



Hei Tautoko i te Marautanga Pāngarau

# Te Tūponotanga



## Hei Whakamihi

Nā He Kupenga Hao i te Reo ngā tuhinga o tēnei pukapuka. E whakamihi ana ki ngā puna kōrero e whai ake nei, inā te ohonga ake o te hinengaro.

*Te Reo Pāngarau: Putanga Tuarua.* (2010). Papaioea: He Kupenga Hao i te Reo.

Van de Walle, J.A. (2007). *Elementary and Middle School Mathematics: Teaching Developmentally*. Boston: Pearson.

Ngā rauemi katoa o Te Poutama Tau

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### Ngā mihi hoki ki:

Ngā kura, ngā pouako, ngā kaitakawaenga, nā rātou i tirotiro, i whakamātau te pukapuka nei, me te āhua o ngā whakahokinga kōrero mai.

Te kaitirotiro i te takoto o te reo: Hēni Jacob

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Kua rāhuitia ngā motika katoa kia āta whakaaetia rā anō e te hunga kei a ia te mana tārua.



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# **Ngā Ihirangi**

<b>Wāhanga 1: Ngā Kōrero Whānui .....</b>	<b>3</b>
He Kupu Whakataki .....	3
Ngā Huatau Matua o te Tūponotanga .....	5
He Tauira Mahere mō te Tūponotanga .....	8
<b>Wāhanga 2: Ngā Whanaketanga Tūponotanga, me ngā Tauira Aromatawai .....</b>	<b>13</b>
Whanaketanga 1e .....	14
Whanaketanga 2a .....	15
Whanaketanga 2e .....	16
Whanaketanga 3a .....	18
Whanaketanga 3e .....	19
Whanaketanga 4a .....	20
Whanaketanga 4e .....	21
Whanaketanga 5a .....	22
<b>Wāhanga 3: He Ngohe Whakaako i te Tūponotanga .....</b>	<b>23</b>
Whanaketanga 1e .....	24
Āpōpō Mai .....	25
Kāri Tau .....	27
Whanaketanga 2a .....	29
He Kianga Tūponotanga .....	30
He Mataono Tae .....	32
Pīroria, ka Tāpiri ai .....	34
Porotiti Tangotango .....	36
Whanaketanga 2e .....	38
Rārangi Tūponotanga 1 .....	39
Rārangi Tūponotanga 2 .....	41
Te Hautau hei Whakaatu Tūponotanga .....	43
Tipako Matapōkere .....	45
Porotiti Karakara .....	47
Whanaketanga 3a .....	48
He Aha te Tūponotanga? .....	49
Putanga Taurangirangi .....	52
Te Taurangitanga me te Tūponotanga .....	54
Whanaketanga 3e .....	56
He Wehe kē, he Whakawhirinaki rānei? .....	57
Hoahoia Rākau .....	59
Tukuna kia Taka .....	61
Whanaketanga 4a .....	64
Pūrere Takahurihuri .....	65
Te Whakaatu Tūponotanga hei Horahanga Tapawhā Hāngai .....	67
Te Tūponotanga hei Ōrau .....	69

Whanaketanga 4e .....	72
Te Tuari o ngā Putanga .....	73
Whiriwhiria te Tūponotanga .....	76
Putanga Whakawhirinaki .....	79
Whanaketanga 5a .....	82
Whakamātau Tūponotanga Papa-Maha .....	83
Kōwhiria kia Rua o roto i te Whā .....	89
<b>Wāhanga 4: Ngā Whārangi Tārua .....</b>	<b>95</b>
Whanaketanga 1e: Whārangi Tārua 1 .....	96
Whanaketanga 2a: Whārangi Tārua 2–3 .....	97
Whanaketanga 2e: Whārangi Tārua 4–7 .....	100
Whanaketanga 3a: Whārangi Tārua 8–9 .....	106
Whanaketanga 3e: Whārangi Tārua 10 .....	109
<b>Te Kuputaka .....</b>	<b>111</b>
Māori → Ingarihi .....	112
Ingarihi → Māori .....	115



# Wāhanga 1

## Ngā Kōrero Whānui



### He Kupu Whakataki

Ko te kaupapa ia o tēnei pukapuka, ko te āta whakaatu i ngā huatau matua o tēnei wāhanga o te pāngarau, te tūponotanga, me ngā whanaketanga ako, hei ekenga taumata mā ā tātou ākonga. Āpiti atu ki tēnā, ko te whakaatu i ētahi ngohe e hāngai ana ki tēnā taumata, ki tēnā taumata o te marautanga, me ngā hononga ki te Mahere Tau<sup>1</sup> me ngā Whanaketanga Pāngarau<sup>2</sup>.

main ideas

Number Framework

Ko tā te tūponotanga, he tirotiro i ngā putanga o tētahi mahi, o tētahi āhuatanga rānei, me te kaha, te ngoikore rānei o tēnā putanga, o tēnā. Ka kīia te mahi, te āhuatanga rānei, he pāpono. Ka whakamahia he hautau kei waenganui i te kore me te tahi, he ūrāu rānei mai i te 0% ki te 100% hei whakaatu i te tūponotanga o tētahi putanga.

outcome

event

He mea nui te tirotiro me te tātai i te tūponotanga o ngā putanga o tētahi pāpono i roto i te ao pakihi, i te ao hākinakina, i roto hoki i ētahi kēmu maha, pērā i te Monopoly me ētahi atu. I te tīmatanga o te ako i te tūponotanga, ka tino whai wahi mai ngā momo kīanga pēnei i te ‘kāore e korē’, te ‘kore rawā’, me te ‘ākene pea’. E tino hono ana te tūponotanga ki ētahi atu whenu o te pāngarau. E whai ake nei ētahi tauira.

probability/chance  
business

<sup>1</sup> Tirohia: *Tē Poutama Tau, Pukapuka Tuatahi: Tē Mahere Tau*. Papaioea: He Kupenga Hao i te Reo (2011).  
<sup>2</sup> Tirohia: *Whanaketanga Pāngarau: He anatohu mā te pouako*. Te Whanganui-a-Tara: Te Tāhuhu o te Mātauranga (2010).

## Te Tau

Ka whakamahia he hautau hei whakaatu i te tūponotanga o tētahi putanga:

- 50% te tūponotanga ka puta he whiore ina piau he uka
- $\frac{1}{3}$  te tūponotanga ka puta he rima, he ono rānei ina pīroria he mataono tau

probability, outcome

toss, coin

roll, dice

Ka tatauria te maha o tētahi putanga i tētahi whakamātau tūponotanga:

probability experiment

### Ngā pīroritanga mataono tau

putanga	maha
1	
2	
3	
4	
5	
6	

## Te Tauira me te Pānga

Mā te whārite taurangi e tātaihia ai te tūponotanga o tētahi putanga:

algebraic equation

$$T = \frac{P}{k} \quad T = \text{tūponotanga}$$

p = te maha o ngā putanga e tirohia ana  
k = te katoa o ngā putanga e taea ana

Mēnā e pīrorihia ana tētahi mataono tau, ka whakamahia te whārite nei hei tātai i te tūponotanga ka puta he taukehe. Ko te 1, te 3 me te 5 ngā putanga o te taukehe, arā, e 3 ērā. E ono katoa ngā putanga e taea ana (1, 2, 3, 4, 5, 6):

odd number

$$T = \frac{P}{k} = \frac{3}{6} = \frac{1}{2}$$

## Te Tauanga

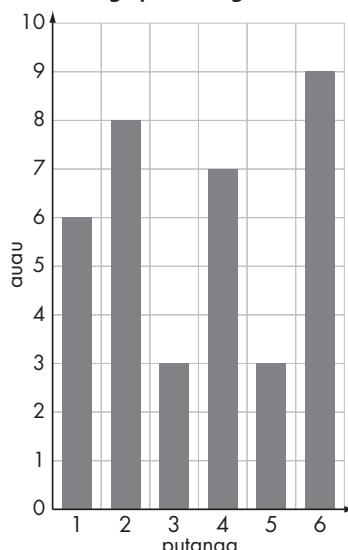
Ko tētahi wāhanga matua o te whakamātau tūponotanga, he kohikohi raraunga, he whakaatu anō i aua raraunga ki tētahi kauwhata. Hei tauira, ko te pīrori mataono tau:

probability experiment,  
data

### E 36 ngā pīroritanga mataono tau

putanga	tatau	auau
1		6
2		8
3		3
4		7
5		3
6		9

### Ngā pīroritanga e 36



# Ngā Huatau Matua o te Tūponotanga

1. E toru ngā takenga mai o te tūponotanga o tētahi putanga:

outcome

- Ko te titiro whakamuri ki taua putanga i ngā wā o mua. Hei tauira, ko te tūponotanga ka eke ki tua atu i te 90% te ōrau o ngā ūhangā a Irene i tana kēmu poitarawhiti. Ina titiro ki ana kēmu tekau kua pahure tata nei, ka tino kitea i te nuinga o aua kēmu ka eke ki tua atu i te 90%, nō reira he nui te tūponotanga ka pērā anō ia i te kēmu e heke mai ana.

kēmu	1	2	3	4	5	6	7	8	9	10
ōrau	92	94	100	98	93	88	90	95	97	94

Ko te mōhio o te tangata ki te horopaki o te putanga te mea matua hei tautohu i te tūponotanga o taua putanga. Pēnā he tangata mahi māra kua roa e noho ana ki tētahi wāhi, e tino mōhio ana ki te tūponotanga ka tau te hukapapa i muri i te marama o Mahuru, kāore rānei.

identify

- Ko te whakahaere whakamātau tūponotanga. Hei tauira, ina piua tētahi pine panapana, he aha te tūponotanga ka tau ki tōna upoko, ka tītaha rānei te tau:

probability experiment  
drawing pin



Ka whakahaerehia te whakamātau hei kimi i ngā tūponotanga nei. Arā, ka 1000 pea ngā piunga o tētahi pine panapana, me te tuhi anō i te maha o ia putanga (upoko, tītaha rānei). Nā runga i ēnei raraunga ka whakatauria ngā tūponotanga. Hei tauira:

outcome, data

Te putanga	upoko	tītaha	$T(\text{upoko}) = \frac{700}{1000} = \frac{70}{100} = 70\%$
Te maha	700	300	$T(\text{tītaha}) = \frac{300}{1000} = \frac{30}{100} = 30\%$

- Ko te tātai i te tūponotanga i runga anō i te whakaaro arorau. Hei tauira, ko te whakaaro arorau e mea ana, ina piua he uka, he ōrite te tūponotanga ka puta he whiore, ka puta rānei he upoko. Arā, kotahi o roto i te rua ( $\frac{1}{2}$ ) te tūponotanga o tētahi upoko, he pērā anō te tūponotanga o tētahi whiore:

logical reasoning

$$T(u) = \frac{1}{2} \quad T(wh) = \frac{1}{2}$$

Mēnā e rua ngā uka ka piua, e toru ngā putanga e taea ana – ko ētahi upoko e rua (u,u), ko ētahi whiore e rua (wh,wh), ko tētahi upoko me tētahi whiore rānei (u,wh):

		uka 1	
		u	wh
uka 2	u	u, u	u, wh
	wh	wh, u	wh, wh

Ko te whakaaro arorau e mea ana he ōrite te tūponotanga o ia putanga e whakaaturia ana ki te tūtohi, nō reira:

$$T(\text{e rua ngā upoko}) = \frac{1}{4}$$

$$T(\text{e rua ngā whiore}) = \frac{1}{4}$$

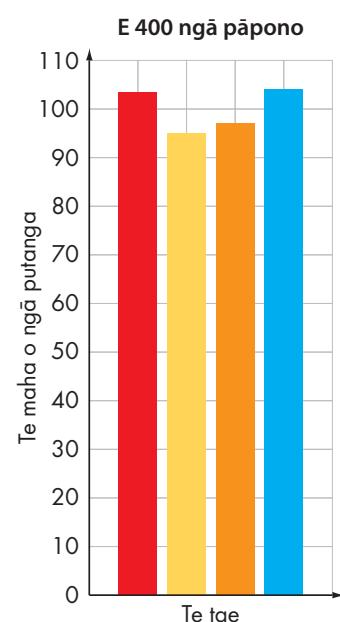
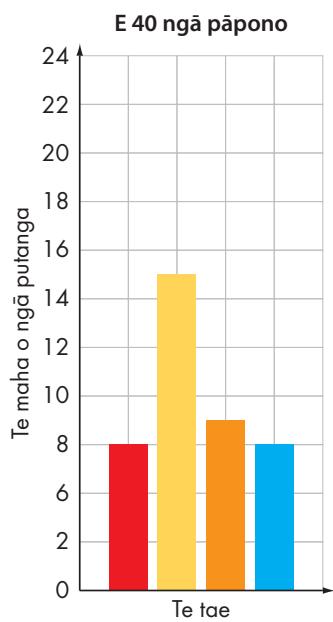
$$T(\text{kotahi te upoko, kotahi te whiore}) = \frac{2}{4} = \frac{1}{2}$$

2. I te nuinga o te wā, ka rerekē ngā putanga o tētahi whakamātau i ngā putanga ka tātaihia i runga i te whakaaro arorau. Ka kīia tēnei ko te taurangitanga o tēnei mea te tūponotanga. Hei tauira, ko te tātaitanga e mea ana, mēnā e 20 ngā piunga uka, ka 10 ngā upoko, ka 10 anō ngā whiore. Engari ka taurangirangi ngā putanga o ia whakamātau:

Whakamātau	1	2	3	4
upoko	11	8	10	7
whiore	9	12	10	13

3. Ina maha haere ngā pāpono o tētahi whakamātau, kāore e pērā rawa te taurangitanga. Hei tauira, mēnā e whā ngā poi paku kei roto i tētahi pēke, he rerekē ngā tae, ā, ka tangohia matapōkerea tētahi, koinei ngā putanga tātai me ētahi tauira putanga whakamātau:

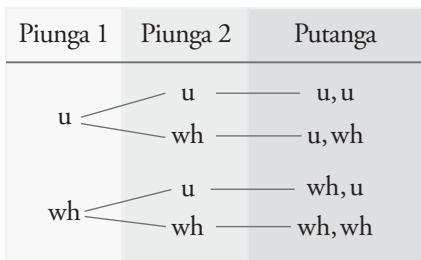
	Whero		Kōwhai		Karaka		Kahurangi	
	whakamātau	tātai	whakamātau	tātai	whakamātau	tātai	whakamātau	tātai
E 40 ngā pāpono	8	10	15	10	9	10	8	10
E 400 ngā pāpono	103	100	95	100	98	100	104	100



4. Kāore te putanga o tētahi pāpono e pā ki te tūponotanga o tētahi putanga i muri mai. Hei tauira, mēnā e ono ngā piunga uka, ā, e ono ngā putanga o te upoko, ko te 50% tonu te tūponotanga ka puta anō he upoko i te piunga tuawhiti.
5. Ka whakamahia te hautau kei waenganui i te 0 me te 1, te ūrau rānei kei waenganui i te 0% me te 100% hei tautohu tūponotanga:

0 — 0% Kore rawa e puta tēnei āhuatanga.  
 $\frac{1}{2}$  — 50% He ūrite te tūponotanga ka puta tēnei āhuatanga, kāore rānei e puta.  
 1 — 100% Ka puta tēnei āhuatanga i ngā pāpono katoa.

6. Ko te tūwehe tētahi atu momo whakaatu i te tūponotanga. Arā, ko te whakamahi i te ōwehenga hei tautohu i te tūponotanga. Hei tauira, ina pīroria tētahi mataono tau, ko te 1:5 (tahi ki te rima) te tūwehe ka puta te ono. Kotahi te ono o roto i ngā putanga katoa e taea ana, ā, e rima ērā atu o ngā putanga.
7. Mēnā he ōrite te tūponotanga o ia putanga i tētahi pāpono, ka kīia he pāpono tōkeke tērā. Hei tauira, ko te tae o tētahi poi ka tangohia matapōkerea i tētahi pēke, mēnā kotahi noa iho te poi o ia tae.
8. Mēnā kāore e ōrite ana te tūponotanga o ia putanga i tētahi pāpono, ka kīia he pāpono haukume tērā. Hei tauira, ko te tae o tētahi poi ka tangohia matapōkerea i tētahi pēke mēnā e rua ngā poi whero, ā, kotahi noa iho te poi o ērā atu o ngā tae.
9. Ka whakaaturia ngā putanga o tētahi pāpono raupapa (arā, ētahi pāpono e rua, nui ake rānei, e whai mai ana tētahi i tētahi) ki te hoahoa rākau. Hei tauira, ko te piu i ētahi uka e rua:



10. Ka kīia he wehe kē ētahi pāpono, he whakawhirinaki ētahi. Hei tauira, ko te tango matapōkere i ētahi poi e rua i tētahi pēke. Mēnā ka whakahokia te poi tuatahi, he pāpono wehe kē, nā te mea kāore te putanga o tētahi tangohanga e pā ki te putanga o tētahi. Engari ki te kore e whakahokia te poi tuatahi, ka pā tērā ki te tangohanga tuarua, nā te mea kua ruarua ake ngā poi mō te tangohanga tuarua. Ka kīia he pāpono whakawhirinaki.

odds  
ratio  
outcome

fair event  
random

biased event

combined event  
tree diagram

independent,  
dependent

## He Tauira Mahere mō te Tūponotanga

Taumata 1	Te Mātauranga Tūponotanga	Te Whakaoti Rapanga Tūponotanga	Te Reo Matatini o te Tūponotanga
Whanaketanga 1a	Karekau he whanaketanga e hāngai ana ki te tūponotanga i tēnei taumata.		
Whanaketanga 1e	E mōhio ana ki ngā putanga katoa e taea ana i tētahi pūāhua tūponotanga māmā.	<p>I tētahi pūāhua tūponotanga māmā, ka tautohua te putanga he nui te tūponotanga, te putanga he iti te tūponotanga, mēnā rānei he āhua ōrite te tūponotanga.</p> <p>Ka whakahaere whakamātau tūponotanga māmā me te tuhi anō i ngā putanga ki tētahi tūtohi.</p> <p>Ka matapae i te putanga o tētahi āhuatanga i runga anō i te mōhio ki te putanga o taua āhuatanga i mua. Hei tauira, ko te whiti mai o te Rā āpōpō mēnā kua toru rangi e ua ana.</p>	E mōhio ana ki ngā kupu tūponotanga nei: tūponotanga, putanga, tūtohi

Taumata 2	Te Mātauranga Tūponotanga	Te Whakaoti Rapanga Tūponotanga	Te Reo Matatini o te Tūponotanga
Whanaketanga 2a	<p>E mōhio ana ki te matapōkere o ngā putanga i tētahi pūāhua tūponotanga.</p> <p>E mōhio ana ki te wehe kētanga o ngā pāpono. Arā, kāore te putanga o tētahi pāpono e pā ki te putanga o te pāpono e whai mai ana. Hei tauira, ina puta he upoko i tētahi piunga uka, he ūrite tonu te tūponotanga ka puta he upoko, he whiore rānei i te piunga o muri mai.</p>	<p>Ka whakahaere whakamātau tūponotanga māmā, me te tuhi anō i ngā putanga ki tētahi tūtohi.</p> <p>Ka matapae i ngā putanga o tētahi whakamātau tūponotanga i runga anō i te whakaaro arorau.</p>	<p>E mōhio ana ki te reo māmā o ia rā hei whakaahua tūponotanga, pēnei i ēnei:</p> <ul style="list-style-type: none"> <li>• kāore e kore</li> <li>• ākene pea</li> <li>• kore rawa</li> <li>• ...</li> </ul> <p>E mōhio ana ki ngā kupu tūponotanga nei: matapae, whakamātau</p>
Whanaketanga 2e	<p>E mōhio ana ki te tikanga o te āwhata hautau (mai i te 0 ki te 1) hei whakaatu tūponotanga. Arā, ko te 0 e mea ana e kore rawa e puta tētahi āhuatanga, ko te tahi e mea ana, āe mārika ka puta taua āhuatanga. Ko te <math>\frac{1}{2}</math> e mea ana he ūrite te tūponotanga ka puta taua āhuatanga, kāore rānei e puta.</p>	<p>Ka whakahaere whakamātau tūponotanga māmā, me te whakaatu anō i ngā putanga ki tētahi whakaari raraunga.</p> <p>Ka whakamāori i te whakaari raraunga o tētahi whakamātau tūponotanga.</p>	<p>E mōhio ana ki te whakaatu i ngā putanga o tētahi whakamātau tūponotanga ki tētahi whakaari raraunga, pērā i te:</p> <ul style="list-style-type: none"> <li>• kauwhata pou</li> <li>• kauwhata ira</li> <li>• kauwhata whakaahua</li> </ul> <p>E mōhio ana ki ngā kupu tūponotanga nei: āwhata, pāpono</p>

Taumata 3	Te Mātauranga Tūponotanga	Te Whakaoti Rapanga Tūponotanga	Te Reo Matatini o te Tūponotanga
Whanaketanga 3a	<p>E mōhio ana ki te tikanga o tētahi hautau māmā hei whakaatu i te tūponotanga o tētahi putanga. Hei tauira:</p> <p><math>T = \frac{1}{2}</math>:</p> <p>He āhua ōrite te tūponotanga ka puta tēnei āhuatanga, kāore rānei e puta.</p> <p><math>T = \frac{3}{4}</math>:</p> <p>He nui te tūponotanga ka puta tēnei āhuatanga.</p> <p><math>T = \frac{1}{4}</math>:</p> <p>He āhua iti te tūponotanga ka puta tēnei āhuatanga.</p> <p>E mōhio ana ki te whiriwhiri i te tūponotanga o ngā putanga i tētahi pūāhua tūponotanga māmā.</p> <p>E mōhio ana ki te taurangitanga o ngā putanga o tētahi whakamātau tūponotanga, kāore e whai tōtika i ngā tātaitanga tūponotanga.</p>	<p>Ka whakahaere whakamātau tūponotanga, me te whakaatu anō i ngā putanga.</p> <p>Ka matapae i ngā putanga o tētahi whakamātau tūponotanga i runga i te whakaaro arorau.</p> <p>Ka tātai i te tūponotanga o ngā putanga o tētahi whakamātau tūponotanga.</p>	<p>E mōhio ana ki ngā kupu tūponotanga nei: matapōkere, matapae, putunga, pāpono wehe kē, pāpono whakawhirinaki</p>
Whanaketanga 3e	<p>E mōhio ana mēnā he wehe kē, he whakawhirinaki rānei ngā putanga o tētahi pāpono raupapa.</p> <p>E mōhio ana ki te whakaatu tūponotanga ki tētahi hoahoa rākau.</p>	<p>Ka tātai i te tūponotanga o ngā putanga o tētahi pāpono raupapa, ka whakahaere whakamātau tūponotanga, me te whakamārama hoki i te taurangitanga o ngā putanga matapae me ngā putanga whakamātau.</p>	<p>E mōhio ana ki te whakaatu pāpono raupapa ki te hoahoa rākau.</p> <p>E mōhio ana ki ngā kupu tūponotanga nei: hoahoa rākau, pāpono raupapa</p>

Taumata 4	Te Mātauranga Tūponotanga	Te Whakaoti Rapanga Tūponotanga	Te Reo Matatini o te Tūponotanga
Whanaketanga 4a	E mōhio ana ki te whakaatu tūponotanga hei ūrau.	<p>Ka whakaputa whakaaro ki te tōkeke, te haukume rānei o tētahi pūāhua tūponotanga, i runga anō i ngā tātaitanga me te whakaaro arorau.</p> <p>Ka whakahaere whakamātau tūponotanga:</p> <ul style="list-style-type: none"> <li>• ka matapae i ngā putanga</li> <li>• ka tātai i ngā tūponotanga</li> <li>• ka whakaatu i ngā putanga ki te whakaari raraunga</li> <li>• ka whakamāori i ngā hua o te whakamātau.</li> </ul>	E mōhio ana ki ngā kupu tūponotanga nei: haukume, tōkeke
Whanaketanga 4e	<p>E mōhio ana ki ngā take e taurangi ai ngā putanga o tētahi whakamātau tūponotanga.</p> <p>E mōhio ana ki te iti haere o te taurangitanga i te nui haere o ngā pāpono o te whakamātau.</p>	<p>Ka whakahaere whakamātau tūponotanga:</p> <ul style="list-style-type: none"> <li>• ka matapae i ngā putanga</li> <li>• ka tātai i ngā tūponotanga</li> <li>• ka whakaatu i ngā putanga ki te whakaari raraunga</li> <li>• ka whakatairite i te tuari o ngā putanga matapae me ngā putanga whakamātau</li> <li>• ka whakamārama i te taurangitanga o ngā putanga whakamātau.</li> </ul>	<p>E mōhio ana ki te whakaatu i te tuari o ngā putanga o tētahi whakamātau tūponotanga ki ngā momo whakaari raraunga e hāngai ana.</p> <p>E mōhio ana ki ngā kupu tūponotanga nei: taurangitanga, tuari</p>

Taumata 5	Te Mātauranga Tūponotanga	Te Whakaoti Rapanga Tūponotanga	Te Reo Matatini o te Tūponotanga
Whanaketanga 5a	E mōhio ana ki te tātai i te tūponotanga o ngā putanga i tētahi pūāhua tūponotanga papa-maha.	Ka hangaia he pūāhua whakatau hei tūhura i tētahi pūāhua tūturu.  Ka whakahaere whakamātau tūponotanga, ka whakaputa whakaaro ki ōna wāhanga katoa.	E mōhio ana ki ngā kupu tūponotanga nei: pūāhua whakatau, pūāhua tūponotanga papa-maha



## Wāhangā 2

# Ngā Whanaketanga o te Tūponotanga, me ngā Tauira Aromatawai



He mea tango mai ngā whārangi e whai ake nei i te pukapuka *Whanaketanga Pāngarau: He Aratohu mā te Pouako*, i whakaputaina e Te Pou Taki Kōrero i te tau 2010. Koia ko ngā whanaketanga mō te Tūponotanga, mai i te 1a ki te 5a, me ngā tauira aromatawai e hāngai ana.

## Te Tūponotanga

Ngā Whāinga		
Ka whakaoti rapanga te ākonga, ka whakamārama otinga, e whai wāhi mai ana:	He tauira ēnei o ngā āhuatanga me mātua mōhio te ākonga e tutuki ai tana whakaoti rapanga:	<sup>29</sup> probability situation <sup>30</sup> predict <sup>31</sup> trial <sup>32</sup> outcome <sup>33</sup> probability event
<ul style="list-style-type: none"> <li>te tūhura i ētahi pūāhua tūponotanga<sup>29</sup> māmā;</li> <li>te matapae<sup>30</sup> me te whakamātau<sup>31</sup> i ngā putanga<sup>32</sup> o tētahi pāpono tūponotanga<sup>33</sup>.</li> </ul>	<ul style="list-style-type: none"> <li>ngā putanga ka taea i tētahi pāpono tūponotanga.</li> </ul>	

## Te Reo Matatini o te Pāngarau

Hei tauira kupu
<ul style="list-style-type: none"> <li>matapae</li> <li>whakamātau</li> <li>putanga</li> </ul>

## He Tauira Rapanga

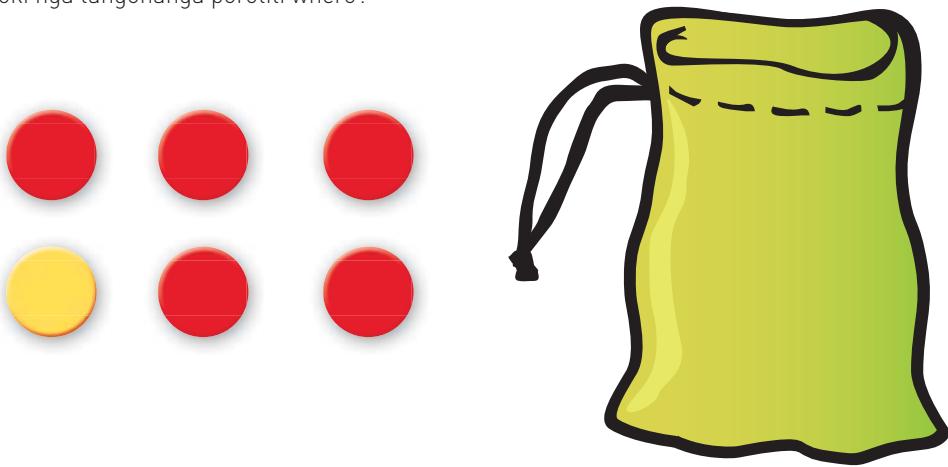
### Te Tūponotanga 1e

#### Rapanga 14

Kuhuna ētahi porotiti e ono ki tētahi pēke, ko tētahi he kōwhai te tae, e rima he whero.

Tukuna he pātai mō te tango matapōkere i tētahi o ngā porotiti. Hei tauira:

- Mēnā ka tango au i tētahi o ngā porotiti, kāore aku tirotiro, ki tōu whakaaro, he aha te tae o te porotiti ka tangohia? He aha i pērā ai ū whakaaro?
- Pēhea nei ū whakaaro mō te tango mai i te porotiti kōwhai?
- Pēhea nei ū whakaaro mō te tango mai i te porotiti kahurangi?
- Māu e whakamātau. Kia tekau ngā tangohanga porotiti. Ki tō whakaaro, ka hia ngā tangohanga porotiti kōwhai, ka hia hoki ngā tangohanga porotiti whero?



Kia mōhio te ākonga ki ngā putanga e taea ana me te mōhio anō mēnā ka tino eke tētahi putanga, ākene pea ka eke, e kore rawa rānei e eke. Hei tauira whakautu ki ngā pātai:

- Ākene pea he whero te tae nā te mea he maha kē atu ngā porotiti whero kei roto i te pēke.
- He waimarie nā te mea kotahi anake te porotiti kōwhai.
- Kāore e taea te porotiti kahurangi nā te mea he kōwhai, he whero anake ngā tae kei roto i te pēke.
- Kia tika te whakamātau i te tangohanga porotiti, me te tuhi anō i ngā putanga o ia tangohanga.  
Kia tika hoki te matapae, kāore e kore he nui ake ngā tangohanga porotiti whero.

# WHANAKETANGA 2a

## Te Tūponotanga

Ngā Whāinga		
Ka whakaoti rapanga te ākonga, ka whakamārama otinga, e whai wāhi mai ana:	He tauira ēnei o ngā āhuatanga me mātua mōhio te ākonga e tutuki ai tana whakaoti rapanga:	<sup>34</sup> outcome <sup>35</sup> uncertain <sup>36</sup> event
<ul style="list-style-type: none"> <li>te reo māmā hei whakaahua i te tūponotanga o tētahi putanga<sup>34</sup>.</li> </ul>	<ul style="list-style-type: none"> <li>te ūrite, te rerekē, te rangirua<sup>35</sup> rānei o ngā putanga o tētahi pāpono<sup>36</sup>.</li> </ul>	

## Te Reo Matatini o te Pāngarau

Hei tauira kupu
<ul style="list-style-type: none"> <li>tūponotanga</li> <li>whakamātau</li> <li>kāore e kore, ākene pea, tērā pea, e kore, kore rawa ...</li> <li>matapae</li> </ul>

## He Tauira Rapanga

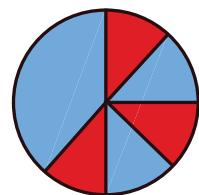
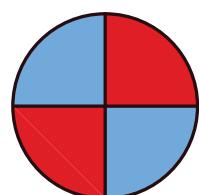
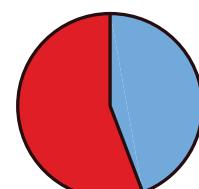
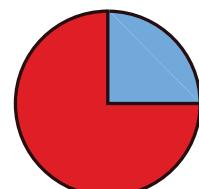
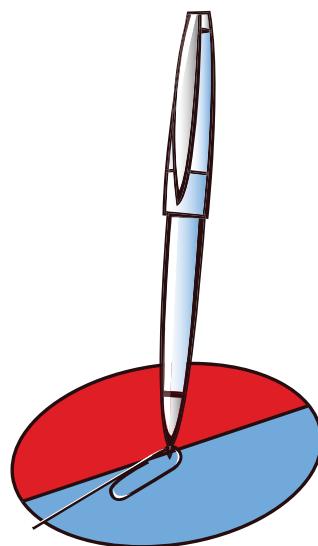
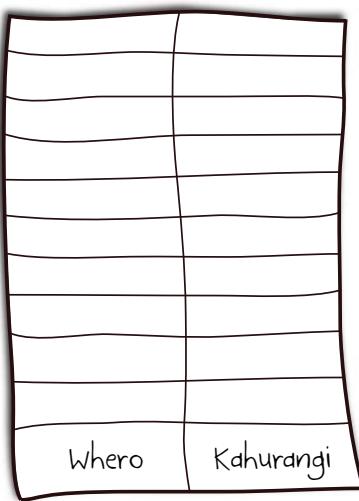
### Te Tūponotanga 2a

#### Rapanga 14

**Rauemi:** Ētahi pūrere takahurihuri [pēnei i ngā mea e whakaahuangia ana ki raro iho nei], he kāri hei tuhi i ngā putanga o te pūrere takahurihuri.

Ka takahurihia te pūrere, ā, ka tuhia he "X" ki te kāri, hei tohu i te tae e tau ai te pūrere. Ko tēhea te tae tuatahi kia tekau ngā taunga a te pūrere takahurihuri?

1. Tonoa te ākonga kia matapae i te tuatahi, kātahi ka whakamātau.
2. Hoatu ētahi porowhita rerekē hei papa mō te pūrere takahurihuri, hei matapae, hei whakamātau mā te ākonga.



Ka matapae te ākonga i te tūponotanga o ia tae i runga anō i te hautanga o taua tae i te porowhita. Ka whakamārama hoki i tana matapae. Hei tauira:

- Kāore e kore ka wini te whero, nā te mea he tino rahi ake te wāhangā whero o te porowhita i te wāhangā kahurangi.
- Ākene pea ka wini te whero, ka wini te kahurangi rānei, nā te mea he ūrite te wāhangā whero me te wāhangā kahurangi o te porowhita.
- Tērā pea ka wini te whero, nā te mea he paku nui ake te wāhangā whero i te wāhangā kahurangi o te porowhita.

