekē ngā kōrero.

Ka kapi i ia mātaītanga tētahi, ētahi rānei o ngā Aho (ngā wāhanga hangarau) e rārangi iho nei:

- Hangarau Koiora
- Te Tuku Mōhiotanga
- Ngā Hanga me ngā Pūhanga Manawa
- Te Tāhiko me te Hangarau Whakatinā
- Hangarau Kai

He anga e mārama ai te tukanga hangarau

Ko te anga nei hei arataki i a kōrua ko te kaiako, kia mārama ai kōrua ki te tukanga hangarau. E whakaahua ana te anga i ngā takahanga katoa o te tukanga hangarau, e whakaatu ana anō hoki i ētahi tauira o ēnei kei roto i te mātaītanga.

Kei te whārangi 14 tētahi hoahoa e whakaatu ana i ngā wāhanga katoa o te tukanga hangarau, ā, ko ēhea wāhanga ka taka ki raro i Ngā Āhuatanga Matua o te Hangarau, ko ēhea wāhanga kei Te Whakaharatau Hangarau.

I ngā whārangi 14–27 e āta whakamāramatia ana ngā tauira o roto mai i te mātaītanga e hāngai ana ki tēnā takahanga, ki tēnā takahanga o te tukanga hangarau.

Ā te mutunga o ngā wāhanga “Te Whakaharatau Hangarau” me “Ngā Āhuatanga Hangarau”, tirohia anō te hoahoa kei whārangi 14. Tāruatia te hoahoa kātahi ka tohu mai mēnā kua kitea e koe he tauira o ia wāhanga mai i te mātaītanga. Mēnā āe, e tohu ana tēnei kua mau i a koe ētahi mōhiotanga ki ngā takahanga katoa o te tukanga hangarau.

Te aromatawai – he aromatawai i te tukanga hangarau me te whakamahi anō i ngā paerewa paetae

Ko tā tēnei wāhanga, he āta whakaatu me pēhea te whakamahi i ngā whāinga paetae hei aromatawai i te mōhio o te ākonga ki ētahi āhuatanga o te tukanga hangarau. Kei konei anō tētahi tauaromahi me ōna anō kupu whakamārama, e hāngai ana ki tētahi whāinga paetae. E whakaahuatia ana ngā paearu, kua takoto anō he whakamārama mō ngā mahi kia mahia, e kīia ai āe, kua tutuki te whāinga.

Ko te tukanga hangarau e arotahia ana i tēnei wāhanga, ko tērā kei te mātaītanga. E whakamahia ana i konei kia āta kite ai koe ka pēhea tō aromatawainga tūturu.

Te Mātaaitanga – He Taonga Tonu te Rāpihi

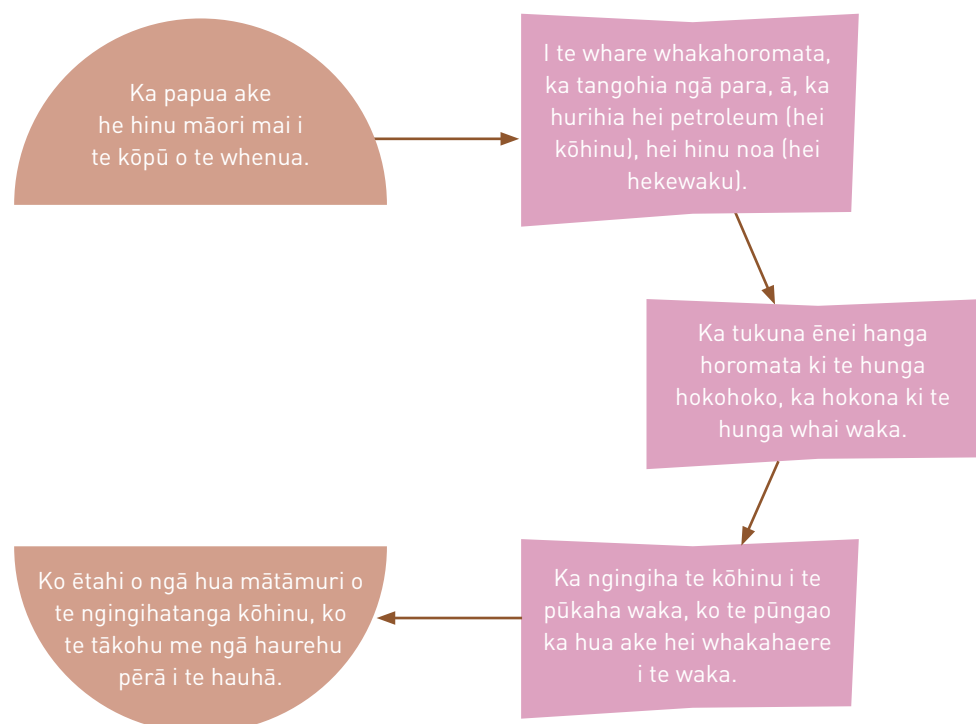
Ngā kora koiora

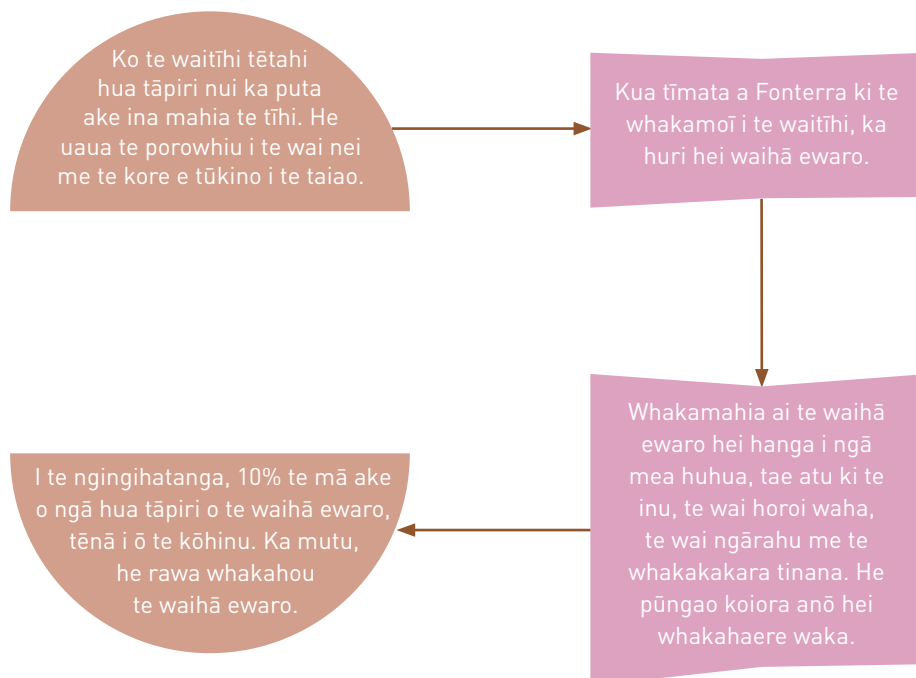
He aha tēnei mea, te kora koiora?

Ko te kora koiora, he kora i ahu mai i ngā rauropi whakahou pērā i te kakau o te tipu huka, te witi, te rākau, te pūkahu wai me ētahi atu rauropi. Ka kīia ēnei he rawa whakahou.

Ka hurihia te rawa hei hinu mewaro, hei waihā ewaro rānei, kia taea ai te whakahaere i ngā taputapu e hiahiatia ana, arā, ko ngā momo waka, me ngā momo mīhini. Ko te whakamahinga nui huri i te ao, ko te whakahaere i ngā waka kawē. Engari, kua mahia anōtia mō te whakaputa hiko.

Nā te pau haere o ngā koranehe, pērā i te waro, te hinu, me te kapuni, he kaupapa nui te whakamahi i ngā kora koiora, huri noa i te ao katoa. Me iti ake hoki te putanga o te haurehu kati mahana.





He pēhea te āhua o ngā kora koiora i Aotearoa?

Ahakoā he hou tonu te whakamahi i ngā kora koiora i Aotearoa, huri noa i te motu, arā, ētahi kamupene, kaunihera, ahumahi hoki e whakanao ana i ēnei momo kora, mā rātou anō.

I Te Papaioea e hurihia ana ngā para i te puke ruapara hei mewaro. Nā tēnā ka puta te hiko hei whakahaere i te pūnaha para tinana.



Kei Tokoroa tētahi whare mira e whakatipu paina ana hei pepa me te kaikaha. Ka tahuna ngā toenga rākau hei whakanao i te hiko. E whakatutukihia ana te nuinga o ō rātou hiahia hiko e rātou anō. He tauira tino pai tēnei. I ia tau, i ia tau nui ake i te 5 miriona tana te papatipu koiora e mahue atu ana ki roto i ngā ngahere paina o Aotearoa.

Ko te whāinga matua a ētahi kaunihera ko te para kore. He maha anō ngā rawa ka taea te whakamahi anō kia puta ai he kora koiora.

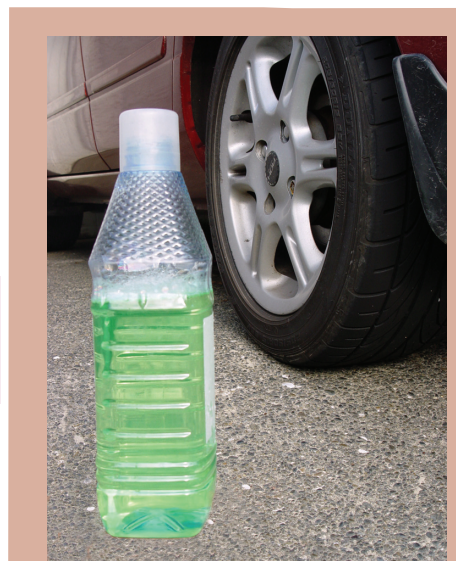


Kei Wairau tētahi tangata e tūhura ana i te painga o ngā pūkahu wai hei kora koiora.

He nui hoki ngā tāngata e hōpara ana huri noa i te motu, engari i tēnei wā karekau he pūnaha ā-motu.

Tūhuratia ētahi atu tāngata, kamupene hoki e hanga koiora ana i te parapara, i ngā matū kore utu rānei.

He rautaki ā ētahi o ngā whare kōhinu e ngāwari ai te whakapaunga o ngā koranehe. Ko tā Gull, he kuhu atu i te waihā ewaro kia 10% ki te kōhinu katoa e hokona ana e rātou ki te kiritaki. He mea hanga te waihā ewaro nei ki ngā toenga miraka kau a Fonterra.



He kora koiora

E tika ana tēnei rautaki ki ōu whakaaro? Me pēhea te whakapai ake?

I pēhea i ngā wā o mua?

I te tīmatatanga o te rautau 19 i whakahaeretia te nuinga o ngā waka ki te hiko.

I te tau 1900 i Parī, i hoahoatia tētahi pūkaha e Rudolf Diesel i whakahaeretia ki te hinu o te pīnati. Ohorere ana ngā kaipūhanga katoa me te mīharo anō. I mōhio tonu a Rudolf ki ngā painga o te huawhenua hei kora i taua wā! Engari i mate ia i mua i te tutukinga o ōna moemoeā.

Ngā kora koiora kei te ao whānui

Ahakoa he iti te kora koiora e whakanao ana ki Aotearoa, he rerekē te āhua ki whenua kē. Ko ngā kaiwhakanao nui rawa atu o te ao, ko Amerika me Parīhi.

Ko Parīhi te kaiwhakanao waihā ewaro nui rawa atu ki te ao katoa. He mea hanga te waihā ewaro o reira ki te kakau o te huka.

Mai i a Parīhi me Amerika ka puta tētahi 70% o te waihā ewaro katoa. He ture kei Parīhi e whakahau ana kia 20% te waihā ewaro me whakauru ki te kōhinu. I whakaūngia taua ture i te tau 1977.

Mai rā anō kua whakatipuria te kānga ki Amerika ki te Uru, hei kai. Engari nā te hiahia nui o te ao ki te hanga kora koiora ki te kānga, kua piki haere te utu o te kānga. Kua harikoa ngā kaipāmu. Kua whakawāteangia ngā wāhi hou hei whakatipu kānga. Engari, ehara i te mea he pai ngā putanga katoa.

