

## Rauemi Marautanga 3

Te whakaatu i ngā pūkenga mō te whakamahi nihowhiti

### Arotahi ki ngā pūkenga

#### Te whakamahi nihowhiti

- Ehara i te mea he nihowhiti ō ngā pahikara katoa – me whai whakaaro ki te tere-kotahi me ngā pahikara BMX
- Ehara i te mea ka kitea ngā nihowhiti o ngā pahikara katoa – he pū ā-roto ō ētahi
- Me ako kia kaua e whakawhiti mōrahi i roto i te mekameka

### Te huritao mō te wāhanga whakangungu pūkenga

#### Kōrerohia ngā akoranga hou me te kaiako akomanga

Tautohua ngā wheako i ngahau ki ngā ākonga i whai wāhi ki ngā whakangungu pūkenga pahikara mō te whakamahi nihowhiti. Tāhopukia ō kitenga ki tētahi Ngaku SOLO. He aha ngā mea i ngahau ki a koe? He aha i pērā ai ō whakaaro? He aha ngā whakaaro ka toko ake ki a koe mō te eke pahikara?

Tātuhia ngā pikitia (hopu whakaahua, ataata rānei) e ai ki ngā āki e whai ake.



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**HookED**

- He aha ngā mea i pārekareka ki a koe i a koe i whakauru ki te whakangungu pūkenga pahikara? [Hangangamaha SOLO – tapawhā roa]
- He aha i pērā ai ki ōu whakaaro? [Pānga SOLO – mirumiru kōrero]
- He aha ngā whakaaro ka toko ake ki a koe mō ngā kaieke pahikara, te eke pahikara hoki/rānei? [Waitara SOLO whānui ake]

**Tāpirihia ki te rārangi akomanga** o ngā wheako ngahau katoa i pā ki ngā ākonga i te wā e whakangungu pūkenga pahikara ana.

Tautohua ngā kupu me ngā kōrero hou i whakaurua ki te wāhanga whakangungu pūkenga pahikara. Tohua ngā kupu me ngā kōrero hou.

Hei tauira, nihowhiti, hāupa, takahuri, nui, iti, whakamau, niho, tereina haupā, tōpana, ōwehenga, huri, mahi, pūngao, whakawhiti, tawhiti, tātua tauru, paewira, mekameka pahikara, nihowhiti kōkiri, nihowhiti whaiwhai, wira nihowhiti, pētara

Tāpirihia ngā kupu me te tikanga o te kupu ki te rārangi kupu a te akomanga/rōpū. Tautohua ngā kupu rerekē ka whakamahi ki tētahi Tūtohu Kupu Frayer.

### Ngā whai wāhitanga mō whakawhitiwhiti me te hapori

*Me honohono me ngā tāngata, whakahaere hoki i roto i tō hapori e matatau ana ki te **whakamahi tauru me ngā nihowhiti hei whakawhiti nekehanga.***

Me honohono me ngā tāngata, whakahaere hoki i roto i tō hapori ka hiahia pea ki te haere atu, te manaaki rānei i ngā ākonga e hiahia ana ki te rapu kōrero atu anō mō te whakamahi tauru me ngā nihowhiti hei whakawhiti nekehanga. Hei tauira, me pōhiri i ngā kaimahi ko tā rātau mahi he nekeneke utanga taumaha ki te kōrero ki ngā ākonga mō te whakamahi i ngā mīhini māmā noa hei āwhina ki te whakawhiti nekehanga, pērā i te neke mīhini taumaha.

Tirohia te Āpitiwhanga A mō tētahi rārangi o ngā rōpū ā-motu, ā-rohe me ngā taipitopito whakapā.

