



TE TĀHUHU O TE MĀTAURANGA
Ministry of Education

Hei Tautoko i te Marautanga Pāngarau

Te Hangā



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

Ngā rauemi o <http://www.nzmaths.co.nz>

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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Nā Te Tāhuhu o te Mātauranga ngā huruhuru tautoko hei whakaputa mā He Kupenga Hao i te Reo i tēnei pukapuka.
Kua rāhuitia ngā motika katoa kia āta whakaetia rā anō e te hunga kei a ia te mana tārua.



Pouaka Poutāpetā 5301, Papaioea 4441

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Wāhangā 1

Ngā Kōrero Whānui



He Kupu Whakataki

Ko te kaupapa ia o tēnei pukapuka ko te āta whakaatu i ngā huatau matua o tēnei mea te hanga me ngā whanaketanga ako, e eke ai ā tātou ākonga i ngā taumata o tēnei wāhangā o te pāngarau. 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 Tau¹ me ngā Whanaketanga Pāngarau².

main ideas

Number Framework

He mea nui tonu te hanga, arā, ngā momo āhua ahu-2, ahu-3 hoki i roto i tō tātou ao. Ahakoa huri ki hea, kitea ai ngā momo hanga i te ao māori (pērā i te āhua o ngā momo rau rākau), i ngā waihangatanga hoki a te tangata (pērā i ngā tauira tukutuku a te Māori).

2-dimensional shapes

He pakari te whakaaro ataata o ētahi o tātou (tae atu hoki ki ā tātou ākonga), he pakari ake pea i te whakaaro tau. Nō reira ko te hanga tētahi kūaha hei whakaurunga atu mā ētahi ki te ao pāngarau me ūna mātauranga mīharo. He nui ngā akoranga ā-ringa e mātau haere ai te ākonga ki ngā hautau o tēnei mea te hanga. He maha hoki ngā tūhononga ki wāhangā ako kē, pērā i te toi, te whakairoiro me te hangarau.

visual perception

graphics

¹ Tirohia: *Tē Poutama Tau, Pukapuka Tuatahi. Tē Mahere Tau*. Papaioea: He Kupenga Hao i te Reo (2011).

² Tirohia: *Whanaketanga Pāngarau: He aratohu mā te pouako*. Te Whanganui-a-Tara: Tē Tāhuhu o te Mātauranga (2010).

He nui ngā akoranga ka hua mai i te tākaro noa a te tamaiti, e pakari ai ūna whakaaro āhuahanga. Hei tauira o ēnei momo tākaro, ko ngā momo poraka hangahanga pērā i te LEGO me ētahi atu, me ngā momo hanganga e taea ana ki ēnei poraka. Mā konei e mārama haere ai te tamaiti ki ngā momo āhua me ū rātou āhuatanga, pērā i te tapa, te rahi, te koki, te kokonga me ētahi atu.

geometric reasoning

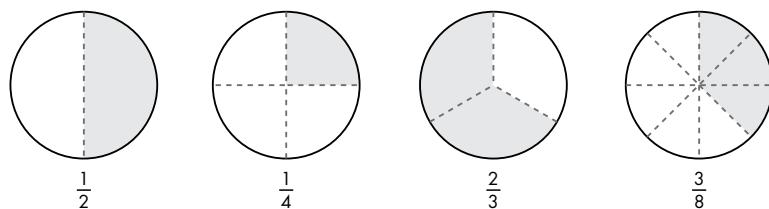
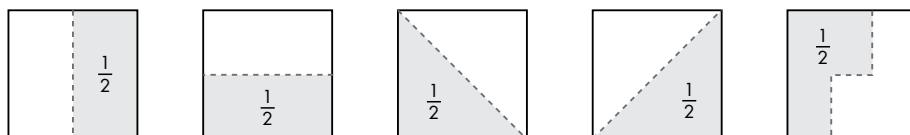


He maha ngā hononga o te hanga ki ērā atu whenu o te marautanga pāngarau. E whai ake nei ētahi tauira.

Te Tau

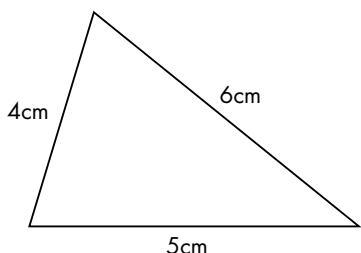
Ko te wāwāhi āhua hei whakatauira i ngā hautau:

partition shapes

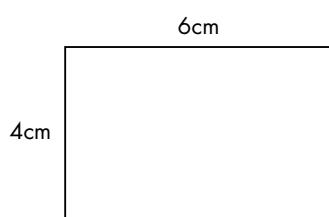


Ko te tātai i te paenga o ngā āhua:

perimeter

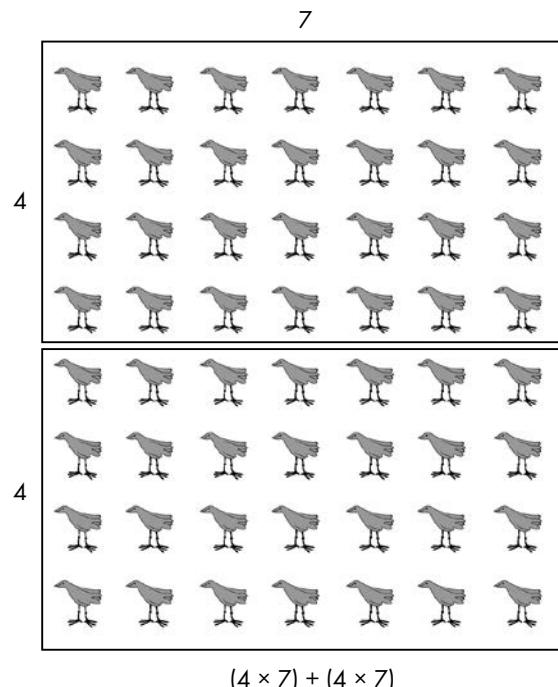
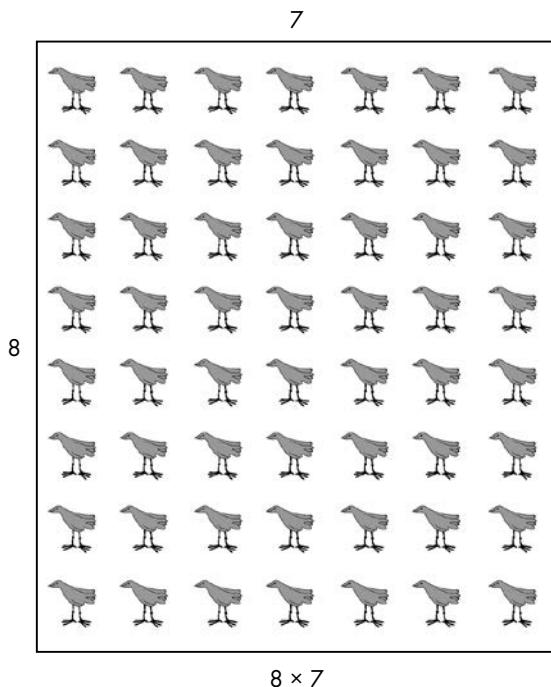


$$\begin{aligned} P &= 4 + 5 + 6 \\ &= 10 + 5 \\ &= 15\text{cm} \end{aligned}$$



$$\begin{aligned} P &= (6 + 4) \times 2 \\ &= 20\text{cm} \end{aligned}$$

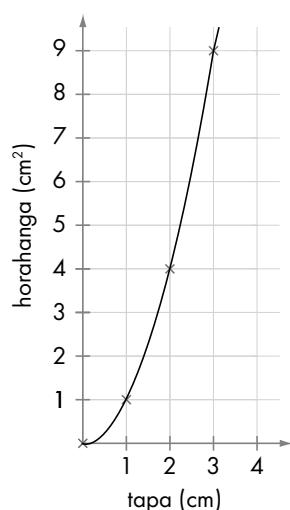
Ko te tātai horahanga o tētahi tapawhā hāngai hei whakatauira i te whakareatanga:



Te Taurangi

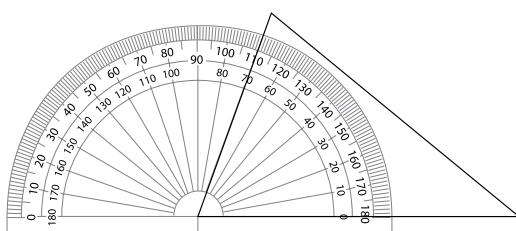
Ko te pānga kei waenganui i ngā tapa me te horahanga o tētahi tapawhā rite:

tapa (cm)	1	2	3	4	t	\sqrt{h}
horahanga (cm ²)	1	4	9	16	t^2	h



Te Ine

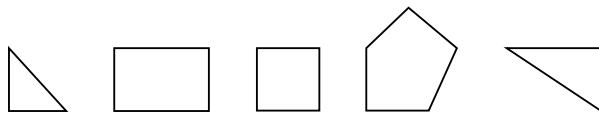
Ko te ine i ngā koki o ētahi tapatoru kia kitea ai ko te 180° te tapeke o ngā koki, ahakoa te āhua o te tapotoru.