- Kua piki haere te utu o te kānga, otirā, o ngā kai katoa, nā te maha e hokona ana ki tai
- Kua hokona te kānga hei rawa e hangaia ai te kora koiora

- Kāore e nui te kānga e toe ana hei kai, hei mahi parāoa
- Kua iti ake te whenua e wātea ana hei māra mō ētahi atu momo kai, me te aha, kua nui te utu o ngā kai katoa.



Ko te whakatipu kānga hei kora koiora tētahi o ngā take tautohetohe o te ao whānui

E whakatipuria ana te kānga ki Amerika hei rawa whakahou mā Amerika. Kāore e hokona ana ki tai. Hāunga tērā, ka hokona ki uta ngā kai huhua mai i whenua kē.

I Initonīhia ka whakamahia te hinu o te rākau “palm” hei hanga kora koiora. Ka whakarakea ngā ngāherehere kia wātea ai mō te whakatipu uru “palm”. Nā te nui o te whenua e hiahiatia ana hei whakanao kora koiora, ka raru ngā tāngata taketake. Kua panaia rātou i ō rātou whenua tupu.

Heoi anō, nā te hīkaka ki te whakanao kora koiora, ka puta ētahi atu āhuetanga.

- Kāore e nui te kai mā te ao katoa.
- Ka piki haere te utu o ngā kai katoa.
- Nā te kore haere o ngā ngahere ka kino anō te kōhauhau i te CO₂.
- Ka mate ngā rauropi i te waerenga o ngā ngahere.
- He nui hoki te wai e hiahiatia ana e ora ai ngā māra kānga.
- Mō ia rita o te waihā ewaro ka whakanaohia, e 860 rita o te wai ka whakapaungia.

Nā te mea kāore i te tōtika ngā pūnaha whakanao, kotahi te rita koranehe e whakapaua ana hei hanga i te kotahi rita o te kora koiora. Hey are you back?

Hei whakaaro ake

- He aha te take kāore a Amerika e kati i te whakanaonga o te kora koiora, mehemea he maha ngā āhuetanga kino e puta ake ana?
- He aha i whakaurua ai te 10% noa iho o te waihā ewaro ki te kōhinu?
- Me pēhea te whai tonu i tēnei huarahi me te kore e puta o ngā otinga kino ki ētahi tāngata?

Whakaarohia he rautaki hanga koiora e kore ai e matekai ētahi o ngā tāngata o te ao.

Te whakamahi i te ruapara kia puta ai te haurehu mewaro

I whakatuwheratia te ruapara ki Awapuni, i Te Papaioea, i te tau 1951. I taua wā tae noa mai ki tana aukatinga i te tau 2007, he wāhi tēnei mō te whiua para, ahakoa te momo para. Ka whiua ki te rua nui, ā, i te kītanga o te rua, ka tāpukengia ki te oneone, ka keria he rua anō. Koinā te āhua o te whiua para i mua.

E 20 heketea te rahi o taua wāhi, ā, e 2,300,000 tana te rahi o te para kei raro i te whenua. I mua i te aukatinga, i waenga i te tau 2004 me te 2007, he nui ake i te 100,000 tana ngā para i whiua ki reira i ia tau, i ia tau. E 12 mita i runga ake i te mata o te moana te teitei o te ruapara.

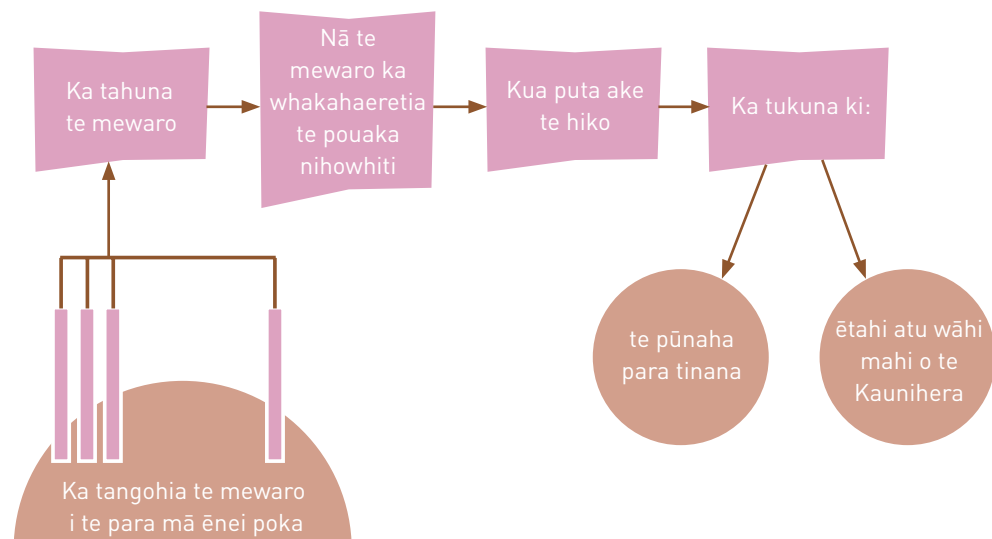


E tū ana ēnei
whare ki runga i te
puke kua hangaia i
te para kua nehua
ki raro i te whenua.

I runga i te whakaaro kia iti ake te tuku haurehu kati mahana ka tahi, kia riro mai ngā whiwhinga waro ka rua, kua whakatakotoria ētahi rautaki, ētahi huarahi e tutuki ai. He whare tukurua tētahi o ngā tino mahi. Ko te mīhini tango haurehu mewaro tētahi atu kaupapa. Kua tautokotia ā-pūtea e te Kaunihera o Te Papaioea. Nā rātou te ruapara, nā rātou hoki te haepapa ki te titiro whānui ki ngā rā e tū mai nei.

I tīmata tēnei mahi i te tau 2006, nō reira he mahi āhua hou tonu. Ahakoa he māmā te pūnaha, he otinga pai ka puta. E kīia ana te kaupapa nei ko te Awapuni Sustainable Development Centre.

E whai ake nei he hoahoa e whakaatu ana i te pūnaha tango haurehu mewaro.



Ko te painga o tēnei mahi, ka pūtakea mai te mewaro i ngā parapara kua whiua ki te ruapara. Kāore he utu. Nā te haurehu mewaro ka whakahaeretia te pouaka nihowhiti e puta ake ai te hiko. Nā konei, ka whakahaeretia te pūnaha para tinana mō te kore utu. Tuarua, kua nui te hiko hei whakahaere i ētahi atu o ngā wāhi o te kaunihera, pērā i te whare tukurua. Ka paku haere te ruapara. Heoi anō, ehara i te mea ka tū tēnei mīhini mō ake tonu. Hei te wā ka pau ngā para o te rua rā, ka mutu te mahi.

Hāunga tērā, he rautaki pai tēnei te whakamahi i te para hei waihanga hiko. Nā te whakamahi i ngā rawa kore utu, ka riro mai ngā whiwhinga waro i raro i te Whakaaetanga o Kyoto, nā te mea, kua iti iho te puta o te haurehu kati mahana. Mā te hoko atu i ngā whiwhinga waro ka riro mai he pūtea ki te Kaunihera. Mā ēnei pūtea ka taea e rātou te whakatū tētahi atu pūnaha pēnei te āhua, e ōrite ana rānei te whāinga.



Ka tahuna te haurehu mewaro kia puta ai te hiko. Ko te "Cogene Plant" tēnei mīhini.

Nā ngā para o te tangata tēnei hiko. He aha ētahi atu pūtake ka taea te whāwhā atu hei whakaputa i te pūngao?

Tūhuratia te mahi hokohoko i ngā whiwhinga waro. He painga ki ētahi motu, engari ka puta he painga ki te katoa?

He Kupu Taka

ewaro	<i>ethanol</i>
haepapa	<i>responsible, responsibility</i>
hauhā	<i>carbon-dioxide</i>
haurehu kati mahana	<i>green-house gas</i>
hinu	<i>oil</i>
hinu māori	<i>crude oil</i>
Initonīhia	<i>Indonesia</i>
kaikaha	<i>pulp</i>
kaipūhanga	<i>engineer</i>
kapuni	<i>gas</i>
kōhauhau	<i>atmosphere</i>
kōhinu	<i>petrol</i>
kakau	<i>stem</i>
kora	<i>fuel</i>
kora koiora	<i>bio-fuels</i>
koranehe	<i>fossil fuel</i>
mewaro	<i>methane</i>
ngingiha	<i>combust/burn</i>
papatipu koiora	<i>bio-mass</i>

para kore	<i>zero waste</i>
Parī	<i>Paris</i>
Parīhi	<i>Brazil</i>
pouaka nihiwhiti	<i>generator</i>
pūkaha	<i>engine</i>
pūkohu wai	<i>algae</i>
pūnaha	<i>system</i>
pūnaha para tinana	<i>sewerage treatment system</i>
rauopi	<i>living organisms</i>
rautaki	<i>strategy</i>
rawa whakahou	<i>renewable resource</i>
rita	<i>litre</i>
ruapara	<i>landfill</i>
tākohu	<i>vapour</i>
tana	<i>tonne</i>
tukurua	<i>recycle</i>
waro	<i>carbon</i>
whakanao	<i>produce</i>
whiwhinga waro	<i>carbon credit</i>



Te Marautanga o Aotearoa

I ahu mai ēnei kōrero i Te Marautanga o Aotearoa

Ko te iho o te hangarau kei te waiata e whai ake nei. Mai i te whakaharatau hangarau a ō tātou tūpuna tae noa ki ngā tukanga hangarau o te ao hurihuri, i whakatakotohia e ō tātou tūpuna he huarahi hei whāinga mā tātou.

Tikina atu i tuawhakarere
I te ao kōhatu
Ngā mōhiotanga o rātou mā
Hei kawē i a tātou i roto i te ao tūroa
Kua takoto kē te whāriki i rarangahia e rātou
Wānangahia, tuakina kia tau
Rangahaua kia maumahara
Manakohia kia whiwhi ai
Te mātauranga Māori motuhake

Kia tipu ake te kākano hangarau ki ā tātou ākonga, me whakawhiti kōrero, me raweke, me whakamātau kia mau tonu.

Te whaitake o te ako i te hangarau

Me whaitake ngā kaupapa hangarau kia kore ai e whāia mō te kore noa iho.

Mā te hangarau ka tū rangatira ngā ākonga. Hei whakahiato i ngā mōhiotanga hangarau, ka tīmata i te ao Māori me tōna hāngai ki te ao hurihuri. Me aro anō ki ngā uara, ngā pūkenga, me ngā mōhiotanga hangarau o te ao e taunga ana ia.

Te hanga o tēnei wāhanga ako

E rua ngā whenu, ko Ngā Āhuetanga o te Hangarau me Te Whakaharatau Hangarau. Kātahi ka taka mai ki ngā aho hangarau e rima. Ko te Hangarau Koiora, Te Tuku Mōhiotanga, ko Ngā Hanga me ngā Pūhanga Manawa, ko Te Tāhiko me te Hangarau Whakatika, me te Hangarau Kai.

E tika ana kia tūhuratia ngā āhuetanga o ngā momo matū kei ia kaupapa hangarau. Ā, he wāhi anō mō te āta whakaaro ki te taha hātepe me te taha whakanao. Kei roto aua wāhanga i te mahere hoahoa a te ākonga.

He rerekē ngā mōhiotanga kei ia whenu. Me hono ngā whenu e rua ki ngā aho kua kōwhiritia hei tūāpapa mō te mahi hangarau. Mai i te kaupapa whānui ka taka iho ngā aho hei āwhina. Tērā pea e rua, e toru rānei ngā aho e hāngai ana. Me hāngai te aromatawai ki ngā whāinga kei ngā whenu.



Ngā āhuatanga o te hangarau

Ka whakaahuatia te whakaharatau hangarau e:

- ngā tāngata me ō rātou āhuatanga katoa;
- ngā hiahia me ngā huarahi wātea o te ao whānui.