#### Te Hāngai ki Ngā Wāhi Ako o Te Marautanga o Aotearoa

Tirohia te Tirohanga Whānui o Ngā Wāhi Ako o Te Marautanga o Aotearoa

**Tirohia te rauemi mō Ngā Whāinga Paetae me Ngā Koronga Akoranga (T1 ki te 4)**

Reo Māori	Te Whakarongo, Pānui me te Tiroiro			Te Kōrero, Tuhituhi me te Whakaatu	
Ngā Toi - Whakaari	Te Mārama ki Ngā Toi i roto i Ngā Horopaki	Te Whakawhanake i Ngā Mōhio Whaitake		Te Waihanga Whakaaro	Te Whakawhitiwhiti me te Whakamāori
Hauora me te Mātauranga Whakakori	Hauora Whaiaro me te Whanaketanga ā-Tinana A - A3 Whakahaerenga Haumaruru			Ngā Hapori Hauora me Ngā Taiao - D2 Ngā Rauemi Hapori	
Pāngarau me te Tauanga	Tau me te Taurangi				
	Ngā rautaki tau me ngā mōhiotanga		Ngā whārite me ngā kianga	Ngā tauira me ngā hononga	
Pūtaiao	Te Āhua o te Pūtaiao				Ō Ahupūngao
	Te mārama ki te pūtaiao	Te tūhura pūtaiao	Te whakawhitiwhiti i roto i te pūtaiao	Te whakauru me te tautoko	Te uiui ā-kiko me ngā ariā ōkiko
Ngā Pūtaiao Pāpori	Tuakiri, Ahurea me te Whakahaere	Te Wāhi me te Taiao		Te Ukiuki me te Huringa	Te Ao Ōhanga
Hangarau	Tikanga Hangarau		Mōhiotanga Hangarau		Te Āhua o te Hangarau

### Ngā mahi akomanga e hāngai ana ki Te Marautanga o Aotearoa

*Te whai māramatanga pāpaku me te matawhānui hei tautoko i ngā wāhanga whakangungu pūkenga pahikara*

#### Te whakatipu i te mārama o ngā ākonga mō te mahi ina eke pahikara

#### 3.1. Ngā tōpana – Ina tere ake te pahikara, pōturi haere, huri i te ahunga me te āhua

[Te whakahiato huatau]

[Ka hono ki Ngā Wāhi Ako o te NZC: Pūtaiao - Ō Ahupūngao.]

He pei, he kukume rānei ngā tōpana. E whā ngā mahi a ngā tōpana ki ngā pahikara - he whakaterere ake; whakapōturi; he huri i te ahunga, he huri i te āhua hoki/rānei o te pahikara.

Hei tauira, ka whakamahia e tātau ngā tōpana pei hei whakaterere ake i te neke o te pahikara. Ka whakamahia e tātau ngā tōpana kume, pana hoki ki ngā puringa hei huri i te ahunga o te nekehanga o te pahikara. Ka whakamahia e tātau ngā pereki kia āta haere te pahikara.

I roto i ngā whakangungu pūkenga pahikara ka whakaahua pea ō kaitohutohu i ngā tōpana kei te pahikara me te nekehanga mā te whakamahia i ētahi o ngā kupu pūtaiao e whai ake (titiro i raro).

Tonoa ngā ākonga kia takirua te mahi.

Tātuhia he atahanga, me hoahoa rānei he awata hei whakaatu i ia momo tōpana.

Mātakina he ataata tuihono e whakaatu ana i tētahi kaieke pahikara e ngahau ana me te noho haumaruru i runga pahikara. Me pātai ki a rātau kia okiokitia te ataata ina tautohua tētahi o ngā āhua o te neke e rārangi ana i raro.

Ngā kupu pūtaiao me te rārangi kupu	Tātuhia he atahanga e whakaatu ana i ia āhua o te neke
<b>Neke</b> <ul style="list-style-type: none"> <li>Tūnoa (kua tū)</li> <li>Neke ana i te tere aumou</li> <li>Tere haere ake te neke (whakaterere ake)</li> <li>Pōturi haere te neke (whakapōturi haere)</li> <li>Neke whakamua, whakamuri, whakarunga, whakararo rānei</li> </ul>	

Mahi takirua:

Ka kimi ngā ākonga i tētahi atahanga o te tino pahikara ki a rātau, mai i te pakimaero ki te ao tūturu.

Tāngia he tārua o te pahikara.

Whakakaupapahia te atahanga o te pahikara me ngā pere e whakaatu ana i pēhea me te wāhi e mahi ana ngā tōpana rerekē.