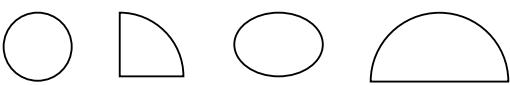
Te Tauanga

Ko te whakarōpū i ngā momo āhua me te whakamārama i ngā rōpū:

He āhua whai koki hāngai:



He āhua whai tapa kōpiko:



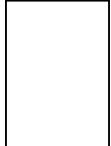
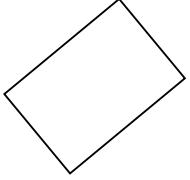
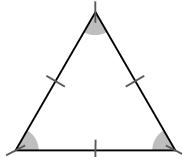
E toru ngā tapa:



Ngā Huatau Matua o te Hanga

Ko Pierre rāua ko Diana van Hiele ētahi kairangahau pāngarau, he Tatimana, nā rāua ngā huatau matua o te whakaako āhuahanga i tūhura, i rangahau i tērā rautau. Ko ā rāua whakakitenga hei tūāpapa mō te whakaako āhuahanga, ā, e whāia whānuitia ana puta noa i te ao³. E whai ake nei he whakarāpopototanga mō tā rāua raupapatanga ako i tēnei mea te āhuahanga:

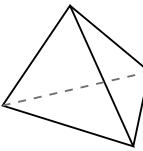
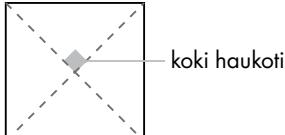
main idea
foundation
learning sequence

Raupapatanga Ako	Whakamārama	
0 Ataata Pitomata Pre-Recognition	<p>Ka <u>tautohu</u> i ētahi āhua māmā, engari kāore e aro ki te hanga o ngā āhua. Ka kite noa iho i ētahi āhuatanga māmā, pēnā he kōpiko, he torotika rānei ngā tapa. Kāore pea e wehewehe i te tapawhā i te tapatoru.</p>	identify
1 Tautohu Ataata Visual	<p>Ka aro ki ngā rerekētanga whānui o ngā āhua, engari kāore e arohia ngā <u>āhuatanga āhuahanga</u>, pēnei i te rahi o ngā <u>koki roto</u>. Ka honoa te hanga o ngā āhua ki ētahi āhuatanga o te taiao. Hei tauira, ki ētahi, he rerekē te āhua mēnā he tītaha, he huripoki rānei te noho o taua āhua:</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>He tapawhā hāngai tēnei, nā te mea he ūrite ki te hanga o tētahi kūaha:</p>  </div> <div style="text-align: center;"> <p>Ehara tēnei i te tapawhā hāngai nā te mea kāore e rite ana ki te hanga o tētahi kūaha:</p>  </div> </div>	geometric properties internal angles
2 Whakamārama Ataata Descriptive	<p>I tēnei kaupae kua tīmata te <u>whakaaro arorau</u>. Ka whakarōpūngia ngā āhua i runga i te hanga o aua āhua. Ka whakamārama i ngā āhuatanga āhuahanga o ngā rōpū. Hei tauira, e whā ngā tapa o ngā tapawhā rite katoa, he ūrite te roa o ngā tapa, he <u>koki hāngai</u> ngā kokonga katoa.</p> <p>Kāore e aro ki te pānga o tētahi rōpū āhua ki tētahi, pēnā he tapatoru waerite hoki ngā tapatoru rite katoa:</p> 	logical thinking right angle

³ Hei tauira, tirohia ngā pukapuka nei:

Elementary and Middle School Mathematics, nā John Van de Walle. I whakaputaina e Pearson Educational i te tau 2007.

Book 9 Numeracy Professional Development Project. *Teaching Number through Measurement, Geometry, Algebra and Statistics*. I whakaputaina e Te Tāhuhu o te Mātauranga i te tau 2008.

3 Pānga Ataata Relational	<p>He <u>nahanaha</u> te <u>tautohu</u> me te whakarōpū i ngā āhua i runga i te pānga o tētahi āhua ki tētahi me ūna <u>āhuatanga</u> <u>āhuahanga</u>. Hei tauira, mēnā he tapatoru rite ngā mata katoa o tētahi matarau, he matawhā rite tērā:</p> 	systematic, identify geometric properties
4 Ataata Arorau Formal Deduction	<p>He <u>ōkawa</u>, he <u>arorau</u> te titiro ki ngā pānga kei waenganui i ngā rōpū āhua. Hei tauira, i ngā kaupae tōmua, nā te titiro noa ki ngā <u>hauroki</u> o tētahi tapawhā rite i mōhiotia ai e 90° te koki <u>haukoti</u>. I tēnei taumata ka āta <u>hāpono</u> i ērā momo āhuatanga.</p> 	formal, logical diagonal intercept, proof
5 Pūnaha Ataata Systematic	<p>I tēnei taumata hōhonu ka waihangā te tangata i ngā <u>pūnaha pāngarau</u> e noho ana hei tūāpapa mō ngā momo tauira āhuahanga.</p>	mathematical system

Kāore e eke ki tua atu i te Raupapatanga Ako 3 i te mahere i runga nei, ngā akoranga e hāngai ana ki te kura tuatahi (tae atu ki te Taumata 5 o te marautanga).

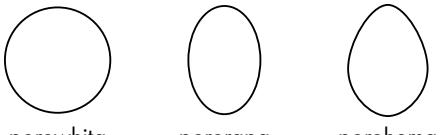
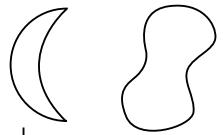
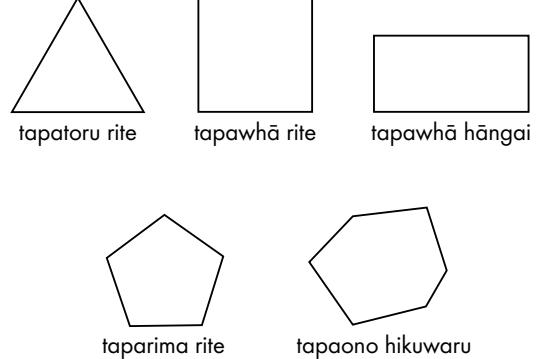
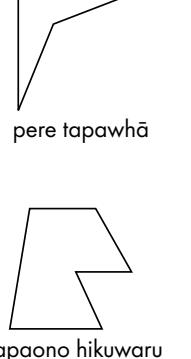
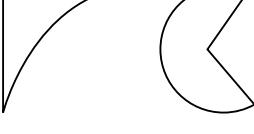
I te nuinga o te wā, he māmā ake te aro ki ngā āhua ahu-rua, (pērā i ngā momo tapawhā me te porowhitia) i ngā āhua ahu-toru (pērā i te koeko, te poi me te rango).