Ka rangahau, ka tūhura ngā ākonga kia mārama ai rātou ki ngā uara me ngā whakapono o te tangata, kia mārama anō ki te pāpātanga o aua āhuatanga ki te whakahiato hangarau.

Ka mōhio ki te tiaki whenua, ki te tiaki taiao, me te pāhekotanga i waenganui i te whakaharatau hangarau me te haporī. Ko te ira atua, ko te ira tangata e noho ngātahi nei te tangata me te whenua.

Me whakaaro ki ngā mahi toitū a ngā tūpuna tae noa mai ki tēnei wā. Me āta titiro ki te pānga o te otinga hangarau ki a Papatūānuku rāua ko Ranginui.

Toitū te whenua, whatungarongaro te tangata. Toitū te whenua, toiora te tangata.

Te whakaharatau hangarau

I roto i tēnei whenu ka pakari haere ngā mōhiotanga me ngā pūkenga hangarau. Ko te whakaharatau hangarau te tōpūtanga o ngā mōhiotanga me ngā pūkenga e puta ai he otinga.

Ētahi pūkenga hangarau:

- te whakaraupapa i ngā mahi hei hātepe;
- te tautohu i ngā hiahia me ngā huarahi wātea hei painga mō te tangata;
- te arotake i ngā hātepe me te otinga i runga i te aro nui ki te take;
- te tīpako me te whakamahi i ngā mātāpono hangarau;
- ngā pūkenga ā-ringa, ngā pūkenga auaha e puta ai he otinga.



Ētahi mōhiotanga hangarau:

- ngā mahi hangarau a ngā tūpuna tae noa ki ēnei wā;
- te āheinga ki te whakatutuki i tētahi hiahia i runga i te tika;
- kia mārama ngā ākonga ki ngā hapori, ki ngā ahurea me ngā tāngata taketake;
- kia mārama ngā ākonga ki ngā mātāpono hangarau me te tika o te whakamahi.

Ngā Aho	Hei whakamārama
Hangarau Koiora	Ko tā te hangarau koiora, he whakamahi i ngā pūnaha whai oranga hei raweke i ngā tukanga māori, hei painga mō te tangata. Tērā pea ko te whakatipu ā-wai, ko te rongoā, ko te tiaki rauropi rānei e tata korehāhā ana. Ka whai wāhi hoki ki te tūhura i ngā tini āhuatanga o te raweke ira.
Te Tuku Mōhiohio	Ko te tuku mōhiohio he whakawhiti mōhiotanga, arā ko te reo, me ngā toi ataata pērā i te whakairo, tae atu ki te tuhi, mā te pene, mā te rorohiko, mā te aha atu rānei. He tirohanga whakamua, whakamuri hoki.
Ngā Hanga me ngā Pūhanga Manawa	Ka tīmata te hanga ki ngā hanga māmā noa, pērā i te pouaka kawē, ka piki ake ki ngā hanga uaua, pērā i te pā tuna, i te tāwhiti kiore, i te manu aute. Ka mārama ki te hononga me te pānga i waenganui i ngā wāhanga o te hua, me te tino take o ia wāhanga.
Te Tāhiko me te Hangarau Whakatina	Ko te tāhiko te hoahoa, te hanga, me te whakanao i ngā pūnaha hiko me ngā pūrere tāhiko. Ko te hangarau whakatina te whakahaeretanga o ēnei pūnaha pūrere tāhiko.
Hangarau Kai	Ko te hangarau kai ko ngā āhuatanga katoa o te whakatipu, te hauhake, te tohu, te tunu, te rokiroki me te tākai kai. Ka tūhuratia hoki ngā āhuatanga kawekawe o ngā tūmomo kai hei whakahiato i ētahi atu kai.

Taumata 6

Ngā Āhuatanga o te Hangarau

1. Ka tirohia ngā uara me ngā whakapono o iwi kē, ka:
 - whakahāngai ki te otinga;
 - mōhio ki ngā whakaharatau;
 - whakarite ki ngā hangarau a tangata kē;
 - mārama ki ngā ārai me ngā huarahi wātea ka taea.
2. Ka tūhura i ngā āhuatanga matua o te tangata e pā ana ki:
 - ngā pūnaha, ngā tukanga rānei;
 - te hiahia o ngā kiritaki;
 - ngā rautaki whakatairanga ki te kiritaki.

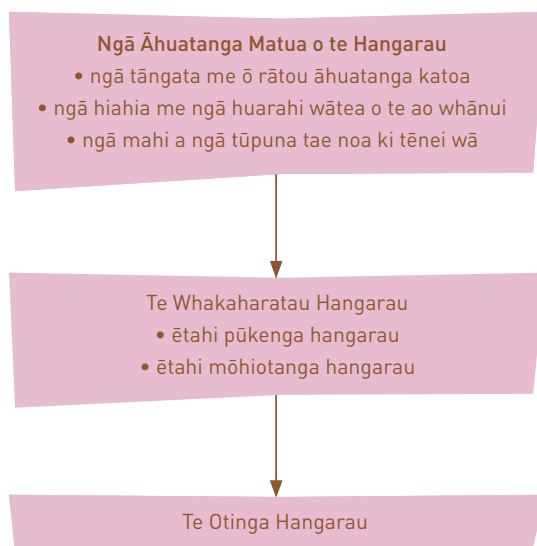
Te Whakaharatau Hangarau

3. Ka arohaehae i ngā whakatakotoranga hoahoa whaiaro, ā ētahi atu hoki, hei āwhina.
4. Ka whakamātautau i ngā raraunga me ngā mōhiotanga hou kia puta ai he otinga tika.

Te Whakawhanaketanga o te Otinga Hangarau

E whakarāpopoto ana te hoahoa i raro nei i te ara e puta ake ai he otinga hangarau. Heoi, ehara i te mea ka āta whāia tēnei raupapa i ngā wā katoa; ka āhua haere kōtuitē te mārama haere ki ngā āhuatanga matua o te hangarau me te whakaharatau hangarau, e puta ai te otinga hangarau ā tōna wā.

Te whakawhanaketanga o te otinga hangarau



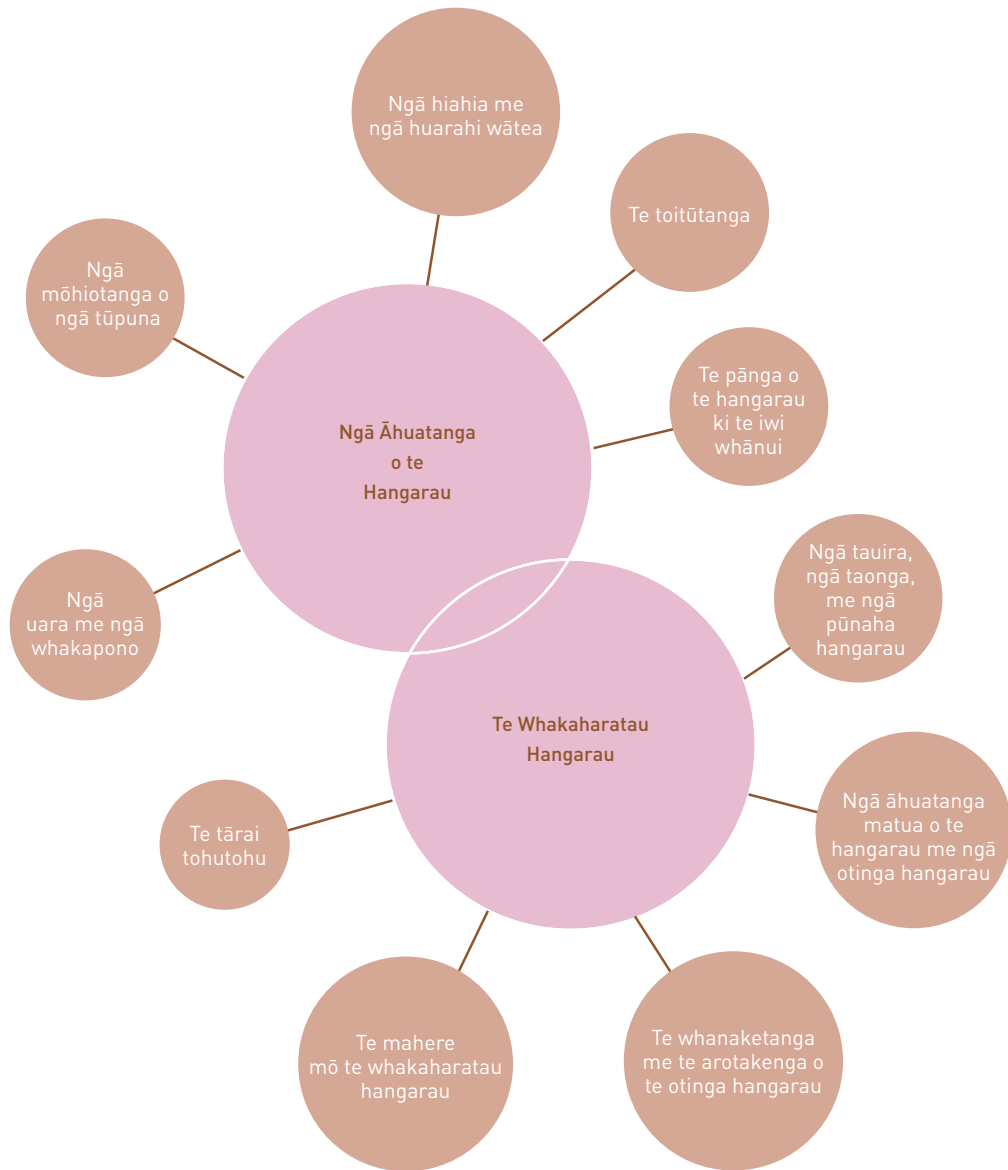
Kei te whakaatu tēnei tauira o te whakawhanaketanga otinga i te tukanga hangarau e puta ai he otinga hangarau. E whakaataria ana anō hoki tēnei i te anga e whai ake nei.





Te Anga Whakaū Māramatanga ki te Tukanga Hangarau

Ngā āhuatanga māramatanga ki te tukanga hangarau



He Kupu Taka

āhuatanga hangarau	technological characteristic/feature	ngā tauira, ngā taonga, me ngā pūnaha hangarau	technological models, products, and systems
āhuatanga māramatanga ki te tukanga hangarau	characteristics/features for understanding the technological process	otinga hangarau	technological outcomes
āhuatanga matua	key characteristic/feature	pānga ki te iwi	impact on society
arotakenga	evaluation	tārai tohutohu	brief development
hiahia me ngā huarahi wātea	needs and opportunities	toitūtanga	sustainability
mahere	plan	uara	values
mōhiotanga o ngā tūpuna	knowledge tūpuna have	whakaharatau hangarau	technological practice
		whakapono	beliefs
		whanaketanga	development

Te Whakaharatau Hangarau

Te tārai tohutohu

Ka whakatakotoria he tohutohu hei āta whakaahua ā-kupu i te otinga e wawatatia ana kia puta hei whakatutuki i tētahi hiahia, i tētahi huarahi kua wātea, i tētahi take rānei. Mā ngā tohutohu e āta whakaatu ngā mahi kia mahia, ā, he aha te take me mahi aua mahi. Ka tuhia ngā tohutohu hei whakapuakitanga huatau.

I roto i ngā tohutohu, me mātua tautohu:

- te otinga e tūmanakotia ana kia puta;
- te hiahia, te huarahi rānei e wātea ana;
- he whakapuakitanga huatau;
- ngā whakatakotoranga whāiti;
- te taiao tūturu me te taiao pāpori;
- te arotakenga a ngā hunga whai pānga mai.

Āta whakaarohia tāu i pānui ai i tēnei pukapuka me tāu i kite ai i te kōpae ataata mō te hanganga o te kora koiora ki te para. Mā te whakautu i ētahi o ngā pātai e rārangi iho nei, ka āwhinatia koe ki te whai whakaaro ki ngā tohutohu tērā pea i whakatakotoria mō te hanganga o tēnei hangarau.