<i>Ngā kupu pūtaiao me te huinga kupu</i>	<i>Kōkūhua he pikitia o te tino pahikara</i>
	<i>Whakakaupapahia te atahanga hei whakaatu i ngā tōpana e pā ana ki te neke i te pahikara</i>
<p><b>Ngā tōpana</b></p> <ul style="list-style-type: none"> <li>• <i>Tōpana tō-ā-papa</i> – te tōpana e kumea ana e Papatūānuku, tētahi atu mea rānei e kukume ana i ngā ahanoa ki tōna iho. Koinei te take e huri amio ai ngā aorangi katoa i te rā. Ka whakamārama te tōpana tō-ā-papa i te take ka tau mai anō koe ki te papa i muri i tō peke i tētahi ara BMX. Koirā i tau ai te pahikara ki te papa i tō tukutanga i muri i te peketanga.</li> <li>• <i>Tōpana renarena</i> – te tōpana ka puta ina huria te hanga o tētahi tumu kūtorotoro. Hei tauira, ka tuku ngā pūniko ngongo pātuki i te parenga ki ngā tōpana e puta ai he nekehanga i ngā pahikara maunga.</li> <li>• <i>Tōpana tautoko</i> – he tōpana e tautoko ana i tētahi mea ki te tō-ā-papa. Hei tauira, te tōpana tautoko o te ara e pana ana i ngā wīra o te pahikara.</li> <li>• <i>Tōpana tōkiri</i> – he tōpana e pana whakamua ana i te waka.</li> <li>• <i>Tōpana wakuwaku</i> – he tōpana e ātete ana i ngā mea e reti ana te hipa tētahi ki tētahi.</li> </ul>	

Mātakina tētahi rōpū kaieke pahikara, mātaki ataata rānei. Me whakarite tētahi kōrero e whakaahua ana i te neke o te pahikara mā te whakamahi i ngā kupu pūtaiao.

**I te taha o ngā āhuatanga e whai ake, tuhia te kupu neke tōtika.**

<b>Āhuatanga</b>	<b>Neke pahikara</b>
He kaieke pahikara e wīra ana i te pahikara ki te hēte.	
He kaieke pahikara e tango ana i te pahikara mai i tētahi mauranga kawē	
He kaieke pahikara e noho ana i runga i te pahikara me te whakatikatika i tōna pōtae	
He kaieke pahikara e pereki ana i mua i tētahi kaitohutohu	
He kaieke pahikara i te wā o tētahi reihi	
He kaieke pahikara e heke ana i tētahi hiwi	
He kaieke pahikara e piki ana i tētahi hiwi tūpou, ka tū i runga o te hiwi kātahi ka kāhaki i te hekenga atu i tērā taha	
He kaieke pahikara e haere ana i te tere ōrite	

**Whakaotihia te rerenga kōrero**

<b>Ina eke pahikara...</b>	<b>Tātuhia he pikitia whakakaupapa hei whakaatu ka pēhea pea te pā mai o te nekehanga whai ake i te wā o te wāhanga pūkenga.</b>
I neke ahau i te tere aumou	
I neke ahau i te tere aumou kātahi ka whakapōturi	
I whakatere ake ahau, kātahi ka neke i te tere aumou	

### 3.2.1. Te mahi i ngā mahi ina ngahau ana i runga pahikara

[Te whakapāpā huatau]

[Ka hono ki Ngā Wāhi Ako o te NZC: Pūtaiao - Ō Ahupūngao]

Ka pōhēhē pea kei te ngahau ki a tātau ina haere ana ki tētahi pāka paetata i runga pahikara, engari ko te whakaahua a ngā tohunga pūtaiao mō te haere i runga pahikara kei te mahi. Ina kōrero ana ngā tohunga pūtaiao mō te huri i te tawhiti e haere ana tētahi ahanua i roto i te wā, ko te whakaahua kē kei te whakawhiti pūngao (kei te mahi rānei).

I roto i te wāhanga whakangungu pūkenga, i mahi ngā ākonga ki te huri i te nekehanga o ō rātau pahikara i roto i te wā. Ka whakawhiti e ngā kaieke pahikara te pūngao me te mahi i a rātau e eke pahikara mai ana i tētahi wāhi ki tētahi atu. He mahi te eke pahikara.

He whakawhiti pūngao te mahi.

Mahi i oti = Tōpana i puta × tawhiti i haerehia.

Tonoa ngā ākonga kia:

Haere ki te hīkoi i te takiwā kura, i te hāpori rānei ka kimi i ngā tauira o te hunga e whakamahi ana i ngā mīhini māmā, pūrere hoki/rānei hei āwhina i a rātau ki te huri i te wāhi o ngā ahanua rerekē.

Me hopu whakaahua o ngā mahi kei te mahia - me whakauru te mīhini/pūrere i whakamahia, te tangata me te ahanua e nekehia.