# WHANAKETANGA 2e

## Te Tūponotanga

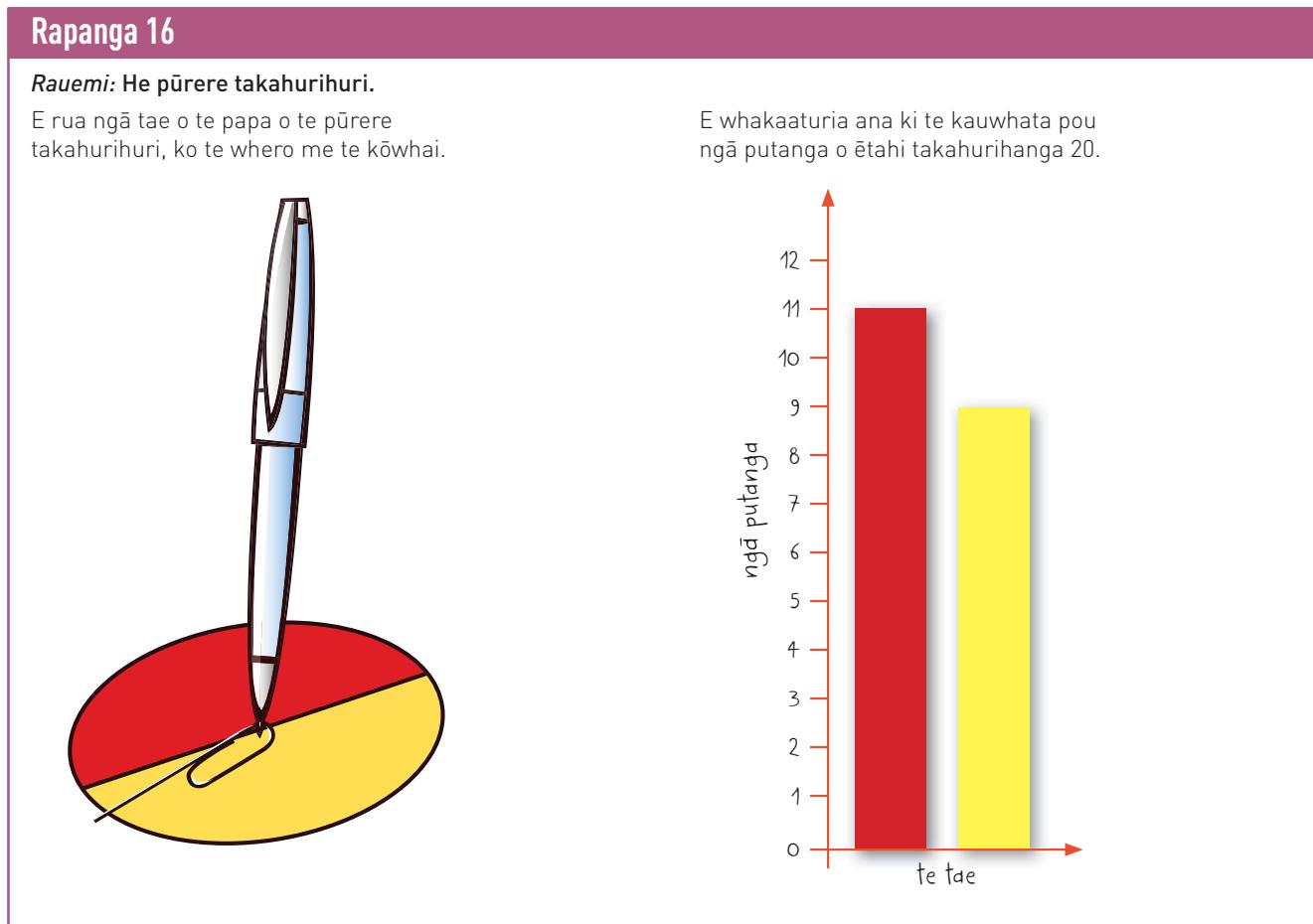
Ngā Whāinga	
Ka whakaoti rapanga te ākonga, ka whakamārama otinga, e whai wāhi mai ana:	He tauira ēnei o ngā āhuatanga me mātua mōhio te ākonga e tutuki ai tana whakaoti rapanga:
<ul style="list-style-type: none"> <li>• te whakaatu tūponotanga ki tētahi āwhata<sup>20</sup></li> <li>• te whakaari raraunga māmā (pērā i te kauwhata ira, te kauwhata whakaahua, me te kauwhata pou).</li> </ul>	<ul style="list-style-type: none"> <li>• te whakaatu putanga<sup>21</sup> ki tētahi whakaari raraunga māmā (pērā i te kauwhata ira, te kauwhata whakaahua, me te kauwhata pou).</li> </ul>

## Te Reo Matatini o te Pāngarau

Hei tauira kupu
<ul style="list-style-type: none"> <li>• tūponotanga</li> <li>• putanga</li> </ul>
Hei tauira whakaahuahanga
<ul style="list-style-type: none"> <li>• kauwhata ira</li> <li>• kauwhata pou</li> </ul>

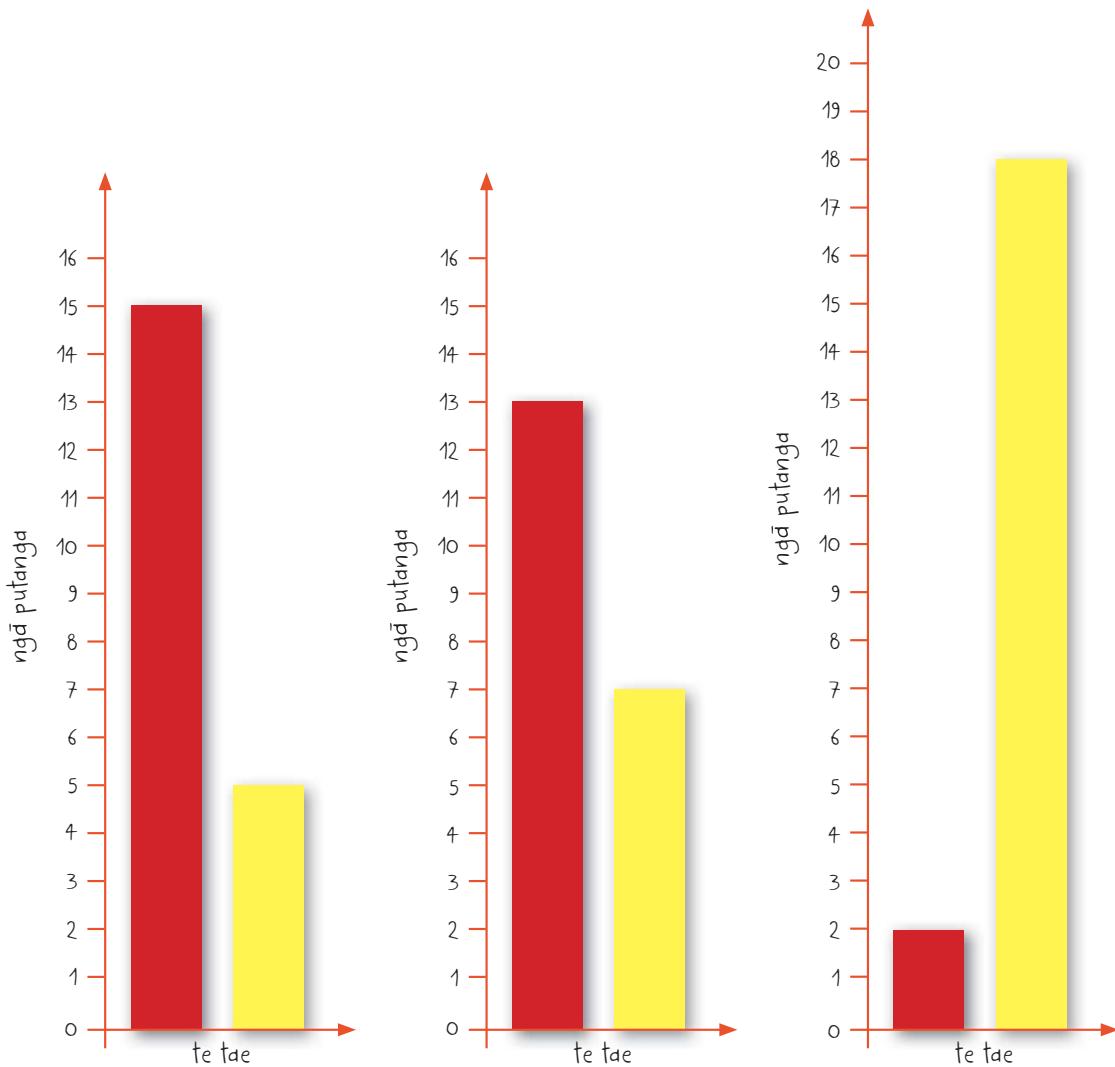
## He Tauira Rapanga

### Te Tūponotanga 2e



## WHANAKETANGA 2e

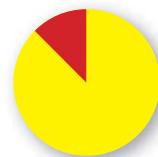
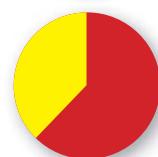
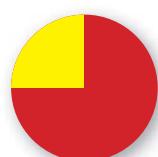
Tuhia te āhua o te papa o te pūrere takahurihuri e hāngai ana ki ēnei kauwhata pou, ka whakamārama ai:



Kia mōhio te ākonga ki te whakamāori i te kauwhata pou me te tūponotanga o ia putanga e whakaaturia ana. Hei tauira, he tino nui ake te puta o te whero i te kauwhata tuatahi, nō reira he nui te tūponotanga he rahi ake te wāhanga whero o te papa porowhita o te pūrere takahurihuri.

Kia mōhio te ākonga ki te whakamāori i ngā kauwhata pou, me te hāngai ki te tūponotanga matapae o ia putanga. Hei tauira whakamārama:

- He āhua nui ake te puta o te whero i te kauwhata tuatahi, nō reira he āhua nui te tūponotanga he rahi ake te wāhanga whero o te papa porowhita o te pūrere takahurihuri. He pēnei pea te āhua:
- He paku nui ake te puta o te whero i te kauwhata tuarua, nō reira he paku nui ake pea te wāhanga whero o te papa o te pūrere takahurihuri. He pēnei pea te āhua:
- He tino nui ake te puta o te kōwhai i te kauwhata tuatoru, nō reira he tino nui te tūponotanga he tino rahi kē ake te wāhanga kōwhai o te papa porowhita o te pūrere takahurihuri. He pēnei pea:



# WHANAKETANGA 3a

## Te Tūponotanga

Ngā Whāinga	
Ka whakaoti rapanga te ākonga, ka whakamārama otinga, e whai wāhi mai ana:	He tauira ēnei o ngā āhuatanga me mātua mōhio te ākonga e tutuki ai tana whakaoti rapanga:
<ul style="list-style-type: none"> <li>te tūhura pūāhua tūponotanga<sup>19</sup> māmā, penei i te piu i tētahi uka, me te pīrori i tētahi mataono tau</li> <li>te whakaatu tūponotanga hei hautau māmā i waenganui i te kore me te kotahi.</li> </ul>	<ul style="list-style-type: none"> <li>te whakatairite i ngā putanga matapae<sup>20</sup> me ngā putanga whakamātau<sup>21</sup> o tētahi pāpono tūponotanga</li> <li>te wehe kētanga<sup>22</sup>, te whakawhirinaki<sup>23</sup>, te aukati<sup>24</sup> rānei o ētahi pāpono e rua.</li> </ul>

## Te Reo Matatini o te Pāngarau

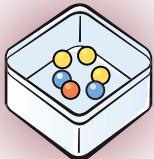
Hei tauira kupu
<ul style="list-style-type: none"> <li>putanga</li> <li>pāpono whakawhirinaki</li> <li>putanga matapae</li> <li>pāpono</li> <li>pāpono aukati</li> <li>putanga whakamātau</li> <li>pāpono wehe kē</li> <li>matapōkere</li> </ul>

## He Tauira Rapanga

### Te Tūponotanga 3a

#### Rapanga 15

E ono ngā poi kei roto i tētahi pouaka, e rua he kahurangi, e toru he kōwhai, he karaka tētahi. He ūrite te rahi o ngā poi katoa.



- Ina tangohia matapōkerehia tētahi o ngā poi, he aha te tūponotanga ka puta he mea kōwhai?
- Ina tangohia matapōkerehia tētahi o ngā poi, he aha te tūponotanga ka puta he mea kōwhai, he mea karaka rānei?
- Ina tangohia matapōkerehia tētahi o ngā poi, he aha te tūponotanga ka puta he mea whero?

Kia tika te whakaatu i ngā tūponotanga me ngā whakamārama pēnei i ēnei:

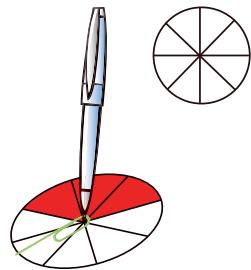
- E toru ngā poi kōwhai o roto i ngā poi e ono katoa. Nō reira e toru o roto i te ono ( $\frac{3}{6}$ ) te tūponotanga o tētahi poi kōwhai. He ūrite tēnā ki te haurua ( $\frac{1}{2}$ ), nā te mea he kōwhai te tae o te haurua o ngā poi e ono katoa.
- E toru ngā poi kōwhai, kotahi te poi karaka, ka whā tēnā o roto i te ono. Nō reira e whā o roto i te ono ( $\frac{4}{6}, \frac{2}{3}$ ) te tūponotanga o tētahi poi kōwhai, poi karaka rānei.
- Ko te kore te tūponotanga o tētahi poi whero, nā te mea karekau he poi whero i roto i te pouaka.

### Te Tūponotanga 3a

#### Rapanga 16

*Rauemi: Ngā mea hei hanga i tētahi pūrere takahurihuri.*

- Hangaia tētahi pūrere takahurihuri ko te  $\frac{3}{8}$  te tūponotanga ka tau te pūrere ki te whero.
- Mēnā e 8 ngā takahurihangā o te pūrere, e hia pea ngā taunga ki te rohe whero?
- Kia tika te whakaatu i ngā hauwaru ki te porowhita me te karakara kia whero ngā hauwaru e toru.
- Kia tika te whakamārama mō te rerekē o te putanga matapae me te putanga whakamātau. Hei tauira:
  - Ko te matapae, ka 3 ngā taunga ki te rohe whero o roto i ngā takahurihangā e 8 o te pūrere, engari ki te whakamātauria, ka nui ake, ka iti iho pea i te toru. Ko te  $\frac{3}{8}$  te tūponotanga, engari he matapōkere ia takahurihangā o te pūrere, kāore e mōhiotia ana ka tau ki hea.



## Te Tūponotanga

Ngā Whāinga		
Ka whakaoti rapanga te ākonga, ka whakamārama otinga, e whai wāhi mai ana:	He tauira ēnei o ngā āhuatanga me mātua mōhio te ākonga e tutuki ai tana whakaoti rapanga:	<sup>24</sup> representation <sup>25</sup> fraction line <sup>26</sup> tree diagram <sup>27</sup> outcome <sup>28</sup> combined event
<ul style="list-style-type: none"> <li>te reo me ngā whakaahuahanga<sup>24</sup> whānui hei whakaatu tūponotanga.</li> </ul>	<ul style="list-style-type: none"> <li>te whakamahi rārangi hautau<sup>25</sup> hei whakaatu tūponotanga</li> <li>te hoahoa rākau<sup>26</sup> hei whakaatu i ngā putanga<sup>27</sup> o ētahi pāpono raupapa<sup>28</sup>.</li> </ul>	

## Te Reo Matatini o te Pāngarau

Hei tauira kupu
<ul style="list-style-type: none"> <li>tūponotanga</li> <li>putanga</li> <li>āwhata</li> <li>pāpono</li> <li>pāpono raupapa</li> <li>hoahoa rākau</li> </ul>
Hei tauira whakaahuahanga
<ul style="list-style-type: none"> <li>hoahoa rākau</li> <li>rārangi hautau</li> </ul>

## He Tauira Rapanga

### Te Tuponotanga 3e

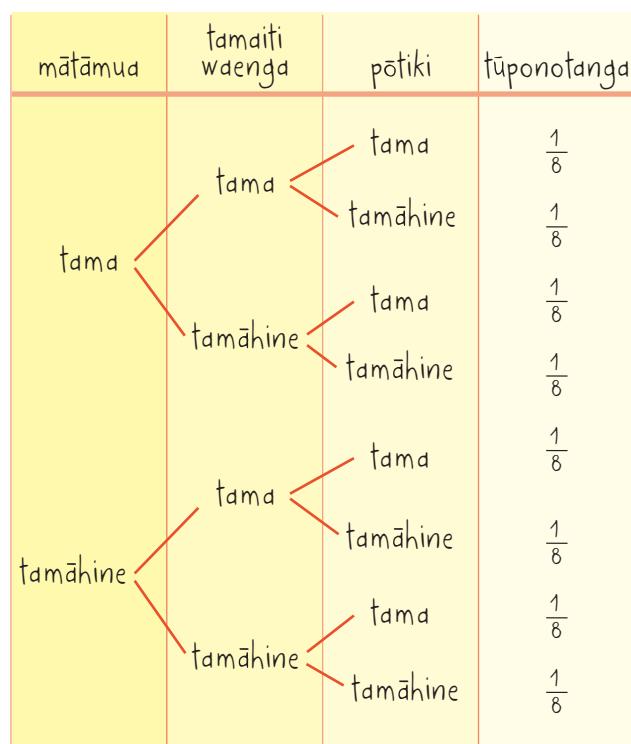
#### Rapanga 15

Tokotoru ngā tamariki a Hone rāua ko Mihipeka. Kāore koe i te mōhio mēnā he tāne, he wahine rānei ā rāua tamariki. Tuhia he hoahoa rākau hei whakaatu i ngā raupapatanga e taea ana mō te tama me te tamāhine.

- He aha te tūponotanga he tama katoa ā rāua tamariki?
- He aha te tūponotanga he tamāhine te mātāmua?
- He aha te tūponotanga e rua ngā tamāhine?
- He aha te tūponotanga e rua ngā tamāhine, ā, he tamāhine te pōtiki?

Kia tika te tuhi hoahoa rākau me te whiriwhiri i ngā tūponotanga. Arā:

- $\frac{1}{8}$  te tūponotanga he tama katoa ā rāua tamariki.
- $\frac{1}{2}$  te tūponotanga he tamāhine te mātāmua.
- $\frac{3}{8}$  te tūponotanga e rua ngā tamāhine.
- $\frac{1}{4}$  te tūponotanga e rua ngā tamāhine, ā, he tamāhine te pōtiki.



# WHANAKETANGA 4a

## Te Tūponotanga

Ngā Whāinga		
Ka whakaoti rapanga te ākonga, ka whakamārama otinga, e whai wāhi mai ana:	He tauira ēnei o ngā āhuatanga me mātua mōhio te ākonga e tutuki ai tana whakaoti rapanga:	<sup>30</sup> fair <sup>31</sup> bias <sup>32</sup> probability event
<ul style="list-style-type: none"> <li>te tōkeke<sup>30</sup>, te haukume<sup>31</sup> rānei o tētahi pāpono tūponotanga<sup>32</sup>.</li> </ul>	<ul style="list-style-type: none"> <li>te whakaatu tūponotanga hei ūrau.</li> </ul>	

## Te Reo Matatini o te Pāngarau

Hei tauira kupu		
• tōkeke	• haukume	• hoahoa rākau
Hei tauira whakaahuahanga		
• he hoahoa rākau		

## He Tauira Rapanga

Te Tūponotanga 4a

### Rapanga 15

Tērā a Hinemoana rāua ko Matiu e pīrori ana i ētahi mataono tau e rua.

Ka mea atu a Hinemoana, "E hoa, ka whakataetae tāua. Ka pīrorihia ngā mataono e rua, kātahi ka tangohia te tau iti i te tau nui (hei tauira, ki te puta he 4 me te 6, ka tangohia te 4 i te 6, ko te 2 te otinga). Koia nei ngā otinga ka taea:

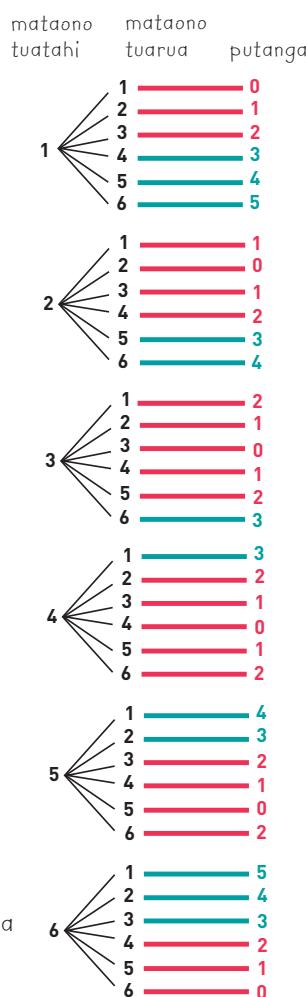
{0, 1, 2, 3, 4, 5}. Mēnā he kore, he kotahi, he rua rānei te otinga, ko au ka toa. Mēnā he toru, he whā, he rima rānei, ko koe tēnā ka toa."

Kei te tōkeke tēnei kēmu a Hinemoana, arā, he ōrite anō te tūponotanga toa o tēnā me tēnā o te tokorua, kei te tītaha rānei? Whakamāramatia mai ū whakaaro.

**Ka tuhia he hoahoa rākau hei tātai i te tūponotanga o ia putanga, kia āta kitea ko te  $\frac{24}{36}$  ( $\frac{2}{3}$ ) te tūponotanga ka puta te 0, te 1, te 2 rānei, ko te  $\frac{12}{36}$  ( $\frac{1}{3}$ ) te tūponotanga ka puta te 3, te 4, te 5 rānei.**



— Ka toa a Hinemoana  
— Ka toa a Matiu



## Te Tūponotanga

Ngā Whāinga		
Ka whakaoti rapanga te ākonga, ka whakamārama otinga, e whai wāhi mai ana:	He tauira ēnei o ngā āhuatanga me mātua mōhio te ākonga e tutuki ai tana whakaoti rapanga:	<sup>29</sup> distribution <sup>30</sup> theoretical outcome <sup>31</sup> experimental outcome <sup>32</sup> variable
<ul style="list-style-type: none"> <li>te whakatairite i te <b>tuari</b><sup>29</sup> o ngā putanga matapae<sup>30</sup> me ngā <b>putanga whakamātau</b><sup>31</sup>.</li> </ul>	<ul style="list-style-type: none"> <li>ngā take e <b>taurangi</b><sup>32</sup> ai ngā putanga o tētahi whakamātau tūponotanga.</li> </ul>	

## Te Reo Matatini o te Pāngarau

Hei tauira kupu
<ul style="list-style-type: none"> <li>tūponotanga</li> <li>matapae</li> <li>putanga</li> <li>whakamātau</li> <li>pāpono</li> <li>tuari</li> </ul>

## He Tauira Rapanga

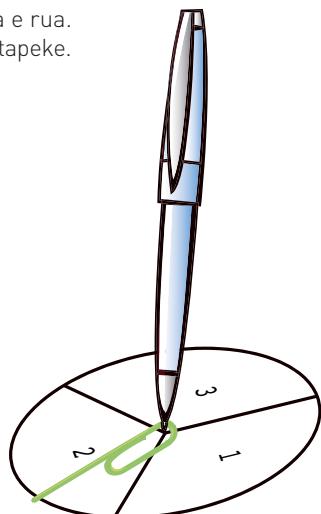
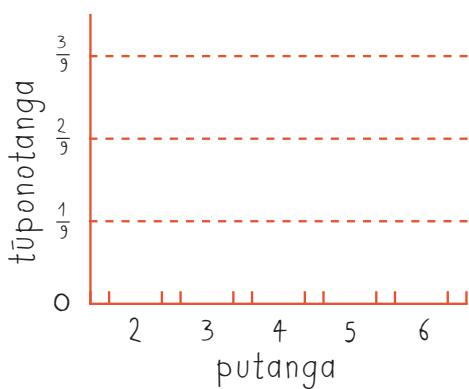
Te Tūponotanga 4e

### Rapanga 15

**Rauemi:** He pūrere takahurihuri.

E rua ngā takahurihanga o te pūrere nei, ka tāpirihia ngā putanga o ngā takahurihanga e rua. Hei tauira, mēnā he 2 te takahurihanga tuatahi, ā, he 3 te takahurihanga tuarua, ko te 5 te tapeke.

- Tuhia he hoahoa rākau hei whakaatu i ngā tapeke katoa e taea ana.
- He aha te tūponotanga ko te 2 te tapeke o ngā takahurihanga e rua?
- He aha te tūponotanga ko te 3 te tapeke?
- He aha te tūponotanga ko te 1 te tapeke?
- He aha te tūponotanga he nui ake i te 4 te tapeke?
- Tāia he kauwhata pou hei whakaatu i ngā tapeke katoa e taea ana, me te tūponotanga o tēnā, o tēnā:



- Mēnā 18 ngā takahurihanga e rua o te pūrere, he aha tō matapae mō te maha o ngā putanga o tēnā tapeke, o tēnā?
- Whakamātauria tāu i matapae ai, ka whakaatu ai i ngā putanga matapae me ngā putanga whakamātau ki tētahi kauwhata pou hiato.
- He aha i rerekē ai ngā putanga matapae me ngā putanga whakamātau?

**Kia tika te whakautu i ngā pātai, te whakaatu i ngā putanga katoa e taea ana ki te hoahoa rākau, te tātai i ngā tūponotanga o ngā putanga, te whakahaere i te whakamātau, me te tuhi i te kauwhata pou hiato.**

# WHANAKETANGA 5a

## Te Tūponotanga

Ngā Whāinga		
Ka whakaoti rapanga te ākonga, ka whakamārama otinga, e whai wāhi mai ana:	He tauira ēnei o ngā āhuatanga me mātua mōhio te ākonga e tutuki ai tana whakaoti rapanga:	<sup>27</sup> multi-level <sup>28</sup> combined event
<ul style="list-style-type: none"> <li>tētahi pūāhua tūponotanga papa-maha<sup>27</sup>.</li> </ul>	<ul style="list-style-type: none"> <li>te tātai tūponotanga o tētahi pāpono raupapa<sup>28</sup>.</li> </ul>	

## Te Reo Matatini o te Pāngarau

Hei tauira kupu
<ul style="list-style-type: none"> <li>pāpono raupapa</li> <li>hoahoa rākau</li> <li>matapōkere</li> </ul>
Hei tauira whakaahuahanga
<ul style="list-style-type: none"> <li>he hoahoa rākau</li> </ul>

## He Tauira Rapanga

Te Tūponotanga 5a

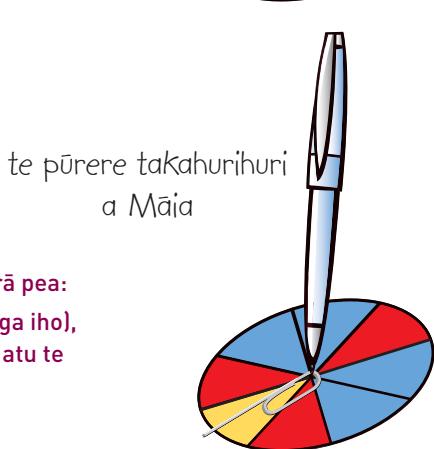
### Rapanga 12

Nā Wiremu i hanga tētahi pūrere takahurihuri, nā Māia hoki tētahi i hanga. E tohe ana a Wiremu he nui ake te tūponotanga ka tau tana pūrere ki te rohe whero i te tūponotanga ka tau te pūrere a Māia ki te rohe whero.

- He pēhea nei ō whakaaro ki te tohenga nei a Wiremu?  
Whakamāramatia mai he aha i pērā ai ō whakaaro.
- Whakamātauria tēnei tohenga a Wiremu.  
Tuhia he pūrongo mō tō whakamātau.



- Kia whaitake te matapae me te whakamārama. Hei tauira:
  - He ūrite te tūponotanga ka tau ki te rohe whero i ia pūrere takahurihuri, nā te mea he  $\frac{3}{8}$  te hautanga whero o ia porowhita.
  - He nui ake pea te tūponotanga ka tau ki te rohe whero i te pūrere a Māia, nā te noho wehe o ngā hauwaru whero e toru.
  - He nui ake pea te tūponotanga ka tau ki te rohe whero i te pūrere a Wiremu, nā te piri tahi o ngā hauwaru whero e toru.



- Kia tika te whakarite me te whakatutuki i te whakamātau tūponotanga. Arā pea:
  - Kia maha ngā takahurihangā o ia pūrere (ki te takiwā pea o te 50 te itinga iho), me te whakamārama mēnā he iti noa iho ngā takahurihangā, he nui kē atu te tūponotanga ka tītaha ngā putanga.
  - Ka whakaaturia ngā putanga ki tētahi tūtohi, tētahi kauwhata rānei.
  - Ka puta he whakataunga i te tohenga a Wiremu i runga i ngā putanga o te whakamātau.



## Wāhanga 3

# He Ngohe Whakaako i te Tūponotanga



He ngohe whakaako ēnei e hāngai ana ki ngā taumata Whanaketanga 1a ki te 5a. Hei tauira noa iho ēnei ngohe, hei āta whakaaro mā te pouako, hei whakawhānui, otirā hei whakahāngai ki āna ake ākonga.

Kei te Wāhanga 4 (whārangi 95) ngā whārangi tārua e hiahiatia ana hei whakatutuki i ētahi o ngā ngohe. Kei te pae ipurangi o [www.nzmaths.co.nz](http://www.nzmaths.co.nz) hoki ēnei whārangi tārua.

## **Whanaketanga 1e**

### **Mātauranga Matua kua Mau kē**

Te Tau

- te tatau ake
- te tatau māwhitiwhiti
- te hautau māmā (haurua, hauwhā)

### **Mātauranga Matua hei Ako**

- te tautohu i ngā putanga katoa e taea ana i tētahi pūahua tūponotanga māmā
- te tautohu i te putanga he nui te tūponotanga, te putanga he iti te tūponotanga, mēnā rānei he āhua ūrite te tūponotanga
- te whakahaere whakamātau tūponotanga māmā me te tuhi anō i ngā putanga ki tētahi tūtohi

### **Rauemi kē atu e Hāngai ana**

Ngā Kōwae Ako o nzmaths

- Manu Takirua

<http://www.nzmaths.co.nz/resource/manu-takirua>

## Āpōpō Mai

1a 1e 2a 2e 3a 3e 4a 4e 5a

E ako ana ahau ki te matapae i te putanga o tētahi āhuatanga o ia rā.

### Rauemi

- He kāri wātea

### Kupu matua

āe, āe pea, kāo, kāore pea, ūrite, rerekē

Ngā tohutohu	He tauira kōrero mā te pouako
Whakamāramahia tētahi horopaki tūponotanga hei matapae mā ngā ākonga i ngā putanga e taea ana i taua horopaki.	<p>Ki tōu whakaaro, ka ūrite te tae o ngā hū o ngā tamariki katoa o tō tātou akomanga āpōpō, ka rerekē rānei ngā tae? Me āta whakaaro. Māku e hoatu he kāri ki a koe, māu e tuhi te kupu ‘ūrite’, te kupu ‘rerekē’ rānei.</p> <p>Tēnā, homai ngā kāri hei tatau mā tātou. Anei ngā kāri ‘ūrite’, ki konei ngā kāri ‘rerekē’. Tokohia e whakaaro ana ka ūrite te tae o ngā hū, tokohia e whakaaro ana ka rerekē ngā tae?</p> <p>Koutou e whakaaro ana ka ūrite te tae o ngā hū o ngā tamariki katoa, he aha i pēnā ai te whakaaro?</p> <p>Nā te mea he pango katoa ngā hū i tēnei rā.</p> <p>Koutou e whakaaro ana ka rerekē te tae o ngā hū o ngā tamariki āpōpō, he aha i pēnā ai te whakaaro?</p> <p>Nā te mea he rerekē ngā tae i tēnei rā. Nā te mea he rerekē ngā momo hū o tēnā, o tēnā o tātou.</p>
Kia pērā anō te arataki i ngā ākonga i tētahi atu horopaki tūponotanga, engari kia toru ngā whiringa i tēnei wā – te āe, te kāo me te rangirua.	<p>Ki tōu whakaaro ka heke te ua āpōpō? Māku e hoatu he kāri ki a koe hei tuhi māu i te kupu ‘āe’, te ‘kāo’, te tohu ‘?’ rānei. Ko te tohu ‘?’ e mea ana kāore koe i te mōhio – ākene pea ka heke te ua, ākene pea kāore te ua e heke.</p> <p>Anei ngā putunga kāri e toru. Tokohia e whakaaro ana ka heke te ua āpōpō? He aha i pēnā ai te whakaaro?</p> <p>Nā te mea kua rua rā e ua ana ināianei, ā, kua tino tau te ua. Nā te mea ko te hōtoke tēnei, te wā he nui te heke o te ua. Nā te mea e heke ana te ua i ngā wā katoa i tēnei rohe.</p> <p>Tokohia e whakaaro ana kāore te ua e heke āpōpō? He aha i pēnā ai te whakaaro?</p>

	<p>Nā te mea kua rua rangi ināianei e heke ana te ua, ā, kei te mao haere.</p> <p>Nā te mea kotahi wiki e whiti ana te rā, ā, e tino tau ana tēnei huarere.</p> <p>Nā te mea koinei te wāhangā o te tau e tino paki ana ngā rangi.</p> <p>Tokohia kāore e mōhio ana mēnā ka heke te ua, kāore rānei e heke āpōpō? He aha i pēnā ai ngā whakaaro?</p> <p>Nā te mea koirā te āhua o te huarere i tēnei wā o te tau. He rā pai, he rā kino, he rā pai, he rā kino. Ko wai ka mōhio ka pēhea āpōpō.</p>
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Kia pērā anō te whakawhitiwhiti kōrero mō ētahi atu horopaki tūponotanga. Hei tauira:

- Te maha o ngā pūkoro kei ngā kākahu o ngā tamariki āpōpō – ka ōrite te maha o ia ākonga, ka rerekē rānei?
- Mēnā ka toa te tīma whutupōro Ōpango i tā rātou kēmu ki Ahitereiria.
- Mēnā ka toa te tīma whutupōro Ōpango i tā rātou kēmu ki Whītī.
- Mēnā ka tae mai a Māui-tikitiki-a-Taranga ki tō tātou kura āpōpō.
- Mēnā ka whero te tae o te rangi āpōpō.
- Mēna ka 12 ngā tamariki katoa i tō tātou akomanga āpōpō.
- Mēnā ka kai āporo koe āpōpō.
- Mēnā ka haere mai koe ki te kura mā runga hōihō āpōpō.
- Mēnā ka haere mai koe ki te kura mā runga motukā āpōpō.

### Hei whakawhānui

Tuhia ngā upoko kōrero o ngā rōpū e toru nei ki te papa tuhituhi:

Āe	Kāo	Āe pea / Kāore pea

Tonoa ngā ākonga kia āta whakaaro i tētahi āhuatanga e tika ana mō ia rōpū. Hei tauira:

Āe	Kāo	Āe pea / Kāore pea
<ul style="list-style-type: none"> <li>• Ka mahi pāngarau tātou āpōpō.</li> <li>• ...</li> </ul>	<ul style="list-style-type: none"> <li>• Ko Matua Hamiora tō tātou pouako āpōpō.</li> <li>• ...</li> </ul>	<ul style="list-style-type: none"> <li>• Ka kitea te Marama i te rangi ā te pō nei.</li> <li>• ...</li> </ul>

## Kāri Tau

1a 1e 2a 2e 3a 3e 4a 4e 5a

E ako ana ahau ki te matapae i ngā putanga o tētahi whakamātau tūponotanga.