Hei whakautu i ēnei pātai, me whiriwhiri anō ko wai ngā hunga whai pānga mai ki ngā kora koiora. Ko ngā hunga whai pānga mai ngā tāngata me ngā rōpū ka puta he otinga – ahakoa pai, ahakoa kino – ki a rātou i ngā kora koiora, ka whakamahi rānei i ngā kora koiora.

- Ko wai mā rātou?
- Ko koe anō tētahi?
- Ka pēhea ētahi atu o tō whānau?
- Ka pēhea te kāwanatanga?
- Ka pēhea te iwi kāinga?
- Ka pēhea ngā kaiwhakarato kora nunui e tuku kora ana ki ngā toa hoko kōhinu?
- Mō tēnā, mō tēnā hunga whai pānga mai kua tautohua, matapakihia ngā otinga tērā e hiahia ana rātou kia puta i te whakaratonga o ngā kora koiora. Tuhia anō ngā take i pēnei ai ō whakaaro.

I āta tautohua ngā hiahia o ēnei huinga tāngata katoa i roto i ngā tohutohu?

- Āe rānei he mea nui kia tautohua ngā hiahia o te katoa i roto i ngā tohutohu? He aha ai?

He aha ētahi o ngā huarahi wātea i whakaarohia i te whakawhanaketanga o ngā kora koiora?

- Āe rānei e takea tūturutia mai ana i te para, i te rāpihi?

Ka pēhea te āhua o te whakapuakitanga huatau?

- Whakaarohia te otinga e whāia ana kia puta, ā, he aha i kīia ai he mea nui kia puta taua otinga.

Āta whakaarohia ngā whakatakotoranga whāiti ka kuhuna ki ngā tohutohu mō te hanganga o te kora koiora.

- He aha aua whakatakotoranga, ā, he aha ētahi take e hurihia ai aua whakatakotoranga?



- Mō te wāhi ki te taiao tūturu, ki te ao tūroa, he aha ētahi āhuatanga me mātua wānanga ina hangaia he kora koiora ki te rāpihi?
- Arā anō te taiao pāpori, e whai wāhi mai ai ngā take matatika, ngā take tōrangapū, ngā take ahurea, me ngā take ohaoha. He aha te pānga o ēnei āhuatanga e whā ki te whakawhanaketanga o ngā kora koiora?

Mō te arotakenga a te hunga whai pānga mai, ka tonoa aua huinga tāngata kia arotake i te pānga (he pānga tūturu, he pānga rānei tērā pea ka ara ake) o ngā kora koiora ki a rātou.

- Ka pēhea te whakahaere a ngā kaitārai tohutohu i tēnei momo arotakenga?
- I pēhea te whakahaerenga o te arotakenga mō ngā kora koiora e tirohia ana i konei? I whaihua anō?
- Me pēhea e mōhiotia ai mēnā i whaihua te arotakenga a ngā rōpū whai pānga mai?

He Kupu Taka

arotakenga	<i>evaluation</i>	tautohu	<i>identify</i>
hunga whai pānga mai	<i>stakeholders</i>	te hiahia, te huarahi rānei e wātea ana	<i>need or opportunity</i>
otinga e tūmanakotia ana kia puta	<i>desired outcome</i>	tohutohu	<i>brief</i>
taiao pāpori	<i>social environment</i>	whakapuakitanga huatau	<i>conceptual statement</i>
taiao tūturu	<i>physical environment</i>	whakatakotoranga whāiti	<i>specification</i>

Te mahere mō te whakaharatau hangarau

Ina whakapaua he kaha kia whaihua tonu te mahere, ka pai noa ake te whakaharatau hangarau.

Ko te mahere, ko te āta whakariterite i a koe mō te wāhi ki ngā mahi kei mua i a koe. Ko te whakamahere i runga i te whaihua, ko te āta whakatina i ngā rauemi (pērā i ngā rawa, i te wā, me ngā tāngata) kia tino puta ai ngā painga.

Hei wāhanga o te mahere, ka whakahuatia ētahi putanga matua kia ea i te ekenga o ia wāhanga matua o te kaupapa, āhea, ā, ka pēhea te whakamahi i ngā rauemi i ea ai aua putanga.

Arā ētahi momo āwhina ka kīia he “taputapu” mahere, koia ētahi ko: te ohia manomano, te mahere hinengaro, te tahua whakaaro, te hautaka huritao, te pukapuka kohinga kuha, te mahere whakatutuki, te tūtohi Gantt, te hoahoa ripo, te kaitātai ataata, tae atu ki ētahi tikanga whakakaupapa, tikanga hoahoa.

Heoi anō, ko te taputapu e kōwhiria, ko tērā e rite ana, e hāngai pū ana ki te mahi.

Mā te whakamahi taputapu mahere, ka taea te anga whakamuri ki ngā mahi kua mahia kētia, ka whakahāngai ai ki tāu e mahi ana i nāianei, me ngā rā kei mua i te aroaro. Ko te tātari hoki tētahi wāhanga nui o ngā mahi whakariterite. Kia rite tonu te āta tiroiro i ō mahi, kia mōhio ai koe āe, e whaihua ana, pēhea kē rānei.

He mea nui anō kia tāwariwari te mahere, engari kia pakari tonu te hanga.

Ko te mahere tāwariwari, ko te mahere e taea ana te kuhu atu ētahi whakarerekētanga ki roto, nā runga anō i ngā mahi arotake i te pai, i te whaihua o ngā mahi e kawea ana.

Ko te mahere pakari, ko te mahere ka tū tonu, ka haere tonu ina kuhuna atu ēnei whakarerekētanga.

Āta whakaarohia te ruapara toitū e whakaputa ana i te haurehu mewaro e hangaia ai te hiko. E mārama ana te kite atu he nui ngā mahi whakariterite mō tēnei kaupapa.

Whakaarohia ngā wāhanga katoa o te tukanga hangarau e hua ake ai he otinga hangarau.

- He aha te otinga hangarau i konei?
- He aha katoa ngā takahanga i whāia e puta ai te otinga?
- He aha ki ō whakaaro ngā taputapu mahere i whāia?
- Kotahi noa te taputapu, he maha kē rānei?

Tirohia ngā kōrero, mātakihia te ataata kia pai ai tō tautohu i ngā taputapu mahere i whakamahia. Ki te kore e tere kitea, māu tonu e whiriwhiri ētahi taputapu e hāngai ana ki tēnā, ki tēnā takahanga o te waihanga ruapara e hāpai ana i ngā tikanga toitūtanga.

- Ki tō titiro, i rawaka anō tā rātou whakawhiti whakaaro tahi ki te iwi kāinga me ngā tāngata noho tata?
- He aha te momo taputapu e rite ana mō tēnei tūāhua?

Whakaarohia ngā wāhanga o te whakatū ruapara kāore e kore i āta whakaritea, me te tuhi i tētahi taputapu mahere e hāngai ana, ka whakamārama anō he aha i hāngai ai ko tērā ki te mahi i tohua māna. Mā konei e kitea ai mēnā e hāngai ana te taputapu mahere ki te kaupapa i tohua māna. Tuhia he tūtohi kia pēnei te āhua:

Āhuatanga	Taputapu mahere	Te hāngai pū ki te mahi kua tohua māna
Te ruapara		
Te kōhi i te haurehu mewaro		
Te whakaputa hiko		
Te kawē i te hiko i te puna hiko		

Hei āwhina i a koe ki te whakakā i tēnei pouaka, pātaihia te pātai e whai ake nei: He aha te take koinei te taputapu mahere pai katoa hei whakatutuki i tēnei āhuatanga?

He Kupu Taka

e hāngai pū ana ki te mahi	<i>fitness for purpose</i>
hautaka huritao	<i>reflective journal</i>
hoahoa ripo	<i>flow diagram</i>
kaitātai ataata	<i>graphical organiser</i>
mahere hinengaro	<i>mind map</i>
mahere pakari	<i>robust plan</i>
mahere tāwariwari	<i>flexible plan</i>
mahere whakatutuki	<i>plan of action</i>

ohia manomano	<i>brainstorm</i>
pukapuka kohinga kuha	<i>scrapbook</i>
tahua whakaaro	<i>idea bank</i>
taputapu mahere	<i>planning tool</i>
tikanga hoahoa	<i>diagramming technique</i>
tikanga whakakaupapa	<i>structuring technique</i>
tūtohi Gantt	<i>Gantt chart</i>

Te whanaketanga me te arotakenga o te otinga hangarau

Ko te whakamau atu mō te whakaharatau hangarau, kia puta tētahi otinga hangarau e hāngai ana ki te mahi i whakaritea māna i te tīmatanga, arā, i roto i ngā tohutohu. Tērā pea he momo taonga tonu te otinga e taea ana te whāwhā, tērā rānei he pūnaha.

Hei whakawhanake i tētahi otinga, me hihiri ake ngā whakaaro auaha, kātahi ka whakapaipai haerehia ēnei i runga i ngā kitenga rangahau, i ngā whakamātautau, i ngā mahi tātari, i ngā mahi whakamātau papanga, tae atu ki te arotakenga i runga i ngā kōrero whāiti i tuhia ki ngā tohutohu.

Me kī ko te whakawhanake otinga me te whakaharatau ngā takahanga whakamātau, waihanga o te whakaharatau hangarau.

Tērā tonu ka puta ētahi otinga waenga i te whakawhanake haeretanga o te otinga whakamutunga. Ko tā aua otinga waenga, he tautoko i te neke whakamua o ngā mahi whakawhanake, he whakaatu rānei he pai ake kia hikina ngā mahi, kia mahia ai ētahi whakarerekētanga, me whakamutu katoa atu rānei.

He tauira ēnei e whai ake nei o ētahi otinga waenga o ngā mahi whakaharatau hangarau:

- He rangahau mēnā ka taea te mea e wawatatia ana.
- He tohutohu kua oti te tārai?
- He whakaahua hukihuki o te huatau.
- He whakaaritanga ā-rorohiko.
- He tauira pakupaku.
- He tauira taketake.

Ka pai ake ngā mahi whakawhanake otinga mēnā ka āta whakaaturia ngā whakaaro kia mārama tonu ki ngā rōpū mātāmua e whai wāhi mai ana, me te whakamahi i ngā hoahoa me ērā atu tikanga ataata hei whakawhiti whakaaro.

Tēnā kia whāiti te titiro ki ngā kōrero me te kōpae ataata mō te ruapara aro nui ki te toitūtanga.

- Ki ō whakaaro, e hāngai pū ana te ruapara (arā, te otinga) ki te mahi i whakaritea kia tutuki i a ia i te tohutohu? Tuhia ngā take i pēnei ai tō whakatau. Me mahi koe ki te āta tūhono i te otinga ki te mahi i whakaritea māna. Ki te kore e hāngai pū, whiriwhiria he aha kē ngā mahi e tika ana kia mahia e ngā ringa whakawhanake.
- Kei te kite anō koe i ētahi tohu o te whakaaro auaha i roto i ngā mahi hoahoa, me te mahi rangahau hei whakapaipai haere i aua whakaaro?
- Me haere ki hea ki te kimi i ngā rangahautanga mō ngā wāhi tuku para e hāpai ana i ngā tikanga toitū? Me pēhea koe e mōhio ai e pono ana ngā kitenga o te rangahautanga?
- He pēhea tā rātou whiriwhiri i te matū tino pai hei waihanga i ngā wāhanga o te ruapara?
- Ki ō whakaaro, i pēhea tā rātou whakamātau i te otinga e tūmanakohia ana kia puta?
- Ko hea ngā wāhi o te ara whakawhanake e tika ana kia kōrero ngā ringa waihanga ki ngā tāngata whai pānga mai ki te kaupapa?

- Ko te otinga o tēnei tukanga whakahaere ruapara e puta ai he haurehu mewaro hei hanga hiko, he taonga, he pūnaha, ko ngā mea e rua rānei?
- Me noho wehe pea ngā whakatau mō te ruapara, te haurehu mewaro, me te hiko. He aha ētahi otinga waenga e taea ana?