Whakamahia ngā atahanga hei waihanganga i tētahi wāhi whakaaturanga taiwhanga toi (ā-mariko, pērā i tētahi paetukutuku, he rangitaki, wiki rānei; he pātū akomanga rānei) e whakaatu ana he pēhea te āwhina a ngā mīhini i a tātau ki te mahi i ō tātau ao o ia rā. Hei tauira, wīra me te paewīra (ngā tūru tari, kāta, tōneke, perēme, pāhi-iti wīra me ngā motukā tākaro), ngā utauta āwhina, kauwhiti (pioi, pae hua, ngā whakarawa kūaha kauwhiti), rōnaki, tauru, wiri, mākahi, (kutikuti, wiri, oka).

Tuhia he rauemi whakatairanga hei tautoko i te whakaaturanga, hei tauira, he mātārere, kāripōhi rānei. Me whakauru he kāri whakaatu iti hei tāpiri ki ia mahi toi. Me whakamahi reo pūtaiao i roto i ngā whakaahuatanga me ngā taitara.

### 3.2.2. Te hōpara i ngā nihowhiti

[Te whakapāpā huatau]

[Ka hono ki Ngā Wāhi Ako o Te Marautanga o Aotearoa: Pūtaiao - Ō Ahupūngao]

**Te whakamahi mīhini hei tohatoha i te kaha e hiahia ana hei neke ahanua.**

Rapu kōrero mō: Pūtaiao: Ngā nihowhiti: <https://www.dkfindout.com/uk/science/simple-machines/gears/>  
Whakaurua te huatau o ngā nihowhiti hei mīhini māmā.

Pātai ki ngā ākonga: he aha te nihowhiti? E whakamōhio ana mō te aha? He aha te mahi a ngā nihowhiti? He pēhea te mahi a ngā nihowhiti i tēnei?

Hei tauira; ko ngā nihowhiti he wīra whai niho. He whakawhiti pūngao mā te neke mai i tētahi wāhi ki tētahi atu. Ka taea e ngā nihowhiti te whakatere ake, te whakapōturi rānei i ngā mea.

He aha tāu i kite ai, i ako ai mō ngā nihowhiti i tō urunga atu ki te akoranga whakangungu pūkenga? Whakamahia tētahi Ngaku SOLO kia tino mārama ai ki te huatau (ka whakamārama i te take), ā, ka whakawhānui ake i te huatau ki te wāhi hou (whakaputa whakaaro).

Hei tauira



He aha tāu i kite ai i roto i te akoranga pūkenga mō te whakamahi nihowhiti i runga pahikara?	He aha i pērā ai ki a koe?	He aha ngā whakaaro ka toko ake ki a koe mō te whakamahi nihowhiti i runga pahikara?
<b>Hangangamaha SOLO</b>	<b>Pānga SOLO</b>	<b>[Waitara SOLO whānui ake]</b>

Ka whakamahi reo motuhake tohunga pūtaiao ina kōrero ana rātau mō ngā nihowhiti. Me whakamātau ki te whakamahi i tēnei rārangi kupu i roto i ngā mahinga e whai ake.

### Ngā kupu pūtaiao

*Nihowhiti kōkiri* – te nihowhiti e 'kōkiri' ana i te neke a ētahi atu nihowhiti; te nihowhiti me te tōpana whakahāngai, hei tauira, te nihowhiti kei te pētara o te pahikara.

*Nihowhiti whaiwhai* – te nihowhiti ka 'whaiwhai' i te neke a ētahi atu o ngā nihowhiti; te nihowhiti e mahi ana i ngā mahi whaitake, hei tauira, te nihowhiti kei muri i te wīra o te pahikara.

*Nihowhiti pāeko* – te nihowhiti ka huri e te nihowhiti kōkiri ka huri i te nihowhiti whaiwhai.

*Tereinanihowhiti* – ngā nihowhiti maha e rārangi ana.

*Whakapiki nihowhiti* – kōkiri nui me te whaiwhai iti, ka whakaterere i te tereina nihowhiti.

*Whakaheke nihowhiti* – kōkiri iti me te whaiwhai nui, ka whakanui ake i te tōpana whakahuri (tōpana huri).

Kimihiā ngā whakautu ki ēnei pātai mā te rāwekeweke i ngā nihowhiti tauira whakahono me ngā paewīra mēnā e wātea ana.