Ngā Huatau Matua o te Hanga me ngā Taumata Marautanga

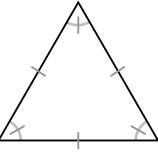
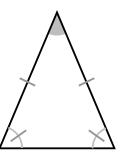
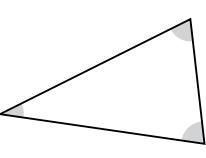
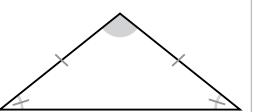
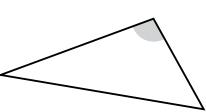
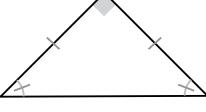
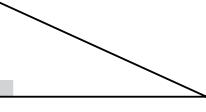
Taumata 1	Ko te aronga matua i tēnei taumata ko te <u>wehewehe</u> i ngā <u>hangā</u> māmā i runga i te <u>āhua</u> o te hanga. Ko te maha o ngā tapa, ko te rahi, ko te tae, ko te torotika, te kōpiko rānei o ngā tapa ētahi āhuatanga hei whakawehewehe i ngā hanga māmā. Ko te reo <u>ōpaki</u> o ia rā hei whakamārama i ngā hanga, pēnā he mōmona, he tūpuhi, he rite ki te wīra, he koi ngā kokonga. Kua tīmata te whakamahi i ētahi kupu āhuahanga, pēnei i te tapa, te torotika, te kōpiko, me ētahi atu. Ka tirotirohia ngā <u>āhua ahu-2</u> me ngā <u>āhua ahu-3</u> .	focus, sort object, appearance informal 2-dimensional shapes
Taumata 2	Ko te aronga matua i tēnei taumata ko te <u>wehewehe</u> i ngā <u>hangā</u> i runga i ō rātou <u>āhuatanga āhuahanga</u> . Ka tino aro ki ngā wāhanga o ngā hanga, pēnei i ngā tapa, ngā kokonga, me ngā mata. Kua tīmata te whakamahi i ngā ingoa o ētahi rōpū āhua, pēnei i te tapatoru, te tapawhā me te mataono.	sort object, geometrical properties
Taumata 3	I tēnei taumata kua mōhio ki ngā ture hei <u>tautohu</u> i ētahi rōpū āhua. Hei tauira, e whā ngā tapa torotika, e whā hoki ngā koki hāngai o tētahi tapawhā hāngai. Ko te maha o ngā tapa ko te <u>hangarite</u> , ko te <u>whakarara</u> , te <u>hāngai rānei</u> o ngā tapa, ko te āhua o ngā koki ētahi āhuatanga hei tautohu i ngā rōpū āhua.	identify symmetry, parallel, perpendicular
Taumata 4	Ko te aronga matua i tēnei taumata ko te tuhi <u>hoahoa ahu-2</u> hei whakaatu āhua ahu-3. Hei tauira, ko te tuhi i ngā momo <u>tirohanga</u> ki tētahi hanga ahu-3, ko te <u>hoahoa inerite</u> , ko te tuhi me te waihangā <u>raumata</u> . I konei kua mōhio ki te āhua o ngā mata o tētahi āhua ahu-3, te hono o tētahi mata ki tētahi, me ngā pānga kei waenganui i ngā tapa, ngā kokonga me ngā mata.	2-dimensional diagram view, isometric diagram net
Taumata 5	I tēnei taumata kua tīmata te whakamahi i ngā āhuatanga āhuahanga hei <u>tātai</u> i ngā tapa me ngā koki o tētahi āhua. Hei tauira, ko ngā <u>koki roto</u> me ngā koki waho o tētahi taparau, ko ngā koki ka hua mai i te rārangī e <u>haukoti ana</u> i ētahi rārangī <u>whakarara e rua</u> , ko ngā <u>ōwehenga pākoki</u> māmā hoki.	calculate internal angle intersect parallel, trigonometric ratio

He Whakarōpūtanga Āhua Ahu-rua

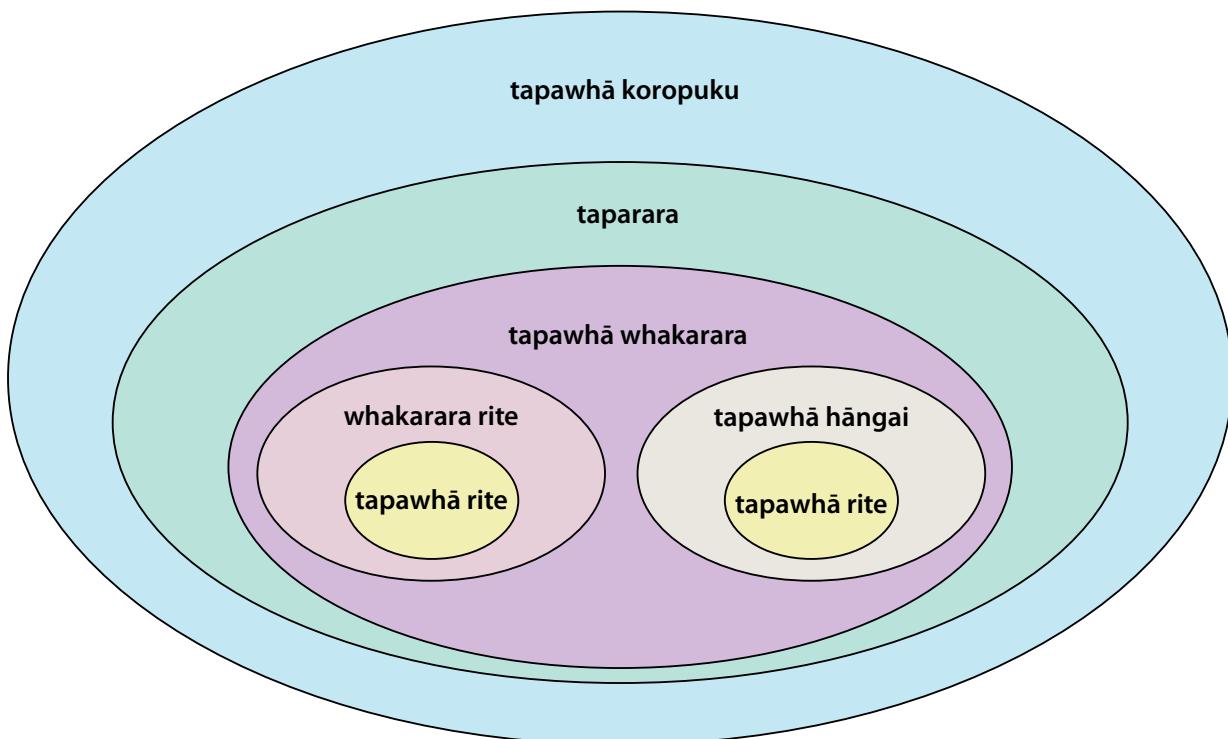
He papatahi katoa ngā āhua ahu-2:

	He koropuku te āhua	He kōpapa te āhua
He kōpiko ngā tapa	 <p>porowhita pororapa porohema</p>	 <p>kape</p>
He torotika ngā tapa (ka kiia he taparau)	 <p>tapatoru rite tapawhā rite tapawhā hāngai taparima rite tapaono hikuwaru</p>	 <p>pere tapawhā tapaono hikuwaru</p>
He torotika, he kōpiko hoki ngā tapa	 <p>porowhita haurua pororapa haurua</p>	

He Whakarōpūtanga Tapatoru

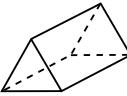
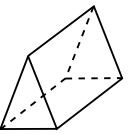
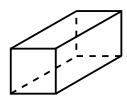
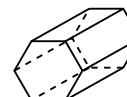
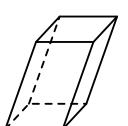
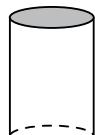
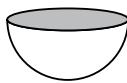
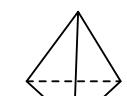
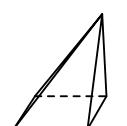
	tapatoru rite (e 3 ngā koki ōrite)	tapatoru waerite (e 2 ngā koki ōrite)	tapatoru hikuwaru (karekau he koki ōrite)
tapatoru koki tāhapa (he tāhapa ngā koki katoa)			
tapatoru koki hāpūpū (kotahi te koki hāpūpū)			
tapatoru hāngai (kotahi te koki hāngai)			

He Whakarōpūtanga Tapawhā



	tapawhā koropuku	<ul style="list-style-type: none"> • e whā nga tapa torotika • he koropuku ngā tapa katoa
	taparara	<ul style="list-style-type: none"> • kia kotahi, nui ake rānei ngā takirua tapa whakarara
	tapawhā whakarara	<ul style="list-style-type: none"> • kia rua ngā takirua tapa whakarara
	whakarara rite	<ul style="list-style-type: none"> • he tapawhā whakarara • he ōrite te roa o ngā tapa katoa
	tapawhā hāngai	<ul style="list-style-type: none"> • he tapawhā whakarara • he koki hāngai ngā kokonga katoa
	tapawhā rite	<ul style="list-style-type: none"> • he tapawhā whakarara • he tapawhā hāngai (e 90° ngā koki katoa) • he whakarara rite (he ōrite te roa o ngā tapa katoa)

He Whakarōpūtanga Āhua Ahu-toru

He kōpiko katoa ngā mata	He papatahi ngā mata katoa (he matarau)	He kōpiko, he papatahi ngā mata
 <p>poi</p>	Ngā momo poro  <p>poro-tapatoru rite</p>  <p>poro-tapatoru waerite</p>  <p>poro-tapawhā rite</p>  <p>poro-tapawhā hāngai</p>  <p>poro-tapaono rite</p>  <p>poro-tapawhā rite hōtiu</p>	 <p>koeko-porowhitia</p>
 <p>poirapa</p>		 <p>rango</p>
 <p>poihemata</p>	Ngā momo matarau rite  <p>matawhā rite</p>  <p>mataono rite</p>  <p>matawaru rite</p>  <p>mata-tekau mā rua rite</p>	 <p>poi-haurua</p>
 <p>tarawhitia</p>	Ngā momo koeko  <p>koeko-tapatoru rite</p>  <p>koeko-tapawhā rite</p>  <p>koeko-tapawhā hāngai</p>  <p>koeko-tapawhā rite hōtiu</p>	