He Kupu Taka

arotakenga	<i>evaluation</i>	tohutohu kua oti te tārai	<i>formalised brief</i>
e hāngai pū ana ki te mahi	<i>fitness for purpose</i>	whakaahua hukihuki o te huatau	<i>concept sketch</i>
otinga hangarau	<i>technological outcome</i>	whakaaritanga ā-rorohiko	<i>computer simulation</i>
rangahau mēnā ka taea	<i>feasibility study</i>	whakaaro auaha	<i>creative thinking</i>
takahanga whakamātau	<i>trialling</i>	whakamaunga	<i>ultimate endpoint</i>
tauirā pakupaku	<i>scale model</i>	whanaketanga	<i>development</i>
tauirā taketake	<i>prototype</i>		

Ngā āhuatanga matua o te hangarau me ngā otinga hangarau

Ngā āhuatanga o te hangarau

Ko te hangarau tētahi o ngā kawenga ahurei a ngāi tāua. He pānga nui whakaharahara ōna ki te ao e noho nei tātou, me te āhua tonu o tā tātou noho ki te ao. He whāinga kei te tūāpapa o ngā mahi hangarau, ā, he haere kōtui te hangarau ki ngā āhuatanga pāpori me ngā āhuatanga ahurea. Nō reira ko ngā kawenga, arā, ko ngā whakaharatau hangarau te hua o te kōkiri a te tangata i ngā hiahia me ngā koronga. Ka hua ake te otinga i te tukanga hoahoa i āta whakaarohia, i āta tāraia, kāore i pōkerekēhū noa te puta ake.

Mā te hangarau ka kaha ake te āhei o te tangata ki te huri i ngā matū, i ngā pūngao, me ngā mōhiotio.

He auaha tonu te āhua o te whakaaro me te mahi a te ringa hangarau. Me āta wānanga e ia ōna whakaaro tīmatanga me ōna huatau hoahoa. Me whakaaro arohaehae ki āna mahi, ka tuketuke i ngā pou aronui, ka ako mai i ngā mahi o mua, ka āta whakaaro anō ki ngā rā kei tua, i a ia e whakawhanake ana i ōna whakaaro. Ā, me whai whakaaro anō ia mēnā ka taea anō te mea e whāia ana e ia, mēnā rānei ka paingia, ka pīrangitia taua mea.

Me aro anō te ringa hangarau ki te hanga whakatau i runga i te whakaaro whitake, i te āta wānanga. E rua ngā momo āta wānanga, ko te āta wānanga taha whakatinana, me te āta wānanga taha painga. Ko te taha whakatinana, e anga ana ki te āhua o te kawē i tētahi mahi e tutuki pai ai. Ko te taha painga, e anga ana ki tērā e tika ana, i runga i te aro nui ki ngā āhuatanga pāpori, ngā āhuatanga matatika, ngā āhuatanga ahurea. Ka arotahingia te mea e “tika” ana, e “hē” ana rānei, e “pai” ana, e “kino” ana rānei, ki te mea e whai uara ana, e uara kore ana rānei. Heoi anō, katoa ēnei, kei te āhua tonu o te titiro a te tangata nāna ngā whakatau – ōna uara, ōna whakapono, ōna māramatanga, ōna mōhiotanga.



Ko tā te hangarau, he whakamahi i te mātauranga hangarau, he whakaputa anō i te mātauranga hangarau hou. Kei te rere tahi te mātauranga hangarau me te taha whakatinana, ā, ka whai mana taua mātauranga ina kawea ake e te hāpori hangarau hei whakatinana i tētahi otinga. Heoi anō, ehara i te mea ka puta he otinga hangarau i ngā whakaharatau hangarau katoa. He wā anō e whakaata kē ana te mea ka puta ake i ngā whakatau katoa i tatū taka mai ki tērā wā.

E hono tahi ana te hangarau ki ngā āhuatanga me ngā pūnaha whakaaro o roto i ngā tau, ki ngā pānga pāpori, me ngā pānga ahurea. He awe nui tō ēnei mea katoa ki ngā hangarau ka whanake ake, me te āhua tonu o te whanake ake o aua hangarau.

E tutuki pai ai te whakaharatau hangarau, me nanao atu te hinengaro ki ngā mātauranga hangarau me ngā mātauranga o kaupapa kē, pērā i te pūtaiao, i te pāngarau. Nō reira, he wā anō me mahi tahi ngā ringa hangarau ki ngā tohunga o ērā atu kaupeka mātauranga.

Ngā āhuatanga o ngā otinga hangarau

Ko te otinga hangarau, he taonga ka taea e te ringa te whāwhā, he pūnaha rānei i waihangatia mā roto i te whakaharatau hangarau, hei whakatutuki i tētahi mahi, ā, ka tū mai ki tōna wāhi e tika ana. Ka arotakea i runga anō i tōna pai ki te kawea i te mahi i whakaritea māna. Ko te kōrero “ki tōna wāhi e tika ana”, e mea ana kei te whakamahia te otinga hangarau e te hāpori hangarau.

He tūātitini te hononga i waenga i ngā taonga hangarau me ngā pūnaha hangarau. Ka mutu, ko te whakatau he taonga rānei, he pūnaha rānei, kei te āhua tonu o te titiro ki taua mea. Hei tauira, ka taea te kī he pūnaha te waea pūkoro, ka taea anō te kī he taonga.

He otinga hangarau ngā mea o te ao mariko (pērā i te pūmanawa rorohiko, i te whakaahua ā-mati, i te aha atu), tae atu ki ngā hanga e taea ana te whāwhā ki te ringa (pērā i te rorohiko, i te arawhiti, i te waka, i te rongoā, i te aha atu).

He hanga “matarua” te otinga hangarau. He āhua taha ōkiko tōna, arā, ko tana hanga tonu tērā; ā-waho, ā-roto. He āhua whakatinana anō tōna, arā, ko ngā mahi ka taea e ia. Me mōhio te ringa hangarau ki ēnei mata e rua, me te hononga i waenganui, e tutuki pai ai tana whakaharatau hangarau.

Hei tārua ake i ēnei kōrero o runga ake, ka taea te whakaahua te otinga hangarau i runga i ōna āhuatanga ōkiko, i ōna āhuatanga whakatinana, otirā, me te whai whakaaro anō ki ngā āhuatanga pāpori me ngā āhuatanga nui kua pā i roto i ngā tau.

Kia whāiti anō te titiro ki te huringa o ngā rāpihi o te ruapara hei hiko, e kitea rā i te kōpae ataata mō tēnei kaupapa. Me āta whai whakaaro anō ki ngā āhuatanga o te hangarau kua kōrerotia i runga ake nei. Ko ngā pātai i raro nei hei ārahi i ō whiriwhiringa.

- He pānga anō ō tēnei kawenga ki te āhua o tā tātou noho ki te ao, o te noho rānei a ētahi atu ki te ao?
- He tāngata tonu kei te kōkiri i te kaupapa?
- I hua ake te kaupapa i ētahi āhuatanga pāpori, i ētahi āhuatanga ahurea?
- Kimihia te tikanga o tēnei, me te whakahāngai i te whakamāoritanga ki tēnei kaupapa.
- He rerekē anō te āhua o te titiro ki te hau mewaro ka puta ake, te hiko ka hua ake, me te tukanga whānui?

- He aha te hiahia pāpori?
- Āe rānei he hiahia ahurea e whai wāhi mai ana?
- He aha te tukanga hoahoa i āta whakatakotoria mō tēnei kaupapa?
- He aha ngā momo whiriwhiringa me mātua whai i te tīmatanga o tēnei kaupapa?
- He aha te huarahi whakaaro i takahia e hua ake ai te hau mewaro hei hanga hiko mai i te putunga rāpihi noa?

Whakaarohia ngā momo rangahautanga i whāia. Rapua te tūāpapa mātauranga e neke whakamua ai tēnei kaupapa.

Arā ētahi tauira o te whakaaro arohaehae i roto i te hanganga o te pūnaha nei. Matapakihia ēnei. Kāore e kore i uru mai anō te ako i ngā āhuatanga o mua, me te whiriwhiri ka pēhea te āhua i ngā rā kei te tū mai.

- Ki ō whakaaro, ko te māharahara nui o te ao mō ngā putanga haurehu kati mahana me te mahana haere o te ao ētahi mea i whai wāhi mai ki ngā whiriwhiringa?

Kimihia te roanga atu o ngā kōrero mō ēnei mea e rua: āe rānei ka taea, ka tutuki te kaupapa?; āe rānei ka paingia, ka pīrangitia e te iwi nui tonu? Whakahāngaitia ēnei pātai ki tēnei kaupapa nei.

- Me pēhea koe e mōhio ai mēnā ka tū tonu, ka tōtika tonu tētahi hanga, ahakoa pēhea?
- Ka pūmau tonu tana mahi tika i te mahi?
- Āe rānei ka taea te whakatū, ahakoa ngā here, (ahakoa ngā whakararu e pāpā mai ana? Hei tauira, ki tā Pita ko te rahi o te ruapara tētahi mea nui. Ki te iti rawa, e kore e whaihua. Nō reira he tauira tēnei o tētahi āhuatanga e kore ai e tutuki pai te kaupapa.)

Ko tētahi atu āhuatanga nui o te hangarau, ko te hanga whakatau i runga i te whakaaro whaitake, i te āta wānanga. Kimihia ngā wāhi i tū ai te āta wānanga taha whakatinana i roto i tēnei kaupapa. He māmā ake te whai haere i te wānanga taha whakatinana, i te mea e aro ana ki ngā pātai me pēhea e tutuki ai tētahi mea, ā, he aha i tutuki ai tētahi mea.

He rehurehu ake te āta wānanga taha painga, i te mea ka uru mai ko ngā whakaaro o ētahi atu. Ka oti i te tangata he whakatau i runga anō i te āhua o ōna uara, ōna whakapono, ōna māramatanga, ōna mōhiotanga, ā, e kore pea tātou e mōhio pū ki ēnei āhuatanga i ētahi atu – he kokonga ngākau, he kokonga hinengaro e kore e kitea!

Ko ngā pātai i te tūtohi nei hei ārahi i a koe ki te wherawhera i te āta wānanga taha painga:

Koinei ngā momo pātai ka tirohia i raro i te wānanga taha painga	
E tika ana anō kia mahia te mahi nei? >	Mā tēnei pātai ka taea te parahau te hangarau i runga anō i ngā āhuatanga pāpori, ngā āhuatanga matatika, ngā āhuatanga tikanga ā-iwi.
Hei whakautu i te pātai i runga ake, me whai whakaaro anō ki ēnei pātai. >	He aha tēnei mea te tika, tēnei mea te hē? He aha tēnei mea te pai, tēnei mea te kino? He aha ngā mea e whai uara ana, he aha ngā mea kāore e whai uara ana?
Ko ngā whakautu ki ēnei pātai katoa, kei te āhua tonu o te tangata, ōna uara, ōna whakapono, ōna māramatanga, ōna pūkenga.	

E tika ana kia taea e te otinga hangarau te mahi i whakaritea māna, i te wāhi e tika ana mōna. Kāore he take mēnā ka tika te mahi i te whare hoahoa anake,





i te whare pūtaiao anake. Me pēhea e mōhiohia ai ngā ringa hangarau mēnā ka taea e tēnei kaupapa te mahi kua whakaritea māna?

Ahakoia he rerekē te taonga hangarau i te pūnaha hangarau, he wā anō ka haere kōtahi ēnei mea e rua i te otinga hangarau kotahi. E mārama ana te kite atu he pūnaha te Awapuni Sustainable Development Centre, he taonga te hau mewaro me te hiko. Ka oti mai anō ngā taonga nei ki te kore he pūnaha?

Āta whakaarohia ngā āhuatanga ōkiko me ngā āhuatanga whakatinana o te pūnaha. Whakaahuatia te otinga hangarau i runga anō i te āhua o ēnei āhuatanga, kātahi ka tuitui atu ki te horopaki pāpori me te horopaki aro whakamuri e hāngai ana.