- Tonoa ngā ākonga ki te tatau e hia ngā niho kei ngā nihowhiti rahinga rerekē. I muri mai me hono ngā nihowhiti ka tatau i ngā wā ka huri ia nihowhiti kua honoa. Kei te kite i tētahi pānga ōrite mō tētahi pahikara whai nihowhiti?
- Heria mai he pahikara whai nihowhiti ki te akomanga. Ina oti i te nihowhiti kōkiri (kua tāpiritia ki te pētara pahikara) tētahi huringa kotahi, e hia ngā huringa o te nihowhiti whaiwhai (kua tāpiritia ki te wīra o muri)?
- He aha ngā nihowhiti ka kōwhiria e koe mēnā ka mate koe ki te tō i tētahi utanga taumaha i muri i tō pahikara?

### Mahi tāpiri:

Ka hiahia ētahi ākonga ki te whakawhānui atu i tēnei me te ako i ngā ōwehenga nihowhiti. (Tirohia ngā kōrero i raro.)

#### Te whakawhiti i te neke mai i te pētara ki te wīra o muri

Ina ōrite ana te maha o ngā niho i roto i ngā nihowhiti kōkiri, whaiwhai hoki, kotahi te huri a te nihowhiti kōkiri, ā, kotahi anō te huringa a te nihowhiti whaiwhai.

Ōwehenga Nihowhiti =  $\frac{\text{te maha o ngā niho o te whaiwhai}}{\text{te maha o ngā niho o te kōkiri}}$

Ō.N. =  $F_t / D_t$  hei tauira, 1/1, 1:1 rānei (me 1 ki te 1 te pānui)

#### Te whakaheke nihowhiti - ōwehenga nihowhiti iti

Mā te whakauru i te pahikara ki ngā nihowhiti teitei ka uaua ake te huri i te pahikara engari ka tere ake tō haere. Ki te rerekē te maha o ngā niho kei ngā nihowhiti kōkiri, whaiwhai hoki; ka huri ana te nihowhiti kōkiri ka rerekē te huri o te nihowhiti whaiwhai. I te tauira i raro, ka huri i tētahi huringa kotahi o te nihowhiti kōkiri i te nihowhiti whaiwhai i ngā wā e toru. Ka nui ake te nihowhiti whaiwhai ka nui ake te tōpana huri.

Ō.N. =  $F_t / D_t$  hei tauira, 1/1, 1:1 rānei (me 1 ki te 1 te pānui)

#### Te whakapiki nihowhiti - ōwehenga nihowhiti teitei

Mā te whakauru i te pahikara ki ngā nihowhiti pāpaku ka māmā ake te huri i te pahikara engari ka pōturi ake tō haere. Ko te take he nui ake ngā niho i roto i te nihowhiti kōkiri tēnā i te nihowhiti whaiwhai. Hei tauira, mēnā i takahuria te maha o ngā niho i roto i te kōkiri me te whaiwhai, e toru ngā huringa o te nihowhiti kōkiri mō te huringa kotahi o te nihowhiti whaiwhai. Ka whakaiti ake te nihowhiti whaiwhai i te tōpana huri.

Ō.N. =  $F_t / D_t$  hei tauira, 3/1, 3 rānei (me 3 ki te 1 te pānui)

### 3.3. Te whakamahi nihowhiti hei tohatoha i te kaha e hiahiatia ana hei neke i tētahi pahikara.

[Te whawhānui huatau]

[Ka hono ki Ngā Wāhi Ako o Te Marautanga o Aotearoa: Pūtaiao - Ō Ahupūngao]

Me whakarōpū ngā ākonga kia mahi takirua, takitoru ki te tūhura **he mahi te eke pahikara – mai i te tirohanga a te tohunga pūtaiao.**

Me whakamahi he whakahono me ngā nihowhiti tauira, ngā paewīra me ngā tātua tauru (mekameka) me ngā pahikara, mekameka, nihowhiti, aha atu, aha atu. Tūhuratia he pēhea te whakahaere i ngā mahi me te whakawhiti i te pūngao e ngā tāngata e whakamahi ana i tētahi o ngā momo pahikara

- he papaneke
- he taraihikara me tētahi pētara ki te wīra
- he pahikara me tētahi pētara kua mau ki te wīra mā tētahi tauru tātua māmā/mekameka nihowhiti-kotahi
- ngā wīra e rua kua honoa e tētahi tātua tauru
- ngā wīra e rua kua honoa e tētahi tātua tāupe
- he pahikara me tētahi pētara kua mau ki tētahi mekameka matatini/nihowhiti-maha.