He Tauira Mahere mō te Hanga

Taumata 1	Te Mātauranga Hanga	Te Whakaoti Rapanga Hanga	Te Reo Matatini o te Hanga
Whanaketanga 1a	<p>Ka tautohu i ētahi āhuatanga māmā o tētahi āhua ahu-2, o tētahi āhua ahu-3 rānei:</p> <ul style="list-style-type: none"> • ūna tapa; • ūna mata; • ūna kokonga; • te kōpiko, te torotika rānei o ūna tapa me ūna mata. <p>Ka mōhio ki ēnei momo rārangi:</p> <ul style="list-style-type: none"> • rārangi torotika; • rārangi kōpiko. 	<p>Ka whakatairite, ka whakarōpū āhua i runga i ngā āhuatanga māmā pēnei i ēnei:</p> <ul style="list-style-type: none"> • te maha o ngā tapa, o ngā mata, o ngā kokonga rānei; • te mātotoru; • te rahi; • te koi o ngā kokonga; • te torotika, te kōpiko rānei o ngā tapa (me ngā mata). 	<p>E mōhio ana ki ngā kupu āhuahanga nei:</p> <ul style="list-style-type: none"> • tapa; • mata; • kokonga; • kōpiko; • rārangi; • torotika. <p>Ka whakamārama i ngā āhua māmā i āna ake kupu.</p>
Whanaketanga 1e	<p>E mōhio ana ki te pūmautanga o tētahi āhua, ahakoa te huri o te noho mai o taua āhua.</p> <p>Ka mōhio ki ēnei momo rārangi:</p> <ul style="list-style-type: none"> • rārangi pouū; • rārangi huapae. <p>Ka mōhio ki ngā āhua ahu-2 nei:</p> <ul style="list-style-type: none"> • tapawhā, tapawhā hāngai, tapawhā rite; • tapatoru; • porowhita. <p>Ka mōhio ki ngā āhua ahu-3 nei:</p> <ul style="list-style-type: none"> • pouaka; • poi; • rango. 	<p>Ka tautohu i ngā āhua ahu-2 māmā me ngā āhua ahu-3 māmā e kitea mai ana i te taiao.</p> <p>Ka hanga whakaahua ā-hinengaro o ngā āhua māmā.</p> <p>Ka whai, ka hoatu tohutohu māmā mō te tuhi i tētahi āhua.</p>	<p>Ka mōhio ki ngā kupu āhuahanga nei:</p> <ul style="list-style-type: none"> • taparau; • matarau; • tapatoru; • tapawhā rite; • tapawhā hāngai; • porowhita; • pouaka; • poi; • rango; • huapae; • pouū. <p>Ka whakaputa kōrero mō ngā āhuatanga rerekē me ngā āhuatanga ūrite o ētahi āhua.</p>

Taumata 2	Te Mātauranga Hanga	Te Whakaoti Rapanga Hanga	Te Reo Matatini o te Hanga
Whanaketanga 2a	<p>Ka mōhio ki ngā momo tapatoru nei:</p> <ul style="list-style-type: none"> • te tapatoru hikuwaru; • te tapatoru waerite; • te tapatoru rite; • te tapatoru hāngai. <p>Ka kite ā-karu i ngā koki ōrite o tētahi taparau.</p> <p>Ka mōhio ki ēnei āhuatanga:</p> <ul style="list-style-type: none"> • rārangi whakarara; • rārangi pūtahi; • rārangi hāngai; • koki hāngai; • koki iti ake i te koki hāngai; • koki nui ake i te koki hāngai; • hauroki. 	<p>Ka tuhi ā-ringa, ka wāwāhi āhua ahu-2 i runga i te hangarite o aua āhua.</p> <p>Ka whai, ka hoatu tohutohu mō te tuhi i tētahi āhua.</p>	<p>E mōhio ana ki ngā kupu āhuahanga nei:</p> <ul style="list-style-type: none"> • hikuwaru; • waerite; • rite; • koki hāngai; • hangarite; • whakarara; • hauroki; • pūtahi; • rārangi hāngai. <p>E mōhio ana ki ngā tohu hei whakaatu koki hāngai, tapa ōrite, koki ōrite, rārangi whakarara hoki.</p> <p>E mōhio ana ki te tikanga mō te whakaingoa i tētahi koki.</p> <p>Ka whakamārama i te hangarite o tētahi āhua māmā i āna ake kupu.</p>
Whanaketanga 2e	<p>Ka mōhio ki ngā momo matarau nei:</p> <ul style="list-style-type: none"> • te poro tapawhā; • te poro tapatoru; • te mataono rite; • te koeko; • te koeko tapawhā; • te koeko tapatoru. 	<p>Ka whakapiri i ētahi āhua māmā (pēnei i te mataono rite) hei hanga tauira.</p> <p>Ka kite ā-hinengaro i te āhua o ngā tapanga āhua ahu-3.</p> <p>Ka whakamahi i ngā taputapu tā (pērā i te tāporowhita me te rūri), hei tuhi koki hāngai, hei tuhi taparau māmā.</p>	<p>E mōhio ana ki ngā kupu āhuahanga nei:</p> <ul style="list-style-type: none"> • poro; • poro tapawhā; • poro tapatoru; • mataono rite; • koeko; • koeko tapawhā; • koeko tapatoru; • tihi; • pūtake. <p>Ka whakamārama i ngā momo matarau māmā i āna ake kupu.</p>

Taumata 3	Te Mātauranga Hanga	Te Whakaoti Rapanga Hanga	Te Reo Matatini o te Hanga
Whanaketanga 3a	<p>Ka mōhio ki ngā āhuatanga āhuahanga o ngā rōpū taparau me ngā rōpū matarau.</p> <p>Hei tauira:</p> <ul style="list-style-type: none"> • e rua ngā tapa whakarara takirua o tētahi tapawhā hāngai; • e rua (e toru rānei) ngā koki ūrite o tētahi tapatoru waerite. 	<p>Ka whakarōpū āhua i runga i ngā āhuatanga āhuahanga o aua āhua, me te whakamārama anō i ngā rōpū.</p> <p>Ka tautohu, ka whakatairite, ka tātari i ngā āhuatanga āhuahanga o ngā āhua ahu-2 me ngā āhua ahu-3.</p> <p>Ka hanga raumata o ētahi āhua ahu-3 māmā:</p> <ul style="list-style-type: none"> • mataono rite; • poro tapawhā hāngai; • koeko tapawhā hāngai. 	<p>E mōhio ana ki ngā kupu āhuahanga nei:</p> <ul style="list-style-type: none"> • raumata.
Whanaketanga 3e	<p>Ka mōhio ki ngā momo ‘ōrite’ o ētahi hanga e rua:</p> <ul style="list-style-type: none"> • ūrite; • ūrite te āhua; • ūrite te rahi. <p>Ka kite ā-karu mēnā he ūrite te āhua o ētahi hanga e rua.</p>	<p>Ka hanga, ka whakarahi, ka whakaiti raumata hei hanga i ngā momo matarau.</p> <p>Hei tauira:</p> <ul style="list-style-type: none"> • ka whiriwhiria te raumata o tētahi poro tapawhā hāngai, kia iti rawa te horahanga mata, engari kia rahi rawa te rōrahi. <p>Ka tūhura i te rōpinepine o ētahi taparau.</p>	<p>E mōhio ana ki ngā kupu āhuahanga nei:</p> <ul style="list-style-type: none"> • ūrite; • ūrite te rahi; • ūrite te āhua; • rōpinepine.