### Rauemi

- He huinga kāri tau (tirohia te Whārangī Tārua 1)

### Kupu matua

putanga, tūponotanga

Ngā tohutohu	He tauira kōrero mā te pouako
Whakaaturia he huinga kāri tau ki ngā ākonga, ka matapae ai i te tau ka puta ina tangohia matapōkerea tētahi.	<p>Titiro ki aku kāri tau. E ono katoa ngā kāri. E rima ngā ‘tahi’. Kotahi te ‘rua’.</p> <p><b>1    1    1    1    1    2</b></p> <p>Ka riwhiriwhia ngā kāri. Ka whakatakotoria ki te tēpu, ko ngā mata ki raro. Kāore tātou i te mōhio he aha te tau o tēnā kāri, o tēnā kāri. E Hera, tohua mai tētahi o ngā kāri.</p> <p>Koinei te kāri i tohua e Hera.</p> <p style="text-align: center;">↓</p> <p><b>                </b> <b>                </b> <b>                </b> <b>                </b> <b>                </b> <b>                </b></p> <p>Ina huripokina te kāri i tohua e Hera, he aha pea te tau ka puta? Ko wai o koutou e whakaaro ana he tahī te tau o tēnei kāri? He aha i pēnā ai ō whakaaro?</p> <p>Nā te mea he maha ngā tahī. E rima ngā tahī, kotahi noa iho te rua.</p> <p>Ko wai e whakaaro ana he rua te tau i tēnei kāri? He aha i pēnā ai ō whakaaro?</p> <p>Kotahi anake te rua, e rima kē ngā tahī. Nō reira ehara pea i te rua. Mēnā ka puta te rua, he tino waimarie tērā.</p> <p>Ko wai e whakaaro ana he toru tēnei kāri? He aha i pēnā ai ō whakaaro?</p> <p>Kāore e puta te toru, nā te mea ko te tahī me te rua anake ngā tau kei ēnei kāri.</p>

<p>Whakamāramatia te tikanga o te kupu tūponotanga nei, te ‘putanga’.</p>	<p>Tēnā, kia huripokina te kāri i tohua e Hera. He aha te tau? Ko te tau o runga i te kāri, koia te putanga o tēnei mahi. He aha te putanga o te huripoki i te kāri? He tahi (he rua rānei).</p> <p>Māu tētahi kāri e tohu, Hinekura. He aha te putanga o te kāri i tohua e Hinekura? He tahi (he rua rānei).</p>				
<p>Whakahaerehia te whakamātau tūponotanga kia tekau ngā tīpako i tētahi o ngā kāri. Tuhia ngā putanga ki tētahi tūtohi.</p>	<p>Ko tā tātou mahi ināianei, he riwhiriwhi anō i ngā kāri, he huripoki anō i tētahi. Kia tekau ngā riwhiriwhinga me ngā huripokinga. Tatauria te maha o ngā putanga o te tahi me te maha o ngā putanga o te rua.</p> <table border="1"> <tr> <td>Ngā tahi</td> <td>Ngā rua</td> </tr> <tr> <td> </td> <td> </td> </tr> </table> <p>E hia ngā putanga o te tahi? E waru.</p> <p>E hia ngā putanga o te rua? E rua.</p> <p>He aha ki ōu whakaaro i maha ake ai ngā putanga o te tahi i ngā putanga o te rua? Nā te mea he maha kē atu ngā tahi – e rima ngā kāri tahi, kotahi noa iho te kāri rua.</p> <p>Āe rā. He nui ake te tūponotanga ka puta he tahi. He iti ake te tūponotanga ka puta he rua.</p>	Ngā tahi	Ngā rua		
Ngā tahi	Ngā rua				
<p>Kia pērā anō te arataki i ngā ākonga mō ētahi atu huinga kāri. Hei tauira:</p> <ul style="list-style-type: none"> <li>• kia 5 ngā ‘ono’, kia 1 te ‘toru’</li> <li>• kia 3 ngā ‘whā’, kia 3 hoki ngā ‘rima’</li> <li>• kia 9 ngā ‘rima’, kia 1 te ‘whā’</li> <li>• kia 5 ngā ‘rua’, kia 4 ngā ‘toru’</li> </ul> <p>Me āta whakamahi ngā kupu hou e rua nei, te ‘putanga’ me te ‘tūponotanga’, kia mārama ai ngā ākonga ki te tikanga o ēnei kupu.</p>					
<p><b>Hei whakawhānui</b></p> <p>Kia pērā anō te arataki i ngā ākonga, engari me whakamahi he porotiti karakara, ā, ka tangohia matapōkerea i tētahi pēke.</p> <p>Tukuna ngā ākonga kia mahi takirua i ngā momo whakamātau tūponotanga nei, pērā i te huripoki kāri, te tango porotiti rānei.</p>					

## **Whanaketanga 2a**

### **Mātauranga Matua kua Mau kē**

Te Tau

- ngā rautaki wāwāhi tau māmā

Te Tūponotanga

- te tautohu i ngā putanga katoa e taea ana i tētahi pūāhua tūponotanga māmā
- te tautohu i te putanga he nui te tūponotanga, te putanga he iti te tūponotanga, mēnā rānei he āhua ūrite te tūponotanga
- te whakahaere whakamātau tūponotanga māmā me te tuhi anō i ngā putanga ki tētahi tūtohi

### **Mātauranga Matua hei Ako**

- te matapōkere o ngā putanga i tētahi pūāhua tūponotanga
- te wehe kētanga o ngā pāpono
- te whakahaere whakamātau tūponotanga māmā, me te tuhi anō i ngā putanga ki tētahi tūtohi
- te matapae i ngā putanga o tētahi whakamātau tūponotanga i runga anō i te whakaaro arorau

### **Rauemi kē atu e Hāngai ana**

Ngā Rapanga o nzmaths

- He Aihikīrimi

<http://www.nzmaths.co.nz/sites/default/files/IcecreamMaori.pdf>

# He Kīanga Tūponotanga

1a 1e 2a 2e 3a 3e 4a 4e 5a

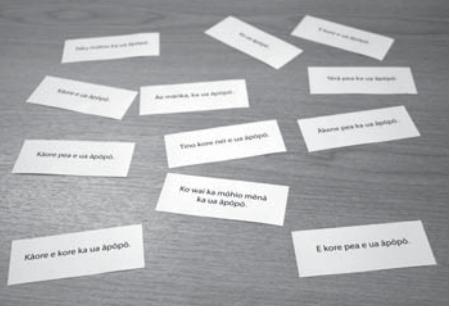
E ako ana ahau ki te matapae i ngā putanga o tētahi whakamātau tūponotanga.

## Rauemi

- Whārangī Tārua 2 & 3

## Kupu matua

āe marika, ākene pea, kāore e kore, tino kore nei, tūponotanga

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Tapahia ngā kāri kei te <b>Whārangī Tārua 2</b>, ka arataki ai i ngā ākonga ki te whakarārangī i ngā kōrero mai i te mea e kaha ana te tūponotanga ka heke te ua, ki te mea e kore nei te tūponotanga o te ua.</p> 	<p>Kia titiro tātou ki ēnei kāri. Ko ngā kōrero katoa kei ēnei kāri mō te tūponotanga ka heke te ua āpōpō. Ko tā tātou mahi, he whakarōpū i ngā kāri.</p> <p>Ki tētahi o ngā rōpū, ko ngā kōrero e mea ana he tino nui te tūponotanga ka heke te ua āpōpō. Ki tōu whakaaro, ko ēhea kōrero ērā?</p> <p>Kāore e kore ka ua āpōpō.</p> <p>Āe mārika, ka ua āpōpō.</p> <p>Ka ua āpōpō.</p> <p>Ki tētahi o ngā rōpū, ko ngā kōrero kei te takiwā o waenganui, arā, e mea ana he āhua ōrite te tūponotanga ka heke te ua āpōpō, kāore rānei e ua. Ki tōu whakaaro, ko ēhea kōrero ērā?</p> <p>Taku mōhio ka ua āpōpō.</p> <p>Tērā pea ka ua āpōpō.</p> <p>E kore pea e ua āpōpō.</p> <p>Ākene pea ka ua āpōpō.</p> <p>Kāore pea e ua āpōpō.</p>
<p>Rōpū 1</p> <p>Āe mārika, ka ua āpōpō. Kāore e kore ka ua āpōpō. Ka ua āpōpō.</p>	<p>Taku mōhio ka ua āpōpō. Tērā pea ka ua āpōpō. Ākene pea ka ua āpōpō. Ko wai ka mōhio mēnā ka ua āpōpō. Kāore pea e ua āpōpō. E kore pea e ua āpōpō.</p>
<p>Rōpū 2</p> <p>Taku mōhio ka ua āpōpō. Tērā pea ka ua āpōpō. Ākene pea ka ua āpōpō. Ko wai ka mōhio mēnā ka ua āpōpō. Kāore pea e ua āpōpō. E kore pea e ua āpōpō.</p>	<p>Ki te rōpū tuatoru, ko ngā kōrero e mea ana he tino nui te tūponotanga kāore te ua e heke āpōpō. Ki tōu whakaaro, ko ēhea kōrero ērā?</p> <p>E kore e ua āpōpō. Tino kore nei e ua āpōpō. Kāore e ua āpōpō.</p>
<p>Rōpū 3</p> <p>Kāore e ua āpōpō. E kore e ua āpōpō. Tino kore nei e ua āpōpō.</p>	<p>Me hoki ki te tirotiro i ngā kōrero kei ia rōpū. Ināianei, me whakarārangī ngā kōrero o ia rōpū, mai i te mea he kaha rawa te tūponotanga o te ua ki te mea he iti rawa te tūponotanga.</p>

<p>Tapahia ngā kāri kei te <b>Whārangi Tārua 3</b>. Tukuna mā ngā ākonga e honohono ngā kāri kia puta ai he kōrero āhua pono nei.</p> <p>Tonoa ngā ākonga kia whakamārama he aha i pērā ai ō rātou whakaaro ki te tūponotanga o tērā putanga, o tērā.</p>	<p>E rua ngā huinga kāri. He kiwikiwi te tae o tētahi huinga kāri, koirā ngā tīmatanga o ētahi rerenga kōrero. He mā tētahi huinga kāri, koirā ngā kupu whakamutunga o ngā rerenga kōrero. Ko tā tātou mahi, he honohono i ngā kāri kia puta ai te katoa o te rerenga kōrero, kia pono hoki taua kōrero.</p> <p>Anei tētahi:</p> <p><i>Tino kore nei ... ... e whiti te Rā ā te pō nei.</i></p> <p>He aha i pēnā ai ōu whakaaro mō te tūponotanga ka whiti te Rā ā te pō nei?</p> <p>Nā te mea kāore te Rā e whiti i ngā pō. Kei tērā taha kē o te ao e whiti ana. He pōuri ngā pō katoa, ko te Marama anahe e whiti mai ana.</p>
<p><b>Hei whakawhānui</b></p> <p>Tonoa mā ngā ākonga e tuhi ā rātou ake rerenga kōrero e whakaatu ana i te tūponotanga o tētahi putanga.</p>	

## He Mataono Tae

1a 1e 2a 2e 3a 3e 4a 4e 5a

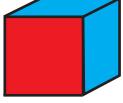
E ako ana ahau ki te matapae i ngā putanga o tētahi whakamātau tūponotanga.

### Rauemi

- He mataono rite, he whero ētahi mata e 3, he kahurangi ētahi mata e 3.
- He mataono rite, he whero ētahi mata e 2, he kahurangi ētahi mata e 2, he kōwhai ētahi mata e 2.
- He mataono rite, he whero ētahi mata e 5, he kahurangi tētahi o ngā mata.

### Kupu matua

pīrori, putanga, tārima, tūponotanga, tūtohi

Ngā tohutohu	He tauira kōrero mā te pouako				
<p>Aratakina ngā ākonga i tēnei whakamātau tūponotanga, te pīrori mataono tae, me te tuhi i ngā putanga ki tētahi tūtohi.</p> <p>Whakawhitiwhiti kōrero mō te tūponotanga o ia putanga.</p> 	<p>Ka mahi takirua koutou. Anei tētahi mataono rite mā ia takirua. He aha ngā tae o ngā mata?</p> <p>He whero ētahi mata e toru, he kahurangi ētahi mata e toru.</p> <p>Mā tētahi o kōrua e pīrori te mataono, ka karanga mai ai i te tae ka puta. Māku e tuhi ki tēnei tūtohi. Me āta titiro mai ki te āhua o taku tuhi i ngā putanga o te pīrori i ngā mataono.</p> <table><thead><tr><th>whero</th><th>kahurangi</th></tr></thead><tbody><tr><td>            III</td><td>                </td></tr></tbody></table> <p>Pēhea nei te āhua o taku tuhi i ngā putanga ki te tūtohi nei?</p> <p>Ka tuhia he tohu poutū mō ia putanga. Mō ia putanga tuarima, ka tuhia he rārangī titaha. Ka tuhia hei rōpū o te rima.</p> <p>He aha i pēnei ai taku tuhi?</p> <p>Nā te mea he māmā te tatau i ngā putanga. He māmā te tatau mawhiti-rima.</p> <p>Ko te ‘tārima’ hei ingoa mō tēnei momo tuhi i ngā tatau.</p> <p>E hia katoa ngā putanga o te whero?</p> <p>Rima, tekau, tekau mā toru.</p> <p>E hia kātoa ngā putanga o te kahurangi?</p> <p>Rima, tekau, tekau mā rima.</p> <p>He āhua ūrite te maha o ngā putanga o te whero me te maha o ngā putanga o te kahurangi. He aha ki ūu whakaaro i pērā ai?</p> <p>Nā te mea e toru ngā mata whero, e toru hoki ngā mata kahurangi.</p>	whero	kahurangi	III	
whero	kahurangi				
III					

Āe rā. He ūrite te rahi o ia mata o te mataono. Ina pīroria, he ūrite te tūponotanga o ia mata. E toru ngā mata whero, e toru hoki ngā mata kahurangi, nō reira he ūrite te tūponotanga ka puta he mata whero, me te tūponotanga ka puta he mata kahurangi.

He aha te tūponotanga ka puta he mata kākāriki?

Kore rawa e puta he mata kākāriki nā te mea karekau he mata kākāriki o tēnei mataono.

Tukuna ngā ākonga kia mahi takirua, ki te pīrori i ētahi atu o ngā mataono rite, me te tuhi anō i ngā putanga ki tētahi tūtohi. Kia 20 pea ngā pīroritanga o ia mataono rite. Me matapae i te tuatahi te maha o ngā putanga o ia tae, me āta matapaki hoki te tūponotanga o ia putanga, arā, mēnā he nui, he iti rānei te tūponotanga o tētahi tae, he āhua ūrite rānei te tūponotanga o ngā tae.

#### **Hei whakawhānui**

Whakamahia ētahi atu matarau rite, pērā i te matawhā rite me te matawaru rite.

## Pīroria, ka Tāpiri ai

1a	1e	2a	2e	3a	3e	4a	4e	5a
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E ako ana ahau i te wehe kētanga o ētahi pāpono tūponotanga.

### Rauemi

- He mataono rite (ko ngā tau 1, 1, 2, 3, 3 kei ngā mata)

### Kupu matua

pāpono, pīrori, putanga, tapeke, tūponotanga, tūtohi, whakamātau

Ngā tohutohu	He tauira kōrero mā te pouako																																													
Whakamāramahia te whakamātau tūponotanga nei, ka arataki ai i ngā ākonga ki te kohikohi i ngā raraunga ka puta.	<p>He mahi takirua tēnei. Anei ētahi mataono tau e rua mā ia takirua. He aha ngā tau kua tuhia ki ngā mata?</p> <p>E rua ngā 1, kotahi te 2, e toru ngā 3.</p> <p>Ko tā kōrua mahi ko tō hoa, he pīrori i ngā mataono e rua, ka tāpiri ai i ngā tau ka puta. He aha ngā tapeke e taea ana i tēnei whakamātau?</p> <p>Me tuhi ki tētahi tūtohi. Ko te 2, te 3, te 4, te 5 me te 6 ngā tapeke e taea ana.</p> <p>Anei tētahi atu tūtohi hei tohu mā kōrua i ngā putanga:</p> <table border="1"> <tr><td>2</td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td>3</td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td>4</td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td>5</td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td>6</td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table>	2									3									4									5									6								
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2	X																																													
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4																																														
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Aratakina ngā ākonga kia kohikohi i ngā raraunga o ia takirua, ka whakaatu ai ki te kauwhata whakaahua.	<p>Ka hanga tātou i tētahi kauwhata, kia kitea ai ko tēhea te putanga tuatahi kia tuhia he rīpeka ki ngā wāhangā katoa o tōna tūtohi.</p> <p>Māku e tuhi ngā putanga ki te papa tuhituhi. Haere mai tētahi o ia takirua, ka whakapiri ai i tētahi pepa ki runga ake i te putanga i kī tuatahi tōna tūtohi i tā kōrua whakamātau.</p>																																													

Whakawhitihiti kōrero mō te tūponotanga o ia putanga.

Ko tēhea te tapeke he maha rawa atu ngā putanga?  
Ko te whā. I kī tuatahi te tūtohi o te whā i roto i ētahi whakamātau e ono.

Ki tōu whakaaro, he aha i maha rawa ai ngā putanga o te whā? He waimarie noa iho te whā?

Kāore. He maha ngā toru me ngā tahi i ngā mata o ngā mataono, nō reira he nui kē atu te tūponotanga ko te whā te tapeke o ngā tau.

Mēnā ka mahi anō tātou i tēnei whakamātau, ki tōu whakaaro, ko tēhea te putanga maha rawa atu? Ko te whā anō, ko tētahi atu o ngā putanga rānei?

Ki taku mōhio, ko te whā anō.

Ko ēhea ngā putanga he iti rawa te tūponotanga?

Ina titiro ki te kauwhata, ko te 2 me te 3.

He aha i iti rawa ai ngā putanga o te 2 me te 3?

He ruarua noa iho ngā tau kei ngā mata o ngā mataono, ina tāpiria ka puta te 2, te 3 rānei (ko te 1 + 1 mō te rua, ko te 2 + 1 mō te 3).

### Hei whakawhānui

Kia pērā anō te arataki i ngā ākonga ki te whakamātau i ētahi atu mataono tau. Hei tauira:

1, 1, 2, 2, 3, 3

1, 1, 1, 1, 1, 2

1, 1, 1, 1, 2, 2

## Porotiti Tangotango

1a 1e 2a 2e 3a 3e 4a 4e 5a

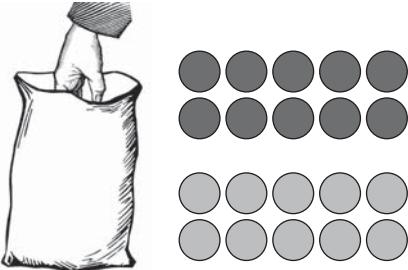
E ako ana ahau ki te tākaro kēmu tūponotanga, ki te tuhi i ngā hua o te kēmu tūponotanga, ki te matapae hoki i ngā putanga.

### Rauemi

- He porotiti karakara
- He pēke

### Kupu matua

matapōkere, tūponotanga

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Whakamāramahia te kēmu tūponotanga nei, te tangotango porotiti, ka tuku ai i ngā ākonga kia mahi.</p> 	<p>Ka mahi takirua koutou i tētahi kēmu. Māku e hoatu tētahi pēke ki ia takirua, me ētahi porotiti. Tekau ngā porotiti whero, tekau anō ngā porotiti kahurangi.</p> <p>Kuhuna ngā porotiti katoa ki roto i te pēke. Ka whai tētahi o kōrua i tētahi ki te tango i ētahi porotiti e rua. He tangohanga matapōkere, he tangohanga kāpō kāore he tirotiro, ko te whāwhā noa iho i ngā porotiti.</p> <p>Mēnā he ūrite te tae o ngā porotiti ka riro aua porotiti i tētahi o kōrua, ā, mēnā he rerekē ngā tae, ka riro ērā i tētahi. I mua i te tangohanga tuatahi, me āta whakatau ki a wai ngā takirua porotiti tae ūrite, ki a wai ngā porotiti tae rerekē.</p> <p>Ka haere tonu te tangotango i ētahi porotiti e rua, kia pau rā te katoa o ngā porotiti o roto i te pēke.</p> <p>Kia oti katoa ngā porotiti te tango, kātahi ka tatauria ngā porotiti a tēnā me tēnā o kōrua. Ko te mea kei a ia te maha rawa o ngā porotiti, ko ia te toa.</p>
<p>Kia oti ētahi kēmu e whā, e rima rānei, me whakawhitiwhiti kōrero mō te tūponotanga ka toa ngā porotiti tae ūrite, ka toa rānei ngā porotiti tae rerekē.</p>	<p>Ko wai te mea o kōrua i toa i te nuinga o te wā – ko te mea i a ia ngā porotiti tae ūrite, ko te mea rānei i a ia ngā tae rerekē?</p> <p>Nō reira he nui ake te tūponotanga ka toa ngā tae ūrite, he nui ake rānei te tūponotanga ka toa ngā tae rerekē?</p> <p>He tauira whakautu:</p> <ul style="list-style-type: none"> <li>• Ko ngā tae rerekē i toa i te nuinga o te wā, he waimarie noa iho.</li> <li>• He ūrite te tūponotanga nā te mea he ūrite te maha o ngā porotiti whero me ngā porotiti kahurangi.</li> <li>• He ūrite te tūponotanga nā te mea he tangohanga matapōkere, kāore he tirotiro, ā, he ūrite te maha o ia tae.</li> </ul>

<p>Tonoa ngā ākonga kia mahi anō i te kēmu, engari i tēnei wā, me tāpiri atu kia whā ngā porotiti kōwhai.</p>	<p>Ka mahi anō kōrua ko tō hoa i te kēmu tangotango porotiti. I tēnei wā, kuhuna kia 10 ngā porotiti whero, kia 10 ngā porotiti kahurangi, kia 4 hoki ngā porotiti kōwhai.</p> <p>Ka whai tētahi o kōrua i tētahi ki te tango i ētahi porotiti e rua. Ki tōu whakaaro, ko wai ka toa i tēnei wā – ko te mea ki a ia ngā porotiti tae ūrite, ko te mea ki a ia ngā porotiti tae rerekē rānei?</p>
<p>Kia oti ētahi kēmu e whā, e rima rānei, me whakawhitiwhiti kōrero mō te tūponotanga ka toa ngā porotiti tae ūrite, ka toa rānei ngā porotiti tae rerekē.</p>	<p>Ko wai te mea o kōrua i toa i te nuinga o te wā – ko te mea i a ia ngā tae ūrite, ko te mea i a ia ngā tae rerekē rānei?</p> <p>Nō reira he nui ake te tūponotanga ka toa ngā tae ūrite, he nui ake rānei te tūponotanga ka toa ngā tae rerekē?</p> <p>He nui ake te tūponotanga ka toa ngā tae rerekē, nā te mea e toru ngā tae o ngā porotiti kei roto i te pēke.</p>
<p>Kia pērā anō te arataki i ngā ākonga i ētahi atu o ēnei kēmu. Hei tauira:</p> <ul style="list-style-type: none"> <li>• kia 5 ngā porotiti whero, kia 10 ngā porotiti kahurangi</li> <li>• kia 10 ngā porotiti whero, kia 10 ngā porotiti kahurangi, kia 1 te porotiti kōwhai</li> <li>• kia 2 ngā porotiti whero, kia 2 ngā porotiti kahurangi, kia 2 ngā porotiti kōwhai, kia 2 ngā porotiti kākāriki</li> <li>• kia 5 ngā porotiti whero, kia 5 ngā porotiti kahurangi, kia 5 ngā porotiti kōwhai, kia 5 ngā porotiti kākāriki.</li> </ul>	

## **Whanaketanga 2e**

### **Mātauranga Matua kua Mau kē**

Te Tau

- ngā rautaki wāwāhi tau me te rautaki paheko kōaro mō te tāpiritanga me te tangohanga
- ngā rautaki tāpiri tāruarua mō te whakareatanga māmā
- ngā tikanga hautau

Te Tūponotanga

- te matapōkere o ngā putanga i tētahi pūāhua tūponotanga
- te wehe kētanga o ngā pāpono
- te whakahaere whakamātau tūponotanga māmā, me te tuhi anō i ngā putanga ki tētahi tūtohi
- te matapae i ngā putanga o tētahi whakamātau tūponotanga i runga anō i te whakaaro arorau

### **Mātauranga Matua hei Ako**

- te tikanga o te āwhata hautau (mai i te 0 ki te 1) hei whakaatu tūponotanga
- te whakahaere whakamātau tūponotanga māmā, me te whakaatu anō i ngā putanga ki tētahi whakaari raraunga
- te whakamāori i te whakaari raraunga o tētahi whakamātau tūponotanga

### **Rauemi kē atu e Hāngai ana**

Ngā Rapanga o nzmaths

- He Uka Kei Runga I Te Tēpu  
<http://www.nzmaths.co.nz/sites/default/files/ThreeCoinsMaori.pdf>

## Rārangi Tūponotanga 1

1a 1e 2a 2e 3a 3e 4a 4e 5a

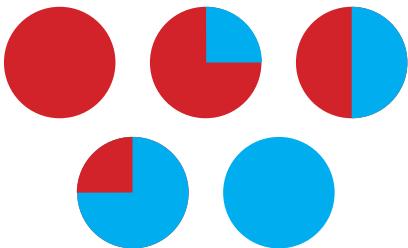
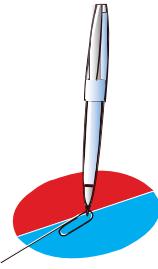
E ako ana ahau ki te whakaatu tūponotanga ki tētahi rārangi tūponotanga.

### Rauemi

- Whārangi Tārua 4 & 5

### Kupu matua

rārangi tūponotanga

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Aratakina ngā ākonga kia hanga, kia whakahaere i tētahi pūrere takahurihuri. Kei te Whārangi Tārua 4 ngā papa porowhita mō te pūrere.</p> <p>Whakawhitihiti kōrero mō te tūponotanga ka tau te pūrere ki te rohe whero, ki te rohe kahurangi rānei.</p> 	<p>Me pēnei te hanga i tētahi pūrere takahurihuri. He papa porowhita, he kini pepa, he pene:</p>  <p>Ko tāu mahi, he pana i te kini pepa kia takahurihuri. Anei ētahi papa rerekē mō te pūrere takahurihuri.</p> <p>Ki tō titiro, ko tēhea te papa he nui rawa te tūponotanga ka tau te pūrere ki te rohe whero?</p> <p>Ko tēnei, nā te mea he whero katoa te papa. Kore rawa e tau ki te kahurangi.</p> <p>Ko tēhea te papa he nui rawa te tūponotanga ka tau te pūrere ki te rohe kahurangi?</p> <p>Ko tēnei, nā te mea he kahurangi katoa te papa. Kore rawa e tau ki te whero.</p> <p>Ko tēhea te pūrere he ūrite te tūponotanga ka tau te pūrere ki te rohe whero, ki te rohe kahurangi rānei?</p> <p>Ko tēnei, nā te mea he ūrite te rahi o te rohe whero me te rohe kahurangi.</p>
<p>Tuhia he rārangi tūponotanga ki te papa tuhituhi. Ki tētahi pito o te rārangi, tuhia ngā kupu ‘kore rawa’, ki tētahi pito ko ngā kupu, ‘ae mārika’. Ki runga ake i te rārangi, ko te upoko kōrero ‘te tūponotanga ka tau ki te rohe whero’.</p>	<p>Kia tuhi au i tētahi rārangi ki te papa tuhituhi. Ka kīia he rārangi tūponotanga. Ko tēnei rārangi hei whakaatu i te tūponotanga ka tau te pūrere ki te rohe whero.</p> <p>Ki tētahi pito o te rārangi te tūponotanga ‘e kore rawa e tau ki te rohe whero’. Ki tētahi pito o te rārangi ko te tūponotanga ‘ae mārika, ka tau ki te rohe whero’. Anei tētahi o ngā papa porowhita o te pūrere takahurihuri, he kahurangi katoa.</p>

Te tūponotanga ka tau ki te rohe whero

kore rawa

āe mārika

Whakawhitihiti kōrero mō te wāhi e tika ana i te rārangī mō ia papa porowhita o te pūrere takahurihuri.

Te tūponotanga ka tau ki te rohe whero

kore rawa

he ūrite te  
tūponotanga

āe mārika

Te tūponotanga ka tau ki te rohe whero

kore rawa

he ūrite te  
tūponotanga

āe mārika

Kia pērā anō te arataki i ngā ākonga ki te whakaatu tūponotanga mō ētahi atu pūāhua tūponotanga. Hei tauira:

- Te tango matapōkere i tētahi porotiti i te pēke:

- ✓ kia 8 ngā porotiti whero
- ✓ kia 8 ngā porotiti kahurangi
- ✓ kia 4 ngā porotiti whero, kia 4 ngā porotiti kahurangi
- ✓ kia 2 ngā porotiti whero, kia 6 ngā porotiti kahurangi
- ✓ kia 6 ngā porotiti whero, kia 2 ngā porotiti kahurangi
- ✓ kia 1 te porotiti whero, kia 7 ngā porotiti kahurangi
- ✓ kia 7 ngā porotiti whero, kia 1 te porotiti kahurangi

- Te tango kāri i tētahi pūkei kāri kua riwhiriwhia (kei te Whārangī Tārua 5 ētahi kāri hei tapatapahi):

- ✓ kia 16 ngā kāri kurī
- ✓ kia 16 ngā kāri ngeru
- ✓ kia 8 ngā kāri kurī, kia 8 ngā kāri ngeru
- ✓ kia 4 ngā kāri kurī, kia 12 ngā kāri ngeru
- ✓ kia 12 ngā kāri kurī, kia 4 ngā kāri ngeru
- ✓ kia 2 ngā kāri kurī, kia 14 ngā kāri ngeru
- ✓ kia 14 ngā kāri kurī, kia 2 ngā kāri ngeru

E hāngai ana tēnei papa porowhita ki tēhea wāhi o te rārangī tūponotanga?

Ki te taha mauī o te rārangī, nā te mea he kahurangi katoa te papa, e kore rawa e tau ki te whero.

Te tūponotanga ka tau ki te rohe whero

kore rawa

āe mārika



Ki hea te papa porowhita whero katoa?

Ki te taha matau o te rārangī. Kāore e kore ka tau ki te rohe whero, nā te mea he whero katoa te papa porowhita.

Ki hea te papa porowhita he haurua kahurangi, he haurua whero?

← Ki waenganui o te rārangī tūponotanga, nā te mea he ūrite te tūponotanga ka tau ki te whero, ka tau rānei ki te kahurangi.

E rua atu anō ngā papa porowhita mō te pūrere takahurihuri. Ko hea ngā wāhi i te rārangī tūponotanga e hāngai ana ki ēnei papa?

← Ki waenganui i ērā o ngā papa porowhita.

## Rārangi Tūponotanga 2

**1a**   **1e**   **2a**   **2e**   **3a**   **3e**   **4a**   **4e**   **5a**

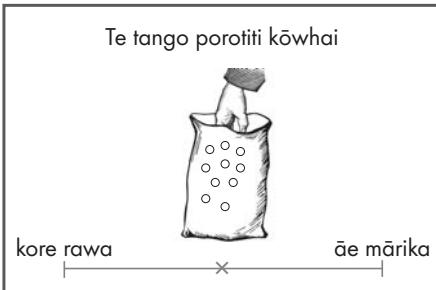
E ako ana ahau ki te whakaatu tūponotanga ki tētahi rārangi tūponotanga.

Rauemi

- Whārangi Tārua 6
  - He pēke
  - He porotiti karakara

Kupu matua

matapōkere, putanga, rārangi, tūponotanga

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Aratakina ngā ākonga i tēnei mahi tūponotanga, ka whakawhitihiti kōrero ai mō te whakaatu i te tūponotanga o ia putanga ki tētahi rārangī tūponotanga.</p>	<p>Anei tētahi rārangī tūponotanga. He aha te wāhi e tohua ana ki te rārangī?</p> <p>Ko waenganui pū o te rārangī tūponotanga. Koirā te wāhi e mea ana he ūrite te tūponotanga ka puta tētahi āhuatanga ki te tūponotanga kāore taua āhuatanga e puta.</p>
 <p>Te tango porotiti kōwhai</p> <p>kore rawa                                      āe mārika</p>	 <p>Te tango porotiti kōwhai</p> <p>kore rawa                                      āe mārika</p> <p>← Anei tētahi pēke me ētahi porotiti karakara. He aha ngā porotiti me kuhu atu ki te pēke, kia hāngai tonu te tūponotanga ka tangohia tētahi porotiti kōwhai ki te tūponotangā e whakaaturia ana ki te rārangī?</p> <p>Kia ūrite te maha o ngā porotiti kōwhai me te maha o ērā atu o ngā tae. Hei tauira:</p> <ul style="list-style-type: none"> <li>• kia 4 ngā porotiti kōwhai, kia 4 ngā porotiti kahurangi</li> <li>• kia 1 te porotiti kōwhai, kia 1 te porotiti whero</li> <li>• kia 5 ngā porotiti kōwhai, kia 3 ngā porotiti kahurangi, kia 2 ngā porotiti kākāriki.</li> </ul> <p>Tekau ngā porotiti e whakaaturia ana i te pēke. Karakarangia ngā porotiti kia hāngai tonu te tūponotanga ka tangohia tētahi porotiti kōwhai ki te tūponotangā e whakaaturia ana ki te rārangī tūponotangā.</p>

Hoatu te Whārangi Tārua 6 hei whakaotī mā ngā ākonga. Tonoa rātou kia whakamārama i ā rātou whiriwhiri mō te maha o ngā porotiti, kia hāngai tonu ki te tūponotanga e whakaaturia ana ki te rārangī tūponotanga.

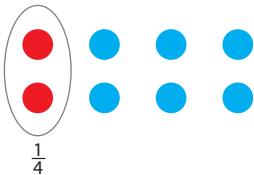
### Hei whakawhānui

Āta tirohia te hononga o tēnei mahi ki te hautau. Hei tauira:

Ko te  $\frac{1}{4}$  te wāhi e tohua ana ki te rārangī tūponotanga:

kore rawa                                  āe mārika

He whero te  $\frac{1}{4}$  o ngā porotiti. Arā,  $\frac{1}{4}$  o te 8 = 2:



# Te Hautau hei Whakaatu Tūponotanga

1a 1e 2a 2e 3a 3e 4a 4e 5a

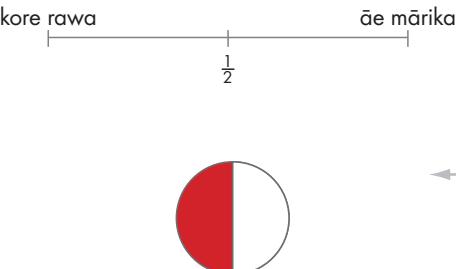
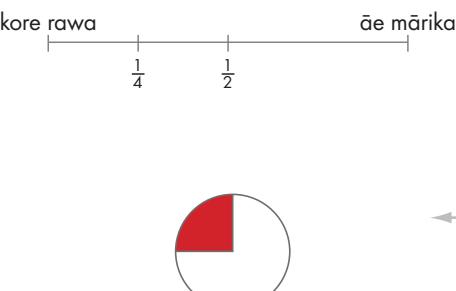
E ako ana ahau ki te whakamahi hautau hei whakaatu tūponotanga.