Te whakatītina i ngā ākonga kia kite ahakoa i te tīmatanga kei te mau ngā pētara ki te wīra o mua (piri tata ana) o te taraihikara, ka nui atu te tawhiti i waenga i te wāhi i hoatu te tōpana (ki te wīra pētara) me te wāhi kei reira te utanga (kei te wīra o muri) i ngā tauira o muri. Ka taea te āputa te whakakī ki te rārangi nihowhiti, ko te tikanga ka whakakīa kētia ki te nihomeka me tētahi mekameka.

Kia mōhio:

Ka māmā ake i ngā nihowhiti te pētara (ka iti ake te huri o ngā wīra mō ia huringa o te pētara).

Ka tuarihia te mahi i te tawhiti nui ake.

Ka uaua ake i ngā nihowhiti te pētara (ka nui ake te huri o ngā wīra mō ia huringa o te pētara).

Ka tuarihia te mahi i te tawhiti poto ake.

Ka ōrite te katoa o te mahi mō te neke i te pahikara i tētahi tawhiti.

<b>Papaneke</b>	<p><i>He aha tāu e kite ana?</i> Ko te kaieke pahikara kei te mahi. Mā te pana mai i te papa ka neke te papaneke i te papa papatahi.</p> <p><i>He pēhea, ā, he aha te take e mahi ai tēnei?</i> Ka hāngai te huri a te tōpana i ngā wīra e neke ana i te papaneke. Tohua he wā e pā ai te wīra o te papaneke ki te papa. Ka kitea ka ahatia ngā wīra i te nekehanga o te papaneke ki wāhi kē.</p> <p><i>Hangaia he tauira hei whakaatu i tēnei tikanga.</i></p> <p>Mahia he tauira e whakaatu ana ka pēhea te whakawhiti i te pūngao ki te papaneke</p>
<b>Taraihikara wīra-mau</b>	<p><i>He aha tāu e kite ana?</i> Ko te kaieke pahikara kei te mahi. Ka neke te pētara hurihuri i te papaneke ki tētahi papa papatahi.</p> <p><i>He pēhea, ā, he aha te take e mahi ai tēnei?</i> Ka huri te tōpana pei ki te pētara i te paewīra kia kotahi te huringa, ā, ka huria te wīra o mua o te taraihikara kia kotahi te huringa. <i>Mahia he tauira hei whakaatu i tēnei pūhanga.</i></p> <p>Mahia he tauira e whakaatu ana ka pēhea te whakawhiti i te pūngao ki te taraihikara wīra-mau.</p>
<b>Ngā tātua tauru</b>	<p><i>Hangaia he tauira hei whakaatu i tēnei tikanga.</i></p> <p>Mahia he tauira e whakaatu ana ka pēhea te whakawhiti i te pūngao ki tētahi:</p> <ul style="list-style-type: none"> <li>• tātua tauru - ko tētahi tōpana kei tētahi paewīra kōkiri kotahi e pā ana ki tētahi paewīra rahinga ōrite i tētahi tawhiti</li> <li>• tātua tauru tāupe - ko tētahi tōpana kei tētahi paewīra kōkiri kotahi e pā ana ki tētahi paewīra rahinga rerekē i tētahi tawhiti</li> <li>• tātua tauru - te huri i te ahunga o tētahi tōpana.</li> </ul>
<b>Mekameka pahikara</b>	<p>Ka whakamahia he mekameka kē nō tētahi tātua tauru kia kore ai e paheke.</p>
<b>Pahikara mekameka pūmau</b>	<p><i>He aha tāu e kite ana?</i> Ko te kaieke pahikara kei te mahi. Ka neke te pētara hurihuri i te pahikara ki tētahi papa papatahi.</p> <p><i>He pēhea, ā, he aha te take e mahi ai tēnei?</i> Ka huria e te pētara te wīra nihowhiti taraiwa. Ka nekehia e te nihowhiti taraiwa te mekameka. Ka nekehia e te tātua tauru (mekameka) te nihowhiti wīra o muri. Ka nekehia e te nihowhiti te wīra o muri.</p> <p><i>Hangaia he tauira hei whakaatu i tēnei pūhanga.</i></p> <p>Mahia he tauira e whakaatu ana he pēhea te whakawhiti i te pūngao i roto i tētahi pūhanga pahikara mekameka pūmau me ngā wāhanga whakahono.</p>