Taumata 4	Te Mātauranga Hanga	Te Whakaoti Rapanga Hanga	Te Reo Matatini o te Hanga
Whanaketanga 4a	<p>Ka mōhio ki ngā tikanga o te taurahi o ētahi taparau he ūrite te āhua.</p> <p>Ka mōhio ki ngā tikanga koki roto nei:</p> <ul style="list-style-type: none"> • 180° te tapeke o ngā koki roto o tētahi tapatoru; • 360° te tapeke o ngā koki roto o tētahi tapawhā. <p>Ka kite ā-karu i ngā momo tirohanga ki tētahi āhua ahu-3 māmā.</p> <p>Ka mōhio ki ngā āhuatanga āhuahanga e rōpinepine ai ētahi āhua ahu-2.</p>	<p>Ka tūhura i te tātaitanga o ngā koki roto o ngā momo taparau.</p> <p>Ka whakamahi i ngā tikanga pānga riterite hei tātai i ngā tapa o ētahi taparau he ūrite te āhua.</p> <p>Ka tuhi i ngā momo tirohanga ki tētahi āhua ahu-3 māmā.</p> <p>Ka tuhi, ka hanga rānei i tētahi āhua ahu-3, mai i ōna momo tirohanga ahu-2.</p> <p>Ka waihanga, ka tuhi rōpinepine.</p> <p>Ka tuhi hoahoa āwhata.</p>	<p>E mōhio ana ki ngā kupu āhuahanga nei:</p> <ul style="list-style-type: none"> • taurahi; • ūwehenga; • koki roto; • āwhata; • tirohanga runga; • tirohanga mua; • tirohanga matau ...
Whanaketanga 4e	<p>Ka mōhio ki ngā tikanga koki. Hei tauira:</p> <ul style="list-style-type: none"> • koki tāhapa; • koki hāpūpū; • koki rārangī; • koki huripū; • koki rāwaho; • koki whakahāngai; • koki whakarārangī; • koki whakahuripū. 	<p>Ka tātai i ngā koki o ētahi rārangī pūtahi.</p> <p>Ka tūhura i te pānga kei waenganui i ētahi āhuatanga o ētahi āhua ahu-2.</p> <p>Hei tauira:</p> <ul style="list-style-type: none"> • te pānga kei waenganui i te pūtoro me te paenga o tētahi porowhita; • te pānga kei waenganui i te maha o ngā tapa me te maha o ngā hauroki o tētahi taparau. 	<p>E mōhio ana ki ngā kupu āhuahanga nei:</p> <ul style="list-style-type: none"> • koki tāhapa; • koki hāpūpū; • koki rārangī; • koki huripū; • koki rāwaho; • koki whakahāngai; • koki whakarārangī; • koki whakahuripū.

Taumata 5	Te Mātauranga Hanga	Te Whakaotī Rapanga Hanga	Te Reo Matatini o te Hanga
Whanaketanga 5	<p>Ka mōhio ki ngā tikanga o ngā koki ka hua mai i te rārangi e haukoti ana i ētahi rārangi whakarara:</p> <ul style="list-style-type: none"> • koki tauaro; • koki tauroto; • koki taurite; • koki tauwhiti. 	<p>Ka tūhura, ka whakamārama i te pānga o ngā koki ka hua mai i te rārangi e haukoti ana i ētahi rārangi whakarara.</p> <p>Ka tūhura, ka whakaputa, ka whakamahi ture hei tātai āhuatanga āhuahanga. Hei tauira:</p> <ul style="list-style-type: none"> • te pūtoro o tētahi porowhita; • te hauroki o tētahi tapawhā hāngai; • te rārangi weherua o tētahi tapatoru rite. 	<p>E mōhio ana ki ngā kupu āhuahanga nei:</p> <ul style="list-style-type: none"> • koki tauaro; • koki tauroto; • koki taurite; • koki tauwhiti; • tāroa.



Wāhanga 2

Ngā Whanaketanga Hangā 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 Hangā, mai i te 1a ki te 5a, me ngā tauira aromatawai e hāngai ana.

WHANAKETANGA 1a

Te Hanga

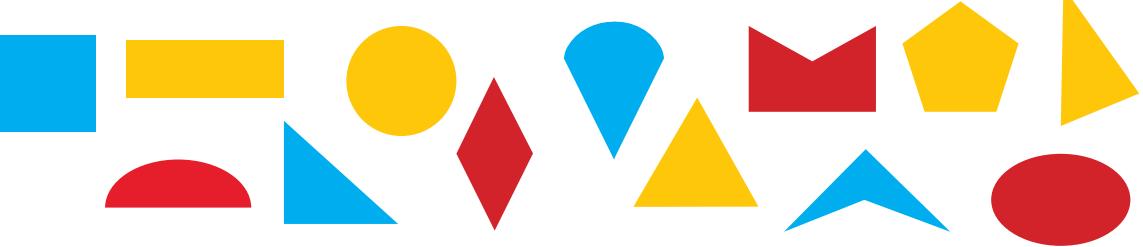
Ngā Whāinga		
Ka whakaoti rapanga te ākonga, ka whakamārama otinga, e whai wāhi mai ana:	He tauira ēnei o ngā āhuatanga me mātua mōhio te ākonga e tutuki ai tana whakaoti rapanga:	<i>*geometric properties</i>
<ul style="list-style-type: none">• te whakarōpū taonga i runga anō i ngā āhuatanga hanga⁹ o aua taonga.	<ul style="list-style-type: none">• ēnei momo āhuatanga hanga māmā hei whakarōpū taonga: te rahi, te tae, te maha o ngā kokonga, ngā tapa, me ngā mata.	

Te Reo Matatini o te Pāngarau

Hei tauira kupu
<ul style="list-style-type: none">• roa• ine• ake/atu (pēnei i te "roa ake")• kokonga• iho (pēnei i te "iti iho")• taumaha• mata• tapa• whakarōpū• whakatairite

He Tauira Rapanga

Te Ine me te Hanga 1a

Rapanga 9
<p><i>Rauemi: He huinga āhua.</i></p> <p>Whakarōpūngia ngā āhua. He aha te/ngā mea ūrite o ngā āhua o ia rōpū?</p>  <p>Ka whakarōpūngia ngā āhua, ā, ka tika te whakamārama i te/ngā āhuatanga ūrite o ia rōpū pēnei i: te momo āhua; te rahi; te kōpiko, te torotika rānei o ngā tapa; te maha o ngā tapa; te koi o ngā kokonga.</p>

Te Hanga

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:	¹⁵ geometric properties ¹⁶ polygon ¹⁷ polyhedron
<ul style="list-style-type: none"> ngā āhuatanga hangā¹⁵ o ngā taparau¹⁶ māmā me ngā matarau¹⁷ māmā. 	<ul style="list-style-type: none"> ngā ingoa o ngā āhua ahu-2²¹ māmā me ngā āhua ahu-3²² māmā (pērā i te tapatoru, te tapawhā, te taimana, te porowhita, te tapawhā rite, te tapawhā hāngai, te pouaka, me te poi). 	²¹ 2-dimensional shape ²² 3-dimensional shape

Te Reo Matatini o te Pāngarau

Hei tauira kupu
<ul style="list-style-type: none"> tapawhā tapawhā rite taimana tapawhā hāngai tapatoru porowhita

He Tauira Rapanga

Te Ine me te Hanga 1e

Rapanga 10

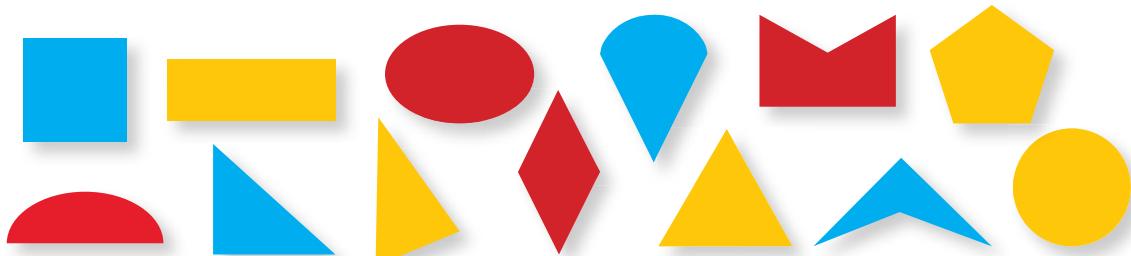
Rauemi: He huinga āhua ahu-2 pēnei i ēnei:

Hoatu he tohutohu hei whakarōpū mā ngā ākonga i ngā āhua ahu-2. Hei tauira:

- Whakarōpūngia ki konei ngā tapawhā katoa.
- Whakarōpūngia ki konei ngā āhua tapa kōpiko.
- Kimihia ngā āhua katoa, e toru ngā kokonga, e whā ngā tapa torotika. (Kia mataara: kāore e taea tētahi āhua pēnei)

Kia tika te whakarōpū i ngā āhua hei whakaatu i te mārama ki ngā āhua ahu-2 nei me ō rātou āhuatanga hanga, pēnei i ēnei:

āhua ahu-2: tapawhā, tapawhā rite, tapawhā hāngai, tapatoru, tapaono, porowhita, taimana
āhuatanga hanga: tapa, tapa torotika, tapa kōpiko, kokonga



WHANAKETANGA 2a

Te Hanga

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:	¹⁷ geometric properties ¹⁸ polyhedron ¹⁹ prism ²⁰ pyramid ²¹ perpendicular line ²² parallel line ²³ intersecting line ²⁴ right angle
<ul style="list-style-type: none">ngā āhuatanga hanga¹⁷ o ngā taparau whānui me ngā matarau whānui.	<ul style="list-style-type: none">ngā momo tapatorungā kupu āhuahanga e hāngai ana (pērā i te akitu, te mata, me te tapa)ngā momo matarau¹⁸ (pērā i ngā poro¹⁹ me ngā koeko²⁰)te rārangi hāngai²¹, te rārangi whakarara²² me te rārangi pūtahi²³te koki hāngai²⁴.	