Hei tauira, whāia tētahi ara whakaaro pēnei nā:

Ka hangaia te pūtahi paenga para toitū ki _____ kia taea ai _____, nā runga i te hiahia o te hāpori ki _____. Mā konei ka mōhio rātou _____. Whakakāia ngā wāhi kua tohua ki te taiapa ki ēnei kōrero:

- ngā matū/raua pai hei hanga i ngā pūrere, tae atu ki te pukuhiko
- te kapo te pūngao matū (te hau mewaro) ka hurihia hei hiko
- te whakaputa hiko me te kore e whakaputa i te haurehu kati mahana, he mea hanga anō ki te para
- e whai ana rātou ki te whakaiti ake i ngā putanga waro

Tukuruatia tēnei tāpaenga kōrero me te whakaata i te titiro a Pita, a te kaunihera, me tētahi tangata e hari ana i āna rāpihi ki taua ruapara. Ka rerekē anō ngā tāpaenga kōrero nei? E tika ana anō kia rerekē?

He Kupu Taka

āhua taha ōkiko	<i>physical nature</i>	mahi i whakaritea māna	<i>fitness for purpose</i>
āhua taha whakatinana	<i>functional nature</i>	mariko	<i>virtual</i>
āhuatanga ahurea	<i>cultural features</i>	matarua	<i>dual nature</i>
āhuatanga matua	<i>key characteristics/features</i>	mātauranga hangarau	<i>technological knowledge</i>
āhuatanga ōkiko	<i>physical properties</i>	otinga hangarau	<i>technological outcome</i>
āhuatanga pāpori	<i>social features</i>	pūnaha	<i>system</i>
āhuatanga whakatinana	<i>functional properties</i>	taonga hangarau	<i>technological product</i>
hāpori hangarau	<i>technological community</i>	tūātititini	<i>complex</i>
huatau hoahoa	<i>design concepts</i>	tukanga hoahoa	<i>design process</i>
huri i ngā matū, i ngā pūngao, me ngā mōhiotia	<i>transform materials, energy, and information</i>	wāhi e tika ana	<i>in situ</i>
kawenga	<i>activity</i>	wānanga taha painga	<i>practical reasoning</i>
mahi	<i>function</i>	wānanga taha whakatinana	<i>functional reasoning</i>
		whakaaro arohaehae	<i>think critically</i>

Ngā tauira, ngā taonga, me ngā pūnaha hangarau

Te whakatauiranga hangarau

Ko tēnei mea te tauira, he whakaaturanga o tētahi mea tūturu. I te ao hangarau, whakamahia ai te tauira hei whakaatu ka pēhea te āhua o tētahi mea mēnā ka whāia tonutia tētahi whakawhanaketanga hangarau. Nā runga i aua whakaaturanga, kua pai te whakatau iho me haere tonu, hei aha noa iho rānei, me whakarerekē rānei tētahi āhuatanga.

He taputapu whakawhanake matua te whakatauirā hangarau i ngā pekanga hangarau katoa. Ahakoa he rerekē ngā mātauranga e noho tūāpapa mai ana ki ngā tauira o tēnā pekanga, o tēnā pekanga, e ōrite ana ngā huatau whānui. Hei tauira, he rerekē te tūāpapa mātauranga o te tauira i te hangarau koiora, tēnā i te tauira i te pekanga hoahoa whare.

Ko ngā poutoko o te whakatauirā hangarau, ko te wānanga taha whakatinana, me te wānanga taha painga. Ko te wānanga taha whakatinana, e arotahi ana ki ēnei āhuatanga: “Ka taea te whakatutuki?” me “Me pēhea te whakatutuki haere?”. Ko te wānanga taha painga, e pātai kē ana i te pātai “e tika ana anō kia whāia tēnei huarahi?” Arā, e arotahi ana ki ngā āhuatanga pāpori, ngā āhuatanga matatika. Mā te kuhu atu i ngā momo wānanga e rua ki ngā mahi whakatauirā hangarau, ka oti mai he arotakenga kauawhi whānui o te taonga hangarau me tōna pānga ki te ao.

Ka tīmata mai pea ngā mahi whakatauirā i te whakaaro noa iho, me te whakawhitinga kōrero ki ētahi atu ringa hangarau. Kātahi ka hangaia pea he tauira 3-D, he tuhinga rānei ki te pepa, ki te rorohiko rānei. Nāwai ā, ka tata ake ngā rawa ka whakamahia mō te tauira ki ērā ka whakamahia he i hanga i te taonga whakamutunga. Ā, mō te tauira taketake, ka whakamahia ngā rawa tūturu.

E rua ngā momo whakatauirā: ko te whakatauirā kawenga, me te hanga tauira taketake.

Ko te whāinga o te whakatauirā kawenga, he torotoro, he arotake i tētahi huatau hoahoa, nō reira ka kaha te whāia o tēnei momo whakatauirā i ngā takahanga tīmatanga o te whakaharatau hangarau. Ka kaha anō te whakawhirinaki ki te whakapae me te whakatau tata i ngā takahanga tīmatanga, i runga i ngā wheako kua puta ake i ētahi atu kaupapa. Mā te whakatauirā kawenga, tērā ka iti ake te moumou rawa, ā, ka mōhio mārire te ringa hangarau ka puta te taonga me te pānga ki te ao e āta hiahia ana ia kia puta.

Hangaia ai he tauira taketake hei arotake i te hāngai o tētahi taonga hangarau ki te mahi i whakaritea māna. Nō reira, ka puta te taonga, ā, ka haere ngā mahi whakatauirā taketake kia kitea ngā taunakitanga hei hanga whakatau i runga i te mōhio, e pai ake ai te taonga. Ko te arotakenga o te hāngai o te taonga ki te kaupapa i hangaia ai, ka inea i runga i te āhua o ngā whakatakotoranga whāiti e mau mai ana ki ngā tohutohu.

Pērā anō i ngā mahi whakatauirā kawenga, nā runga i ngā whakatau ka puta ake i te whakatauirā taketake, tērā ka turakina, ka whāmutua te kaupapa, tērā rānei ka kuhuna atu ētahi whakarerekētanga nui tonu.

Tēnā kia whāiti te titiro ki ngā kōrero mō te ruapara e hāpai ana i ngā tikanga toitū.

- He aha ki ō whakaaro ngā mahi whakatauirā i whāia mō te ruapara nei?
- Ko te whakatauirā taha whakatinana, ko te hanga tauira taketake rānei te mea e tino hāngai ana?
- He aha ngā take i whāia ai tēnā me tēnā momo?
- Kotahi anō te momo whakatauirā e rite ana mō ngā āhuatanga katoa o te waihanga ruapara?
- Ka pēhea te tukanga kapo i te haurehu mewaro, te huri hei hiko, me te tuku ki te teihana hiko?



Whakakīia te tūtohi e whai ake nei hei whakaatu i te momo wānanga e whakaaro ana koe i noho tūāpapa mai ki ngā mahi whakatauirā:

Te momo whakatauirā	Te wānanga taha whakatinana	Te wānanga taha painga

He wā anō, ki ō whakaaro, i tūpono ai rātou ki tētahi raruraru i whāmutua ai te kaupapa, i kuhuna ai rānei ētahi whakarerekētanga nui? Whakaahuatia ēnei raruraru.

Ngā taonga hangarau

Ko te taonga hangarau, he mea e taea ana te whāwhā, ā, nā te hoahoa tangata, nā te ringa tangata i puta ai ki te ao.

He mea nui kia mārama te tangata ki te hononga i waenga i ngā āhuetanga o ngā matū me te whakamahinga o te matū, e mārama ai ia ki tētahi taonga hangarau, ā, me pēhea te waihanga i taua taonga. Ka uru mai ki te karangatanga “taonga hangarau” ngā mea kikokiko tonu, pērā i te whakaahua ka tāia ki te pepa, tae atu ki ērā o te ao mariko, pērā i te whakaahua ā-mati e noho ana ki te rorohiko, ki te kōpae rānei.

Ko te mātauranga e noho tūāpapa mai ana ki ngā ariā mō ngā āhuetanga o te matū, tae atu ki te hanganga me te whakamahinga o ngā matū, kei te āhua tonu o ngā matū ka whakamahia hei hanga i tētahi taonga. Hei tauira, ko ngā māramatanga hei whakanao i tētahi kai, ka rerekē i ērā hei hanga i te papanga, i te taonga tāhiko rānei.

Nō te ao hou nei te hangarau matū. Heoi, kei te toro atu ōna kawekawe ki ētahi atu rerenga mātauranga kua roa e tū ana, e taea ai te huhua noa o ngā kawenga matū me ngā taonga matū whakahirahira tonu. Hei tauira, ko te aranga ake o ngā matū me ngā papanga “ihumanea”, arā, ko ngā matū ka urutau atu, ka urupare atu ki tētahi akiaki o waho, he akiaki hangarau tonu pea, he akiaki rānei nā te tangata. Nā te akiaki o waho, ka rerekē tētahi āhuetanga o roto i te matū, tana mahi rānei. Ko ētahi tauira o ngā taonga ka mahia ki te matū ihumanea, ko ngā kākahu aro ki te pāmahana, ko te papanga ka horoi i a ia anō, ko ngā mōwhiti aro ki te aho, me ngā uaua horihori.

Ko tētahi arotahinga nui o tēnei wāhanga, ko te pānga o te whakamahinga, te huringa, te hanganga rānei o te matū ki ngā huringa taonga me ngā mahi whakatina i ngā rawa. Mā konei e pakari ai te māramatanga hangarau ki te toitūtanga mō te wāhi ki te whakahaere rawa, ngā huringa taonga, me te porowhiuwhiu taonga.

Kia hoki ake anō ki ngā kōrero mō te pae tuku para.

- Whiriwhiria he aha ngā taonga. He taonga anō te ruapara whānui tonu? Whakamāramatia tō whakautu.

Me whai whakaaro ki ngā whakapaunga kaha a te tangata, ki te taha hoahoa, me ngā mātauranga e noho tūāpapa mai ana ki te whakamahinga o ngā matū hei hanga i te taonga.

- He aha ētahi āhuetanga o ngā rawa ka whakamahia hei waihanga i tēnei mea, te ruapara?

- Ka pēhea ērā atu wāhanga o te tukanga, pērā i te kaponga o te haurehu mewaro me te hanganga o te hiko ki te pukuhiko?

Āta whakaarohia ēnei āhuetanga, ā, ka pēhea te whakamahi hei hanga i te taonga.

- Ka taea te whakamahi ētahi rawa kē atu?
- He wā anō ka whai wāhi mai ngā āhuetanga whakatina rawa, penapena rawa ki te hanganga o tētahi taonga.
- He āhuetanga whakatina rawa e hāngai ana ki tēnei kaupapa?
- Ki ō whakaaro, he taonga anō te haurehu mewaro me te hiko ka hua ake?

Whakakīia te tūtohi i raro nei hei ārahi i a koe ki te whakautu i ēnei pātai:

Te Taonga	Ngā āhuetanga – āe, kāore rānei?	Whakamārama
He mea hanga ki tētahi momo matū?		
Nā te ringa tangata i puta ai ki te ao?		
He hononga anō kei waenga i ngā āhuetanga o ngā matū/rawa me te āhua o te whakamahi?		
He taonga kikokiko, nō te ao mariko rānei?		
He mātauranga anō e noho tūāpapa mai ana ki te whakamahinga o te matū/rawa hei hanga i te taonga?		

Ngā pūnaha hangarau

Ko te pūnaha hangarau, he huinga wāhanga e hono tahi ana, ko tāna mahi, he huri, he pupuri, he kawea, he whakatina rānei i te matū, i te pūngao, i te pārongo rānei.

Nā te hoahoa tangata, nā te ringa tangata i puta mai ai he pūnaha ki te ao, engari ina takoto he pūnaha, ka mutu i reira ngā mahi hoahoa a te tangata e tutuki ai i te pūnaha tāna mahi. Hei tauira, ina whakamahi te tangata i ngā pereki hei whakatū i tana waka (ka oti i a ia he mahi hei whakaara ake i te pūnaha), ehara i te mea me oti anō i taua tangata he mahi hoahoa e tika ai te mahi a te pūnaha whakatū a te waka.