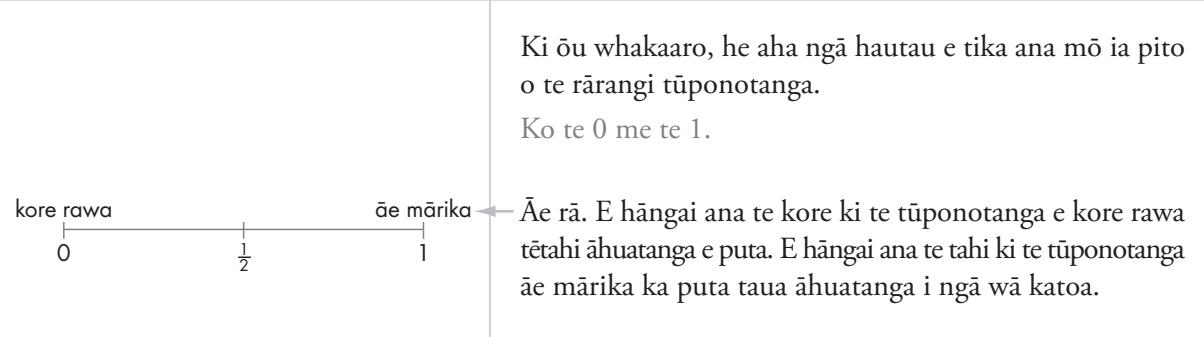
## Rauemi

- He papa porowhita mō te pūrere takahurihuri

## Kupu matua

mataono tau, pīrori, piu uka, pūrere takahurihuri, putanga, rārangī tūponotanga, tūponotanga

Ngā tohutohu	He tauira kōrero mā te pouako
Whakawhitihiti kōrero mō te whakamahi i te hautau hei whakaatu tūponotanga.  	Kia hoki tātou ki te tirotiro i te rārangī tūponotanga. <p style="text-align: center;">kore rawa                          āe mārika</p> <p>Mēnā he haurua (<math>\frac{1}{2}</math>) te tūponotanga o tētahi putanga, ko hea te wāhi i te rārangī tūponotanga e hāngai ana?  Ko te wāhi kei waenganui pū.</p> <p>Tuhia he pikitia o te papa porowhita o te pūrere takahurihuri e hāngai ana ki te haurua. He aha te kōrero mō tēnei papa porowhita?  He whero te kotahi haurua o te papa porowhita. Ko te haurua (<math>\frac{1}{2}</math>) te tūponotanga ka tau te pūrere ki te rohe whero.</p>
Whakawhitihiti kōrero mō te hautau e hāngai ana ki ia pito o te rārangī tūponotanga.  	Mēnā ko te hauwhā ( $\frac{1}{4}$ ) te tūponotanga o tētahi putanga, ko hea te wāhi i te rārangī tūponotanga e hāngai ana? Tuatahi, ka whiriwhiria te wāhi mō te haurua, kātahi ko te wāhi kei waenganui pū i te haurua me te pito mauī. <p>Tuhia he pikitia o te papa porowhita o te pūrere takahurihuri e hāngai ana ki te huawhā (<math>\frac{1}{4}</math>). He aha te kōrero mō tēnei papa porowhita?  He whero te kotahi hauwhā o te papa porowhita. Ko te hauwhā (<math>\frac{1}{4}</math>) te tūponotangka ka tau te pūrere ki te rohe whero.</p>
Kia pērā anō te arataki i ngā ākonga kia whakaatu i ētahi atu tūponotanga hei hautau. Arā, ko ēnei: $(\frac{1}{2}), (\frac{1}{4}), (\frac{3}{4}), (\frac{1}{8}), (\frac{3}{8}), (\frac{5}{8}), (\frac{7}{8})$	Anei tā tātou rārangī tūponotanga: <p style="text-align: center;">kore rawa                          āe mārika</p> <p style="text-align: center;"><math>\frac{1}{8} \quad \frac{1}{4} \quad \frac{3}{8} \quad \frac{1}{2} \quad \frac{5}{8} \quad \frac{3}{4} \quad \frac{7}{8}</math></p>
Whakawhitihiti kōrero mō te hautau e hāngai ana ki ia pito o te rārangī tūponotanga.	



# Tīpako Matapōkere

1a	1e	2a	2e	3a	3e	4a	4e	5a
----	----	----	----	----	----	----	----	----

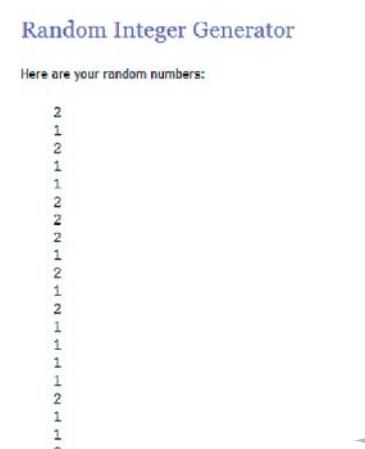
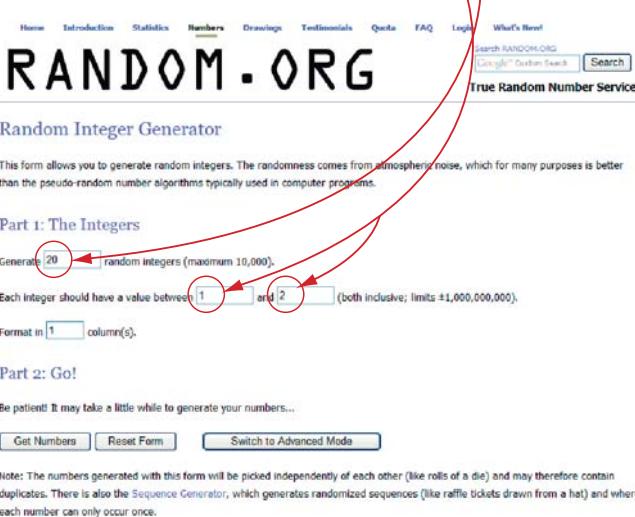
E ako ana ahau ki te whakahaere whakamātau tūponotanga.

## Rauemi

- He rorohiko, me te whai wāhitanga atu ki te ipurangi

## Kupu matua

matapōkere, tīpako, tūtohi

Ngā tohutohu	He tauira kōrero mā te pouako											
<p>Whakamāramahia te whakamahinga o te pae ipurangi nei hei whakaputa matapōkere i tētahi tau, tētahi huinga tau rānei:</p> <p><a href="http://www.random.org/integers/">http://www.random.org/integers/</a></p> <p>Aratakina ngā ākonga kia whakamahi i te pae ipurangi nei hei whakahaere i tētahi whakamātau tūponotanga.</p>  <table border="1"> <thead> <tr> <th>Ngā tahi</th> <th>Ngā rua</th> </tr> </thead> <tbody> <tr> <td>Tīpakonga 1</td> <td>11</td> <td>9</td> </tr> <tr> <td>Tīpakonga 2</td> <td></td> <td></td> </tr> <tr> <td>...</td> <td></td> <td></td> </tr> </tbody> </table>	Ngā tahi	Ngā rua	Tīpakonga 1	11	9	Tīpakonga 2			...			<p>Kia kuhu atu tātou ki te pae ipurangi nei. Ko tāna, he tīpako matapōkere i tētahi tau, i tētahi huinga tau rānei. Arā, kāore he tirotiro a te rorohiko ki ngā tau kua puta kē i mua. Ko ia tīpakonga tau, he wehe kē i ērā atu tīpakonga, kāore he hononga o tētahi ki tētahi. Ko te tīpako i ngā tau o Lotto tōna rite.</p> <p>Ka tohua te rorohiko kia 20 ngā tīpakonga. Ko te 1 me te 2 anahe ngā tau kei roto i ēnei tīpakonga:</p>  <p>Koia nei ngā tau ka tīpakona e te rorohiko.</p> <p>E hia ngā tahi, e hia ngā rua i tīpakona?</p> <p>11 ngā tahi, e 9 ngā rua.</p> <p>Me whakaatu ēnei raraunga o te tīpakonga tuatahi ki te tūtohi.</p> <p>Tohua te rorohiko kia 20 anō ngā tīpako i te tahi, i te rua rānei. Tuhia ngā hua o te tīpakonga tuarua nei ki te tūtohi.</p> <p>Kia 10 katoa ngā tīpakonga, ka tuhi ai i ngā hua ki te tūtohi.</p>
Ngā tahi	Ngā rua											
Tīpakonga 1	11	9										
Tīpakonga 2												
...												

<p>Whakawhitihiti kōrero mō ngā hua o ngā tīpakonga e whakaaturia ana ki te tūtohi.</p>	<p>He aha ētahi whakaaro mō te maha o ngā tāhi me te maha o ngā rua kua puta i ēnei tīpakonga tau?      Ko te nuinga kei te takiwā o te haurua ngā tīpako i te tāhi, ko te haurua anō i te rua.</p> <p>Āe rā. Koia te āhuatanga e tika ana mēnā he matapōkere ngā tīpakonga. He aha ai?      Nā te mea he ūrite te tūponotanga ka tīpakona he tāhi, ka tīpakona rānei he rua.</p> <p>Mēnā karekau he tāhi, e 20 ngā rua i tētahi o ngā tīpakonga, he aha ngā whakaaro mō tērā?      He tino waimarie rawa atu te rua i taua tīpakonga.</p> <p>Mēnā he maha ngā tīpakonga e pērā ana, he aha ngā whakaaro mō tērā?      Kāore pea i te tika te hōtaka rorohiko. Kāore i te matapōkere te tīpakonga, he tītaha, he haukume kē.</p>
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Kia pērā anō te arataki i ngā ākonga i ētahi atu tīpakonga matapōkere. Hei tauira:

- Kia 30 ngā tīpakonga o ngā tau 1, 2 me te 3.
- Kia 100 ngā tīpakonga o ngā tau 1, 2, 3, 4, 5.

## Porotiti Karakara

1a 1e 2a 2e 3a 3e 4a 4e 5a

E ako ana ahau ki te whakamāori kauwhata e whakaatu ana i ngā putanga o tētahi whakamātau tūponotanga.

### Rauemi

- Whārangī Tārua 7

### Kupu matua

matapōkere, putanga, tīpako, whakamātau

Ngā tohutohu	He tauira kōrero mā te pouako																				
Whakamāramahia tētahi whakamātau tūponotanga, ka whakawhitiwhiti kōrero ai mō te āhua o te kauwhata pou hei whakaatu i ngā putanga tērā tonu ka hua mai.	<p>E ono ngā porotiti karakara i whakaurua ki te pēke, he whero, he kahurangi, he karaka ngā tae. E 30 ngā tīpakonga matapōkere i tētahi o aua porotiti. E 4 o ēnei whakamātau tūponotanga i whakaharehia. Ko te kauwhata pou tuatahi kei te Whārangī Tārua 7 e whakaatu ana i ngā hua ka puta:</p> <table border="1"> <caption>Data from the bar chart showing student counts by gender and whakamātau</caption> <thead> <tr> <th>Whakamātau</th> <th>Red (Males)</th> <th>Blue (Females)</th> <th>Orange (Other)</th> </tr> </thead> <tbody> <tr> <td>Whakamātau 1</td> <td>9</td> <td>11</td> <td>10</td> </tr> <tr> <td>Whakamātau 2</td> <td>10</td> <td>9</td> <td>11</td> </tr> <tr> <td>Whakamātau 3</td> <td>10</td> <td>10</td> <td>10</td> </tr> <tr> <td>Whakamātau 4</td> <td>12</td> <td>9</td> <td>9</td> </tr> </tbody> </table>	Whakamātau	Red (Males)	Blue (Females)	Orange (Other)	Whakamātau 1	9	11	10	Whakamātau 2	10	9	11	Whakamātau 3	10	10	10	Whakamātau 4	12	9	9
Whakamātau	Red (Males)	Blue (Females)	Orange (Other)																		
Whakamātau 1	9	11	10																		
Whakamātau 2	10	9	11																		
Whakamātau 3	10	10	10																		
Whakamātau 4	12	9	9																		
	<p>Ki ū whakaaro, e hia ngā porotiti o ia tae i tēnei whakamātau? Te āhua nei, he ōrite te maha o ia tae, arā, e rua ngā whero, e rua ngā kahurangi, e rua hoki ngā karaka, nā te mea he āhua ōrite te maha o ia tae i puta i ngā whakamātau e 4.</p> <p>Nō reira, he aha te tūponotanga ka puta tētahi mea whero? Ko te rua hauono (<math>\frac{2}{6}</math>), te hautoru rānei. E rua ngā porotiti whero o roto i ngā porotiti e ono katoa.</p> <p>He aha te tūponotanga ka puta he porotiti kahurangi, he porotiti karaka rānei?</p> <p>Ko te rua hautoru.</p>																				

Kei te Whārangī Tārua 7 ētahi atu kauwhata pou me tētahi tūtohi hei whakawhitiwhiti kōrero, hei whakamāori mā ngā ākonga.

## **Whanaketanga 3a**

### **Mātauranga Matua kua Mau kē**

Te Tau

- ngā rautaki whakarea māmā
- ngā tau ā-ira (kia kotahi te mati ā-ira)
- te whiriwhiri hautanga māmā

Te Tūponotanga

- te tikanga o te āwhata hautau (mai i te 0 ki te 1) hei whakaatu tūponotanga
- te whakahaere whakamātau tūponotanga māmā, me te whakaatu anō i ngā putanga ki tētahi whakaari raraunga
- te whakamāori i te whakaari raraunga o tētahi whakamātau tūponotanga

### **Mātauranga Matua hei Ako**

- te tikanga o tētahi hautau māmā hei whakaatu i te tūponotanga o tētahi putanga
- te whiriwhiri i te tūponotanga o ngā putanga i tētahi pūāhua tūponotanga māmā
- te taurangitanga o ngā putanga o tētahi whakamātau tūponotanga, kāore e whai tōtika i ngā tātaitanga tūponotanga
- te whakahaere whakamātau tūponotanga, me te whakaatu anō i ngā putanga
- te matapae i ngā putanga o tētahi whakamātau tūponotanga i runga i te whakaaro arorau

### **Rauemi kē atu e Hāngai ana**

Ngā Rapanga o nzmaths

- Te Kuhu Tōkena  
<http://www.nzmaths.co.nz/sites/default/files/DressingMaori.pdf>
- Piua He Uka  
<http://www.nzmaths.co.nz/sites/default/files/CoinMaori.pdf>

He Tau Anō Te Tau

- Te Tauanga (Putanga Hou)

## He Aha te Tūponotanga?

1a 1e 2a 2e 3a 3e 4a 4e 5a

E ako ana ahau ki te tātai i te tūponotanga o tētahi putanga.

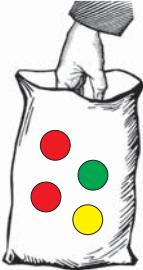
### Rauemi

- Whārangī Tārua 8
- He uka
- He mataono tau

### Kupu matua

matapōkere, putanga, tūponotanga

Ngā tohutohu	He tauira kōrero mā te pouako
Whakawhitiwhiti kōrero mō te piu i tētahi uka, ngā putanga e taea ana, me te tātai anō i te tūponotanga o auā putanga.	<p>Ina piua he uka, e hia ngā putanga e taea ana? E rua – ko te upoko, ko te whiore rānei.</p> <p>He ūrite, he rerekē rānei te tūponotanga o auā putanga? He ūrite. Ia piunga o te uka, kāore e mōhiotia ana he aha te putanga, engari he ūrite te tūponotanga o te upoko me te whiore.</p> <p>Nō reira, he aha te hautau hei whakaatu i taua tūponotanga? Ko te haurua. Ko te haurua te tūponotanga ka puta he upoko, arā, kotahi te upoko o roto i ngā putanga e rua. Ko te haurua hoki te tūponotanga ka puta he whiore, arā, kotahi te whiore o roto i ngā putanga e rua.</p> <p>Mēnā ka kīia ko te haurua te tūponotanga o tētahi putanga, koia nei te tikanga:</p> <p><math>T = \frac{1}{2}</math></p> <p style="text-align: center;">te maha o ngā putanga e kōrerohia ana (pēnā i te ‘upoko’) ngā putanga katoa e taea ana (te upoko me te whiore)</p>
Kia pērā anō te whakawhitiwhiti kōrero mō te pīrori i tētahi mataono tau.	<p>Ina pīrioria he mataono tau, he aha ngā putanga e taea ana? Ko te 1, te 2, te 3, te 4, te 5 me te 6.</p> <p>Āe rā, e ono katoa ngā putanga e taea ana. He ūrite, he rerekē rānei te tūponotanga o ia putanga? He ūrite. He wehe kē, he motuhake ia pīroritanga o te mataono tau, kāore e mōhiotia ana he aha te putanga, engari he ūrite te tūponotanga o tēnā me tēnā.</p> <p>Nō reira, he aha te hautau hei whakaatu i auā tūponotanga? Ko te hauono te tūponotanga o ia putanga. Kotahi o ia tau o roto i ngā putanga e ono katoa.</p>

	<p>Anei anō te whārite:</p> $T = \frac{\text{te maha o ngā putanga e kōrerohia ana}}{\text{ngā putanga katoa e taea ana}}$ <p>He aha ki ōu whakaaro te tikanga o tēnei whārite?</p> $T(1) = \frac{1}{6}$ <p>Ko te ‘T’, koirā te tūponotanga. Ko te mea kei roto i ngā taiapa e tohu ana i te putanga e kōrerohia ana (arā, te tahī). Ko te <math>\frac{1}{6}</math>, koirā te tūponotanga o taua putanga.</p> <p>He aha ēnei tūponotanga?</p> <p><math>T(5) =</math>      <math>T(1,6) =</math>      <math>T(\text{taurua}) =</math></p>
<p>Kia pērā anō te whakawhitihiti kōrero mō te tīpako porotiti i tētahi pēke.</p> 	<p>E whā ngā porotiti ka whakaurua ki tētahi pēke – e rua he whero, kotahi he kākāriki, kotahi he kōwhai.</p> <p>Mēnā ka tīpako matapōkerea tētahi o ngā porotiti, he aha ngā tae rerekē e taea ana?</p> <p>Ko te whero, te kākāriki me te kōwhai.</p> <p>E whā katoa ngā porotiti, nō reira e whā katoa ngā putanga e taea ana. E hia o aua putanga te tae whero?</p> <p>E rua.</p> <p>Nō reira he aha te tūponotanga ka puta he porotiti whero?</p> <p>Ko te rua o roto i te whā. Arā, <math>\frac{2}{4}</math>, he ūrite tērā ki te <math>\frac{1}{2}</math>.</p> <p>He aha te tūponotanga ka puta he porotiti kākāriki?</p> <p>Ko te kotahi o roto i te whā, arā, <math>\frac{1}{4}</math>.</p> <p>He aha te tūponotanga ka puta he porotiti whero, he porotiti kōwhai rānei?</p> <p>E rua o roto i te <math>\frac{2}{4}</math> mō te whero, kotahi o roto i te whā (<math>\frac{1}{4}</math>) mō te kōwhai. Tāpiria ērā tūponotanga, ko te toru hauwhā (<math>\frac{3}{4}</math>).</p> <p>Nō reira, he aha te tūponotanga ka whānau mai tētahi tangata i te Rāhina?</p> <p>Kotahi te Rāhina o roto i ngā rā e whitu o te wiki, nō reira ko te <math>\frac{1}{7}</math> te tūponotanga.</p> <p>He pērā anō te tūponotanga mō ērā atu o ngā rā o te wiki?</p> <p>Āe, he kotahi hauwhitu te tūponotanga o ngā rā katoa.</p>

Nō reira, he aha te tūponotanga ka whānau mai tētahi tangata i tētahi o ngā rangi mutunga wiki?

E rua ngā rangi i te mutunga wiki, ko te Rāhoroi me te Rātapu, nō reira e rua o roto i te whitu ( $\frac{2}{7}$ ) te tūponotanga ka whānau mai te tangata i tētahi o aua rā.

Kei te Whārangi Tārua 8 ētahi mahi pēnei hei whakaoti mā ngā ākonga, hei whakaū i tēnei akoranga e pā ana ki te tātai tūponotanga hei hautau.

## Putanga Taurangirangi

1a	1e	2a	2e	3a	3e	4a	4e	5a
----	----	----	----	----	----	----	----	----

E ako ana ahau i te taurangitanga o ngā putanga o tētahi whakamātau tūponotanga.

### Rauemi

- Whārangī Tārua 9
- He porotiti karakara me tētahi pēke
- He rorohiko me te whai wāhitanga atu ki te ipurangi

### Kupu matua

matapae, matapōkere, putanga, taurangitanga, tūponotanga, whakamātau

Ngā tohutohu	He tauira kōrero mā te pouako																																								
<p>Aratakina ngā ākonga kia matapae i ngā putanga o tēnei whakamātau tūponotanga.</p> <p style="text-align: center;"><input type="radio"/> 1   <input type="radio"/> 2   <input type="radio"/> 3   <input type="radio"/> 4</p>	<p>Kua tauria ngā porotiti e whā nei. Mēnā ka raua atu ki tētahi pēke, ā, ka tangohia tētahi, he aha te tūponotanga o ia putanga?</p> <p>Ko te hauwhā (<math>\frac{1}{4}</math>). He ōrite te tūponotanga o ia putanga, e whā katoa ngā putanga e taea ana.</p> <p>Nō reira, mēnā e whā ngā tangohanga, he aha te matapae mō te maha o ia putanga?</p> <p>Nā runga i te tūponotanga o ia putanga (<math>\frac{1}{4}</math>), tērā tonu pea, ka kotahi te putanga o ia tau.</p> <p>Mēnā e waru ngā tangohanga, he aha te matapae mō te maha o ia putanga?</p> <p>He ōrite te tūponotanga o ia putanga, nō reira ka rua pea ngā putanga o ia tau.</p>																																								
<p>Whakamātauria ngā matapae, ka whakawhitihiti kōrero ai mō te taurangitanga o ngā putanga o te whakamātau.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <th>Putanga</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> </tr> <tr> <td>Whakamātau 1</td> <td>2</td> <td>1</td> <td>0</td> <td>1</td> </tr> <tr> <td>Whakamātau 2</td> <td>...</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Whakamātau 3</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Whakamātau 4</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Whakamātau 5</td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	Putanga	1	2	3	4	Whakamātau 1	2	1	0	1	Whakamātau 2	...				Whakamātau 3					Whakamātau 4					Whakamātau 5					<p>Tēnā, kia whakamātauria ēnei matapae. Kuhuna ngā porotiti ki te pēke, ka tango ai i tētahi. Tuhiā te putanga ki tētahi tūtohi. Whakahokia te porotiti, ka tango anō ai i tētahi. Kia whā katoa ngā tangohanga:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <th>Putanga</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> </tr> <tr> <td>Whakamātau 1</td> <td>2</td> <td>1</td> <td>0</td> <td>1</td> </tr> </table> <p style="text-align: right;">← Kia 5 ngā whakamātau, ka tuhi ai i ngā putanga ki te tūtohi.</p> <p>He aha tētahi āhuatanga e kitea ana i ēnei whakamātau?</p> <p>He rerekē te maha o ia putanga ki te maha o ia putanga i matapaehia.</p> <p>Āe rā. Ka kīia tērā ko te taurangitanga o ngā putanga o tētahi whakamātau tūponotanga. Mēnā ka puta te tahi i te tangohanga tuatahi, ko te hauwhā tonu te tūponotanga ka puta anō te tahi i te tangohanga tuarua.</p>	Putanga	1	2	3	4	Whakamātau 1	2	1	0	1
Putanga	1	2	3	4																																					
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Putanga	1	2	3	4																																					
Whakamātau 1	2	1	0	1																																					

Whakamāramahia te whakamahinga o te pae ipurangi nei hei whakaputa matapōkere i tētahi tau, tētahi huina tau rānei (tirohia te ngohe ‘Tīpako Matapōkere,’ taumata 2e, whārangī 45):  
<http://www.random.org/integers/>

Aratakina ngā ākonga i tēnei whakamātau tūponotanga.

Putanga	1	2	3	4
Whakamātau 1	4	5	5	6
Whakamātau 2	...			
Whakamātau 3				
Whakamātau 4				
Whakamātau 5				

Kia hoki anō tātou ki te pae ipurangi nei hei whakaputa i ētahi tau matapōkere. Tohua te rorohiko kia whakaputaina ētahi tau matapōkere e 8, mai i te 1 ki te 4. Tuhia ngā tau ka puta ki tētahi tūtohi. Kia rima ngā whakamātau:

Putanga	1	2	3	4
Whakamātau 1	2	3	1	2
Whakamātau 2	...			
Whakamātau 3				
Whakamātau 4				
Whakamātau 5				

I tēnei wā, tohua te rorohiko kia whakaputaina ētahi tau matapōkere 12, mai i te 1 ki te 4. Tuhia ngā tau ka puta ki tētahi tūtohi. Kia rima ngā whakamātau:

Putanga	1	2	3	4
Whakamātau 1	3	3	2	4
Whakamātau 2	...			
Whakamātau 3				
Whakamātau 4				
Whakamātau 5				

← I te wā tuatoru nei, tohua te rorohiko kia whakaputaina ētahi tau matapōkere 20, mai i te 1 ki te 4. Tuhia ngā tau ka puta ki tētahi tūtohi. Kia rima ngā whakamātau.

He aha tētahi mea e kitea mai ana i ngā tūtohi?  
 He taurangirangi ngā putanga o ngā whakamātau, kāore e whai tōtika i ngā tūponotanga.

Kei te Whārangī Tārua 9 ētahi atu whakamātau tūponotanga hei mahi mā ngā ākonga, e kitea ai te taurangitanga o ngā putanga o tētahi whakamātau tūponotanga.

## Te Taurangitanga me te Tūponotanga

1a 1e 2a 2e 3a 3e 4a 4e 5a

E ako ana ahau i te taurangitanga o ngā putanga o tētahi whakamātau tūponotanga.

### Rauemi

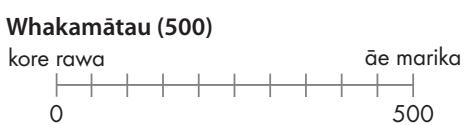
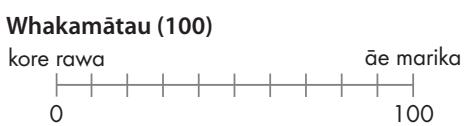
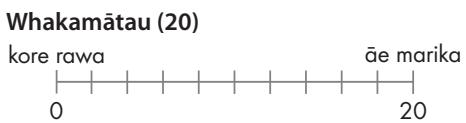
- He mataono tau
- He porotiti karakara me tētahi pēke
- He rorohiko me te whai wāhitanga atu ki te ipurangi
- He pūrere takahurihuri

### Kupu matua

matapae, matapōkere, putanga, taurangitanga, tūponotanga, whakamātau

Ngā tohutohu	He tauira kōrero mā te pouako													
Aratakina ngā ākonga kia whakahaere i te whakamātau tūponotanga nei, te pīrori mataono tau. Kia 20, kia 100, kia 500 ngā pīroritanga, ka tārima ai i ngā putanga ki te tūtohi tatau.	Ko tā tātou mahi, he pīrori i tētahi mataono tau, me te tuhi anō ki te tūtohi mēnā ka puta he taukehe, he taurua rānei. He pai pea te tārima i ngā putanga. Hei tauira:													
	<table border="1"><thead><tr><th></th><th>Taurua</th><th>Taukehe</th></tr></thead><tbody><tr><td>Whakamātau (20)</td><td>      III</td><td>     II</td></tr></tbody></table>			Taurua	Taukehe	Whakamātau (20)	III	II						
	Taurua	Taukehe												
Whakamātau (20)	III	II												
	He aha te tūponotanga o tētahi taukehe, o tētahi taurua rānei? Ko te haurua ( $\frac{1}{2}$ ). E 3 o roto i ngā tau e 6 katoa, he taukehe, e 3 anō he taurua. He ūrite te toru hauono ( $\frac{3}{6}$ ) ki te haurua ( $\frac{1}{2}$ ).													
	Whakahaerehia tētahi anō whakamātau, engari kia 100 ngā pīroritanga i tēnei wā. Tuhia ngā putanga ki te tūtohi. Hei tauira:													
	<table border="1"><thead><tr><th></th><th>Taurua</th><th>Taukehe</th></tr></thead><tbody><tr><td>Whakamātau (20)</td><td>      IIII III</td><td>     II</td></tr><tr><td>Whakamātau (100)</td><td></td><td></td></tr></tbody></table>			Taurua	Taukehe	Whakamātau (20)	IIII III	II	Whakamātau (100)					
	Taurua	Taukehe												
Whakamātau (20)	IIII III	II												
Whakamātau (100)														
	Whakahaerehia tētahi anō whakamātau, engari kia 500 ngā pīroritanga i tēnei wā. Tuhia ngā putanga ki te tūtohi. Hei tauira:													
	<table border="1"><thead><tr><th></th><th>Taurua</th><th>Taukehe</th></tr></thead><tbody><tr><td>Whakamātau (20)</td><td>      IIII III</td><td>     II</td></tr><tr><td>Whakamātau (100)</td><td></td><td></td></tr><tr><td>Whakamātau (500)</td><td></td><td></td></tr></tbody></table>			Taurua	Taukehe	Whakamātau (20)	IIII III	II	Whakamātau (100)			Whakamātau (500)		
	Taurua	Taukehe												
Whakamātau (20)	IIII III	II												
Whakamātau (100)														
Whakamātau (500)														

Tuhia ki te papa tuhituhi he rārangi hautau hei whakaatu i te hautanga o ngā taukehe o ia whakamātau, ka whakawhitihiti kōrero ai. Kia āhua roa tonu ngā rārangi hautau.



Ko te mea matua, kia mārama ngā  
ākonga ki te:

- taurangitanga o ngā putanga o ngā whakamātau;
  - pātata haere o ngā putanga ki te tūponotanga tātai (te haurua) ina maha haere ngā whakamātau.

E whā ngā rārangi tau kua tuhia ki te papa tuhituhi. I te rārangi tuatahi, whakaaturia mai te wāhi e hāngai ana ki te tūponotanga ka puta tētahi taukehe.

Ko te haurua ( $\frac{1}{2}$ ) tērā.

I te rārangi tuarua, whakaaturia te maha o ngā taukehe i puta i roto i ngā pīroritanga 20.

I te rārangi tuatoru, whakaaturia te maha o ngā taukehe i puta i roto i ngā pīroritanga 100.

I te rārangi tuawhā, whakaaturia te maha o ngā taukehe i puta i roto i ngā pīroritanga 500.

He aha tētahi āhuatanga e kitea mai ana?

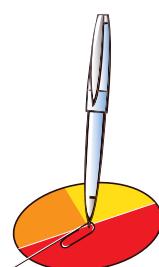
E pātata haere ana te hautanga o ngā taukehe ki te haurua, ina pikī ana te maha o ngā pīroritanga.

Koia rā tētahi āhuatanga o tēnei mea te taurangitanga o ngā putanga o tētahi whakamātau tūponotanga. E kitea ana te taurangitanga o ngā putanga, arā, he tino waimarie mēnā e hangai pū ana ki te tūponotanga, te haurua ( $\frac{1}{2}$ ). Tērā hoki e kitea, ina pikī ana te maha o ngā whakamātau, ka pātata haere te hautanga o ngā putanga ki te hautau o te tūponotanga.

Kia pērā anō te arataki i ngā ākonga ki ētahi atu whakamātau pēnei i te mea o mua ake nei, te putanga o te taukehe i te pīroritanga mataono tau. Hei tauira:

Kia whā ngā porotiti ki tētahi pēke, kia rerekē ngā tae o tēnā me tēnā. Kia 20, kia 100, kia 400 ngā tangohanga matapōkere.

Whakamahia te pae ipurangi nei <http://www.random.org/integers/> hei tīpako matapōkere i te 1, te 2, te 3 rānei. Kia 30, kia 300, kia 900 ngā tīpakonga.



Whakamahia he pūrere takahurihuri pēnei i tēnei. Kia 20, kia 100, kia 400 ngā takahurihangā.

## **Whanaketanga 3e**

### **Mātauranga Matua kua Mau kē**

Te Tau

- ngā rautaki whakarea
- ngā tau ā-ira (kia toru ngā mati ā-ira)

Te Tūponotanga

- te tikanga o tētahi hautau māmā hei whakaatu i te tūponotanga o tētahi putanga
- te whiriwhiri i te tūponotanga o ngā putanga i tētahi pūāhua tūponotanga māmā
- te taurangitanga o ngā putanga o tētahi whakamātau tūponotanga, kāore e whai tōtika i ngā tātaitanga tūponotanga
- te whakahaere whakamātau tūponotanga, me te whakaatu anō i ngā putanga
- te matapae i ngā putanga o tētahi whakamātau tūponotanga i runga i te whakaaro arorau

### **Mātauranga Matua hei Ako**

- te wehe kē, te whakawhirinaki rānei o ngā putanga o tētahi pāpono raupapa
- te whakaatu tūponotanga ki tētahi hoahoa rākau
- te tātai i te tūponotanga o ngā putanga o tētahi pāpono raupapa
- te whakahaere whakamātau tūponotanga
- te whakamārama i te taurangitanga o ngā putanga matapae me ngā putanga whakamātau

### **Rauemi kē atu e Hāngai ana**

Ngā Rapanga o nzmaths

- He Kōpae Pūoro  
<http://www.nzmaths.co.nz/sites/default/files/GrabbingCDsMaori.pdf>

He Tau Anō Te Tau

- *Te Tauanga: Putanga Hou*. Te Whanganui-a-Tara: Te Pou Taki Kōrero (2009).

## He Wehe kē, he Whakawhirinaki rānei?

1a 1e 2a 2e 3a 3e 4a 4e 5a

E ako ana ahau i te wehe kētanga, te whakawhirinakitanga rānei o ngā putanga o tētahi whakamātau tūponotanga.

### Rauemi

- He mataono tau
- He kāri me tētahi pēke
- He uka
- He pūrere takahurihuri

### Kupu matua

matapōkere, putanga, tūponotanga, wehe kē, whakawhirinaki

Ngā tohutohu	He tauira kōrero mā te pouako																																
Aratakina ngā ākonga kia whakahaere i ngā whakamātau tūponotanga e rua nei. He pai pea te matapae i te tuatahi mēnā ka ūrite, ka rerekē rānei ngā putanga i tēnā me tēnā o ngā whakamātau.	<p>E rua e rua a Himiona rāua ko Hineora e whakahaere ana i tētahi whakamātau tūponotanga.</p> <p>Ko tā Himiona, kia rua ngā piunga uka, me te tuhi i ngā putanga.</p> <p>Ko tā Hineora, he tango matapōkere i ētahi kāri e rua i te pēke. E whā katoa ngā kāri, he upoko kei ētahi kāri e rua, he whiore kei ētahi kāri e rua. Ka tuhia ngā putanga.</p> <p>He aha ngā putanga e taea ana i ēnei whakamātau e rua nei? E toru ngā putanga e taea ana mō ngā whakamātau e rua nei. Ka rua ngā upoko, ka kotahi te upoko, kotahi te whiore, ka rua rānei ngā whiore.</p> <p>Tēnā, me whakahaere ēnei whakamātau e rua a Himiona rāua ko Hineora, me te tārima i ngā putanga ki tētahi tūtohi. Hei tauira:</p> <table border="1"><thead><tr><th rowspan="2">Te maha o ngā whakamātau</th><th colspan="3">Himiona</th><th colspan="3">Hineora</th></tr><tr><th>upoko ×2</th><th>upoko whiore</th><th>whiore ×2</th><th>upoko ×2</th><th>upoko whiore</th><th>whiore ×2</th></tr></thead><tbody><tr><td>20</td><td></td><td></td><td></td><td></td><td></td><td></td></tr><tr><td>100</td><td></td><td></td><td></td><td></td><td></td><td></td></tr></tbody></table>						Te maha o ngā whakamātau	Himiona			Hineora			upoko ×2	upoko whiore	whiore ×2	upoko ×2	upoko whiore	whiore ×2	20							100						
Te maha o ngā whakamātau	Himiona			Hineora																													
	upoko ×2	upoko whiore	whiore ×2	upoko ×2	upoko whiore	whiore ×2																											
20																																	
100																																	

### He aha ētahi āhuatanga e kitea ana i te tūtohi?

- Mō ngā whakamātau e rua nei, he nui ake ngā putanga o tētahi upoko me tētahi whiore i ngā putanga o ētahi upoko e rua, i ngā putanga rānei o ētahi whiore e rua.
- Engari i te whakamātau a Hineora, he tino nui kē atu ngā putanga o tētahi upoko me tētahi whiore.