Te Reo Matatini o te Pāngarau

Hei tauira kupu
<ul style="list-style-type: none">tapatoru, tapawhā, taparima ...mataono ritetapatoru hāngai, tapatoru hikuwaru ...kokihāngaiakitu/kokongakoeko tapatoru, koeko tapawhā ...matapūtahitapaporo tapatoru, poro tapawhā ...whakarara

He Tauira Rapanga

Te Ine me te Hanga 2a

Rapanga 8

Whakamāramatia ngā āhuatanga hanga o tētahi taparau, ka tono ai i ngā ākonga kia tuhia te taparau, kia whakaingoatia hoki. Hei tauira:

Kotahi te koki hāngai, e toru ngā tapa o tēnei āhua.



E whā ngā tapa o tēnei āhua, e rua ūna koki hāngai.



Kia tika te tuhi i ngā taparau me te whakaingoa anō hoki, hei whakaatu mā te ākonga i tōna mōhio ki ngā āhuatanga hanga nei:
tapa, rārangi hāngai, rārangi whakarara, koki hāngai, kokonga/akitu.

WHANAKETANGA 2e

Te Hanga

Ngā Whāinga	
Ka whakaotī 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 whakaotī rapanga:
<ul style="list-style-type: none"> • te tuhi hoahoa me te hanga tauira o ngā āhua ahu-¹⁰ me ngā āhua ahu-3. 	<ul style="list-style-type: none"> • te whakamahi i te rūri, te tāporowhita⁸, me te koki hāngai⁹, hei ine, hei tuhi āhua.

Te Reo Matatini o te Pāngarau

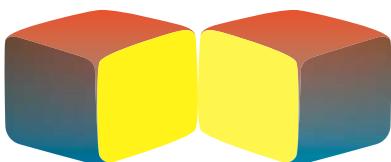
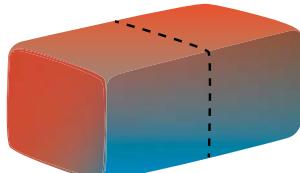
Hei tauira kupu
<ul style="list-style-type: none"> • mata • tāporowhita • hoahoa • āhua ahu-3 • tapahanga • āhua ahu-2 • koki hāngai • mataono rite • poro tapawhā hāngai • poro tapawhā rite • poro tapatoru • rango, koeko • koeko tapawhā rite • koeko tapatoru • koeko tapawhā hāngai

He Tauira Rapanga

Te Ine me te Hanga 2e

Rapanga 8

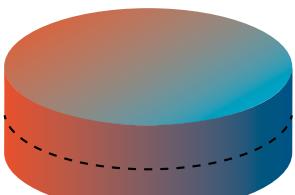
Kua tapahia tēnei āhua. He tapawhā rite te āhua ka puta i te tapahanga.



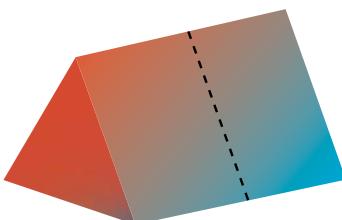
Te āhua ka puta
i te tapahanga

Titiro ki ngā āhua e whai ake nei. Ko te rārangī irairā e whakaatu ana i te wāhi ka tapahia ngā āhua. Tuhia te āhua ka puta i te tapahanga.

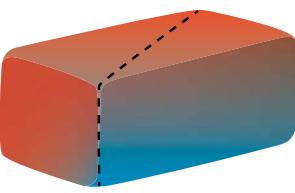
1.



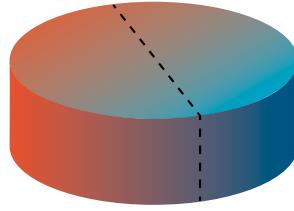
2.



3.



4.



Kia tika te tuhi i te āhua o ngā tapahanga, te whakamahi i te rūri hei tuhi rārangī torotika, me te whakamahi tāporowhita hei tuhi porowhita.

WHANAKETANGA 3a

Te Hanga

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:	¹⁰ protractor ¹¹ net
<ul style="list-style-type: none">ngā raumata¹¹ o ngā āhua ahu-3 māmā, pēnei i te mataono rite, te poro tapawhā hāngai, me te koeko tapawhā hāngai.	<ul style="list-style-type: none">te whakamahi i ngā momo taputapu ine whānui (pērā i te ine-koki¹⁰).	

Te Reo Matatini o te Pāngarau

Hei tauira kupu
<ul style="list-style-type: none">raumatakoki hāngaiine-kokitākiri/putuahu-2, ahu-3
Hei tauira tohu
<ul style="list-style-type: none">◦

He Tauira Rapanga

Te Ine me te Hanga 3a

Rapanga 8

Rauemi: He rūri, he ine-koki.

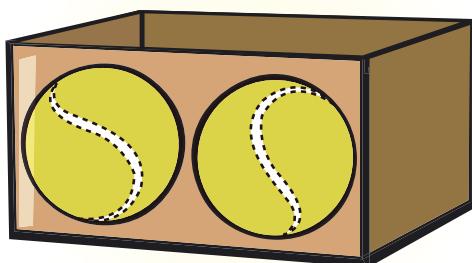
Tuhia tētahi tapatoru hāngai. Kia 12.7 cm te roa o tētahi tapatoru. Kia 35° te rahi o tētahi o ngā koki.

Kia tika te tuhi i te tapatoru hāngai (me te mōhio anō he aha te tapatoru hāngai), me te whakamahi i ngā taputapu ine. E tōtika ana te inenga roa (12.7 cm), me ngā inenga koki (90° me te 35°).

Te Ine me te Hanga 3a

Rapanga 10

Rauemi: He kāri (kia A3 te rahi), he rūri, he kutikuti, kia rua ngā pōro tēnehi, he tēpa whakapiri.



Tuhia te raumata o tētahi pouaka mō ngā pōro tēnehi e rua nei. Kāore he taupoki o te pouaka. Hangaia te pouaka.

Kia tika te ine i ngā pōro tēnehi me te tuhi i te raumata. Ina whētuia te raumata ka hua mai te pouaka, ā, ka uru ngā pōro ki roto.

WHANAKETANGA 3e

Te Hanga

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:	⁹ unit of measurement ¹⁰ net ¹¹ 3-dimensional shape ¹² grid ¹³ cube
<ul style="list-style-type: none"> • te whakatau tata me te whiriwhiri horahanga māmā, rōrahi māmā • te tuhi raumata¹⁰ o ngā āhua ahu-3¹¹ whānui. 	<ul style="list-style-type: none"> • ngā waeine⁹ e tika ana mō te horahanga me te rōrahi, pēnei i te cm², te cm³, te m², me te m³ • te whakamahi tukutuku¹² hei whiriwhiri horahanga • te whakamahi mataono rite¹³ hei whiriwhiri rōrahi. 	

Te Reo Matatini o te Pāngarau

Hei tauira kupu
<ul style="list-style-type: none"> • raumata • mitarau pūrua
Hei tauira tohu
<ul style="list-style-type: none"> • cm², m² • cm³, m³ • L, mL

He Tauira Rapanga

Te Ine me te Hanga 3e

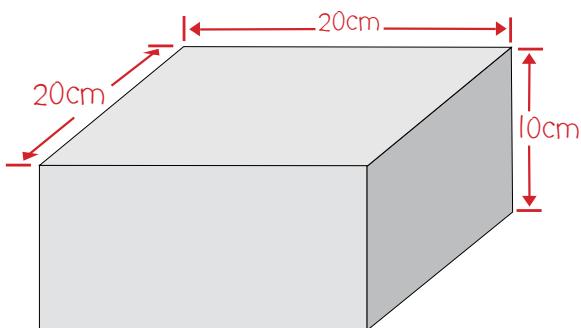
Rapanga 8

Kua hangaia he pouaka hei tākai i ngā mataono rite.