Ko ngā mātauranga hangarau o tēnei wāhanga, ko te mārama ki ngā mea ka whakaurua, ngā putanga, ngā tukanga hurihanga, me te whakatina. Ko te mārama anō ki te tikanga o te “pouaka pango” tētahi mea ka tirohia.

Arā ētahi o ngā mea ka whakaurua, ko te tangata, ko ngā taonga hangarau, ko te moni, ko te rawa māori, ko te pārongo, ko te pūngao. Ko te tino putanga, ko te otinga e tika ana kia hua ake i te pūnaha. Hei tauira, ko te putanga o tētahi pūnaha whakanao hēki Aranga, he matū ka hurihia, arā, ko te hēki tonu. Ko te putanga o tētahi pūnaha whakapāpā ā-waea, ko te pārongo ka hurihia, ka kawea, arā, ko te reo ka kawea, ka pā atu ki wāhi kē.

Ko ngā tukanga hurihanga, ko ngā tukanga o roto i tētahi pūnaha e āta hurihia ai ngā mea ka whakaurua hei putanga, me te ū ki tērā i whakaarohia e te tangata mō te pūnaha ka tahi, e kore ai te tangata e mate ki te mahi hoahoa atu anō ka rua.

Arā ētahi huatau i roto i te hoahoanga me te kawenga o te pūnaha hangarau e tika ana kia tūhuratia. Ko ētahi, ko te piki kawenga me te tōtika o te mahi.

Ko tētahi āhua o te piki kawenga, ko te hoatu i tētahi momo tāpiritanga ki te pūnaha hei āhuetanga haumarua, hei “ora kāinga rua”. Ko te tōtika o te mahi, ko te ū tonu o ngā wāhanga o te pūnaha ki te mahi i whakaritea mā tēnā, mā tēnā, mō te wā e tika ana. He mea nui te tōtika o te mahi me te piki kawenga i te ahumahi rererangi.



Ko ngā pūnaha whakanao manomano hei tauira o te pūnaha kua nui ōna pānga ki te ao. Kua noho ko te “pouaka pango” tētahi wāhanga o ngā pūnaha whakanao o ēnei rā. He wā anō he pūnaha iti te pouaka pango nō te pūnaha nui ake.

Ā tēnā, whiriwhiria mēnā he tukanga hangarau e whāia ana hei whakaputa i te haurehu mewaro, i te hiko. Tērā pea he pūnaha hangarau e whai wāhi mai ana ki te kaponga o te haurehu me te huringa hei hiko. Kotahi anō te pūnaha, ki tō titiro, he maha rānei ngā pūnaha whāiti e hono tahi ana hei pūnaha nui?

Kei te rite ēnei āhuatanga katoa:

- He huinga wāhanga e hono tahi ana?
- E uru mai ana he matū, he pūngao, he pārongo rānei?
- Nā te hoahoa tangata, nā te ringa tangata i puta ai ki te ao?
- He tūāpapa mātauranga hangarau tōna?
- He mea anō ka whakaurua atu?
- He mea anō ka puta mai?
- Kei konā ōna anō tukanga panoni?
- Kei konā ōna anō tukanga whakatina?
- He pūnaha pouaka pango tōna?

Hangaia he tūtohi hei whakaatu i ngā āhuatanga i runga ake nei mō tēnā, mō tēnā pūnaha ka tautohua e koe, e puta ai te haurehu mewaro me te hiko. Hei āwhina i a koe, kimihia ngā kōrero mō ētahi atu pūnaha whakanao e kitea nuitia ana, hei tauira, ko ērā e noho mai ai he pouaka pango.

He Kupu Taka

e uru mai ana he matū, he pūngao, he pārongo rānei	<i>involving materials, energy, or information</i>	ngā tauira, ngā taonga, me ngā pūnaha hangarau	<i>technological models, products, and systems</i>
hangarau matū	<i>materials technology</i>	papanga ka horoi i a ia anō	<i>self cleaning textiles</i>
he mea anō ka puta mai	<i>has outputs</i>	piki kawenga	<i>redundancy</i>
he mea anō ka whakaurua atu	<i>has inputs</i>	porowhiuwhiu taonga	<i>product disposal</i>
he tūāpapa mātauranga hangarau tōna	<i>identified technological knowledge base</i>	pouaka pango	<i>black box</i>
hoahoa tangata	<i>human design</i>	pūnaha	<i>system</i>
huatau hoahoa	<i>design concept</i>	putanga	<i>output</i>
huatau whānui	<i>generic concept</i>	rawa māori	<i>raw material</i>
huinga wāhanga e hono tahi ana	<i>set of interconnected parts</i>	taonga matū	<i>material product</i>
huringa taonga	<i>product life cycle</i>	taputapu whakawhanake matua	<i>key development tool</i>
kākahu aro ki te pāmahana	<i>heat regulated clothing</i>	tauira taketake	<i>prototype</i>
kauawhi whānui	<i>holistic</i>	taunakitanga	<i>evidence</i>
kei konā ōna anō tukanga panoni	<i>has transformation processes</i>	toitūtanga	<i>sustainability</i>
kei konā ōna anō tukanga whakatina	<i>has control processes</i>	tōtika o te mahi	<i>reliability</i>
mahi i whakaritea māna	<i>fitness for purpose</i>	tukanga hurihanga	<i>transformation process</i>
mariko	<i>virtual</i>	uaua horihori	<i>artificial muscle</i>
matū “ihumanea”	<i>SMART materials</i>	urupare	<i>response</i>
mea whakaurua	<i>input</i>	urutau	<i>adapt</i>
mōwhiti aro ki te aho	<i>light responsive sunglasses</i>	wānanga taha painga	<i>practical reasoning</i>
nā te hoahoa tangata, nā te ringa tangata i puta ai ki te ao	<i>exists in the world as a result of human design</i>	wānanga taha whakatinana	<i>functional reasoning</i>
		whakanao	<i>production</i>
		whakanao manomano	<i>mass production</i>
		whakatauiria kawenga	<i>functional modelling</i>
		whakatina	<i>control</i>

Ngā Āhuatanga Hangarau

Ngā hiahia me ngā huarahi e wātea ana

Mā te tautohu i tētahi take me tōna horopaki e kitea ai ngā hiahia me ngā huarahi wātea tūturu. Ka noho ko taua hiahia, taua huarahi wātea rānei te whāinga whai takenga mō te whakawhanaketanga hangarau, ā, ka hāngai tonu, ka whāiti tonu ngā tohutohu ka takoto ki taua hiahia, ki taua huarahi rānei.

Āta whakaarohia te ruapara toitū me te hanganga o te haurehu mewaro hei hanga hiko.

- He aha te hiahia tūturu?
- Ko wai e hiahia ana kia whāia tēnei kaupapa, ā, he aha ai?
- Ko ō whakaaro, i ara ake te hiahia i mua i te huakanga o te ruapara, i muri rānei, i te wā e kīkī haere ana te rua i te rāpihi?

He aha te huarahi i wātea? I ētahi wā ko te huarahi wātea, ko te whakapau kaha noa me kore e ea ngā hiahia o te katoa.

- He aha ētahi o ngā mea i whiriwhiria kia ea ai aua hiahia?
- He aha ngā kōrero i te kōpae ataata mō ngā mahi me mātua mahi e kapohia ai he haurehu mewaro?
- Ka pai noa iho mēnā i waiho noa ngā para kia haupū nui mai?
- Ka taea anō e ngā ringa whakawhanake i te ruapara te whakaea ngā hiahia o te katoa?

Te toitūtanga

He mea nui te toitūtanga. Ahakoa he aha te mahi i te ao nei, i runga i te kaupapa o te toitūtanga me mātua whai kia kaua e puta he otinga kino i taua mahi ki a Papatūānuku, ki a Ranginui. Me āta penapena ngā rawa māori, me āta tiaki te taiao hei oranga, hei pārekarekatanga mā ngā uri whakaheke. I te wā ki ngā tūpuna, arā, ngā tikanga pērā i te rāhui hei toitū i ngā rawa māori. He tikanga pai te rāhui e whakatina ai, e penapena ai ngā iwi i ā rātou rawa.

Ko te toitūtanga te tino aronga o tēnei kaupapa, arā, ko te hāpai i ngā tikanga toitū i te ruapara.

- He aha ētahi o ngā take toitūtanga me āta whiriwhiri mō te wāhi ki tēnei wāhi tuku rāpihi?
- He rerekē ngā take a ngā tāngata takitahi, tēnā i ngā huinga tāngata pērā i te iwi, i te hāpori noho tāone, i te kamupene?
- He aha i kīia ai he mea nui kia whai whakaaro ngā ringa whakawhanake ki ngā āhuatanga toitū?
- He ōrite anō ngā āhuatanga toitū e pā ana ki tēnei ruapara ki ērā o ngā ruapara huri katoa i Aotearoa?

Ngā mōhiotanga o ngā tūpuna

Kei ngā tūpuna ngā mōhiotanga, ngā pūkenga me ngā māramatanga ki tō rātou ao e noho ora ai rātou i Aotearoa i mua noa atu i te taenga mai o tau iwi. Ka mutu, i āta haere kōtui ērā āhuatanga me te taha wairua.



- I whai wāhi mai anō ngā mātauranga Māori o nehe ki te hanganga o te ruapara?
- I whakaputua anō e ngā tūpuna ngā para i te wā ki a rātou?
- He pēhea te pānga o ngā mōhiotanga o ngā tūpuna ki ngā wāhi e tukuna ai ngā para?
- Ka whakaae anō tētahi iwi, tētahi hapū kia tū tata tētahi ruapara ki tō rātou marae? Kia tū tata rānei ki ā rātou mahinga kai, ki ngā urupā rānei? He aha ngā momo whakahē ka puta?

Ngā uara me ngā whakapono

I haere kōtui anō ngā mōhiotanga, ngā pūkenga, me ngā māramatanga o ngā tūpuna ki ō rātou uara me ō rātou whakapono. E karapotī ana ēnei āhuatanga i ngā huatau pērā i te wairua, i te aroha, i te manaakitanga, i te kaitiakitanga, me ngā kawenga e tika ana, arā, ko ngā tikanga tonu ērā.

Ki ō whakaaro, ka rerekē te āhua o te ruapara e kitea ana i te kōpae ataata mēnā i uru mai ngā uara me ngā whakapono o ngā tūpuna ki ngā whakaritenga?

Me whai whakaaro anō ki te hiko iti nei te utu, he hiko tautaiāo anō hoki, ka hua ake hei whakamahi mā te whānau/hapū/iwi.

- Ka pēhea ō rātou whakaaro ki tērā?
- Mēnā e pērā ana, he uara, he whakapono anō e hāngai ana ki ngā whakawhanaketanga i ēnei rā?

Te pānga ki te iwi

He huhua tonu ngā pānga o te otinga hangarau ki te iwi, ki te hāpori. Heoi anō, ko te tikanga, he pānga e taea ana te ine.

- Me pēhea te kimi mai i te pānga ki te iwi/hāpori?

Arā tētahi huarahi, ko te uiui haere i ngā tāngata kua rongō i ētahi o aua pānga. Tērā pea ka whakatairitea ngā raraunga ka kohia i mua me ērā ka kohia i muri i te tatūnga o te otinga hangarau.

- I whai hua anō? He pēhea nei te kaha o te whai hua?

Ina whakaarohia te ruapara toitū, te hiko ka hua ake, tae atu ki ngā pānga katoa o te mahi nei, me pēhea e kimi ai e ngā ringa whakawhanake i te tīmatanga ngā pānga katoa tērā ka ara ake?

- Ko wai mā te hunga i uiuitia e rātou? Ko wai mā ētahi atu e tika ana kia uiuitia?
- Mēnā i uiuitia ngā huinga tāngata katoa e whai pānga mai ana, āe rānei i arohia te katoa o ō rātou whakaaro? Me pēhea koe i mōhio ai?
- Ki ō whakaaro, he aha rawa te take i tahuri ai ngā ringa whakawhanake ki te mahi i te mahi toitū e whai nei rātou i nāianei?