Whakatairitea ngā putanga o ia whakamātau, ka whakawhitihitiki kōrero ai mō te rerekē o tētahi me tētahi.

Āta tirohia te wehe kē o tā Himiona, me te whakawhirinaki o te whakamātau a Hineora.

Te kāri tuatahi a Hineora	Ngā kāri e toe ana	Te kāri tuarua a Hineora
u ( $T = \frac{2}{4} = \frac{1}{2}$ )	u, wh, wh	u ( $T = \frac{1}{3}$ ) wh ( $T = \frac{1}{3}$ )
wh ( $T = \frac{2}{4} = \frac{1}{2}$ )	u, u, wh	u ( $T = \frac{2}{3}$ ) wh ( $T = \frac{2}{3}$ )

He aha i tino nui kē atu ai ngā putanga o tētahi upoko me tētahi whiore i te whakamātau a Hineora? He aha te rerekētanga o tāna whakamātau me tā Himiona?

E rua ngā piunga uka a Himiona kia hua mai ai te putanga, arā, ngā upoko e rua, te upoko me te whiore, ngā whiore e rua rānei. Kotahi te tangohanga kāri a Hineora e hua mai ai te putanga.

Āe rā. I te whakamātau a Himiona, he wehe kē ia piunga o te uka. I te piunga uka tuatahi, kotahi haurua ( $\frac{1}{2}$ ) te tūponotanga o te upoko, kotahi haurua ( $\frac{1}{2}$ ) hoki te tūponotanga o te whiore. He pērā anō ngā tūponotanga i te piunga uka tuarua.

I te whakamātau a Hineora, e rua ngā kāri ka tangohia i te wā kotahi. He haurua ( $\frac{1}{2}$ ) te tūponotanga he upoko tētahi o ngā kāri, nā te mea e rua ngā upoko o roto i ngā kāri e whā. Engari mēnā he upoko tētahi, e toru ngā kāri e toe ana, ā, kotahi anake o aua kāri he upoko, nō reira ko te hautoru ( $\frac{1}{3}$ ) te tūponotanga o tērā upoko. Anei ngā putanga me ngā tūponotanga mō te whakamātau a Hineora.

Ka kīia he whakawhirinaki te tīpako kāri a Hineora, nā te mea e whakawhirinaki ana te putanga o te kāri tuarua ki te putanga o te kāri tuatahi. Mēnā he upoko tana kāri tuatahi, he nui kē atu te tūponotanga he whiore te kāri tuarua. Mēnā he whiore te kāri tuatahi, he nui kē atu te tūponotanga he upoko te kāri tuarua.

He wehe kē te mahi piu uka a Himiona, he whakawhirinaki te mahi tīpako kāri a Hineora.

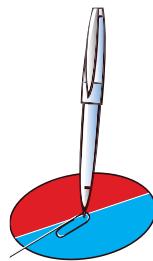
Kia pērā anō te arataki i ngā ākonga kia kitea ai te wehe kētanga, te whakawhirinakitanga rānei o tētahi whakamātau.

Hei tauira o te whakamātau wehe kē:

- Te pīrori i ētahi mataono tau e rua. Ko ngā putanga: ētahi taurua e rua, kotahi te taurua kotahi te taukehe, ētahi taukehe e rua.
- Kia rua ngā takahurihanga o te pūrere takahurihuri. Ko ngā putanga: e rua ngā whero, kotahi te whero kotahi te kahurangi, e rua ngā kahurangi.

Hei tauira o te whakamātau whakawhirinaki:

- Te tango matapōkere i ētahi kāri e rua i te pūkei kāri (me te kore e whakahokia o te kāri tuatahi).
- Te tango matapōkere i ētahi porotiti e rua i te pēke (me te kore e whakahokia o te porotiti tuatahi).



## Hoahoa Rākau

1a 1e 2a 2e 3a 3e 4a 4e 5a

E ako ana ahau ki te whakaatu pāpono raupapa ki tētahi hoahoa rākau.

### Rauemi

- Whārangī Tārua 10
- He uka
- He mataono tau
- He pūrere takahurihuri

### Kupu matua

hoahoa rākau, pāpono, pāpono raupapa, putanga, tūponotanga

Ngā tohutohu	He tauira kōrero mā te pouako														
<p>Aratakina ngā ākonga kia whakaatu i ngā putanga o te piu i ētahi uka e rua ki te hoahoa rākau.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <th>Piunga tuatahi</th> <th>Piunga tuarua</th> <th>Putanga whakamutanga</th> </tr> <tr> <td>           upoko            whiore         </td> <td>           upoko ————— u, u            whiore ————— u, wh         </td> <td>           upoko ————— wh, u            whiore ————— wh, wh         </td> </tr> </table>	Piunga tuatahi	Piunga tuarua	Putanga whakamutanga	upoko whiore	upoko ————— u, u whiore ————— u, wh	upoko ————— wh, u whiore ————— wh, wh	<p>Mēnā e rua ngā mahi o roto i tētahi whakamātau tūponotanga, ka kīia he pāpono raupapa tērā. Hei tauira, ko te piu i ētahi uka e rua. Ka kīia ia piunga o te uka, he pāpono, ā, he raupapa nā te mea e whai ana tētahi piunga i tētahi.</p> <p>Ko tētahi momo hoahoa hei whakaatu pāpono raupapa, ko te hoahoa rākau. Ka whakaaturia ngā putanga o ia pāpono (arā, ia piunga uka), me ngā putanga whakamutunga.</p> <p>E hia katoa ngā putanga whakamutunga?            E whā, engari e rua o aua putanga, he ūrite.</p> <p>Ki tāu titiro, he ūrite te tūponotanga o ia putanga whakamutunga, he rerekē rānei ngā tūponotanga?</p> <p>He ūrite. I te piunga tuatahi, he ūrite te tūponotanga o te upoko me te whiore. I te piunga tuarua, he ūrite anō te tūponotanga o te upoko me te whiore.</p> <p>Ka taea ngā tūponotanga te whakaatu ki te hoahoa rākau:</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <th>Piunga tuatahi</th> <th>Piunga tuarua</th> <th>Putanga whakamutunga</th> <th>Tūponotanga</th> </tr> <tr> <td>           upoko            whiore         </td> <td>           upoko ————— u, u ————— <math>\frac{1}{4}</math>            whiore ————— u, wh ————— <math>\frac{1}{4}</math> </td> <td>           upoko ————— wh, u ————— <math>\frac{1}{4}</math>            whiore ————— wh, wh ————— <math>\frac{1}{4}</math> </td> <td></td> </tr> </table> <p>Nō reira, he aha ngā tūponotanga o ēnei putanga:            • E rua ngā whiore?  <math>T = \frac{1}{4}</math></p>	Piunga tuatahi	Piunga tuarua	Putanga whakamutunga	Tūponotanga	upoko whiore	upoko ————— u, u ————— $\frac{1}{4}$ whiore ————— u, wh ————— $\frac{1}{4}$	upoko ————— wh, u ————— $\frac{1}{4}$ whiore ————— wh, wh ————— $\frac{1}{4}$	
Piunga tuatahi	Piunga tuarua	Putanga whakamutanga													
upoko whiore	upoko ————— u, u whiore ————— u, wh	upoko ————— wh, u whiore ————— wh, wh													
Piunga tuatahi	Piunga tuarua	Putanga whakamutunga	Tūponotanga												
upoko whiore	upoko ————— u, u ————— $\frac{1}{4}$ whiore ————— u, wh ————— $\frac{1}{4}$	upoko ————— wh, u ————— $\frac{1}{4}$ whiore ————— wh, wh ————— $\frac{1}{4}$													

	<ul style="list-style-type: none"> <li>• Kotahi te whiore, kotahi te upoko?  <math>T = \frac{2}{4} = \frac{1}{2}</math> </li> <li>• Karekau he whiore?  <math>T = \frac{1}{4}</math> </li> <li>• E rua ngā upoko, e rua rānei ngā whiore?  <math>T = \frac{2}{4} = \frac{1}{2}</math> </li> <li>• Karekau he upoko, karekau he whiore rānei?  <math>T = 0</math> </li> </ul>																								
Tukuna ngā ākonga kia whakahaere i te whakamātau tūponotanga, ka whakatairite ai i ngā tūponotanga me ngā putanga o te whakamātau.	<p>Mēnā ka whakahaerehia tēnei whakamātau tūponotanga, ā, e 20 ngā piunga o ngā uka e rua nei, he aha tō matapae mō te maha o ia putanga whakamutunga? Me tuhi ngā matapae me ngā putanga o te whakamātau ki tētahi tūtohi:</p> <table border="1"> <thead> <tr> <th>Putanga</th> <th>u, u</th> <th>u, wh (wh, u rānei)</th> <th>wh, wh</th> </tr> </thead> <tbody> <tr> <td><b>Tūponotanga</b></td> <td></td> <td></td> <td></td> </tr> <tr> <td>E 20 ngā pāpono</td> <td>matapae</td> <td></td> <td></td> </tr> <tr> <td></td> <td>whakamātau</td> <td></td> <td></td> </tr> <tr> <td>100 ngā pāpono</td> <td>matapae</td> <td></td> <td></td> </tr> <tr> <td></td> <td>whakamātau</td> <td></td> <td></td> </tr> </tbody> </table> <p>E tika ana ki te takiwā o te 5 ngā putanga o ētahi upoko e rua, nā te mea ko te 5 te hauwhā (<math>\frac{1}{4}</math>) o te 20, ā, ko te hauwhā (<math>\frac{1}{4}</math>) te tūponotanga o ētahi upoko e rua. Engari ka nui ake ka iti iho rānei i te 5, nā te mea he taurangirangi ngā putanga o tētahi whakamātau tūponotanga, kāore e whai tōtika i ngā tūponotanga.</p>	Putanga	u, u	u, wh (wh, u rānei)	wh, wh	<b>Tūponotanga</b>				E 20 ngā pāpono	matapae				whakamātau			100 ngā pāpono	matapae				whakamātau		
Putanga	u, u	u, wh (wh, u rānei)	wh, wh																						
<b>Tūponotanga</b>																									
E 20 ngā pāpono	matapae																								
	whakamātau																								
100 ngā pāpono	matapae																								
	whakamātau																								
Kia pērā anō te arataki i ngā ākonga i ngā whakamātau tūponotanga kei te Whārangī Tārua 10.																									

## Tukuna kia Taka

1a 1e 2a 2e 3a 3e 4a 4e 5a

E ako ana ahau ki te tuku matapae i runga i ngā hua o tētahi whakamātau tūponotanga.

### Rauemi

- He taupoki kirihi o tētahi ipu waireka

### Kupu matua

putanga, rautaki, tūponotanga, whakamātau

Ngā tohutohu	He tauira kōrero mā te pouako								
<p>Aratakina ngā ākonga kia whakahaere i tēnei whakamātau tūponotanga, hei whiriwhiri i te tūponotanga o ngā putanga.</p>  	<p>Ko tāu mahi i tēnei whakamātau, he whakataka i tētahi taupoki ipu waireka, me te tuhi i te āhua o tana tau ki te papa. Kia āhua 50cm te teitei o te tuku i te taupoki kia taka.</p> <p>He aha ngā taunga o te taupoki e taea ana?</p> <p>E toru ngā taunga rerekē e taea ana: ko te taunga a runga ki raro, ko te taunga a runga ki runga, ko te taunga ki te taha:</p>  <p>raro      runga      taha</p> <p>Ki ōu whakaaro, he aha te tūponotanga o ia putanga?</p> <p>He rerekē ngā whakaaro, ngā matapae a tēnā me tēnā o koutou. Me pēhea tātou e whiriwhiri ai i te tūponotanga o ia putanga?</p> <p>Me whakamātau. Me tuku te taupoki kia taka, kia kitea ai te taunga.</p> <p>Ki ōu whakaaro, kia hia ngā tukutanga o te taupoki kia taka? Mēnā he ruarua noa iho ngā tukutanga, kāore i te tino mōhio mēnā he rite ki te tūponotanga tōtika. Kia maha ngā tukutanga, kātahi rā pea ka rite te maha o ia taunga ki te tūponotanga.</p> <p>Tēnā, whakahaerehia te whakamātau. He aha te tūponotanga o ia putanga?</p> <p>Kotahi rau aku tukutanga i te taupoki. Koia nei ngā putanga:</p> <table border="1"> <thead> <tr> <th>Putanga</th> <th>raro</th> <th>runga</th> <th>taha</th> </tr> </thead> <tbody> <tr> <td>100 ngā tukutanga</td> <td>63</td> <td>29</td> <td>8</td> </tr> </tbody> </table> <p>Nō reira, i runga i ēnei raraunga, ko te <math>\frac{63}{100}</math> te tūponotanga ka tau ki ‘raro’, ko te <math>\frac{29}{100}</math> te tūponotanga ka tau ki ‘runga’, ko te <math>\frac{8}{100}</math> te tūponotanga ka tau ki te ‘taha’.</p>	Putanga	raro	runga	taha	100 ngā tukutanga	63	29	8
Putanga	raro	runga	taha						
100 ngā tukutanga	63	29	8						

Tonoa ngā ākonga kia whakaemi i ngā putanga whakamātau a ia ākonga, kia eke ki te 1000 te maha o ngā tukutanga o te taupoki. Whakawhitiwhiti kōrero mō te tūponotanga o ia putanga.

Putanga	raro	runga	taha
Hēmi	63	29	8
Aroha	...	...	...
Atawhai	...	...	...
...			

Tēnā kia whakaemia ngā tukutanga a ia ākonga ki te tūtohi kotahi, hei whakatairiterite.

Tāpiria ngā raraunga o ia ākonga. Whakahaerehia ētahi anō whakamātau kia eke ki te 1000 te maha o ngā tukutanga katoa. E hia ināianei te hautanga o ia putanga?

Mēnā he maha rawa ngā whakamātau, ka pātata haere te hautanga o ia putanga ki te tūponotanga tōtika.

Whakamahia ngā hua o te whakamātau hei tākarō i tētahi kēmu tūponotanga, ka tono ai i ngā ākonga kia āta whakaaro i te rautaki e toa ai te tangata i te kēmu.

Nā runga i ngā hua o te whakamātau nei, kua toko ake te whakaaro ki tētahi kēmu. Anei ngā ture:

- Ka tukuna te taupoki kia taka.
- Mēnā ka tau ki ‘raro’, kotahi te whiwhinga.
- Mēnā ka tau ki ‘runga’, e rua te whiwhinga.
- Mēnā ka tau ki te ‘taha’, e toru te whiwhinga.
- Tekau ngā tukutanga ki a koe i te tuatahi. I mua i ia tukutanga, māu te matapae ka pēhea te tau o te taupoki. Mēnā kei te tika, ka riro i a koe ngā whiwhinga e hāngai ana. Kia tekau ngā tukutanga, ka tāpiri ai i ō whiwhinga.
- Kātahi kia tekau ngā tukutanga ki ahau. Ko te mea he rahi rawa te tapeke o ngā whiwhinga, ko ia te toa.

I a koe e tākarō ana, me āta whakaaro te rautaki e toa ai te tangata i tēnei kēmu.

Me tuhi ngā putanga me ngā whiwhinga ki tētahi tūtohi.

	Ahau			Koe		
	matapae	putanga	whiwhinga	matapae	putanga	whiwhinga
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
	TAPEKE			TAPEKE		

Whakawhitihiti kōrero mō te rautaki e toa ai te tangata i tēnei kēmu tūponotanga.

I runga i tō mōhio ki tēnei kēmu ināianei, he aha te rautaki e toa ai koe i te nuinga o te wā?

Hei tauira whakautu:

E toru ngā whiwhinga mēnā ka tau ki te 'taha', engari he tino iti te tūponotanga o tēnei putanga. Ahakoa tērā, te āhua nei koirā te kōwhiringa e toa ai te tangata, kia maha ūna whiwhinga i te mutunga o te kēmu.

## **Whanaketanga 4a**

### **Mātauranga Matua kua Mau kē**

Te Tau

- te whakaawhiwhi tau
- te ūrāu me ngā ūwehenga māmā
- ngā hautau ūrite

Te Tūponotanga

- te wehe kē, te whakawhirinaki rānei o ngā putanga o tētahi pāpono raupapa
- te whakaatu tūponotanga ki tētahi hoahoa rākau
- te tātai i te tūponotanga o ngā putanga o tētahi pāpono raupapa
- te whakahaere whakamātau tūponotanga
- te whakamārama i te taurangitanga o ngā putanga matapae me ngā putanga whakamātau

### **Mātauranga Matua hei Ako**

- te whakaatu tūponotanga hei ūrāu
- te whakaputa whakaaro ki te tōkeke, te haukume rānei o tētahi pūāhua tūponotanga, i runga anō i ngā tātaitanga me te whakaaro arorau
- te whakahaere whakamātau tūponotanga:
  - ka matapae i ngā putanga
  - ka tātai i ngā tūponotanga
  - ka whakaatu i ngā putanga ki te whakaari raraunga
  - ka whakamāori i ngā hua o te whakamātau

### **Rauemi kē atu e Hāngai ana**

Ngā Rapanga o nzmaths

- Te Parehe a Peni  
<http://www.nzmaths.co.nz/sites/default/files/PennyPizzaMaori.pdf>

He Tau Anō Te Tau

- *Te Tauanga: Putanga Hou*. Te Whanganui-a-Tara: Te Pou Taki Kōrero (2009).

## Pūrere Takahurihuri

1a	1e	2a	2e	3a	3e	4a	4e	5a
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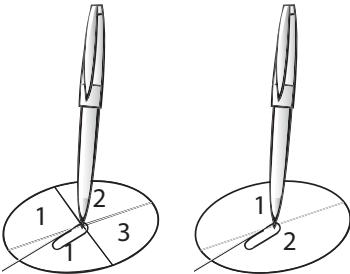
E ako ana ahau ki te whakaatu pāpono raupapa ki te hoahoa rākau, ki te matapae i ngā putanga o tētahi whakamātau i runga i te tūponotanga o ngā putanga, ki te arotake hoki i te tōkeke o tētahi kēmu tūponotanga.

### Rauemi

- He pūrere takahurihuri
- He mataono tau
- He porotiti karakara

### Kupu matua

hoahoa rākau, pāpono, pāpono raupapa, putanga, taurangitanga, tōkeke, tūponotanga, whakamātau

Ngā tohutohu	He tauira kōrero mā te pouako										
<p>Tuhia te rapanga nei ki te papa tuhituhi, ka tuku ai i ngā ākonga ki te whakahaere i te whakamātau tūponotanga:</p> <p>Ka mea atu a Tanu ki tana hoa, “Ka takahuria ēnei pūrere takahurihuri e rua, ka tāpiria ngā tau ka puta. Mēnā ko te 2, ko te 3 rānei te tapeke, ko au te toa. Mēnā ko te 4, ko te 5 rānei te tapeke, ko koe te toa.”</p> 	<p>Pēhea nei ōu whakaaro ki te kēmu nei a Tanu? Kei te tōkeke, kāore rānei i te tōkeke?</p> <p>He tōkeke mēnā he ūrite te tūponotanga toa o ia tangata.</p> <p>Whakahaerehia tēnei kēmu. Ko tēhea te tapeke tuatahi kia tekau ngā putanga? Tārimahia ngā putanga ki tētahi tūtohi:</p> <table border="1"> <tr> <td>Putanga (tapeke)</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td>Te maha</td> <td></td> <td></td> <td></td> <td></td> </tr> </table> <p>Ko tēhea te tau tuatahi kia tekau ūna putanga? I te nuinga o ngā whakamātau, ko te 3. I ētahi atu whakamātau, ko te 2, ko te 4 rānei.</p> <p>He aha ki tōu whakaaro i pēnei ai? He nui kē atu te tūponotanga o te 3 i ētahi atu o ngā tapeke. Engari, he taurangirangi tonu ngā putanga o tētahi whakamātau – kāore e whai tōtika i ngā tūponotanga i ngā wā katoa.</p>	Putanga (tapeke)	2	3	4	5	Te maha				
Putanga (tapeke)	2	3	4	5							
Te maha											
Whakawhitiwhiti kōrero mō te whiriwhiri i te tūponotanga o ia putanga.	<p>Me pēhea te whiriwhiri i te tūponotanga o ia putanga o te whakamātau nei?</p> <p>Me tuhi ki te hoahoa rākau.</p>										

	Pūrere 1	Pūrere 2	Putanga	Tūponotanga
	1 — 2	1 — 2	2 — 3	$\frac{1}{8}$
	1 — 2	1 — 2	2 — 3	$\frac{1}{8}$
	1 — 2	1 — 2	3 — 4	$\frac{1}{8}$
	1 — 2	1 — 2	4 — 5	$\frac{1}{8}$

Nō reira, he aha te tūponotanga o te 2?

E rua ngā putanga o te 2 o roto i ngā putanga e waru, nō reira ko te  $\frac{2}{8}$ , te  $\frac{1}{4}$  rānei te tūponotanga.

Ko tēhea te putanga he nui rawa te tūponotanga?

Ko te 3. E toru ngā putanga o te 3 o roto i ngā putanga e waru katoa. Nō reira, ko te  $\frac{3}{8}$  te tūponotanga.

Koirā te take i te nuinga o ngā whakamātau ko te 3 te tau tuatahi kia tekau ūna putanga.

Nō reira he tōkeke, kāore rānei i te tōkeke te kēmu nei a Tanu?

Kāore i te tōkeke nā te mea he nui kē atu te tūponotanga o te 2, o te 3 rānei (ko te  $\frac{5}{8}$  te tūponotanga), i te tūponotanga o te 4, o te 5 rānei (ko te  $\frac{3}{8}$  te tūponotanga).

Tonoa ngā ākonga kia tūhura i te tōkeke o ētahi atu kēmu pēnei, me te tuhi hoki i ā rātou ake. Hei tauira:

- Ka pīrorihia tētahi mataono tau, ka toa a Manahi mēnā he taukehe ka puta, ka toa a Māia mēnā he taurua.
- Ka pīrorihia ētahi mataono tau e rua, ka tāpirihia ngā tau e rua ka puta. Ka toa a Hinewai mēnā he taukehe te tapeke, ka toa a Haki mēnā he taurua.
- Ka pīrorihia ētahi mataono tau e rua, ka tāpirihia ngā tau e rua ka puta. Ka toa a Hinewai mēnā he nui ake i te 6 te tapeke, ka toa a Haki mēnā he 6, iti iho rānei.
- Ka pīrorihia ētahi mataono tau e rua, ka tangohia te tau iti i te tau nui. Ka toa a Roimata mēnā he 2, iti iho rānei te otinga. Ka toa a Rongopai mēnā he nui ake i te 2 te otinga.
- E 3 ngā porotiti kei roto i tētahi pēke, e rua ngā mea whero, kotahi te mea kākāriki. Ka tangohia matapōkerea tētahi, ā, ka whakahokia ki te pēke. Kātahi ka tangohia tētahi anō. Ka toa a Waiora mēnā he ūrite ngā tae o ngā porotiti e rua ka puta, ka toa a Kahurangi mēnā he rerekē ngā tae.

# Te Whakaatu Tūponotanga hei Horahanga Tapawhā Hāngai

1a 1e 2a 2e 3a 3e 4a 4e 5a

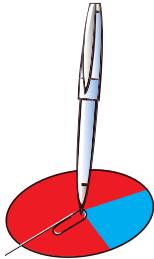
E ako ana ahau ki te whakaatu i ngā tūponotanga o tētahi pāpono raupapa hei horahanga tapawhā hāngai.

## Rauemi

- He pūrere takahurihuri

## Kupu matua

hoaho a rākau, horahanga, pāpono, pāpono raupapa, putanga, taurangitanga, tūponotanga, whakamātau

Ngā tohutohu				He tauira kōrero mā te pouako																																																								
Aratakinā ngā ākonga kia whakaatu i ngā putanga me ngā tūponotanga o te whakamātau tūponotanga nei, hei horahanga ki tētahi tapawhā hāngai.				<p>E rua ngā takahurihangā o tēnei pūrere. He aha ngā putanga e taea ana?</p> <p>E rua ngā whero, e rua ngā kahurangi, kotahi rānei o ia tae: (wh,wh) (k,k) (wh,k)</p> 																																																								
<table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td></tr> </table> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td></td><td></td><td></td><td></td></tr> <tr><td>whero</td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td></tr> </table>																								whero																<p>Kia āta tirotiro tātou i te tātaitanga o te tūponotanga o ia putanga.</p> <p>He aha te tūponotanga o ia tae i te takahurihangā tuatahi? Ko te <math>\frac{3}{4}</math> mō te whero, ko te <math>\frac{1}{4}</math> mō te kahurangi.</p> <p>Kia whakaaturia ngā tūponotanga nei mō te takahurihangā tuatahi hei kapa ki tētahi tapawhā hāngai kua tuhia ki te pepa tukutuku.</p> <p>Ko te <math>\frac{3}{4}</math> o te horahanga o te tapawhā hei whakaatu i te tūponotanga <math>\frac{3}{4}</math> ka tau te pūrere takahurihuri ki te rohe whero. Ko te <math>\frac{1}{4}</math> te horahanga mō te kahurangi.</p>																				
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	wh, wh		wh, k																																																									
whero																																																												
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	<p>Koia te tūponotanga o ētahi whero e rua.</p> <p>He aha te hautanga o te tapawhā e hāngai ana ki ērā atu o ngā putanga?</p> <p>Mō ētahi kahurangi e rua: <math>\frac{1}{16}</math></p> <p>Mō tētahi whero me tētahi kahurangi: <math>\frac{3}{16} + \frac{3}{16} = \frac{6}{16}</math></p>																																									
<p>Whakamahia ngā tūponotanga hei matapae i ngā putanga o te whakamātau. Tukuna ngā ākonga kia whakahāere i te whakamātau, ka tuhi ai i ngā putanga ki tētahi tūtohi.</p> <p>Whakawhitihī kōrero mō te matapae i ngā putanga i runga i te tūponotanga o tēnā me tēnā, me te taurangitanga o ngā putanga whakamātau.</p>	<p>Mēnā 16 ngā takahurihangā e rua o te pūrere nei, he aha tō matapae mō te maha o ia putanga? Tuhia ki tētahi tūtohi.</p> <table border="1"> <thead> <tr> <th rowspan="2"></th> <th colspan="3">Matapae</th> <th colspan="3">Whakamātau</th> </tr> <tr> <th>wh, wh</th> <th>k, k</th> <th>wh, k</th> <th>wh, wh</th> <th>k, k</th> <th>wh, k</th> </tr> </thead> <tbody> <tr> <td>16</td> <td>9</td> <td>1</td> <td>6</td> <td>...</td> <td>...</td> <td>...</td> </tr> <tr> <td>32</td> <td>...</td> <td>...</td> <td>...</td> <td>...</td> <td>...</td> <td>...</td> </tr> <tr> <td>48</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>160</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Whakahāerehia te whakamātau, ka tuhi ai i ngā putanga ki te tūtohi.</p> <p>He aha tētahi mea e kitea ana i te tūtohi?</p> <p>He taurangirangi ngā putanga o ngā whakamātau, kāore e whai tōtika ana i ngā matapae me te tūponotanga o ia putanga. Engari, ina maha haere ngā takahurihangā, ka āhua pātata haere ngā matapae me ngā whakamātau.</p>		Matapae			Whakamātau			wh, wh	k, k	wh, k	wh, wh	k, k	wh, k	16	9	1	6	...	...	...	32	...	...	...	...	...	...	48							160						
	Matapae			Whakamātau																																						
	wh, wh	k, k	wh, k	wh, wh	k, k	wh, k																																				
16	9	1	6	...	...	...																																				
32	...	...	...	...	...	...																																				
48																																										
160																																										
<p>Kia pērā anō te tūhura i ētahi atu pāpono raupapa, me te whakamahi horahanga tapawhā hei tātai i ngā tūponotanga. Hei tauira:</p> <ul style="list-style-type: none"> <li>• te piu uka me te pīrori mataono tau</li> <li>• kia rua ngā tangohanga matapōkere i tētahi porotiti i te pēke, kia kotahi te porotiti whero, kia kotahi te kōwhai, kia rua ngā kākāriki.</li> </ul>																																										

## Te Tūponotanga hei Ōrau

1a 1e 2a 2e 3a 3e 4a 4e 5a

E ako ana ahau ki te whakaatu tūponotanga hei ūrāu.

### Rauemi

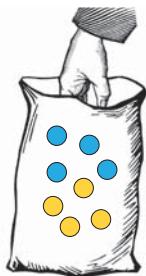
- He pūrere takahurihuri (kia maha ngā papa rerekē)
- He porotiti karakara me tētahi pēke
- He rorohiko me te hōtaka ripanga

### Kupu matua

matapōkere, ūrāu, ripanga, tūponotanga

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Whakaaturia he rārangi tūponotanga e hāngai ana ki tētahi pūāhua tūponotanga, ka whakawhitihitī kōrero ai mō te ūrāu e hāngai ana ki tēnā pūwāhi, ki tēnā pūwāhi o te rārangi.</p>	<p>Kia tirotiro tātou ki ētahi papa mō te pūrere takahurihuri. Anei ētahi:</p>  <p>Ki ū whakaaro, ko tēhea te papa pūrere takahurihuri e hāngai ana ki ēnei tūponotanga?</p> <ul style="list-style-type: none"><li>• E 50% te tūponotanga ka tau ki te rohe whero.</li><li>• 100% te tūponotanga ka tau ki te rohe whero.</li><li>• 100% te tūponotanga kāore e tau ki te rohe kahurangi.</li><li>• 75% te tūponotanga ka tau ki te rohe whero.</li><li>• 25% te tūponotanga ka tau ki te rohe kahurangi.</li><li>• 25% te tūponotanga kāore e tau ki te rohe whero.</li></ul> <p>He aha ētahi kōrero mō te ūrāu tūponotanga e hāngai ana ki te papa tuawhā me te tuarima?</p> <p>Tuawhā:</p> <p>33% te tūponotanga ka tau ki te rohe kahurangi. 33% te tūponotanga kāore e tau ki te rohe whero. 66% te tūponotanga ka tau ki te rohe whero. 66% te tūponotanga kāore e tau ki te rohe kahurangi.</p> <p>Tuarima:</p> <p>12.5% te tūponotanga ka tau ki te rohe kahurangi. 12.5% te tūponotanga kāore e tau ki te rohe whero. 87.5% te tūponotanga ka tau ki te rohe whero. 87.5% te tūponotanga kāore e tau ki te rohe kahurangi.</p>

Tonoa ngā ākonga kia whakaarohia ngā porotiti karakara hei rau atu ki tētahi pēke, kia hāngai ki tētahi tūponotanga.



Kia whakaaro tātou ki te whakamātau tūponotanga nei, te tango porotiti i tētahi pēke.

E hia ngā porotiti hei rau atu ki te pēke, he aha hoki ngā tae, kia riro ko te 50% te tūponotanga ka tangohia tētahi porotiti kōwhai?

Kia kotahi te porotiti kōwhai, kia kotahi te whero. Kia rua rānei ngā porotiti kōwhai, kia rua anō ngā mea o tētahi atu tae. Ko te mea nui, kia ūrite te maha o ngā porotiti kōwhai me te maha o ērā atu o ngā tae.

Āe, ko te mea nui, me kōwhai te 50% o ngā porotiti.

Kia pērā anō te whakawhitiwhiti kōrero mō ētahi atu ūrau tūponotanga. Hei tauira:

- E hia ngā porotiti hei rau atu ki te pēke, he aha hoki ngā tae, kia riro ko te 25% te tūponotanga ka tangohia tētahi porotiti kōwhai?
- E hia ngā porotiti hei rau atu ki te pēke, he aha hoki ngā tae, kia riro ko te 66% te tūponotanga ka tangohia tētahi porotiti kōwhai?
- E hia ngā porotiti hei rau atu ki te pēke, he aha hoki ngā tae, kia riro ko te 20% te tūponotanga ka tangohia tētahi porotiti kōwhai?
- E hia ngā porotiti hei rau atu ki te pēke, he aha hoki ngā tae, kia riro ko te 12.5% te tūponotanga ka tangohia tētahi porotiti kōwhai?

### Hei whakawhānui

Aratakina ngā ākonga kia whakahere i tētahi whakamātau tūponotanga, ka whakaatu ai i ngā matapae me ngā putanga whakamātau hei ūrau ki tētahi kauwhata porowhita. Me whakamahi tētahi hōtaka ripanga i te rorohiko. Whakawhitiwhiti kōrero mō te āhua o ngā kauwhata me ngā āhuatanga matua e whakaaturia ana. Hei tauira:

E rima ngā porotiti kei roto i te pēke. E rua ngā mea kōwhai. Ka tangohia matapōkerea tētahi.

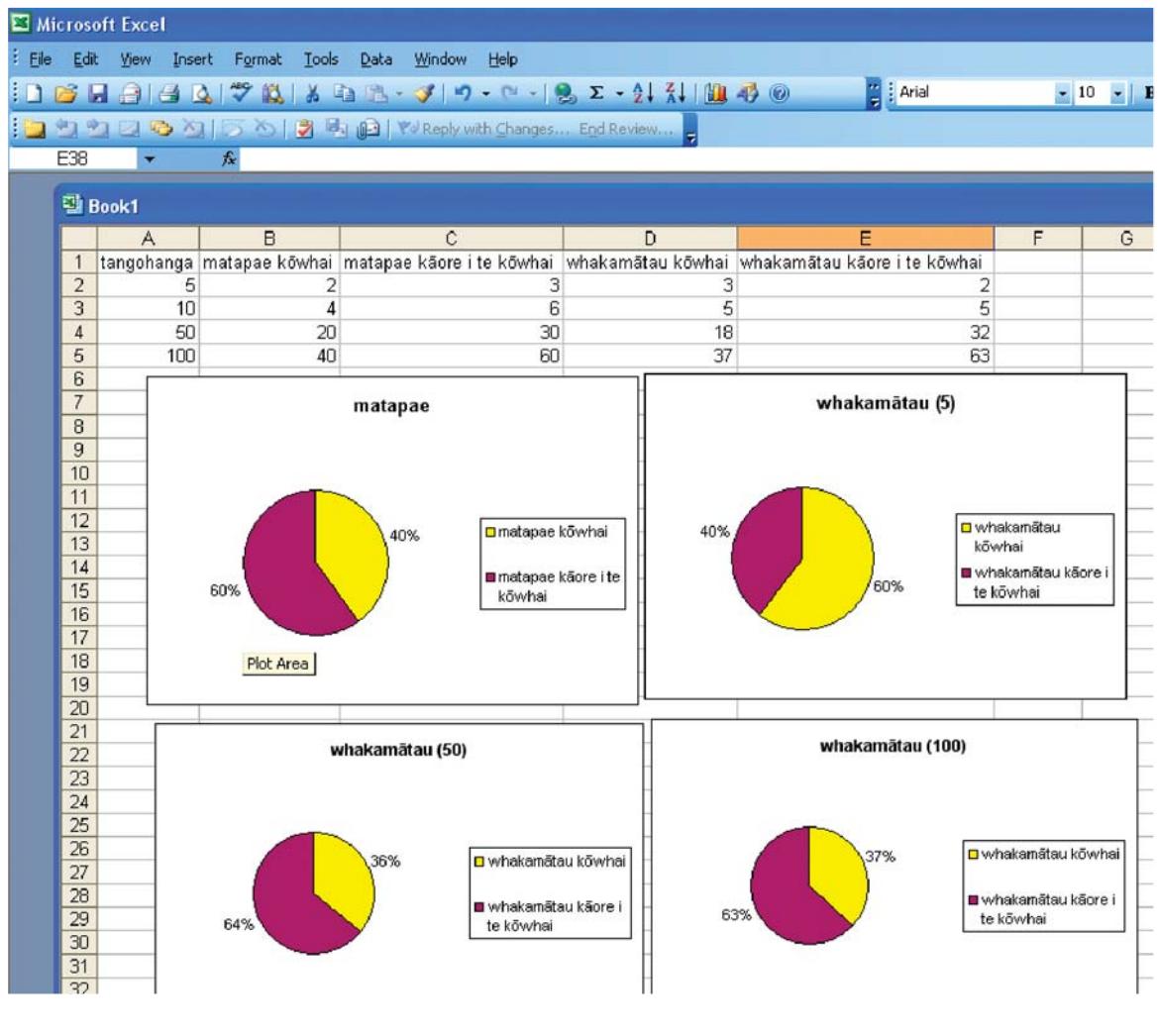
Ko te tūponotanga o tētahi mea kōwhai =  $\frac{2}{5} = 40\%$ .