E 20cm ki te 20cm ki te 10cm ngā tapa o te pouaka.

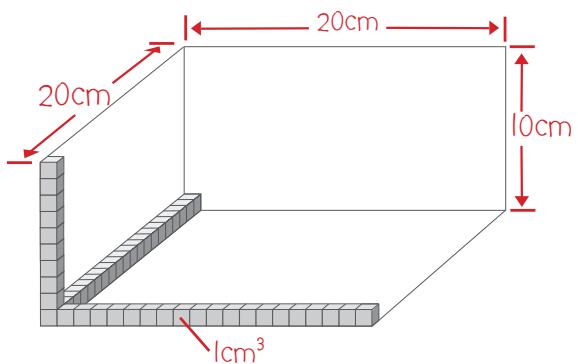


1. E hia ngā mataono rite, 1cm ki te 1cm ki te 1cm ka uru ki te pouaka?
2. E hia ngā mataono rite, e 2cm ki te 2cm ki te 2cm ka uru ki te pouaka?



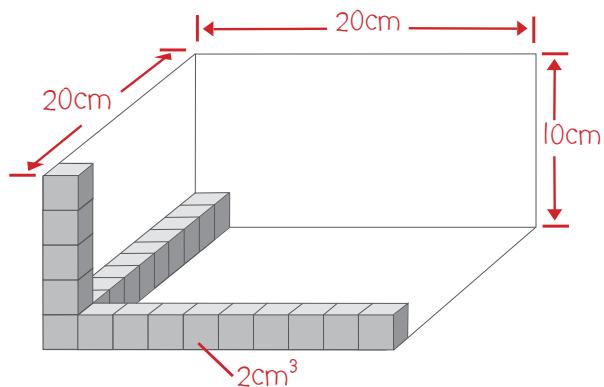
Kia tika te whiriwhiri i te rōrahi me te whakaatu anō i te mōhio ki te tikanga o te rōrahi. Hei tauira:

1. Ka tātaihia te maha o ngā cm³ ka takoto ki te papa o te pouaka (mā te whakarea $20 \times 20 = 400$), kātahi ka tātaihia te maha o ngā paparanga cm³ (mā te whakarea $400 \times 10 = 4,000$).



WHANAKETANGA 3e

2. Ka tātaihia te maha o ngā mataono rite 2cm^3 ka takoto ki te papa o te pouaka (mā te whakarea $10 \times 10 = 100$), kātahi ka tātaihia te maha o ngā paparanga o ngā mataono 2cm^3 (mā te whakarea $100 \times 5 = 500$)

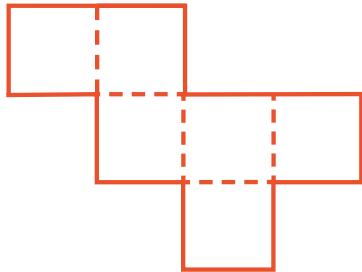


Te Ine me te Hanga 3e

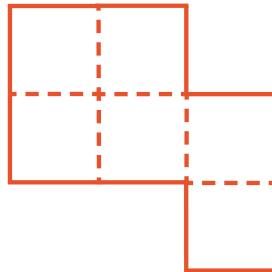
Rapanga 9

Ko ēhea o ēnei he raumata mataono rite? (Arā, ina whētuia ka hua mai he mataono rite.)

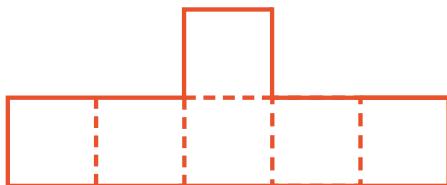
1



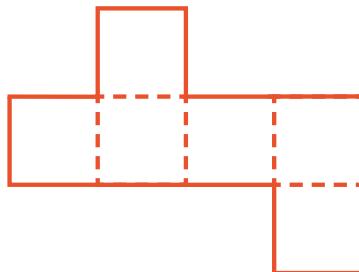
2



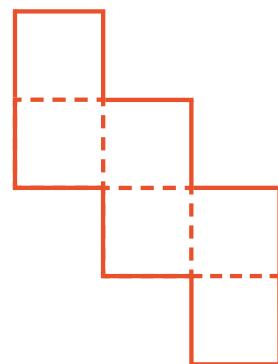
3



4



5



6



Mēnā e 5 cm te roa o ia tapa o te mataono rite, he aha tōna rōrahi?

Ka mārama te ākonga ki te āhua o te mataono rite, me ngā raumata e hangaia ai he mataono rite.

Kia tika te tātai i te rōrahi me te hoatu i te waeine e tika ana. Arā, $5 \times 5 \times 5$ (5^3 rānei) = 125 cm^3

WHANAKETANGA 4a

Te Hanga

Ngā Whāinga	
Ka whakaotī 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 whakaotī rapanga:
<ul style="list-style-type: none"> ngā inenga tapa me ngā ture hei tātai paenga¹⁰, horahanga, rōrahi hoki o ngā āhua māmā te whakaatu āhua ahu-3¹⁵ hei hoahoa ahu-2 (pērā i te tuhinga hoahoa inerite¹⁶) te tuhi hoahoa āwhata. 	<ul style="list-style-type: none"> ngā momo tirohanga ki tētahi mea, pērā i te tirohanga ā-manu, te tirohanga mua me te tirohanga mauī te whakamahinga o te ōwehenga¹¹ me te taurahi¹² hei tuhi hoahoa āwhata¹³.

Te Reo Matatini o te Pāngarau

Hei tauira kupu
<ul style="list-style-type: none"> ture tātai rōrahi hoahoa āwhata
<ul style="list-style-type: none"> paenga ahu-2, ahu-3 tirohanga ā-manu, tirohanga mua, tirohanga mauī ...
Hei tauira whakaahuahanga
<ul style="list-style-type: none"> he hoahoa inerite ngā momo tirohanga he hoahoa āwhata

He Tauira Rapanga

Te Ine me te Hanga 4a

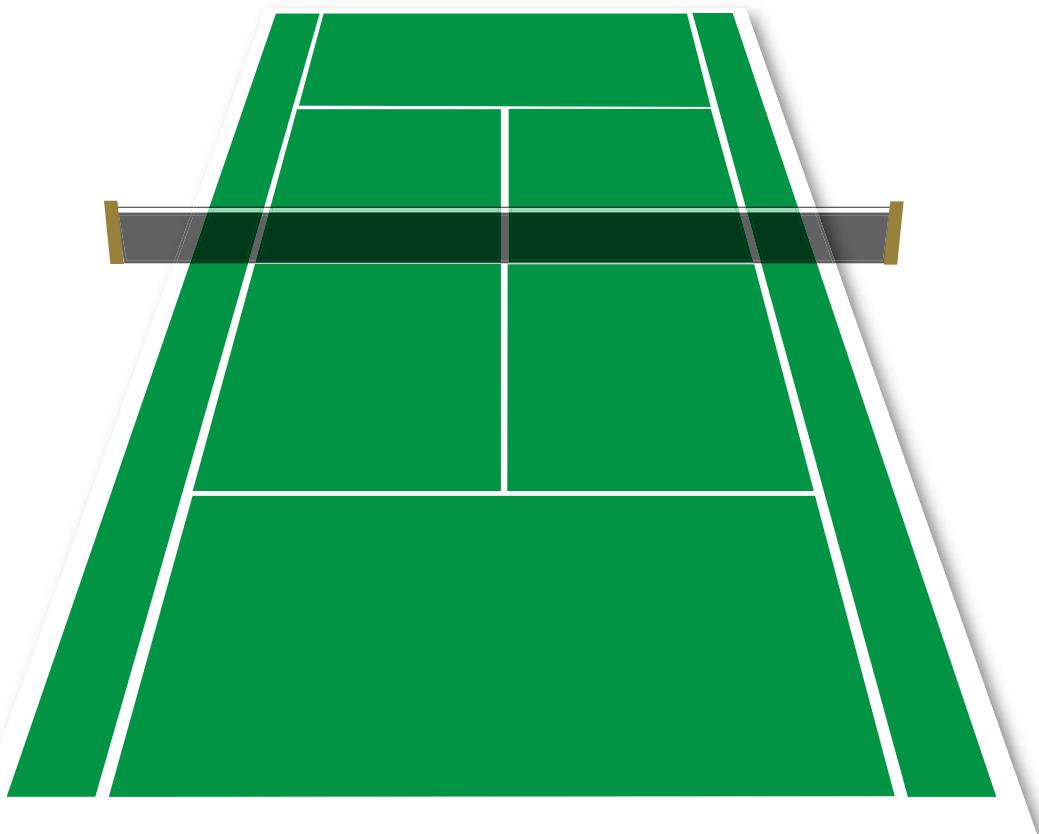
Rapanga 8	
<p>E 20 rita te rōrahi o tētahi pēke wairākau.</p>  <ol style="list-style-type: none"> Tuhia he hoahoa o tētahi pouaka e taea ai te katoa o te wairākau o tētahi pēke te ringi atu ki roto. He pēhea nei te roa, te whānui, me te teitei o te pouaka? Hauruatia ia taha o tō pouaka. E hia ngā rita wairākau ka taea ki roto ināianei? Kia tika te tuhi hoahoa o te pouaka me te whakamārama i ngā roa o ngā tapa o te pouaka. Ka mōhio i te ōrite o te 1L me te 1 000 cm³. Nō reira, e tika ana kia 20 000 cm³ te rōrahi o te pouaka. 	<p>Ka whakamahia te ture tātai $R = r \times wh \times t$ ($R = \text{rōrahi}$, $r = \text{roa}$, $wh = \text{whānui}$, $t = \text{teitei}$) mō te rōrahi o tētahi poro tapawhā hāngai, ā, ka whiriwhiria ngā tapa e toru. Ina whakareatia aua tapa e toru, ka rite ki te 20 000.</p> <p>Hei tauira:</p> $20 \text{ cm} \times 50 \text{ cm} \times 20 \text{ cm} (20 \times 50 \times 20 = 20 000)$  <ol style="list-style-type: none"> Kia tika te whakamahi i te ture hei tātai i te rōrahi o tētahi pouaka, arā: $ \begin{aligned} R &= r \times wh \times t \\ &= 25 \times 10 \times 10 \quad (\text{te haurua o ngā inenga o te pouaka kei runga ake nei}) \\ &= 2,500 \text{ cm}^3 \\ &= 2.5\text{L} \quad (\text{rita}) \text{ wairākau ka taea ki roto} \end{aligned} $