Mēnā e whakaaro ana ngā rangatira o te ruapara ki te hanga pae tuku rāpihi anō ki tētahi atu wāhi, me āta rangahau anō ngā pānga ki te hāpori o reira, ka pai noa iho rānei te waiho i te mea kua whakahaeretia kētia te kaupapa, ā, kua mōhio kē rātou ki ngā āhuatanga e hāngai ana?

He aha te pānga ki a koe, ki tō whānau mēnā i whakatūria tētahi kia pātata ki tōu ake kāinga?

He aha ngā pānga ki ngā hanga me ngā ratonga ka horaina ki te hāpori?

Ina āta whiriwhiria ēnei āhuatanga hangarau katoa, ki tō mōhio, he otinga hangarau pai te ruapara toitū e whakaputa ana i te haurehu mewaro hei hanga hiko?

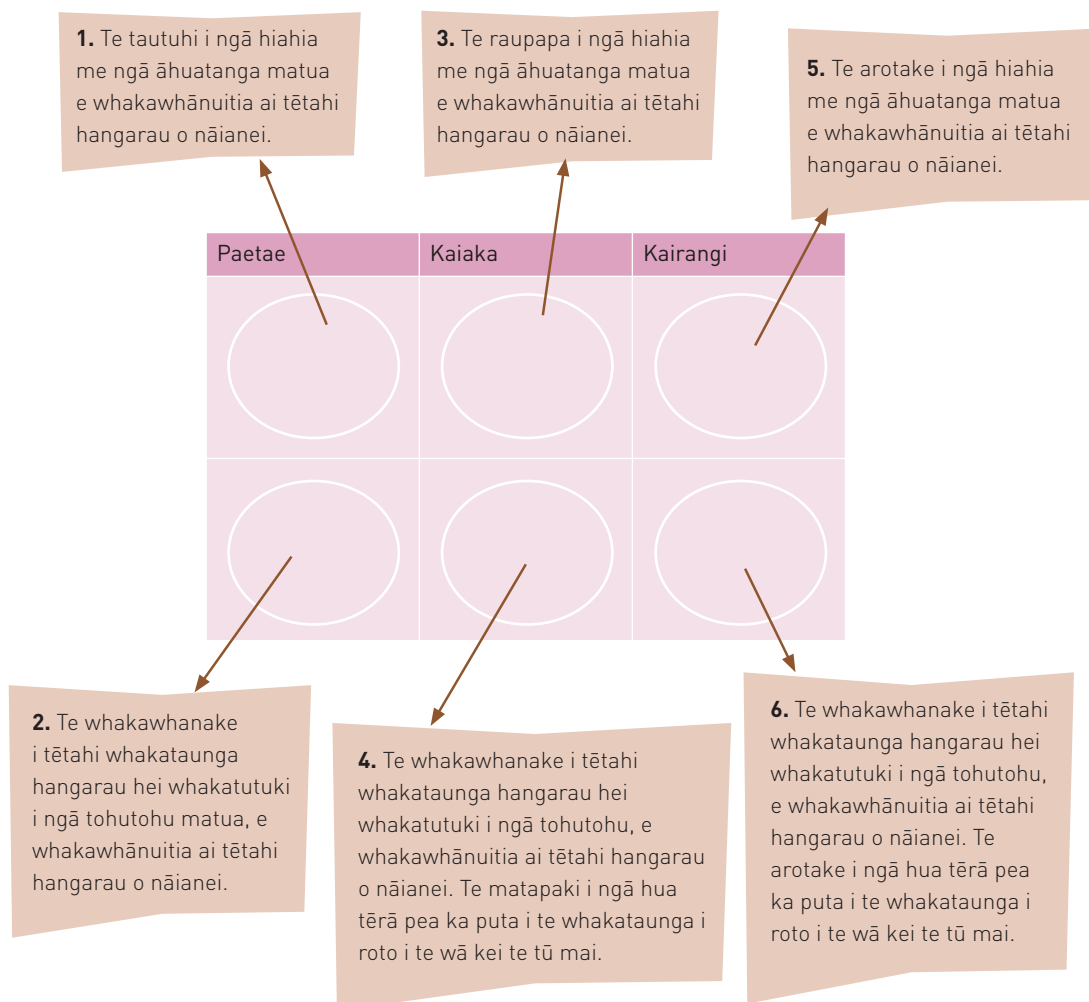
Te Aromatawai

He aromatawai i te tukanga hangarau me te whakamahi anō i ngā paerewa paetae

Paerewa Paetae 90047 (hei tauira)

Te whakatika i tētahi whakataunga hangarau mā te whakawhānui kē atu i te whakamahinga o te hangarau o nāianei tonu.

Paearu Paetae





Paerewa Paetae 90047 Te whakatika i tētahi whakataunga hangarau mā te whakawhānui kē atu i te whakamahinga o te hangarau o nāianei tonu

Ko tā te Paerewa Paetae, he āta whakaatu he aha ngā mea kia tutuki e kīia ai kua “eke paetae”, kua “eke kaiaka”, kua “eke kairangi” rānei te ākonga i runga i tēnā, i tēnā paearu ka whakarārangitia. Ko te “eke paetae” e tohu ana ka taea e te ākonga te mea e tohua ana i te taitara o te paerewa. I konei, ki te kīia kua eke paetae koe, e tohu ana tērā ka taea e koe te whakatika i tētahi whakataunga hangarau mā te whakawhānui kē atu i te whakamahinga o te hangarau o nāianei tonu. Ko te kaiaka, e tohu ana kua neke atu i tērā te pai o tō kawae i ngā mahi, ā, ko te kairangi, koirā te mea pai katoa ka taea. (E whai ake nei te roanga atu o ngā kōrero mō tēnā, mō tēnā.)

E eke paetae ai koe, me tutuki pai i a koe:

- te kōwhiri i tētahi hangarau o nāianei e taea ana tōna whakamahinga te whakawhānui atu;
- te tautohu i ngā hiahia, i ngā huarahi e wātea ana, tae atu ki ngā āhuatanga matua o tēnei hangarau e whai wāhi mai ana;
- te whakawhanake i tētahi otinga e anga nui ana ki ngā tohutohu e kī ana me whakawhānui ake te whakamahinga o te hangarau.

Mō te paerewa paetae 90047, ina mātakitaki koe i te kōpae ataata me te pānui i ngā kōrero e hāngai ana, mā tō kaiako koe e ārahi ki te whakatutuki i ngā paearu, me te whakamahi anō i Te Anga Whakaū Māramatanga ki te Tukanga Hangarau. Ko tētahi wāhanga o te anga, ko Te Whanaketanga me te Arotakenga o te Otinga Hangarau. Kei reira ngā kōrero mō ngā mea me āta whakaatu ina whakawhanaketia he otinga. Ka whaihua tonu pea tō hoki atu ki ngā pātai kua tohua ki te tohumatā i te wāhanga kauruku, ka āta whiriwhiri ai. Mā konei e taea ai e koe te hanga whakautu e hāngai ana ki tēnā, ki tēnā paearu i te paerewa paetae.

Hei tauira

Ngā paearu	Ngā whakautu ki ngā pātai kua noho rārangi mai ki te anga
Te kōwhiri i tētahi hangarau o nāianei	
Te whakatau āe e taea ana tōna whakamahinga te whakawhānui atu	
Te tautohu i ngā hiahia me ngā huarahi e wātea ana	
Te tautohu i ngā āhuatanga matua e whai wāhi mai ana	
Te whakawhanake i tētahi otinga e anga nui ana ki ngā tohutohu e kī ana me whakawhānui ake te whakamahinga o te hangarau	

E eke kaiaka ai koe, me tutuki pai i a koe ngā mea o runga ake nei, me ēnei anō:

- te whakaraupapa i ngā hiahia, i ngā huarahi e wātea ana, tae atu ki ngā āhuatanga matua e whai wāhi mai ana;
- te whakawhanake i te otinga me te whakawhiti kōrero mō tōna pānga i ngā rā kei te tū mai.

Ko te rerekētanga i waenga i te eke paetae me te eke kaiaka, ko te āhei ki te whakaraupapa i ngā hiahia, i ngā huarahi e wātea ana, me ngā āhuatanga matua e whai wāhi mai ana, ā, ina puta te otinga, ki te whakawhiti kōrero mō tōna pānga i ngā rā kei te tū mai.

E eke kairangi ai koe, me tutuki pai i a koe ngā mea o runga ake nei, me ēnei anō:

- te arotake i ngā hiahia me ngā huarahi e wātea ana;
- te whakawhanake i te otinga me te arotake i tōna pānga i ngā rā kei te tū mai.

Ko te rerekētanga i waenga i te eke kaiaka me te eke kairangi, ko te āhei ki te arotake i te whakaraupapatanga o ngā hiahia me ngā huarahi e wātea ana, me te arotake i te pānga o te otinga i ngā rā kei te tū mai.

He Kupu Taka

āhuatanga matua	<i>key factor</i>
arotake	<i>evaluate</i>
hiahia	<i>needs and/or opportunities</i>
hua tērā ka puta	<i>outcome</i>
matapaki	<i>discuss</i>
Paerewa Paetae	<i>Achievement Standard</i>
raupapa	<i>prioritise</i>

tautuhi	<i>identify</i>
tohutohu matua	<i>essential requirements (of the brief)</i>
whakataunga hangarau	<i>technological outcome</i>
whakatutuki	<i>address</i>
whakawhānui	<i>widen</i>





He Kupu Taka

āhua ā-mahi	<i>technique</i>
arotake	<i>evaluate</i>
arotautanga	<i>optimisation</i>
auaha	<i>creative; innovative</i>
hangarau kai	<i>food technology</i>
hangarau koiora	<i>biotechnology</i>
hangarau whakatina	<i>control technology</i>
hāpori	<i>community</i>
hātepe/tukanga	<i>process</i>
hinengaro auaha	<i>ingenuity</i>
hiranga	<i>excellence; superior</i>
hoahoa	<i>design</i>
huarahi wātea	<i>opportunity</i>
kaka-aku	<i>textile</i>
kawenga	<i>activity</i>
kirihou	<i>plastic</i>
kiritaki	<i>customer; client</i>
koiora	<i>biology</i>
konganuku	<i>metal</i>
korehāhā	<i>extinct</i>
kounga	<i>quality</i>
kōwhiri	<i>select</i>
māia	<i>confidence</i>
matatika	<i>ethics</i>
mātau	<i>know; understand</i>
matū	<i>material</i>
matū waihanga	<i>synthetic material</i>
mauroanga	<i>durable</i>
ohaoa	<i>economics</i>
pāpā	<i>impact</i>
pāpori	<i>social</i>

parahau	<i>justify</i>
paturopi	<i>antibiotics</i>
pūhanga manawa	<i>mechanical</i>
pūkenga whakahaere mahi	<i>project management skills</i>
pūnaha	<i>system</i>
rauropi	<i>living organism</i>
rautaki	<i>strategy</i>
rawa	<i>resource; materials</i>
rawa ora	<i>living material</i>
rerehua	<i>aesthetics</i>
tāhiko	<i>electronics</i>
taukumekume	<i>debate</i>
tautohu	<i>identify</i>
tauwhāiti	<i>specific</i>
tikanga haumarua	<i>safety procedure</i>
toitū	<i>lasting; sustainable</i>
tōrangapū	<i>political; politics</i>
tūhura	<i>explore; investigate</i>
tukanga/hātepe	<i>process</i>
tuku mōhiohio	<i>information transfer</i>
urupare	<i>feedback; response</i>
utauta	<i>equipment</i>
whai kiko	<i>purposeful</i>
whai patanga	<i>purposeful; useful</i>
whaiaro	<i>personal</i>
whakaharatau hangarau	<i>technological practice</i>
whakahiato	<i>develop</i>
whakatairanga	<i>promote</i>
whakataurite	<i>compare</i>
whakawhanake	<i>develop</i>



Te Kāwanatanga o Aotearoa