Te maha o ngā tangohanga porotiti	Te matapae i te maha o ngā porotiti kōwhai	Te whakamātau i te putanga o ngā porotiti kōwhai
5	2	3
10	4	5
50	20	18
100	40	37

Ka whakaurua ēnei raraunga ki te ripanga rorohiko:

	A	B	C	D	E
1	tangohanga	matapae kōwhai	matapae kāore i te kōwhai	whakamātau kōwhai	whakamātau kāore i te kōwhai
2	5	2	3	3	2
3	10	4	6	5	5
4	50	20	30	18	32
5	100	40	60	37	63

Ka whakaputaina he kauwhata porowhita e kitea ai ngā ōrau:



## **Whanaketanga 4e**

### **Mātauranga Matua kua Mau kē**

Te Tau

- te ōwehenga me te pāpātanga
- te taupū māmā

Te Tūponotanga

- te whakaatu tūponotanga hei ūrāu
- te whakaputa whakaaro ki te tōkeke, te haukume rānei o tētahi pūāhua tūponotanga, i runga anō i ngā tātaitanga me te whakaaro arorau
- te whakahaere whakamātau tūponotanga:
  - ka matapae i ngā putanga
  - ka tātai i ngā tūponotanga
  - ka whakaatu i ngā putanga ki te whakaari raraunga
  - ka whakamāori i ngā hua o te whakamātau

### **Mātauranga Matua hei Ako**

- ngā take e taurangirangi ai ngā putanga o tētahi whakamātau tūponotanga
- te iti haere o te taurangitanga i te nui haere o ngā pāpono o te whakamātau
- te whakahaere whakamātau tūponotanga:
  - ka matapae i ngā putanga
  - ka tātai i ngā tūponotanga
  - ka whakaatu i ngā putanga ki te whakaari raraunga
  - ka whakatairite i te tuari o ngā putanga matapae me ngā putanga whakamātau
  - ka whakamārama i te taurangitanga o ngā putanga whakamātau

### **Rauemi kē atu e Hāngai ana**

Ngā Rapanga o nzmaths

- Mihini Tukatuka Rare  
<http://www.nzmaths.co.nz/sites/default/files/BubblegumMaori.pdf>

He Tau Anō Te Tau

- *Te Tauanga: Putanga Hou.* Te Whanganui-a-Tara: Te Pou Taki Kōrero (2009).

## Te Tuari o ngā Putanga

1a 1e 2a 2e 3a 3e 4a 4e 5a

E ako ana ahau ki te whakaatu i te tuari o ngā putanga o tētahi whakamātau tūponotanga ki te kauwhata.

### Rauemi

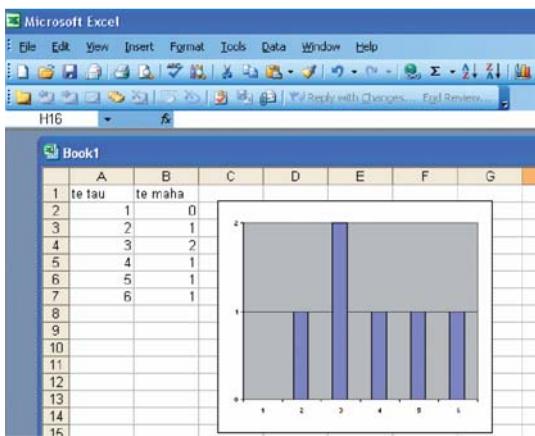
- He rorohiko me te hōtaka ripanga
- Te whai wāhitanga atu ki te ipurangi

### Kupu matua

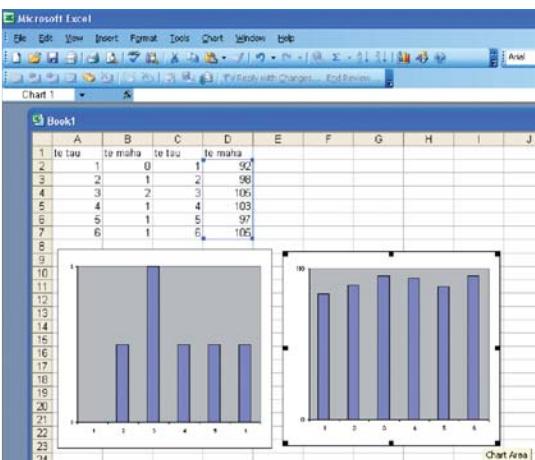
putanga, ripanga rorohiko, tau matapōkere, taurangitanga, tuari, tūponotanga, whakamātau

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Whakamahia tētahi hōtaka rorohiko, tētahi pae ipurangi rānei hei whakaputa tau matapōkere. Hei tauira:</p> <p><a href="http://www.random.org/integers/">http://www.random.org/integers/</a></p> <p>Whakaputaina kia 6 ngā tau matapōkere, mai i te 1 ki te 6, ānō nei kia ono ngā pīroritanga mataono tau.</p>	<p>Huakina te pae ipurangi nei, hei whakaputa tau matapōkere. E hiahitia ana kia whakaputaina he tau matapōkere mai i te 1 ki te 6. He ōrite ki te pīrori mataono tau:</p>  <p>The screenshot shows the Random.org Integer Generator interface. In the 'Part 1: The Integers' section, the 'Generate' field contains '6' and the 'Each integer should have a value between' fields are set to '1' and '6'. Below these, there's a note about generating numbers independently. In the 'Part 2: Go!' section, there are buttons for 'Get Numbers', 'Reset Form', and 'Switch to Advanced Mode'. A note at the bottom states that generated numbers will be independent.</p> <p>Pāwhiria te pūtohu 'Get Numbers', hei whakaputa i ngā tau matapōkere e ono:</p>  <p>The screenshot shows the results page of the Random.org Integer Generator. It displays the generated numbers: 2, 6, 5, 3, 3, 4. Below the numbers, it says 'Timestamp: 2010-11-02 01:03:11 UTC' and has 'Again!' and 'Go Back' buttons. A note at the bottom indicates the numbers are generated left to right, across columns.</p>

Whakaurua te maha o ia tau ki te hōtaka ripanga (pērā i te Excel), ka whakaputa ai i te kauwhata pou hei whakaatu i te tuari o ngā tau matapōkere:



Kia pērā anō te mahi, engari kia maha ngā whakaputanga o ngā tau matapōkere, kia 600 pea. Tuhia te maha o ia tau ki te ripanga rorohiko, ka whakaputa anō ai i tētahi kauwhata pou:



Whakawhitihiti kōrero mō te tūponotanga o ia putanga, me te taurangitanga o ngā kauwhata.

He aha te tūponotanga o ia putanga?

Ko te hauono. E ono katoa ngā putanga (1, 2, 3, 4, 5, 6), ā, he ōrite te tūponotanga o ia putanga. Nō reira, kotahi o roto i te ono te tūponotanga.

He aha te mea e kitea ana i ngā kauwhata pou?

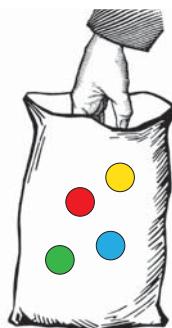
Ko te tuari o ngā putanga. I te kauwhata tuatahi (e ono noa iho ngā whakaputanga tau matapōkere), e kitea ana te nui o te taurangitanga. Mēnā e whai ana i te tūponotanga o ia putanga, ka ōrite te teitei o ia pou. Kāore i te pērā rawa te taurangitanga i te kauwhata tuarua, arā, he āhua ōrite te teitei o ia pou.

He aha i pērā ai te rerekē o te taurangitanga o ia kauwhata? Nā te mea he ruarua noa iho ngā whakaputanga tau matapōkere mō te kauwhata tuatahi. Mēnā kotahi anake te rerekē i tā te tūponotanga, pēnei i tēnei kauwhata (karekau he 1, ā, e rua ngā 3), he nui tonu te hautanga o te rerekē, arā, kotahi o roto i te 6 (16.7%).

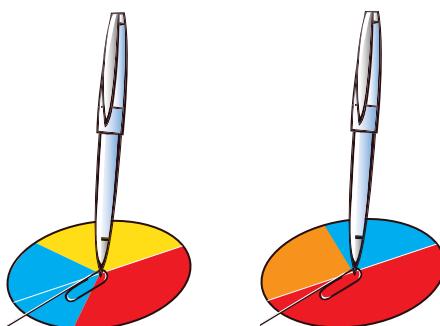
I te kauwhata tuarua (e 600 ngā whakaputanga tau matapōkere), mēnā e 8 te rerekētanga o ngā whakaputanga i tā te tūponotanga (e 92 ngā putanga o te 2 o roto i te 600, engari e ai ki te tūponotanga, kia 100 kē o roto i te 600), he iti te hautanga o te rerekē, arā, e 8 o roto i te 600 (1.3%).

Kia pērā anō te arataki i ngā ākonga kia whakahaere whakamātau tūponotanga, me te whakaatu i te tuari o ngā putanga ki te kauwhata. Hei tauira:

- Kia whā ngā porotiti karakara ki te pēke, kia rerekē ngā tae. Ka tango matapōkere i tētahi.



- Te whakamahi pūrere takahurihuri, pēnei i ēnei:



- Te pīrori i ētahi mataono tau e rua, me te tango i te tau iti i te tau nui.

## Whiriwhiria te Tūponotanga

1a 1e 2a 2e 3a 3e 4a 4e 5a

E ako ana ahau ki te whiriwhiri i te tūponotanga o tētahi pāpono, i runga i ngā putanga o tētahi whakamātau.

### Rauemi

- He rorohiko me te papatono ripanga

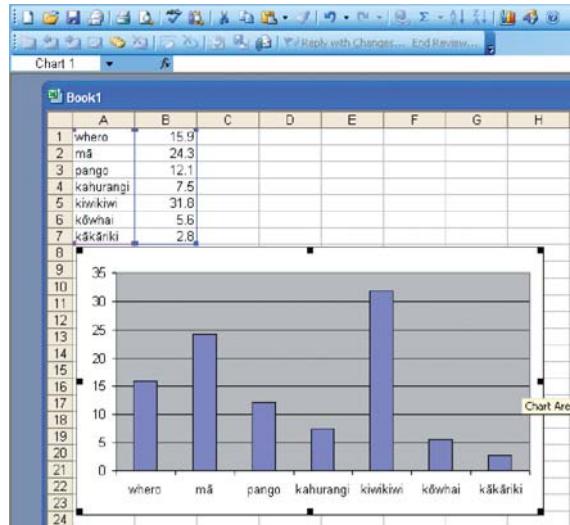
### Kupu matua

pāpono, putanga, tārima, tuari, tūponotanga, tūtohi tatau, whakamātau

Ngā tohutohu	He tauira kōrero mā te pouako		
Aratakina ngā ākonga kia tātai i ngā tūponotanga ka hua mai i tētahi whakamātau tūponotanga.	He haurua haora a Reihana e tirotiro ana i te tae o ngā motukā e hipa ana i te kura. Kua tuhia ki tētahi tūtohi tārima:		
Te ine	Te tatau	Te maha	
whero		17	
mā		26	
pango			
kahurangi			
kiwikiwi			
kōwhai			
kākāriki			
Whakaotia te tūtohi. Tuhia te maha o ia tae.			
E hia katoa ngā motukā i hipa i te kura i te haurua haora e tirotiro ana a Reihana?			
Hui katoa te maha o ia tae, ka 107.			
Me pēhea te whiriwhiri i te tūponotanga he whero te tae o tētahi motukā e hipa ana i te kura?			
I runga i ngā raraunga kua kohia mai e Reihana, 17 ngā motukā whero o roto i ngā motukā 107. Nō reira, ko te $\frac{17}{107}$ te tūponotanga.			
Me pēhea te huri hei ūrau?			
Me whakarea te hautau ki te kotahi rau. Arā, ka whakareatia te $\frac{17}{107}$ ki te 100 i te tātaitai, ka 16%.			
Tātaihia te tūponotanga o ia tae hei ūrau.			

Tonoa ngā ākonga kia whakauru i ngā tūponotanga ki te ripanga rorohiko, me te whakaatu anō ki te kauwhata pou.

Whakaurua ngā ūrau ki te ripanga rorohiko, ka whakaputa ai i tētahi kauwhata pou hei whakaatu i ngā tūponotanga o ia tae.



Tonoa ngā ākonga kia whakahaere i ā rātou ake whakamātau i ngā tae o ngā motukā e hipa ana i te kura, me te whakatairite anō i ā rātou ake raraunga ki ngā raraunga a Reihana.

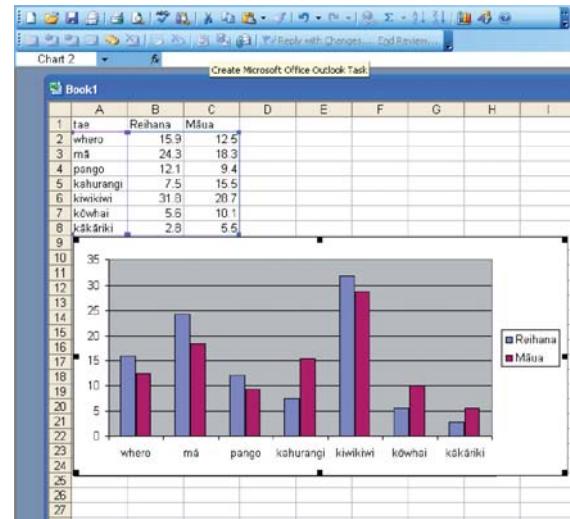
Ka mahi takirua koutou ki te tatau i ngā tae o ngā motukā e hipa ana i te kura i roto i tētahi haurua haora.

Tārimahia ngā tae ki tētahi tūtohi tatau.

Nā runga i ngā raraunga kua kohia mai e kōrua ko tō hoa, he aha te tūponotanga o ia tae?

Me pēhea te whakatairite i ngā tūponotanga o ia tae kua puta i tā kōrua whakamātau me ngā tūponotanga i puta i tā Reihana?

Me whakaatu ki te kauwhata pou hiato. Arā, mō ia tae, ka tuhia ētahi pou e rua – ko tētahi hei whakaatu i ngā tūponotanga a Reihana, ko tētahi hei whakaatu i ā māua tūponotanga.

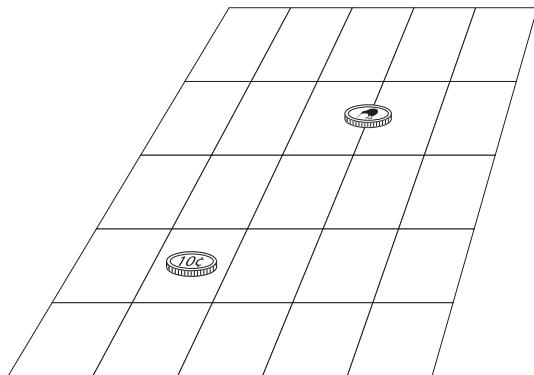


<p>Whakawhitihiti kōrero mō te rerekē o ngā tūponotanga kua puta i ngā whakamātau e rua nei.</p>	<p>He aha ētahi āhuatanga e kitea mai ana i te kauwhata pou hiato nei?</p> <ul style="list-style-type: none"> <li>• He kiwikiwi te tae o te huinga motukā nui katoa i ngā whakamātau e rua. He kākāriki te tae o te huinga motukā iti katoa.</li> <li>• Kāore i te pērā rawa te taurangitanga o ngā tūponotanga i tā māua whakamātau i te whakamātau a Reihana.</li> </ul>
--	--

Kia pērā anō te arataki i ngā ākonga kia whiriwhiri i ngā tūponotanga o ngā putanga o tētahi whakamātau. Hei tauira:

Ina whakatakahia tētahi uka kia tau ki runga tukutuku:

- he aha te tūponotanga, ka tau ki runga i tētahi rārangi o te tukutuku?
- he aha te tūponotanga kāore e tau ki tētahi rārangi?
- he aha te tūponotanga ka tau ki runga i tētahi rārangi o te tukutuku, ko te upoko ki runga?



Ki tōu whakaaro, me pēhea te rahi o ngā wehenga o te tukutuku kia 50% te tūponotanga ka tau te kapa ki runga i tētahi rārangi? Whakamātauria.

## Putanga Whakawhirinaki

1a 1e 2a 2e 3a 3e 4a 4e 5a

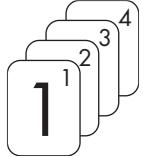
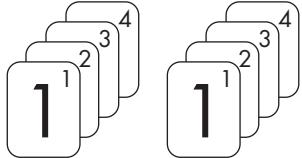
E ako ana ahau ki te whiriwhiri i te tūponotanga o tētahi pāpono whakawhirinaki.

### Rauemi

- He kāri tau 1 – 4
- He porotiti karakara
- He pēke

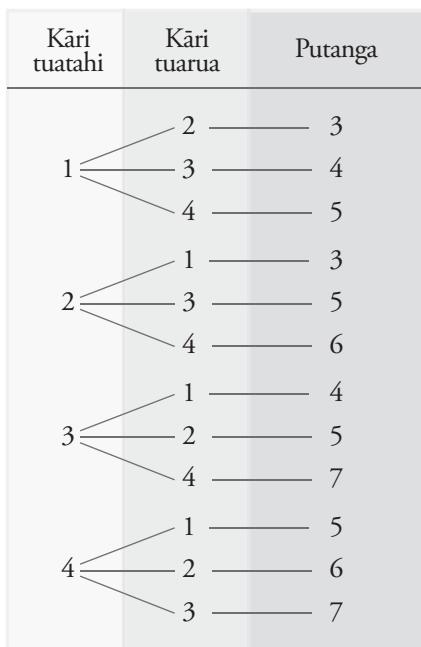
### Kupu matua

matapōkere, putanga, putanga wehe kē, putanga whakawhirinaki, tuari, tūponotanga, whakamātau

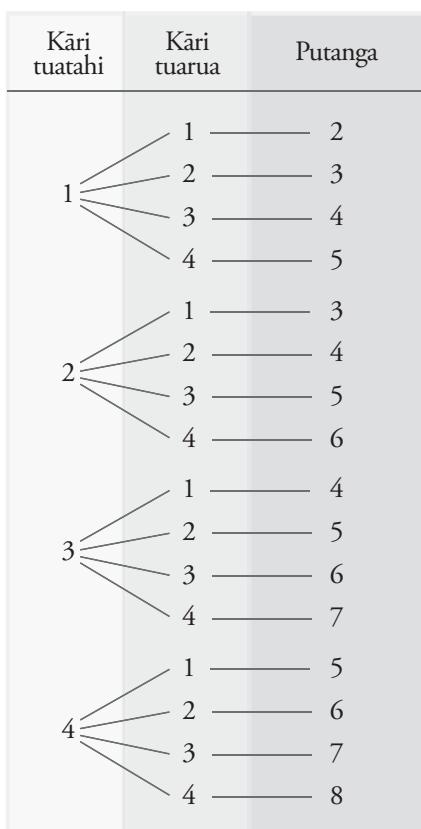
Ngā tohutohu	He tauira kōrero mā te pouako
Whakamāramahia te rerekē o te pāpono wehe kē me te pāpono whakawhirinaki.	<p>Anei ētahi whakamātau tūponotanga e rua:</p> <p>1. Kotahi te pūkei kāri tau, 1 ki te 4. Ka tangohia matapōkerea tētahi kāri, kātahi ka tango matapōkere i tētahi anō. Ka tāpiria ngā tau.</p>  <p>2. E rua ngā pūkei kāri tau, 1 ki te 4. Ka tangohia matapōkerea tētahi kāri i ia pūkei. Ka tāpiria ngā tau.</p>  <p>He aha te rerekētanga o ēnei whakamātau e rua? I te whakamātau tuatahi, e toru noa iho ngā kāri mō te tangohanga tuarua. I te whakamātau tuarua, e whā ngā kāri mō ia tangohanga.</p> <p>Āe rā. Ka kīia he whakawhirinaki te whakamātau tuatahi. Arā, ko te putanga o te tangohanga tuarua e whakawhirinaki ana ki te putanga o te tangohanga tuatahi. Hei tauira, mēnā ka tangohia he ‘rua’ i te tuatahi, ko te ‘tahi’, te ‘toru’ me te ‘whā’ anake ngā kāri e toe ana mō te tangohanga tuarua.</p> <p>Ko ngā kāri e whā katoa e wātea mai ana mō ngā tangohanga e rua o te whakamātau tuarua.</p>

Aratakina ngā ākonga kia whiriwhiri i te tūponotanga o ngā putanga o ngā whakamātau e rua nei.

#### Whakamātau tuarua



#### Whakamātau tuarua



He aha ngā putanga e taea ana mō ngā whakamātau e rua nei? E pai ana pea te whakaatu ki tētahi hoahoa rākau.

Ko ngā putanga e taea ana i te whakamātau tuatahi:  
(3, 4, 5, 6, 7)

Ko ngā putanga e taea ana i te whakamātau tuarua:  
(2, 3, 4, 5, 6, 7, 8)

I te whakamātau tuatahi, e 2 ngā putanga o te ‘toru’ o roto i ngā putanga 12 katoa. Nō reira, ko te  $\frac{2}{12}$  te tūponotanga o te ‘rua’. Ina whakareatia ki te 100 hei tātai i te ūrau, ko te 16.7% tērā. Tātaihia ngā tūponotanga o ia putanga o ngā whakamātau e rua, ka tuhi ai ki te tūtohi:

Putanga	Whakamātau 1		Whakamātau 2	
	hautau tūponotanga	ōrau tūponotanga	hautau tūponotanga	ōrau tūponotanga
2	0	0	$\frac{1}{16}$	6.3%
3	$\frac{2}{12}$	16.7%	$\frac{2}{16}$	12.5%
4	$\frac{2}{12}$	16.7%	$\frac{3}{16}$	18.8%
5	$\frac{4}{12}$	33%	$\frac{4}{16}$	25%
6	$\frac{2}{12}$	16.7%	$\frac{3}{16}$	18.8%
7	$\frac{2}{12}$	16.7%	$\frac{2}{16}$	12.5%
8	0	0	$\frac{1}{16}$	6.3%

E kitea ana i te tūtohi nei, he nui kē atu te tūponotanga o te 5 i te whakamātau tuatahi (33%) i te tūponotanga o te 5 i te whakamātau tuarua (25%). Whakamātauria tēnei āhuatanga. Whakahaerehia ngā whakamātau e rua nei. Ko tēhea te tuatahi kia 10 te maha o ngā ‘rima’?

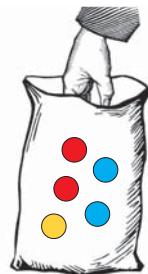
Ko te whakamātau tuatahi, nā te mea he nui kē atu te tūponotanga o te ‘rima’ i tēnei whakamātau.

Āe rā, kei te tika tēnā, engari mēnā ko te whakamātau tuarua te mea tuatahi kia 10 te maha o ngā ‘rima’, he tohu tērā o te aha?

Hei tohu tērā i te taurangitanga o ngā putanga o tētahi whakamātau. Kāore e whai tōtika i ngā tūponotanga o ia putanga. He waimarie noa iho kia pērā ngā putanga o taua whakamātau.

Kia pērā anō te tirotiro i ētahi atu whakamātau, he whakawhirinaki ngā putanga o tētahi, he wehe kē ngā putanga o tētahi. Hei tauira:

Kuhuna he porotiti karakara ki te pēke, ka tango ai i tētahi. I tētahi whakamātau, ka whakahokia taua porotiti, ā, ka tangohia anō tētahi. I tētahi whakamātau, kāore e whakahokia te porotiti i muri i te tangohanga tuarua. Kia rima ngā porotiti – kia rua ngā whero, kia rua ngā kahurangi, kia kotahi te kōwhai.



## **Whanaketanga 5a**

### **Mātauranga Matua kua Mau kē**

Te Tau

- te kōwhiri i te rautaki paheko tau e tino hāngai ana ki te horopaki

Te Tūponotanga

- ngā take e taurangirangi ai ngā putanga o tētahi whakamātau tūponotanga
- te iti haere o te taurangitanga i te nui haere o ngā pāpono o te whakamātau
- te whakahaere whakamātau tūponotanga:
  - ka matapae i ngā putanga
  - ka tātai i ngā tūponotanga
  - ka whakaatu i ngā putanga ki te whakaari raraunga
  - ka whakatairite i te tuari o ngā putanga matapae me ngā putanga whakamātau
  - ka whakamārama i te taurangitanga o ngā putanga whakamātau

### **Mātauranga Matua hei Ako**

- te tātai i te tūponotanga o ngā putanga i tētahi pūāhua tūponotanga papa-maha
- te hanga pūāhua whakatau hei tūhura i tētahi pūāhua tūturu
- te whakahaere whakamātau tūponotanga me te whakaputa whakaaro ki ūna wāhanga katoa

### **Rauemi kē atu e Hāngai ana**

Ngā Kōwae Ako o nzmaths

- He Kēmu Tūponotanga  
<http://www.nzmaths.co.nz/resource/he-k-mu-t-ponotanga>
- Hoahoa Tūponotanga  
<http://www.nzmaths.co.nz/resource/hoahoa-t-ponotanga>
- Pēhea nei te Tōkeke  
<http://www.nzmaths.co.nz/resource/p-hea-nei-te-t-keke>

Ngā Rapanga o nzmaths

- Te Tapeke Nui Rawa Atu  
<http://www.nzmaths.co.nz/sites/default/files/MaketheHighestTotalMaori.pdf>
- He Papa Pere  
<http://www.nzmaths.co.nz/sites/default/files/AnotherDartboardMaori.pdf>

He Tau Anō Te Tau

- *Te Tauanga: Putanga Hou*. Te Whanganui-a-Tara: Te Pou Taki Kōrero (2009).

## Whakamātau Tūponotanga Papa-Maha

1a 1e 2a 2e 3a 3e 4a 4e 5a

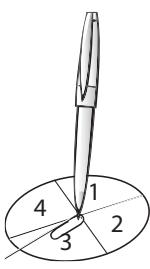
E ako ana ahau ki te tātai i te tūponotanga o ngā putanga o tētahi whakamātau tūponotanga papa-maha.

### Rauemi

- He rorohiko me te hōtaka ripanga
- He pūrere takahurihuri

### Kupu matua

putanga, ripanga rorohiko, tuari, tūponotanga, whakamātau, whakamātau papa-maha

Ngā tohutohu	He tauira kōrero mā te pouako																																																																							
<p>Aratakina ngā ākonga kia whakahaere i te whakamātau tūponotanga nei, ka whakawhitihiti kōrero ai mō te tātai i te tūponotanga o ngā putanga o tētahi whakamātau papa-maha.</p> 	<p>E rua ngā takahurihangā o te pūrere nei, ka tāpiria ngā tau. He aha ngā putanga e taea ana?</p> <p>Ko te <math>1 + 1</math> te putanga iti rawa atu, ko te <math>4 + 4</math> te putanga nui rawa atu, me ngā tau katoa kei waenganui:</p> <p>(2, 3, 4, 5, 6, 7, 8)</p> <p>Tēnā, kia tuhia he hoahoā rākau hei whakaatu i ngā putanga e taea ana me ngā tūponotanga:</p> <table border="1"> <thead> <tr> <th>Takahurihangā tuatahi</th> <th>Takahurihangā tuarua</th> <th>Putanga</th> <th>Tūponotanga</th> </tr> </thead> <tbody> <tr> <td><math>\frac{1}{4}</math></td> <td>1</td> <td>2</td> <td><math>\frac{1}{16}</math></td> </tr> <tr> <td><math>\frac{1}{4}</math></td> <td>2</td> <td>3</td> <td><math>\frac{1}{16}</math></td> </tr> <tr> <td><math>\frac{1}{4}</math></td> <td>3</td> <td>4</td> <td><math>\frac{1}{16}</math></td> </tr> <tr> <td><math>\frac{1}{4}</math></td> <td>4</td> <td>5</td> <td><math>\frac{1}{16}</math></td> </tr> <tr> <td><math>\frac{1}{4}</math></td> <td>1</td> <td>3</td> <td><math>\frac{1}{16}</math></td> </tr> <tr> <td><math>\frac{1}{4}</math></td> <td>2</td> <td>4</td> <td><math>\frac{1}{16}</math></td> </tr> <tr> <td><math>\frac{1}{4}</math></td> <td>3</td> <td>5</td> <td><math>\frac{1}{16}</math></td> </tr> <tr> <td><math>\frac{1}{4}</math></td> <td>4</td> <td>6</td> <td><math>\frac{1}{16}</math></td> </tr> <tr> <td><math>\frac{1}{4}</math></td> <td>1</td> <td>4</td> <td><math>\frac{1}{16}</math></td> </tr> <tr> <td><math>\frac{1}{4}</math></td> <td>2</td> <td>5</td> <td><math>\frac{1}{16}</math></td> </tr> <tr> <td><math>\frac{1}{4}</math></td> <td>3</td> <td>6</td> <td><math>\frac{1}{16}</math></td> </tr> <tr> <td><math>\frac{1}{4}</math></td> <td>4</td> <td>7</td> <td><math>\frac{1}{16}</math></td> </tr> <tr> <td><math>\frac{1}{4}</math></td> <td>1</td> <td>5</td> <td><math>\frac{1}{16}</math></td> </tr> <tr> <td><math>\frac{1}{4}</math></td> <td>2</td> <td>6</td> <td><math>\frac{1}{16}</math></td> </tr> <tr> <td><math>\frac{1}{4}</math></td> <td>3</td> <td>7</td> <td><math>\frac{1}{16}</math></td> </tr> <tr> <td><math>\frac{1}{4}</math></td> <td>4</td> <td>8</td> <td><math>\frac{1}{16}</math></td> </tr> </tbody> </table>				Takahurihangā tuatahi	Takahurihangā tuarua	Putanga	Tūponotanga	$\frac{1}{4}$	1	2	$\frac{1}{16}$	$\frac{1}{4}$	2	3	$\frac{1}{16}$	$\frac{1}{4}$	3	4	$\frac{1}{16}$	$\frac{1}{4}$	4	5	$\frac{1}{16}$	$\frac{1}{4}$	1	3	$\frac{1}{16}$	$\frac{1}{4}$	2	4	$\frac{1}{16}$	$\frac{1}{4}$	3	5	$\frac{1}{16}$	$\frac{1}{4}$	4	6	$\frac{1}{16}$	$\frac{1}{4}$	1	4	$\frac{1}{16}$	$\frac{1}{4}$	2	5	$\frac{1}{16}$	$\frac{1}{4}$	3	6	$\frac{1}{16}$	$\frac{1}{4}$	4	7	$\frac{1}{16}$	$\frac{1}{4}$	1	5	$\frac{1}{16}$	$\frac{1}{4}$	2	6	$\frac{1}{16}$	$\frac{1}{4}$	3	7	$\frac{1}{16}$	$\frac{1}{4}$	4	8	$\frac{1}{16}$
Takahurihangā tuatahi	Takahurihangā tuarua	Putanga	Tūponotanga																																																																					
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$\frac{1}{4}$	4	8	$\frac{1}{16}$																																																																					

E kitea ana i te hoahoa rākau nei, ko te  $\frac{1}{4}$  te tūponotanga o ia tau i te takahurihangā tuatahi. Ko te  $\frac{1}{4}$  anō te tūponotanga o ia tau i te takahurihangā tuarua.

He aha te tūponotanga o ia putanga whakamutunga e rārangī mai ana i te pou matau o te hoahoa rākau? Tekau mā ono ngā putanga e rārangī mai ana, ā, he ōrite te tūponotanga o tēnā me tēnā, nō reira ko te  $\frac{1}{16}$  te tūponotanga.

He aha te hononga o ngā tūponotanga o ia tau i ngā takahurihangā e rua (te  $\frac{1}{4}$  me te  $\frac{1}{4}$ ) me te tūponotanga o ia putanga whakamutunga (te  $\frac{1}{16}$ )?

Ko te hauwhā o te hauwhā, koirā te  $\frac{1}{16}$ . Arā, whakareatia te  $\frac{1}{4}$  ki te  $\frac{1}{4}$  ka hua ko te  $\frac{1}{16}$  ( $\frac{1}{4} \times \frac{1}{4} = \frac{1}{16}$ ).

Āe rā. Ina whakareatia te tūponotanga o te tau i te takahurihangā tuatahi ki te tūponotanga o te tau i te takahurihangā tuarua, ka hua ko te tūponotanga o te putanga whakamutunga.

Whakatauiratia te tātaitanga tūponotanga o tētahi whakamātau papa-rua ki te tapawhā hāngai.

Tukuna ngā ākonga kia tātai i ngā tūponotanga o ngā putanga whakamutunga, me te whakaatu anō i te tuari o ngā tūponotanga i te kauwhata pou. Whakawhitiwhiti kōrero mō te hangarite o te tuari.

	1	2	3	4
1	2	3	4	5
2	3	4	5	6
3	4	5	6	7
4	5	6	7	8

Ka taea ēnei tūponotanga te whakatauira ki te tapawhā hāngai. Kotahi hauwhā te tūponotanga o ia tau i te takahurihangā tuatahi:

1 (tūponotanga = $\frac{1}{4}$ )
2 (tūponotanga = $\frac{1}{4}$ )
3 (tūponotanga = $\frac{1}{4}$ )
4 (tūponotanga = $\frac{1}{4}$ )

takahurihangā tuatahi

← Ka whakaaturia ngā putanga o te takahurihangā tuarua hei pou ki te tapawhā hāngai. Kotahi hauwhā anō te tūponotanga o ia putanga. Kei roto i ngā wehenga o te tapawhā hāngai ngā putanga whakamutunga, arā, te tapeke o ngā tau.

He aha te hautanga o ia wehenga o te tapawhā?

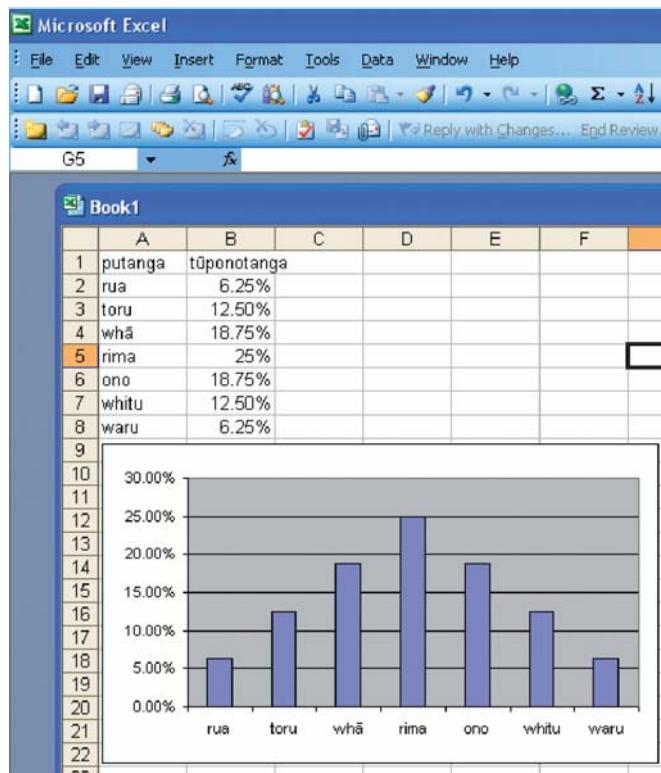
Ko te  $\frac{1}{16}$ . Tekau mā ono ngā wehenga, ā, he ōrite te rahi o ia wehenga.