<b>Pahikara mekameka tāupe</b>	<i>He aha tāu e kite ana?</i> Ko te kaieke pahikara kei te mahi. Ka neke te pētara hurihuri i te pahikara ki tētahi papa papatahi.
<b>Hei tauira, ngā pahikara tere-kotahi me te tere-maha</b>	<i>He pēhea, ā, he aha te take e mahi ai tēnei?</i> Ka huria e te pētara tētahi o ngā wīra nihowhiti taraiwa. Ka nekehia e te nihowhiti taraiwa te mekameka. Ka nekehia e te mekameka tētahi o ngā nihowhiti wīra o muri. Ka nekehia e te nihowhiti wīra o muri te wīra o muri. <i>Hangaia he tauira hei whakaatu i tēnei pūhanga.</i>
<b>[e rua ngā nihowhiti rahinga rerekē]</b>	Mahia he tauira tuatahi e whakaatu ana he pēhea te whakawhiti i te pūngao i roto i tētahi pūhanga pahikara mekameka tāupe.

**Me pēhea te mahi a ngā nihowhiti pahikara:** [www.exploratorium.edu/cycling/gears1.html](http://www.exploratorium.edu/cycling/gears1.html)

**Ngā whakanoho tauira e hāngai ana mō te hōrapa nihowhiti:**

K'Nex Education Gears: <https://www.teaching.co.nz/product/KN78630>

Every Educaid: <http://www.everyeducaid.co.nz/catalogue/construction-and-engineering/gears.html>

#### **Pāngarau me te Tauanga**

Ngā Rauemi Pāngarau o Aotearoa:

Te whakapiki nihowhiti: <https://nzmaths.co.nz/resource/gearing-0>

Wheketere Pihikete; Tau <https://nzmaths.co.nz/node/1570>

Te Nihowhiti Tika; Te whakamahi pāpātanga me ngā ōwehenga <https://nzmaths.co.nz/resource/right-gear>

#### **Wāhanga Huritao**

- He aha ngā mea kei te mōhio koe kāore koe i te mōhio mō te whakamahi tauru me ngā nihowhiti hei whakawhiti nekehanga ina eke pahikara?
- He aha ngā mea i ako koe he hou ki a koe mō te whakamahi i ngā tauru me ngā nihowhiti hei whakawhiti nekehanga?
- He aha ngā mea ka whakaaroarohia e koe mō te whakamahi tauru me ngā nihowhiti hei whakawhiti nekehanga ina eke pahikara?

Whakamahia ngā urupare a ngā ākonga hei tuku whakatau mō ngā wāhanga whai ake.

#### **Tohua te Rūpiki Aromatawai-whaiaro Kaiakatanga Matua <sup>1</sup> i tīpakohia mō Ngā Pūkenga Pahikara 3.**

<b>Whakaaroaro</b>	<b>Whakahaere whaiaro</b>	<b>Te whakauru me te tautoko</b>	<b>Te whai pānga ki ētahi atu</b>	<b>Te whakamahi tohu reo me ngā kupu</b>
Whakapakaritia te kanohi arohaehae (arokā wāhitanga) mō ngā wāhi me ngā mahi kāore i te haumarua ina pahikara ana koe.	Kia tika te āhua i a koe i runga pahikara, i waenga pahikara hoki. Ko te āhua me te wairua pai ko te whakaū kia 'ngahau te eke pahikara me ngā wāhi haumarua'.	Te whakaatu mōhio ki ngā take paetata mō te eke pahikara. Me tino whai wāhi atu ki ngā take hāpori e pā ana ki te whakangahau me te noho haumarua ina eke pahikara. Te tautoko i ngā wāhi me ngā huihuinga paetata kia 'ngahau me te haumarua te eke pahikara'.	Te pāhekoheko me ētahi atu ki te waihanga i ngā wāhi pahikara 'ngahau me te haumarua' i te kura me te hāpori.	Te whakamāori i ngā karere i roto i ngā kōrero mō te 'eke pahikara kia ngahau me ngā wāhi haumarua'. Te whakamahi i ngā tohu reo me ngā kupu hei whakaputa i ngā karere mō te 'ngahau o te eke pahikara me ngā wāhi haumarua'.

<sup>1</sup> Mō ngā rūpiki Aromatawai-whaiaro Hira, tirohia te Āpitianga B.