Āe rā. I te tuatahi ka wāwāhia te tapawhā kia 4 ngā kapa ōrite. Ko te hauwhā tērā. Tuarua, ka wāwāhia ia hauwhā kia hauwhā anō. Ko te hauwhā o te hauwhā, koia ko te  $\frac{1}{16}$ . Arā te whārite whakareatanga:  $\frac{1}{4} \times \frac{1}{4} = \frac{1}{16}$

Nō reira, koirā te tūponotanga o ia putanga whakamutunga, ko te  $\frac{1}{16}$ .

E whā ngā putanga o te 5 e whakaaturia ana, nō reira e whā ngā  $\frac{1}{16}$  ( $\frac{1}{16} \times 4$ ) te tūponotanga o te 5. Arā, ko te  $\frac{4}{16}$ , ko te  $\frac{1}{4}$  rānei.

He aha te tūponotanga o ērā atu o ngā putanga whakamutunga? Tuhia ki te ripanga rorohiko, ka whakaatu anō ai ki te kauwhata pou.



He aha tētahi mea e kitea ana i te kauwhata?

He hangarite te tuari o ngā tūponotanga. He ōrite te tūponotanga o te rua me te waru. He ōrite anō te toru me te whitu, te whā me te ono. Ko te rima te rārangī hangarite o te kauwhata.

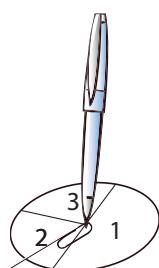
He aha ki ōu whakaaro i hangarite ai te tuari o ngā tūponotanga?

Nā te mea he ōrite te tūponotanga o ia putanga i te takahurihangā tuatahi me te takahurihangā tuarua.

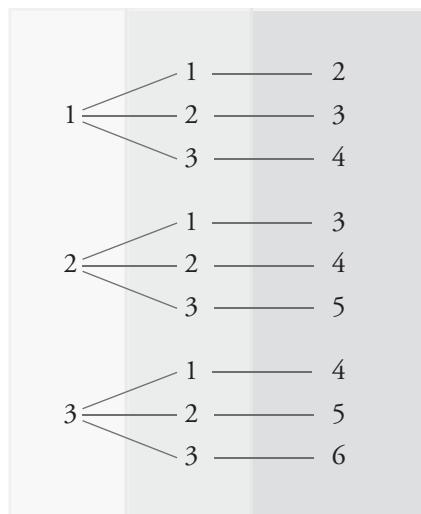
Kia pērā anō te arataki i ngā ākonga kia tātai i ngā tūponotanga o tētahi whakamātau papa-rua, engari i tēnei wā, me rerekē te tūponotanga o ngā putanga.

Anei anō tētahi pūrere takahurihuri. Mēnā e rua ngā takahurihangā o te pūrere, ā, ka tāpiria ngā tau ka puta, he aha ngā putanga e taea ana?

Ko te  $1 + 1$  te putanga iti rawa atu, ko te  $3 + 3$  te putanga nui rawa atu, me ngā tau kei waenganui. Arā, ko ēnei: (2, 3, 4, 5, 6)



Whakaaturia ngā putanga whakamutunga ki tētahi hoahoa rākau, ki tētahi tapawhā hāngai anō hoki:



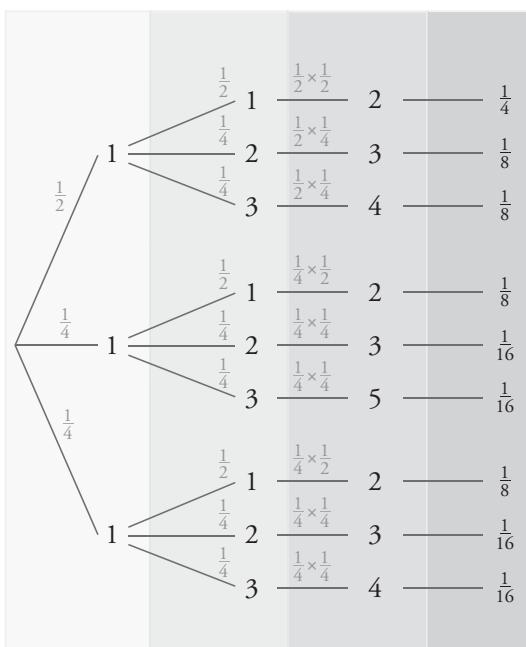
takahurihangā tuarua			
1	2	3	
1	2	3	4
2	3	4	5
3	4	5	6

E iwa ngā putanga e whakaaturia ana ki te hoahoa rākau me te tapawhā. He ōrite te tūponotanga o ia putanga, he rerekē rānei?

He rerekē, nā te mea he nui kē atu te tūponotanga o te 1 i te tūponotanga o te 2, o te 3 rānei i ia takahurihangā.

Nō reira, me pēhea te tātai i ngā tūponotanga o ngā putanga whakamutunga?

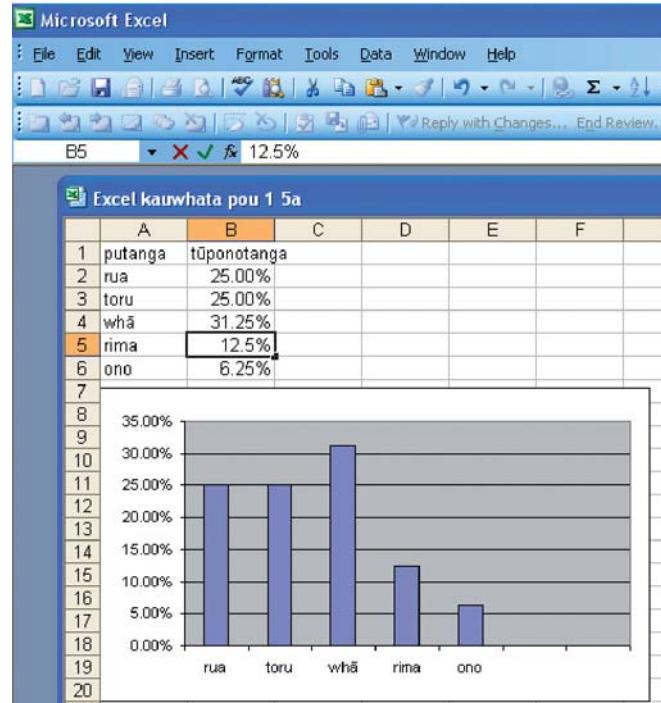
Me whakaatu ngā tūponotanga ki te hoahoa rākau, me te tapawhā. Ka whakareatia te tūponotanga o te tau i te takahurihangā tuatahi ki te tūponotanga o te tau i te takahurihangā tuarua.



takahurihangā tuarua			
1	2	3	
1	$(T = \frac{1}{2} \times \frac{1}{2})$	$(T = \frac{1}{2} \times \frac{1}{4})$	$(T = \frac{1}{2} \times \frac{1}{4})$
2	$(T = \frac{1}{4} \times \frac{1}{2})$	$(T = \frac{1}{4} \times \frac{1}{4})$	$(T = \frac{1}{4} \times \frac{1}{4})$
3	$(T = \frac{1}{4} \times \frac{1}{2})$	$(T = \frac{1}{4} \times \frac{1}{4})$	$(T = \frac{1}{4} \times \frac{1}{4})$

Tonoa ngā ākonga kia whakauru i ngā tūponotanga ki te ripanga rorohiko, me te whakaputa kauwhata hei whakaatu i te tuari o ngā tūponotanga.

Tuhia ngā tūponotanga ki te ripanga rorohiko, ka whakaputa ai i tētahi kauwhata pou hei whakaatu i te tuari o ngā tūponotanga.



Pēhea nei te āhua o te tuari o ngā tūponotanga?

Kāore i te hangarite, he tuari tītaha. E tītaha ana ki te taha mauī, ki te rua, te toru me te whā, nā te mea he nui kē atu te tūponotanga o ērā putanga, i te tūponotanga o te rima me te ono.

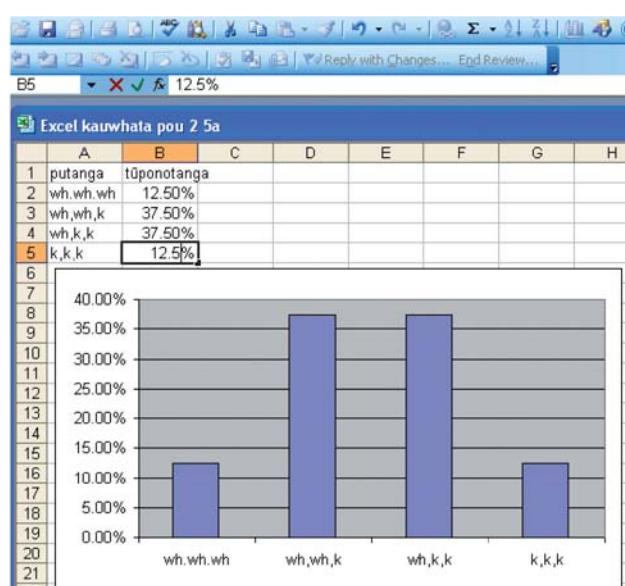
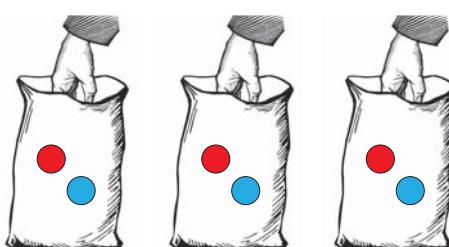
### Hei whakawhānui

Tūhuratia tētahi whakamātau papa-toru, me tētahi whakamātau whakawhirinaki.

Hei tauira:

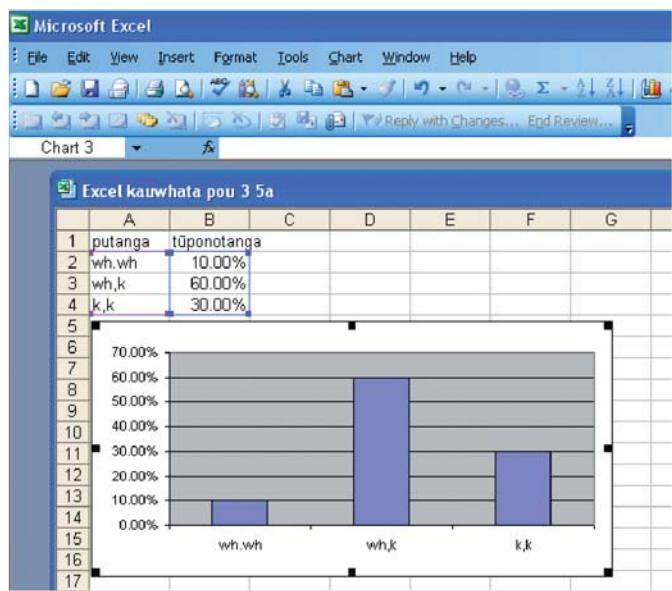
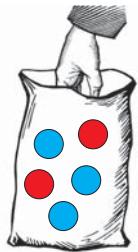
Whakamātau papa-toru:

E toru ngā pēke, ā, ka tangohia matapōkerea tētahi porotiti i ia pēke:



Whakamātau whakawhirinaki:

E rima ngā porotiti kei roto i te pēke,  
ka tangohia matapōkerea kia rua:



## Kōwhiria kia Rua o roto i te Whā

1a 1e 2a 2e 3a 3e 4a 4e 5a

E ako ana ahau ki te hanga i tētahi pūāhua whakatau hei tūhura i tētahi pūāhua tūponotanga.

### Rauemi

- He rorohiko me te hōtaka ripanga
- He kāri tau, 1 – 4
- He pēke

### Kupu matua

pūāhua whakatau, tūponotanga tātai, tūponotanga whakamātau

Ngā tohutohu	He tauira kōrero mā te pouako
Whakawhitihiti kōrero mō te kēmu tūponotanga ‘Lotto Strike’, me te tātai i te tūponotanga ka toa te tangata i tēnei kēmu.	<p>Tērā te kēmu tūponotanga e kīa ana ko ‘Lotto Strike’. Ka tīpako matapōkerea ngā tau e whā, mai i ngā tau 1 – 40, me te raupapa anō i te putanga o aua tau. Arā, he kōwhiri i ngā tau e whā ka puta me te tika anō o te raupapa o aua tau.</p> <p>He aha te tūponotanga ka tika te kōwhiri i te tau tuatahi? E 40 ngā tau, ā, he ōrite te tūponotanga o ia tau. Nō reira ko te <math>\frac{1}{40}</math> te tūponotanga.</p> <p>He aha te tūponotanga ka tika te kōwhiri i te tau tuatahi me te tau tuarua?</p> <p>Ko te <math>\frac{1}{40}</math> te tūponotanga ka tika te tau tuatahi. E 39 ngā tau e toe ana, nō reira ko te <math>\frac{1}{39}</math> te tūponotanga ka tika te tau tuarua. Hei tātai i te tūponotanga ka tika te tau tuatahi me te tuarua, me whakarea te <math>\frac{1}{40} \times \frac{1}{39}</math> ki te <math>\frac{1}{39}</math>. Ko te 0.06% tērā.</p> <p>Koia nei te tātaitanga ka tika te kōwhiri i ngā tau e whā:  <math display="block">\frac{1}{40} \times \frac{1}{39} \times \frac{1}{38} \times \frac{1}{37} = 0.0000454\%</math></p> <p>Nō reira, e kitea ana he tino iti te tūponotanga ka wini te tangata i te moni nui o tēnei kēmu.</p>
Whakamāramatia te kēmu ‘Kōwhiria kia 2 o roto i te 4’.	<p>Ko tā tātou mahi, he tūhura i tētahi kēmu tūponotanga e rite ana ki te ‘Lotto Strike’, engari he āhua ngāwari ake. E whā ngā tau, ko tāu mahi he kōwhiri kia rua. Ko te ingoa o tēnei kēmu ko te ‘Kōwhiria kia 2 o roto i te 4’.</p> <p>Ka tuhia ngā tau 1 ki te 4 ki runga kāri (tētahi tau ki ia kāri), ka rau atu ai ki rō pēke. E rua ngā tau ka tangohia matapōkerea i te pēke. Ko tāu, he matapae i ngā tau ka puta, me te raupapatanga hoki o aua tau (arā, ko tēhea te mea ka puta tuatahi mai, ko tēhea ka tuarua).</p>

	<p>Kāore he whiwhinga mēnā kāore e ōrite ana ū kōwhiringa ki ērā ka tangohia i te pēke.</p> <p>Hei tauira, ka kōwhiria e Waiora ko te 2 tana tau tuatahi, ko te 1 tana tau tuarua. Mēnā ko te 3 te mea ka tango tuatahitia, ko te 1 ka tango tuaruatia, e hia te whiwhinga a Waiora?</p> <p>E hē ana tana kōwhiringa tuatahi, e tika ana tana tuarua. Nō reira ko te 5 te whiwhinga.</p> <p>Mēnā ko te 1, kātahi ko te 2 ngā tau ka tangohia i te pēke, e hia te whiwhinga a Waiora?</p> <p>E hē ana ngā tau e rua (arā, te raupapa mai o ngā tau), nō reira kāore ana whiwhinga.</p> <p>Mēnā ko te 10 te whiwhinga, he aha ngā tau i tangohia i te pēke, me te raupapa anō o aua tau?</p> <p>Ko te 2 te tau tuatahi, kātahi ko te 1.</p>																																																		
Tukuna ngā ākonga kia tūhura i te kēmu, kia whakamātau i ngā putanga.	<p>Māu e kōwhiri ētahi tau e rua, ka tuhi ai ki te tūtohi. Whakamātauria kia tekau ngā tangohanga kāri i te pēke, ka tuhi ai i ngā tau ka puta me ngā whiwhinga ka riro i a koe mō ia tangohanga:</p> <table border="1" style="margin-top: 10px;"> <thead> <tr> <th></th><th>Tau tuatahi</th><th>Tau tuarua</th></tr> </thead> <tbody> <tr> <td>Taku kōwhiringa</td><td></td><td></td></tr> </tbody> </table> <table border="1" style="margin-top: 20px;"> <thead> <tr> <th>Tangohanga</th><th>Tau tuatahi</th><th>Tau tuarua</th><th>Whiwhinga</th></tr> </thead> <tbody> <tr><td>1</td><td></td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td><td></td></tr> <tr><td>3</td><td></td><td></td><td></td></tr> <tr><td>4</td><td></td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td><td></td></tr> <tr><td>6</td><td></td><td></td><td></td></tr> <tr><td>7</td><td></td><td></td><td></td></tr> <tr><td>8</td><td></td><td></td><td></td></tr> <tr><td>9</td><td></td><td></td><td></td></tr> <tr><td>10</td><td></td><td></td><td></td></tr> </tbody> </table> <p>E hia ngā tangohanga ko te 10 tō whiwhinga?  E hia ngā tangohanga ko te 5 tō whiwhinga?  E hia ngā tangohanga karekau ū whiwhinga?</p>		Tau tuatahi	Tau tuarua	Taku kōwhiringa			Tangohanga	Tau tuatahi	Tau tuarua	Whiwhinga	1				2				3				4				5				6				7				8				9				10			
	Tau tuatahi	Tau tuarua																																																	
Taku kōwhiringa																																																			
Tangohanga	Tau tuatahi	Tau tuarua	Whiwhinga																																																
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9																																																			
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Whakawhitihiti kōrero mō te ūrau o ia putanga me te whakamahi i ngā ūrau o tēnei whakamātau hei tūponotanga.

Tēnā, kia hurihia te maha o ngā putanga o ia whiwhinga hei ūrau. E rua ū whiwhinga i te 10, nō reira he aha tēnā hei ūrau?

E rua o roto i ngā tangohanga tekau. Ko te  $\frac{2}{10}$ , ko te 20% hei ūrau.

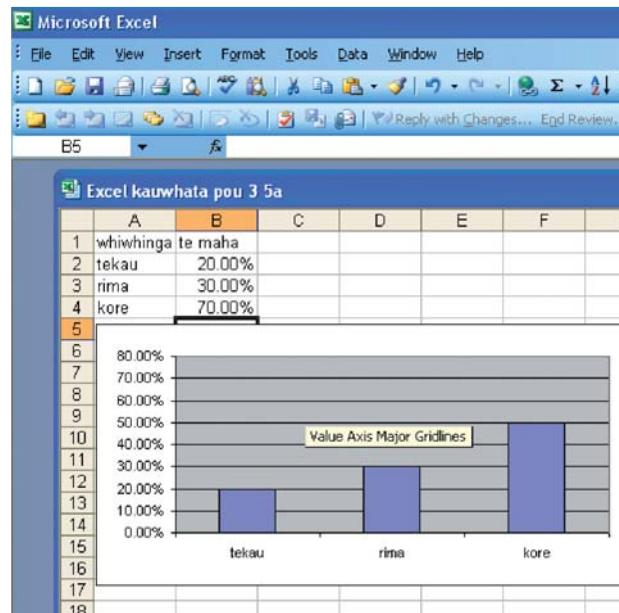
E toru ū whiwhinga i te 5. E hia ūrau tēnā?

E toru o roto i ngā tangohanga tekau – ko te 30% tērā.

E rima ngā tangohanga, karekau ū whiwhinga. E hia ūrau tērā?

Ko te 50%.

Whakaaturia te tuari o ngā whiwhinga nei ki tētahi kauwhata pou:



Nō reira, i runga i ngā raraunga kua kohia nei e koe i tēnei whakamātau, he aha te tūponotanga ka 10 te whiwhinga i tētahi tangohanga kāri?

Ko te 20% - koia te putanga o tēnei whakamātau.

He aha hoki ngā tūponotanga mō ērā atu o ngā whiwhinga? Ko te 30% mō te 5, ko te 50% mō te kore.

Ki ōu whakaaro, he tōtika ēnei tūponotanga?

Kāore pea, nā te mea he rerekē te tuari o aku whiwhinga ki te tuari o ngā whiwhinga a ētahi atu. Arā, he taurangirangi ngā putanga o tētahi whakamātau tūponotanga.

Aratakina ngā ākonga kia tātai i ngā tūponotanga o ia whiwhinga.

Me pēhea te tātai tōtika i ngā tūponotanga o ia putanga?

Me whakaatu ngā putanga me ngā tūponotanga ki tētahi hoahoa rākau.

He aha te tūponotanga ka 10 te whiwhinga i tētahi tangohanga?

Kia ūrite ngā tau me te raupapa mai o ngā tau ka tangohia i te pēke. Kotahi o roto i ngā putanga 12. Ko te 8.3% tērā.

Tangohanga tuatahi	Tangohanga tuaruua	Putanga	Tūponotanga
1	2 3 4	1, 2 1, 3 1, 4	$\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$
2	1 3 4	2, 1 2, 3 2, 4	$\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$
3	1 2 4	3, 1 3, 2 3, 4	$\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$
4	1 2 3	4, 1 4, 2 4, 3	$\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$

He aha te tūponotanga ka 5 te whiwhinga?

Kia ūrite tētahi o ngā tau me te raupapa mai o taua tau. Mēnā ko te 3 kātahi ko te 1 ngā tau ka kōwhiria, e miramira ana ngā whiwhinga o te 5 i te hoahoa rākau. →

Nō reira, e 4 o roto i te 12 ngā whiwhinga o te 5 ( $\frac{4}{12}$ ). Ko te 33.3% tērā.

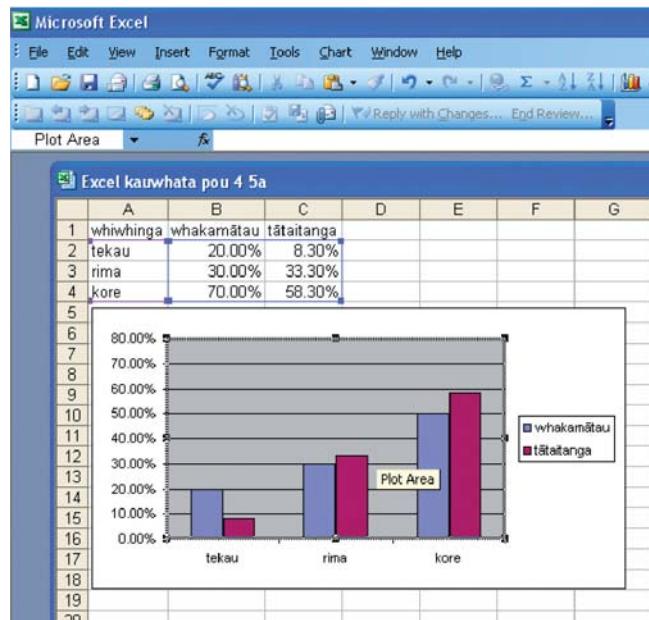
He aha te tūponotanga karekau he whiwhinga i tētahi tangohanga?

Ko te 7 o roto i te 12, arā, ko te 58.3% tērā.

Tangohanga tuatahi	Tangohanga tuaruua	Putanga	Tūponotanga
1	2 3 4	1, 2 1, 3 1, 4	$\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$
2	1 3 4	2, 1 2, 3 2, 4	$\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$
3	1 2 4	3, 1 3, 2 3, 4	$\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$
4	1 2 3	4, 1 4, 2 4, 3	$\frac{1}{12}$ $\frac{1}{12}$ $\frac{1}{12}$

Tonoa ngā ākonga kia whakaatu i ngā tātaitanga tūponotanga ki te taha o ngā tūponotanga i puta i te whakamātau hei kauwhata pou hiato. Whakawhitiwhiti kōrero mō te rerekē o ngā tūponotanga whakamātau me ngā tūponotanga tātai.

Whakamahia te ripanga rorohiko, ka whakaputa ai i tētahi kauwhata pou hei whakaatu i ngā tūponotanga tātai me ngā tūponotanga ka hua mai i tō whakamātau.



He aha i rerekē ai ngā tūponotanga o te whakamātau me ērā i tātaihia?

He taurangirangi ngā putanga o tētahi whakamātau. He waimarie mēnā ka ōrite ki ngā tūponotanga tātai. Engari e kitea ana i te kauwhata, kei te āhua rite, kāore i te tino rerekē. Arā, he ruarua ngā whiwhinga o te 10, he mahā ngā tāima karekau he whiwhinga, ā, ko te whiwhinga o te 5 kei waenganui.

Kia pērā anō te tūhura i tētahi atu kēmu tūponotanga e rite ana, pērā i te Kōwhiria kia 2 o roto i te 5 (arā, kia rima ngā kari, ko ngā tau 1-5).





## Wāhangā 4

# Ngā Whārangi Tārua\*

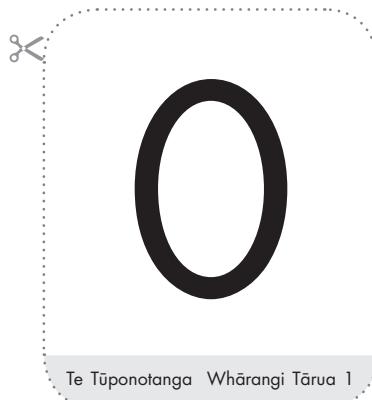


Koinei ngā Whārangi Tārua e hāngai ana ki ngā ngohe whakaako o roto i te Wāhangā 3 o tēnei pukapuka. Whakamahia he kutikuti hei tapahi i ngā rārangi iraira o ngā Whārangi Tārua.

\*Kei te pae ipurangi o [www.nzmaths.co.nz](http://www.nzmaths.co.nz) ēnei whārangi tārua hei tiki atu mā te pouako ina hiahiatia.

## Kāri Tau 0 – 16

Te Tūponotanga  
Whārangi Tārua 1



## Kīanga Tūponotanga 1

Te Tūponotanga  
Whārangi Tārua 2



Tērā pea ka ua āpōpō.

Ākene pea ka ua āpōpō.

Te Tūponotanga

Whārangi Tārua 2

Te Tūponotanga

Whārangi Tārua 2

E kore e ua āpōpō.

Ka ua āpōpō.

Te Tūponotanga

Whārangi Tārua 2

Te Tūponotanga

Whārangi Tārua 2

Kāore e kore ka ua āpōpō.

Ko wai ka mōhio mēnā  
ka ua āpōpō.

Te Tūponotanga

Whārangi Tārua 2

Te Tūponotanga

Whārangi Tārua 2

E kore pea e ua āpōpō.

Kāore e ua āpōpō.

Te Tūponotanga

Whārangi Tārua 2

Te Tūponotanga

Whārangi Tārua 2

Āe mārika, ka ua āpōpō.

Kāore pea e ua āpōpō.

Te Tūponotanga

Whārangi Tārua 2

Te Tūponotanga

Whārangi Tārua 2

Tino kore nei e ua āpōpō.

Taku mōhio ka ua āpōpō.

Te Tūponotanga

Whārangi Tārua 2

Te Tūponotanga

Whārangi Tārua 2

## Kīanga Tūponotanga 2

Te Tūponotanga  
Whārangi Tārua 3



Tērā pea ka ...

... ara mai te Rā āpōpō.

Te Tūponotanga

Whārangi Tārua 3

Te Tūponotanga

Whārangi Tārua 3

E kore e ...

... whiti te Rā ā te pō nei.

Te Tūponotanga

Whārangi Tārua 3

Te Tūponotanga

Whārangi Tārua 3

Kāore e kore ka ...

... wini i ahau te moni nui  
a Lotto.

Te Tūponotanga

Whārangi Tārua 3

Te Tūponotanga

Whārangi Tārua 3

E kore pea e ...

... tau te hukapapa āpōpō.

Te Tūponotanga

Whārangi Tārua 3

Te Tūponotanga

Whārangi Tārua 3

Āe mārika ka ...

... pupuhi te hau āpōpō.

Te Tūponotanga

Whārangi Tārua 3

Te Tūponotanga

Whārangi Tārua 3

Tino kore nei e ...

... mahana ake te rā āpōpō.

Te Tūponotanga

Whārangi Tārua 3

Te Tūponotanga

Whārangi Tārua 3



Ākene peā ka ...

... kai aihi kīrīmi  
au ā te ahiahi nei.

Te Tūponotanga

Whārangi Tārua 3

Te Tūponotanga

Whārangi Tārua 3

Ka ...

... toa taku tīma poiwhana  
ā te Rāhoroi.

Te Tūponotanga

Whārangi Tārua 3

Te Tūponotanga

Whārangi Tārua 3

Ko wai ka mōhio mēnā ka ...

... tū au hei Pirimia mō  
Aotearoa ā te tau 2020.

Te Tūponotanga

Whārangi Tārua 3

Te Tūponotanga

Whārangi Tārua 3

Kāore e ...

... haere mai au ki te kura  
mā runga motukā āpōpō

Te Tūponotanga

Whārangi Tārua 3

Te Tūponotanga

Whārangi Tārua 3

Kāore peā e ...

... haere mai au ki te kura  
mā runga hōihō āpōpō.

Te Tūponotanga

Whārangi Tārua 3

Te Tūponotanga

Whārangi Tārua 3

Taku mōhio ka ...

... haere au ki Ahitereiria ā te  
hararei kura e heke mai nei.

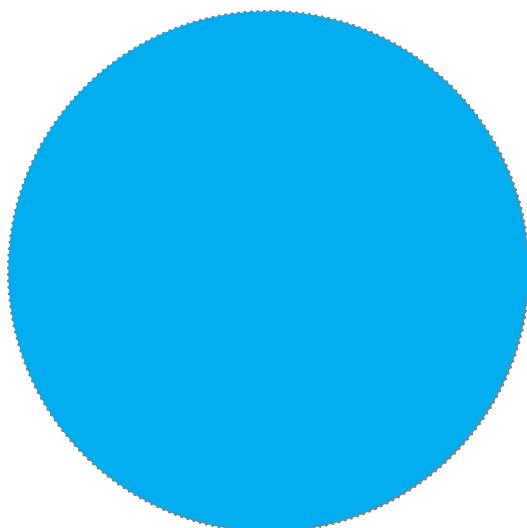
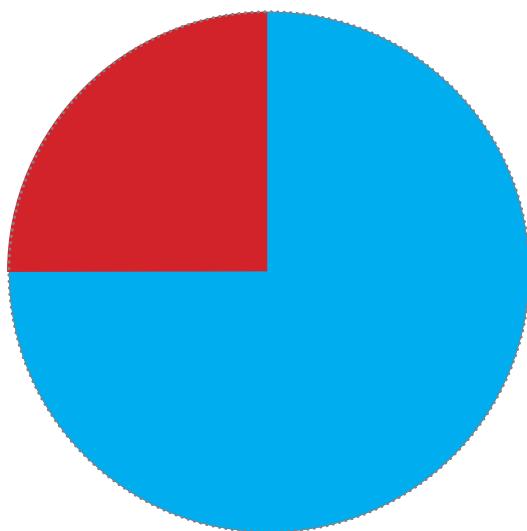
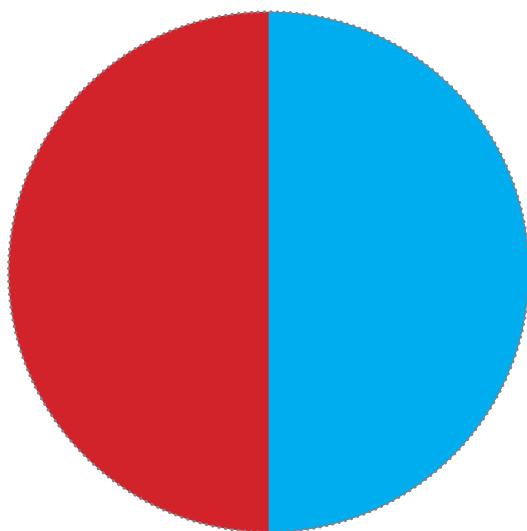
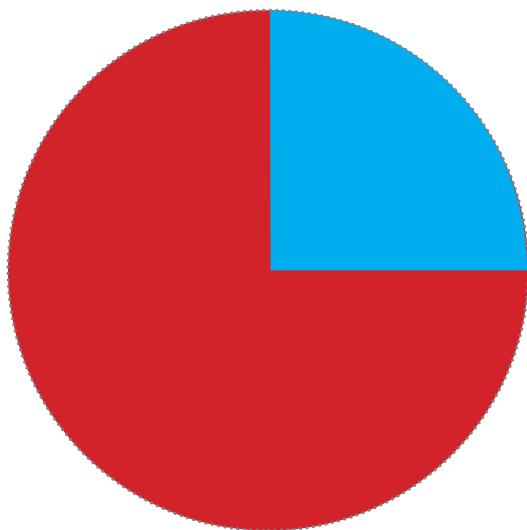
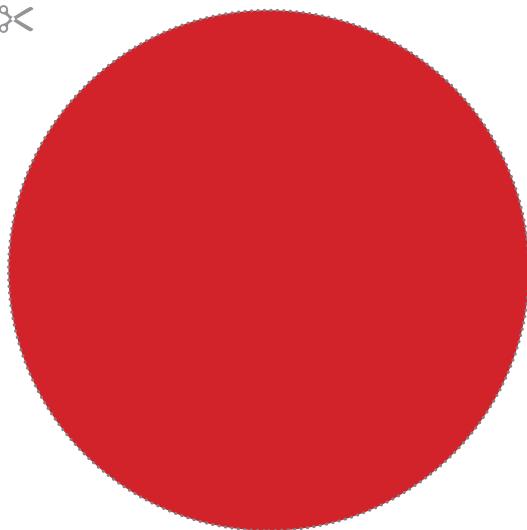
Te Tūponotanga

Whārangi Tārua 3

Te Tūponotanga

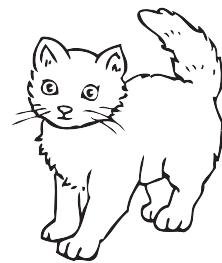
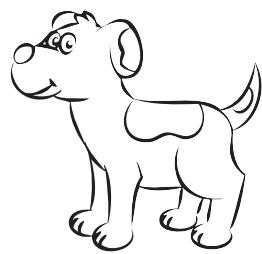
Whārangi Tārua 3

☒



# Kāri Kararehe

Te Tūponotanga  
Whārangi Tārua 5

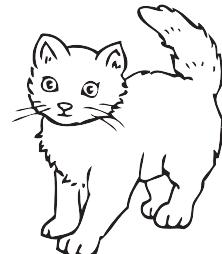


Te Tūponotanga

Whārangi Tārua 5

Te Tūponotanga

Whārangi Tārua 5

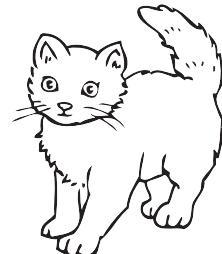


Te Tūponotanga

Whārangi Tārua 5

Te Tūponotanga

Whārangi Tārua 5

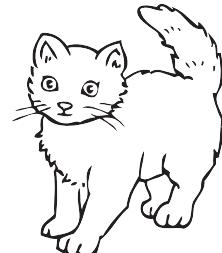
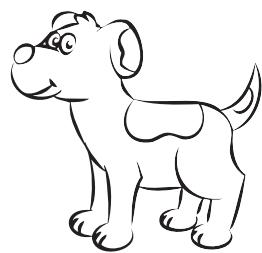


Te Tūponotanga

Whārangi Tārua 5

Te Tūponotanga

Whārangi Tārua 5

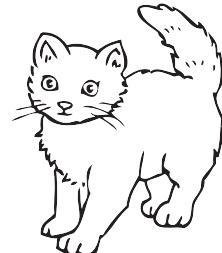
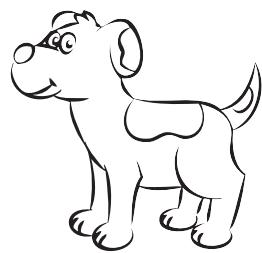


Te Tūponotanga

Whārangi Tārua 5

Te Tūponotanga

Whārangi Tārua 5



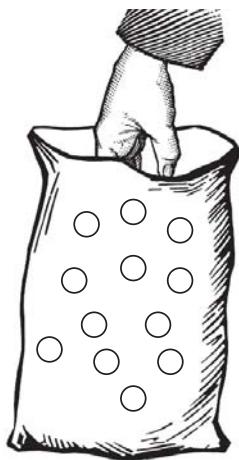
Te Tūponotanga

Whārangi Tārua 5

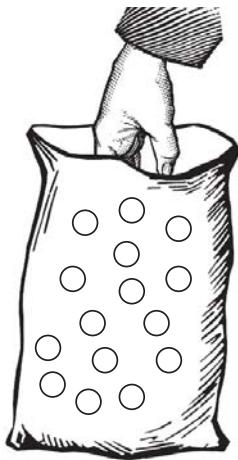
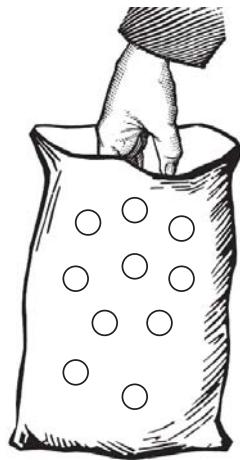
Te Tūponotanga

Whārangi Tārua 5

## Te tango porotiti whero

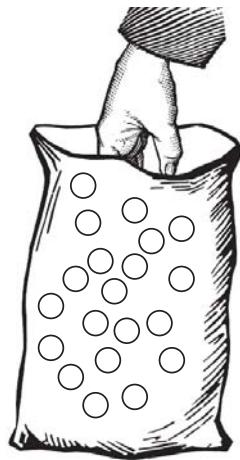


kore rawa āe mārika



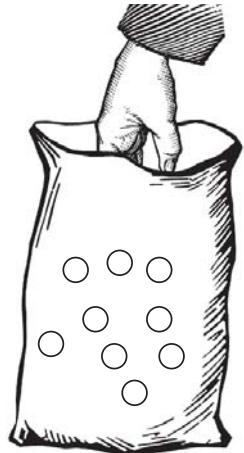
kore rawa āe mārika

## Te tango porotiti kahurangi



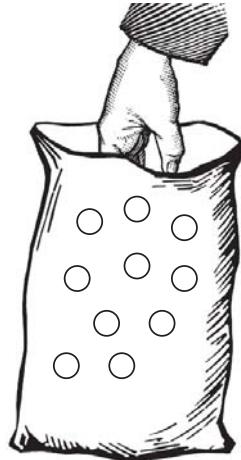
kore rawa āe mārika

Te tango porotiti whero



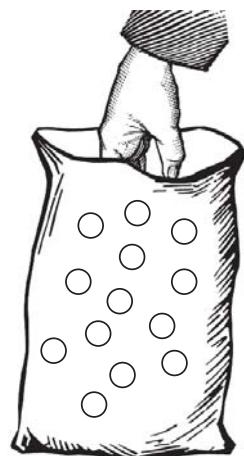
kore rawa āe mārika

## Te tango porotiti kōwhai



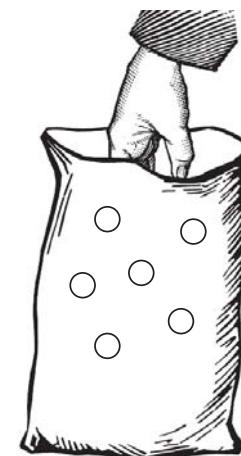
kore rawa āe mārika

## Te tango porotiti kākāriki

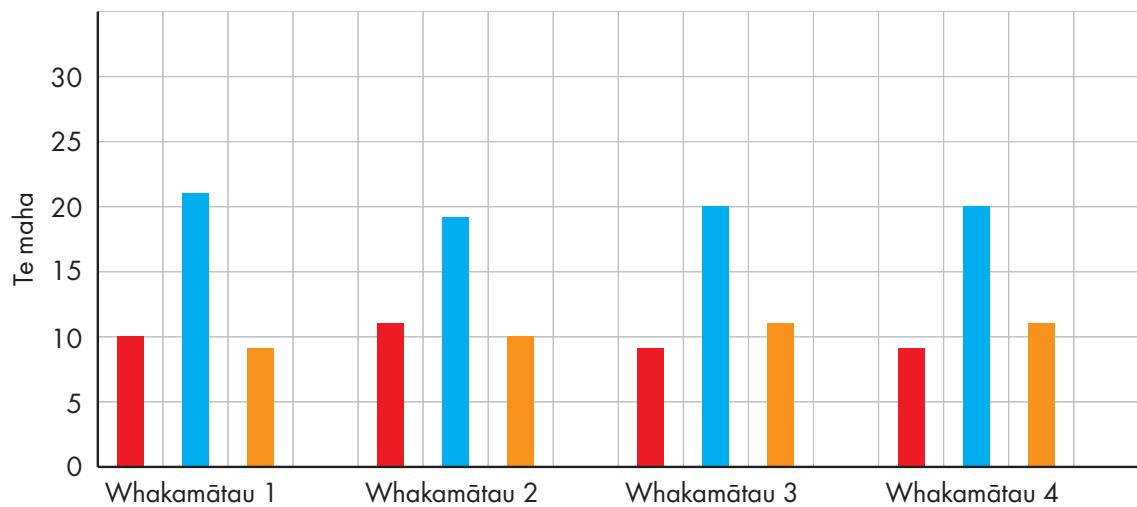
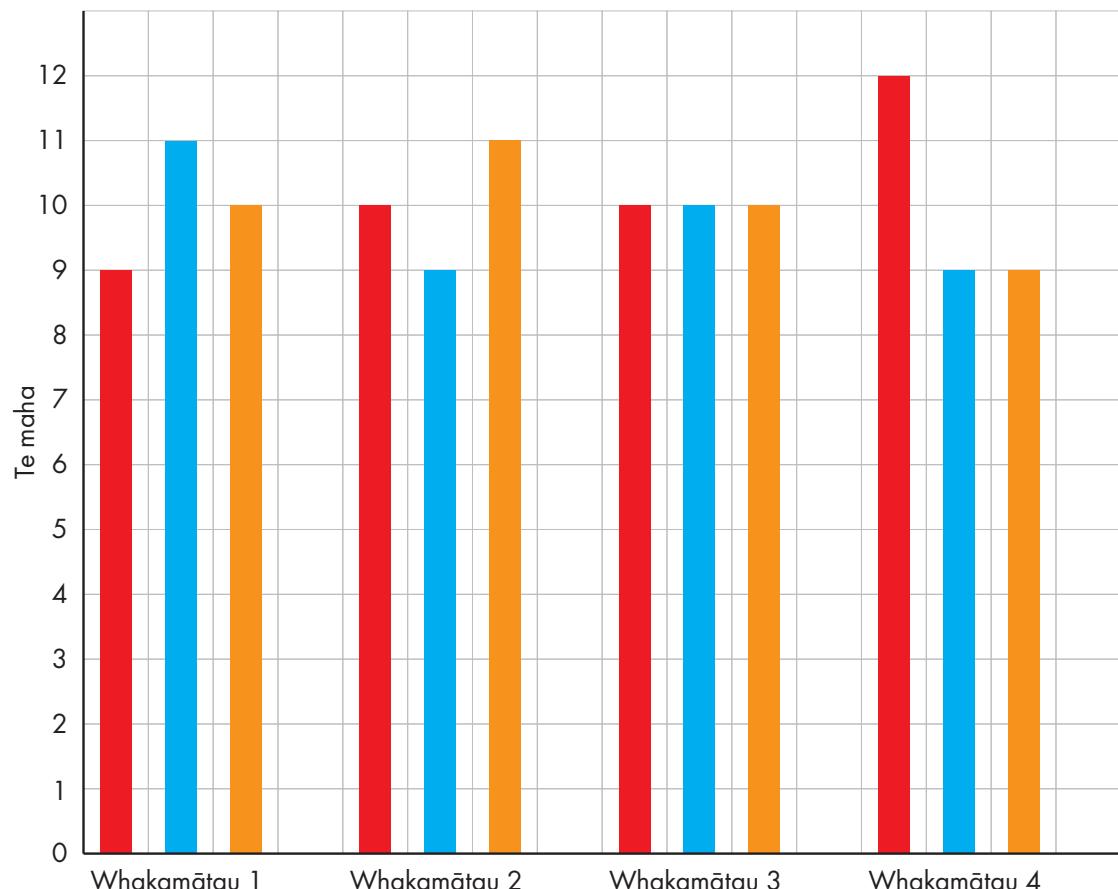


kore rawa āe mārika

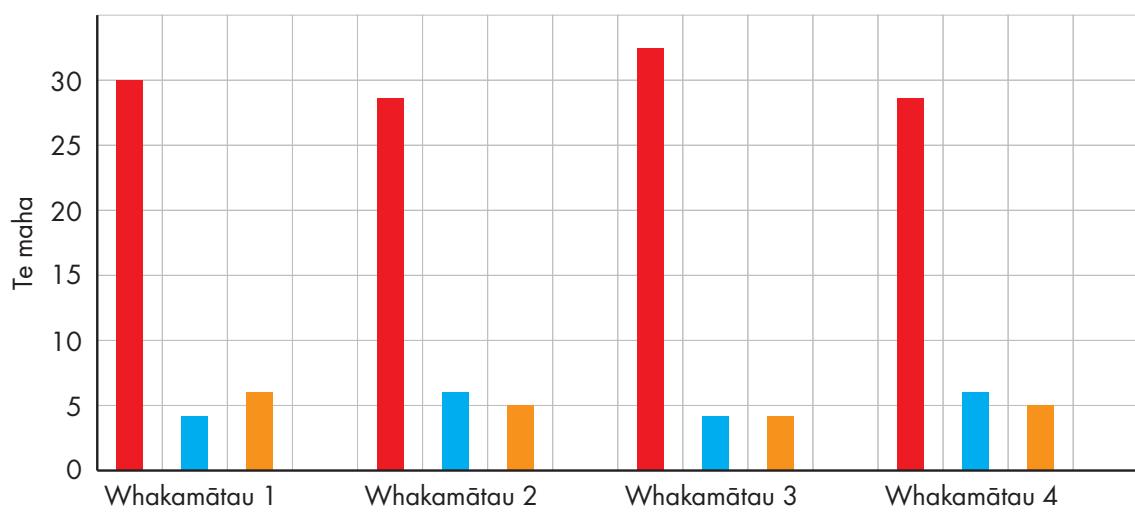
## Te tango porotiti kahurangi



kore rawa āe mārika

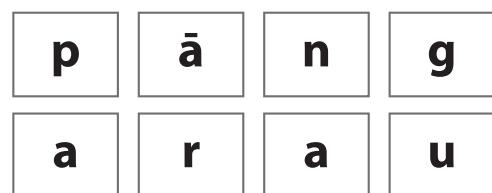


	whero	kahurangi	karako
Whakamātau 1			
Whakamātau 2			
Whakamātau 3			



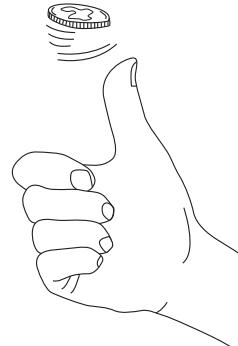
- Ka tuhia ngā pū o te kupu ‘pāngarau’ ki ētahi kāri.  
Ka kuhuna ēnei kāri ki tētahi pēke, ā, ka tangohia tētahi.

- a) He aha te tūponotanga ka tangohia te ‘p’?
- e) He aha te tūponotanga ka tangohia tētahi o ngā ‘a’?
- h) He aha te tūponotanga ka tangohia tētahi oropuare?
- i) He aha te tūponotanga ka tangohia he ‘k’?
- k) He aha te tūponotanga kāore e tangohia he pū e whai tohutō ana?
- m) Tuhia he rārangi tūponotanga hei whakaatu i ngā tūponotanga o ia pū.



- Ka piua tētahi uka.

- a) He aha te tūponotanga ka puta he upoko?
- e) He aha te tūponotanga kāore e puta he upoko?
- h) He aha te tūponotanga ka puta he upoko, he whiore rānei?
- i) He aha te tūponotanga kāore e puta he upoko, he whiore rānei?



- Ka pīroria tētahi mataono tau.

- a) E hia katoa ngā putanga e taea ana?
- e) He aha te tūponotanga ka puta he 6?
- h) He aha te tūponotanga ka puta he 1?
- i) He aha te tūponotanga ka puta he taukehe?
- k) He aha te tūponotanga ka puta he 7?
- m) He aha tētahi putanga e hāngai ana ki te tūponotanga  $\frac{1}{6}$ ?
- n) He aha te tūponotanga ka puta he 2, he 5 rānei?
- o) He aha te tūponotanga ka puta tētahi tau he iti ake i te 6?



- He whakamātau piu uka tēnei. Kei te pou mauī o te tūtohi e whakaaturia ana te maha o ngā piunga uka:

Te maha o ngā piunga uka	Te matapae i te maha o ngā upoko	Te whakamātau i te maha o ngā upoko
10		
20		
30		
40		
50		

- Matapaea te maha o ngā upoko tērā tonu pea ka puta, ka tuhi ai ki te tūtohi. Whakamāramatia mai tō matapae.
    - Whakamātauria. Kia 10 ngā piunga uka, ka tuhi ai i te maha o ngā upoko ki te tūtohi. Kia 20 ngā piunga uka, ka tuhi ai i te maha o ngā upoko, haere tonu, haere tonu.
    - He aha i rerekē ai ngā matapae me ngā whakamātau?
  - Ina pīrorihia he mataono tau, he aha te tūponotanga ka puta te 6?
    - Mēnā e 6 ngā pīroritanga mataono tau, e hia pea ngā ono ka puta?
    - Mēnā 12 ngā pīroritanga mataono tau, e hia pea ngā ono ka puta?
    - Whakamātauria te pīrori mataono tau, ka whakaoti ai i te tūtohi:
- | Te maha o ngā pīroritanga mataono tau | Te matapae i te maha o ngā 6 | Te whakamātau i te maha o ngā 6 |
|---------------------------------------|------------------------------|---------------------------------|
| 12                                    |                              |                                 |
| 18                                    |                              |                                 |
| 24                                    |                              |                                 |
| 36                                    |                              |                                 |
| 48                                    |                              |                                 |

- He aha i rerekē ai ngā matapae me ngā whakamātau?

3. Ka tuhia ngā oropuare poto o te reo Māori (a, e, i, o, u) ki te kāri (tētahi oropuare ki tētahi kāri), ka raua atu ai ki rō pouaka.

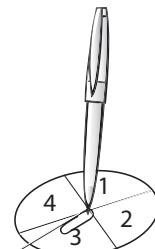
- a) Ka tangohia matapōkerea tētahi kāri. He aha te tūponotanga ka puta te ‘e’?
- e) Mēnā 10 ngā tangohanga o tētahi oropuare, he aha tō matapae mō te maha o ngā ‘e’ ka puta? Whakamātauria tāu i matapae ai.
- h) Whakaotia te tūtohi:

Te maha o ngā tangohanga oropuare	Te matapae i te maha o ngā ‘e’	Te whakamātau i te maha o ngā ‘e’
10		
20		
30		
40		
50		

- k) He aha i rerekē ai ngā matapae me ngā whakamātau?

4. Hangaia te pūrere takahurihuri nei.

- a) Ina takahurihia, he aha te tūponotanga ka tau ki te rohe o te toru?
- e) Whakaotia te tūtohi:



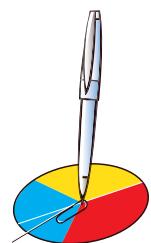
Te maha o ngā takahurihangā	Te matapae i te maha o ngā 3	Te whakamātau i te maha o ngā 3
12		
16		
20		
24		
28		

- h) He aha i rerekē ai ngā matapae me ngā whakamātau?

1. Ka pīroria ētahi mataono tau e rua, ka tāpiria ngā tau ka puta.
  - a) Tuhia he hoahoa rākau hei whakaatu i ngā putanga e taea ana me ngā tūponotanga o ia putanga.
  - e) He aha ngā putanga whakamutunga e taea ana?
  - h) He ūrite, he rerekē rānei te tūponotanga o ia putanga whakamutunga?
  - i) He aha te tūponotanga o te 2?
  - k) He aha te tūponotanga o te 12?
  - m) He aha te tūponotanga o te 6?
  - n) He aha te putanga he nui rawa atu te tūponotanga?
  - o) He aha te tūponotanga o tētahi taurua?
  - p) He ūrite, he rerekē rānei te tūponotanga o te taurua me te taukehe?
  - r) Whakahaerehia tēnei whakamātau tūponotanga, kia 48 ngā pīroritanga o ētahi mataono tau e rua. Tuhia ngā matapae me ngā putanga whakamātau ki te tūtohi:

Putanga	2	3	4	5	6	7	8	9	10	11	12
Tūponotanga											
Matapae (48)											
Whakamātau (48)											

- t) He aha i rerekē ai ētahi o ngā matapae me ētahi o ngā putanga whakamātau?
2. E rua ngā takahurihangā o te pūrere takahurihuri nei.
    - a) Tuhia he hoahoa rākau hei whakaatu i ngā putanga whakamutunga e taea ana me ngā tūponotanga o ia putanga.
    - e) He aha ngā putanga whakamutunga e taea ana?
    - h) He ūrite, he rerekē rānei te tūponotanga o ia putanga whakamutunga?
    - i) He aha te tūponotanga o ētahi whero e rua?



- k) He aha te tūponotanga o tētahi whero me tētahi kahurangi?
- m) He aha te tūponotanga kāore he taunga ki te rohe whero?
- n) He aha tētahi putanga ko te  $\frac{2}{9}$  te tūponotanga?
- o) Whakahaerehia tēnei whakamātau tūponotanga, kia 54 ngā takahurihanga e rua o tēnei pūrere takahurihuri. Tuhia ngā matapae me ngā putanga whakamātau ki te tūtohi:

Putanga	whero whero	whero kahurangi	whero kōwhai	kahurangi kahurangi	kahurangi kōwhai	kōwhai kōwhai
Tūponotanga						
Matapae (54)						
Whakamātau (54)						

- t) He aha i rerekē ai ētahi o ngā matapae me ētahi o ngā putanga whakamātau?
3. E rua ngā pīroritanga mataono tau. Ka tangohia te tau iti i te tau nui.
- a) Tuhia he hoahoa rākau hei whakaatu i ngā putanga e taea ana me ngā tūponotanga o ia putanga.
- e) He aha ngā putanga whakamutunga e taea ana?
- h) He ūrite, he rerekē rānei te tūponotanga o ia putanga whakamutunga?
- i) He aha te tūponotanga o te rua?
- k) He aha te tūponotanga o te toru?
- m) He aha te tūponotanga o te rua, o te toru rānei?
- n) He aha te putanga he nui rawa atu te tūponotanga?
- n) He aha te putanga ko te  $\frac{6}{36}$  ( $\frac{1}{6}$ ) te tūponotanga?
- o) Whakahaerehia tēnei whakamātau tūponotanga, kia 72 ngā pīroritanga o ngā mataono tau e rua. Tuhia ngā matapae me ngā putanga whakamātau ki te tūtohi:

Putanga	0	1	2	3	4	5
Tūponotanga						
Matapae (72)						
Whakamātau (72)						

- t) He aha i rerekē ai ētahi o ngā matapae me ētahi o ngā putanga whakamātau?



## Te Kuputaka



## Māori → Ingarihi

<b>auau</b>	frequency
<b>āwhata</b>	scale (for measurement) ( <i>takenga mai</i> : arawhata – ladder)
<b>hangarite</b>	symmetrical, symmetry ( <i>takenga mai</i> : hanga – shape; rite – alike, corresponding)
<b>haukume</b>	bias, biased ( <i>takenga mai</i> : haukume – pull)
<b>hautau, hautanga</b>	fraction, proportion (part of a whole) ( <i>takenga mai</i> : hau – parts, fraction; tau – number)
<b>hoahoa rākau</b>	tree diagram ( <i>kupu kē atu</i> : hoahoa mangarau)
<b>horahanga</b>	area ( <i>takenga mai</i> : hora – spread out)
<b>hora raraunga</b>	spread of data
<b>huinga raraunga</b>	dataset
<b>kauwhata</b>	graph ( <i>takenga mai</i> : kauwhata – stage or frame)
<b>kauwhata porowhita</b>	pie graph, circle graph
<b>kauwhata pou</b>	bar graph
<b>kauwhata pou hiatō</b>	composite bar graph ( <i>takenga mai</i> : kauwhata pou – bar graph; hiatō – be gathered together)
<b>manei ~tanga</b>	fluctuate, fluctuation ( <i>takenga mai</i> : manei – waver, vacillate <i>kupu kē atu</i> : mānenei)
<b>mataono tau</b>	dice
<b>matapae ~hia</b>	predict
<b>matapōkere</b>	random ( <i>takenga mai</i> : matapōkere – blindly, at random, in the dark <i>kupu kē atu</i> : kapo noa, tupurangi)
<b>ōrau</b>	percent ( <i>takenga mai</i> : ō – of, belonging to; rau – hundred <i>kupu kē atu</i> : pahiñeti)
<b>ōwehenga</b>	ratio ( <i>takenga mai</i> : ō – of, belonging to; wehe – detach, divide)
<b>pae ipurangi</b>	website
<b>pāngā</b>	function, relation ( <i>takenga mai</i> : pā – connected with <i>kupu kē atu</i> : hononga)
<b>papa-maha</b>	multi-level
<b>papatono (rorohiko)</b>	program (computer)
<b>pāpono</b>	event (probability) ( <i>takenga mai</i> : pā – connected with; pono [tūponotanga – probability])
<b>pāpono aukati</b>	mutually exclusive event
<b>pāpono haukume</b>	biased event
<b>pāpono matapōkere</b>	random event
<b>pāpono raupapa</b>	combined event
<b>pāpono tōkeke</b>	fair event
<b>pāpono wehe kē</b>	independent event
<b>pāpono whakawhirinaki</b>	dependent event
<b>pāwhiri ~a (kiore rorohiko)</b>	click (computer mouse) ( <i>takenga mai</i> : pā – touch; kōwhiri – select, choose)

<b>porotiti</b>	counter ( <i>takenga mai</i> : porotiti – disc)
<b>pūāhua</b>	situation
<b>pūāhua tūponotanga</b>	probability situation
<b>pūāhua tūturu</b>	real situation
<b>pūāhua whakatau</b>	simulation
<b>pūkei kāri</b>	pack of cards ( <i>kupu kē atu</i> : pūranga kāri)
<b>pūrere takahurihuri</b>	spinner
<b>putanga</b>	outcome ( <i>takenga mai</i> : puta – come forth, come out <i>kupu kē atu</i> : hua, otinga)
<b>putanga matapōkere</b>	random outcome
<b>putanga tātai</b>	theoretical outcome
<b>putanga wehe kē</b>	independent outcome
<b>putanga whakamātau</b>	experimental outcome
<b>putanga whakawhirinaki</b>	dependent outcome
<b>rāpoi</b>	cluster ( <i>takenga mai</i> : rāpoi – swarm, cluster, assemble)
<b>rārangī hautau</b>	fraction line
<b>rārangī tau</b>	number line
<b>rārangī tūponotanga</b>	probability line
<b>raraunga</b>	data ( <i>takenga mai</i> : rarau – lay hold of)
<b>raupapa ~hia</b>	order, sequence
<b>rautaki</b>	strategy
<b>ripanga</b>	spreadsheet ( <i>takenga mai</i> : ripa – row, rank, line)
<b>ripanga rorohiko</b>	computer spreadsheet
<b>tāiringa kōrero</b>	conjecture ( <i>takenga mai</i> : tāiri – be suspended; kōrero – talk)
<b>tāpae ~tanga kōrero</b>	assert, assertion ( <i>takenga mai</i> : tāpae – place before a person, present; kōrero – talk)
<b>tapeke</b>	score (result of a game), sum, total
<b>tārima ~hia</b>	tally in fives ( <i>takenga mai</i> : tā – print; rima – five)
<b>tātai ~hia ~tanga</b>	calculate, calculation ( <i>takenga mai</i> : tātai – arrange, set in order; measure)
<b>tau matapōkere</b>	random number
<b>taurangitanga</b>	variability, variation
<b>tautohu ~a</b>	identify
<b>tauwhata</b>	point on a scale ( <i>takenga mai</i> : tau – number; whata [āwhata] – scale)
<b>tīpako ~na ~nga</b>	sample, select, selection ( <i>takenga mai</i> : tīpako – pick out, select)
<b>tītaha</b>	skewed ( <i>takenga mai</i> : tītaha – lean to one side, slant)
<b>tōkeke</b>	fair, unbiased ( <i>takenga mai</i> : tōkeke – just, impartial)

<b>tuari</b>	distribution
<b>tuari hangarite</b>	normal distribution
<b>tuari titaha</b>	skewed distribution
<b>tūhura ~tanga</b>	investigate, investigation
<b>tukutuku</b>	grid
<b>tūponotanga</b>	probability, chance ( <i>takenga mai</i> : tūpono – chance to hit)
<b>tūponotanga tātai</b>	theoretical probability
<b>tūponotanga whakamātau</b>	experimental probability
<b>tūtohi</b>	chart, table (of data) ( <i>takenga mai</i> : tūtohi – point out, indicate <i>kupu kē atu</i> : papa raraunga)
<b>tūtohi auau</b>	frequency table
<b>tūtohi tatau</b>	tally chart
<b>tūwehe</b>	odds ( <i>takenga mai</i> : tū [tūponotanga] – chance, probability; wehe [ōwehangā] – ratio)
<b>uka</b>	coin ( <i>kupu kē atu</i> : kapa)
<b>wehe kē</b>	independent
<b>whakaari raraunga</b>	data display ( <i>kupu kē atu</i> : whakaaturanga raraunga)
<b>whakaaro arorau</b>	logical reasoning
<b>whakamāori ~tia</b>	interpret
<b>whakamātau ~ria</b>	test, trial, experiment
<b>whakamātau tūponotanga</b>	probability experiment
<b>whakatairite ~a</b>	compare ( <i>kupu kē atu</i> : whakataurite ~a)
<b>whakawhirinaki</b>	dependent
<b>whārangī tārua</b>	blackline master, copymaster
<b>whārite</b>	equation ( <i>takenga mai</i> : whārite – balance by an equivalent)
<b>whiriwhiringa raupapa</b>	permutation ( <i>takenga mai</i> : whiriwhiri – select, choose; raupapa – sequence)
<b>whiriwhiringa raupapa-kore</b>	combination ( <i>takenga mai</i> : whiriwhiri – select, choose; raupapa – sequence; kore – not, negative)
<b>whiwhinga</b>	point (in a game)

## Ingarihi → Māori

area	<b>horahanga</b>
assert, assertion	<b>tāpae ~tanga kōrero</b> ( <i>takenga mai</i> : tāpae – place before a person, present; kōrero – talk)
bar graph	<b>kauwhata pou</b>
bias, biased	<b>haukume</b> ( <i>takenga mai</i> : haukume – pull)
biased event	<b>pāpono haukume</b>
calculate, calculation	<b>tātai ~hia ~tanga</b> ( <i>takenga mai</i> : tātai – arrange, set in order, measure)
chart	<b>tūtohi</b> ( <i>takenga mai</i> : tūtohi – point out, indicate <i>kupu kē atu</i> : papa raraunga)
click (computer mouse)	<b>pāwhiri ~a</b> ( <i>kiore rorohiko</i> ) ( <i>takenga mai</i> : pā – touch; kōwhiri – select, choose)
cluster	<b>rāpoi</b> ( <i>takenga mai</i> : rāpoi – swarm, cluster, assemble)
coin	<b>uka</b> ( <i>kupu kē atu</i> : kapa)
combination	<b>whiriwhiringa raupapa-kore</b> ( <i>takenga mai</i> : whiriwhiri – select, choose; raupapa – sequence; kore – not, negative)
combined event	<b>pāpono raupapa</b>
compare	<b>whakatairite ~a</b> ( <i>kupu kē atu</i> : whakataurite ~a)
composite bar graph	<b>kauwhata pou hiato</b> ( <i>takenga mai</i> : kauwhata pou – bar graph; hiato – be gathered together)
computer spreadsheet	<b>ripanga rorohiko</b>
conjecture	<b>tāiringa kōrero</b> ( <i>takenga mai</i> : tāiri – be suspended; kōrero – talk)
copymaster	<b>whārangī tārua</b> ( <i>takenga mai</i> : whārite – balance by an equivalent)
counter	<b>porotiti</b> ( <i>takenga mai</i> : porotiti – disc)
data	<b>raraunga</b> ( <i>takenga mai</i> : raraū – lay hold of)
data display	<b>whakaari raraunga</b> ( <i>kupu kē atu</i> : whakaaturanga raraunga)
dataset	<b>huinga raraunga</b>
dependent	<b>whakawhirinaki</b>
dependent event	<b>pāpono whakawhirinaki</b>
dependent outcome	<b>putanga whakawhirinaki</b>
dice	<b>mataono tau</b>
distribution	<b>tuari</b>
equation	<b>whārite</b>
event (probability)	<b>pāpono</b> ( <i>takenga mai</i> : pā – connected with; pono [tūponotanga] – probability)
experiment	<b>whakamātau</b>
experimental outcome	<b>putanga whakamātau</b>
experimental probability	<b>tūponotanga whakamātau</b>
fair event	<b>pāpono tōkeke</b>

fair, unbiased	<b>tōkeke</b> ( <i>takenga mai</i> : tōkeke – just, impartial)
fluctuate, fluctuation	<b>manei ~tanga</b> ( <i>takenga mai</i> : manei – waver, vacillate <i>kupu kē atu</i> : mānenei)
fraction line	<b>rārangi hautau</b>
fraction, proportion (part of	<b>hautau, hautanga</b> ( <i>takenga mai</i> : hau – parts, fraction; tau – number)
frequency	<b>auau</b>
frequency table	<b>tūtohi auau</b>
function, relation	<b>pānga</b> ( <i>takenga mai</i> : pā – connected with <i>kupu kē atu</i> : hononga)
graph	<b>kauwhata</b> ( <i>takenga mai</i> : kauwhata – stage or frame)
grid	<b>tukutuku</b>
identify	<b>tautohu ~a</b>
independent	<b>wehe kē</b>
independent event	<b>pāpono wehe kē</b>
independent outcome	<b>putanga wehe kē</b>
interpret	<b>whakamāori ~tia</b>
investigate, investigation	<b>tūhura ~tanga</b>
logical reasoning	<b>whakaaro arorau</b>
multi-level	<b>papa-maha</b>
mutually exclusive event	<b>pāpono aukati</b>
normal distribution	<b>tuari hangarite</b>
number line	<b>rārangi tau</b>
odds	<b>tūwehe</b> ( <i>takenga mai</i> : tū [tūponotanga] – chance, probability; wehe [ōwehangā] – ratio)
order, sequence	<b>raupapa ~hia</b>
outcome	<b>putanga</b> ( <i>takenga mai</i> : puta – come forth, come out <i>kupu kē atu</i> : hua, otinga)
pack of cards	<b>pūkei kāri</b> ( <i>kupu kē atu</i> : pūranga kāri)
percent	<b>ōrau</b> ( <i>takenga mai</i> : ō – of, belonging to; rau – hundred <i>kupu kē atu</i> : pahiñeti)
permutation	<b>whiriwhiringa raupapa</b> ( <i>takenga mai</i> : whiriwhiri – select, choose; raupapa – sequence)
pie graph	<b>kauwhata porowhita</b>
point (in a game)	<b>whiwhinga</b>
point on a scale	<b>tauwhata</b> ( <i>takenga mai</i> : tau – number; whata [āwhata] – scale)
predict	<b>matapae ~hia</b>
probability, chance	<b>tūponotanga</b> ( <i>takenga mai</i> : tūpono – chance to hit)
probability experiment	<b>whakamātau tūponotanga</b>
probability line	<b>rārangi tūponotanga</b>
probability situation	<b>pūāhua tūponotanga</b>

program (computer)	<b>papatono</b> (rorohiko)
random	<b>matapōkere</b> ( <i>takenga mai</i> : matapōkere – blindly, at random, in the dark <i>kupu kē atu</i> : kapo noa, tupurangi)
random event	<b>pāpono matapōkere</b>
random number	<b>tau matapōkere</b>
random outcome	<b>putanga matapōkere</b>
ratio	<b>ōwehenga</b> ( <i>takenga mai</i> : ō – of, belonging to; wehe – detach, divide)
real situation	<b>pūāhua tūturu</b>
relation, function	<b>pāngā</b> ( <i>takenga mai</i> : pā – connected with <i>kupu kē atu</i> : hononga)
sample	<b>tīpako ~na ~nga</b> ( <i>takenga mai</i> : tīpako – pick out, select)
scale (for measurement)	<b>āwhata</b> ( <i>takenga mai</i> : arawhata – ladder)
score (result of a game)	<b>tapeke</b> ( <i>takenga mai</i> : tā – print; rima – five)
select, selection	<b>tīpako ~na ~nga</b> ( <i>takenga mai</i> : tīpako – pick out, select)
simulation	<b>pūāhua whakatau</b>
situation	<b>pūāhua</b>
skewed	<b>tītaha</b> ( <i>takenga mai</i> : tītaha – lean to one side, slant)
skewed distribution	<b>tuari tītaha</b>
spinner	<b>pūrere takahurihuri</b>
spread of data	<b>hora raraunga</b> ( <i>takenga mai</i> : hora – spread out)
spreadsheet	<b>ripanga</b> ( <i>takenga mai</i> : ripa – row, rank, line)
strategy	<b>rautaki</b>
symmetrical, symmetry	<b>hangarite</b> ( <i>takenga mai</i> : hanga – shape; rite – alike, corresponding)
table (of data)	<b>tūtohi</b> ( <i>takenga mai</i> : tūtohi – point out, indicate <i>kupu kē atu</i> : papa raraunga)
tally chart	<b>tūtohi tatau</b>
tally in fives	<b>tārima ~hia</b>
test, trial, experiment	<b>whakamātau ~ria</b>
theoretical outcome	<b>putanga tātai</b>
theoretical probability	<b>tūponotanga tātai</b>
total	<b>tapeke</b> ( <i>takenga mai</i> : tā – print; rima – five)
tree diagram	<b>hoahoā rākau</b> ( <i>kupu kē atu</i> : hoahoā mangarau)
unbiased, fair	<b>tōkeke</b> ( <i>takenga mai</i> : tōkeke – just, impartial)
variability, variation	<b>taurangitanga</b>
website	<b>pae ipurangi</b>