WHANAKETANGA 4a

Te Ine me te Hangā 4a

Rapanga 9

Tāngia he hoahoa āwhata o tētahi papa tākaro tēnehi, poitarawhitī rānei. Whakaaturia ngā paetaha/rārangi katoa o te papa ki tō hoahoa āwhata. He aha te taurahi o tō hoahoa? Whakamāramatia mai ō mahi katoa.



Kia tika te tuhi hoahoa āwhata o te papa tākaro me te whai i tētahi raupapatanga mahi pēnei i tēnei:

- Ka tuhi ā-ringatia te papa tākaro me ūna paetaha/rārangi katoa.
- Ka inea te roa o ngā rārangi, me te tuhi anō i ēnei inenga ki te hoahoa. Kia tika te whiriwhiri me te whakamahi i te taputapu ine.
- Ka whiriwhiria te taurahi. Ka whakaaro hia te rārangi roa rawa o te papa tākaro me te roa o tēnei rārangi i te hoahoa. Hei tauira, mēnā e 30m te tapa roa o te papa tākaro, ka hurihia tēnei hei mitarau i te tuatahi (30m → 30cm), kātahi ka hauruatia (30cm → 15cm). E pai ana te 15cm hei rārangi roa rawa ki te hoahoa.
- Kia pērātia anō ngā inenga katoa hei whiriwhiri i te roa o ngā rārangi ki te hoahoa.
- Ka whakamahia te rūri hei tuhi i te hoahoa āwhata, me te tika anō o te roa o ngā rārangi o te hoahoa.

Te Hanga

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:	¹⁴ complimentary angle ¹⁵ supplementary angle ¹⁶ conjugate angle ¹⁷ acute angle ¹⁸ obtuse angle
<ul style="list-style-type: none"> te whiriwhiri i te rahi o tētahi koki. 	<ul style="list-style-type: none"> te tikanga o te koki whakahāngai¹⁴, te koki whakarārangī¹⁵, te koki whakahuripū¹⁶, te koki tāhapa¹⁷, me te koki hāpūpū¹⁸. 	

Te Reo Matatini o te Pāngarau

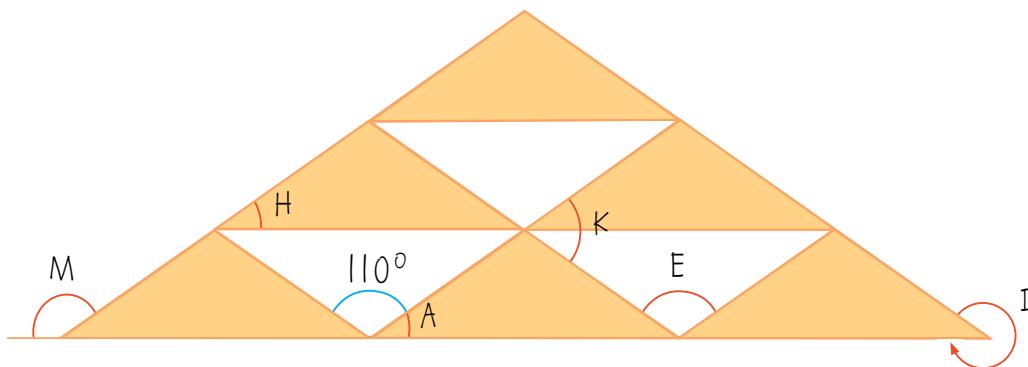
Hei tauira kupu
<ul style="list-style-type: none"> koki whakarārangī koki hāpūpū koki whakahuripū koki roto koki whakahāngai koki tāhapa

He Tauira Rapanga

Te Ine me te Hanga 4e

Rapanga 9

He whakarahinga tēnei o tētahi wāhangā o tētahi tauira tāniko.



Whiriwhiria te rahi o ngā koki e tohua ana, ka whakamārama mai ai.

Kia tika te whiriwhiri me te whakamārama i ngā koki. Hei tauira:

Koki A = 35° E rua o ēnei koki me te koki 110°, ka rite ki te 180° (koki whakarārangī).

Koki E = 110° He nekehanga o te tapatoru e tohua mai ana te koki 110°. Ka pūmau tonu te koki i roto i te nekehanga.

Koki H = 35° He nekehanga o te tapatoru. E 35° ngā koki iti o ngā tapatoru katoa. Ka pūmau tonu te koki i roto i te nekehanga.

Koki I = 325° Ko te 360° te tapeke o tēnei koki me te koki 35° e noho mai ana ki roto i te tapatoru (koki huripū).

Koki K = 70° E rua ngā koki iti o ngā tapatoru (35° + 35°).

Koki M = 145° Ko te 180° te tapeke o tēnei koki me te koki 35° e noho mai ana ki roto i te tapatoru (koki whakarārangī).

WHANAKETANGA 5a

Te Hanga

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:	⁷ formulae ⁸ interior angle ⁹ opposite angle ¹⁰ corresponding angle ¹¹ alternate angle ¹² intersecting lines
<ul style="list-style-type: none"> ngā ture⁷ hei tātai tapa, paenga, horahanga, koki, horahanga mata, rōrahi hoki o ngā āhua whānui ngā tikanga koki o te rārangi pūtahi¹², te rārangi whakarara, me ngā taparau. 	<ul style="list-style-type: none"> te whakamahi i te ture a Pythagoras te tikanga o te koki tauroto⁸, te koki tauaro⁹, te koki taurite¹⁰, me te koki tauwhiti¹¹. 	

Te Reo Matatini o te Pāngarau

Hei tauira kupu
<ul style="list-style-type: none"> ture tātai koki taurite mati ā-ira pūtakerua rārangi pūtahi koki tauwhiti tātaitai koki tauaro tāroa pūrua

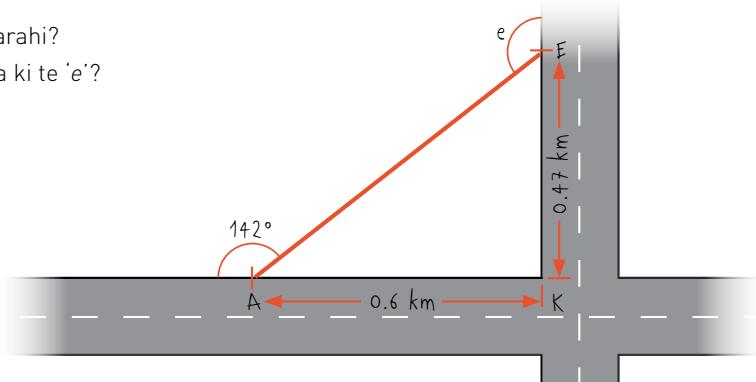
He Tauira Rapanga

Te Ine me te Hanga 5a

Rapanga 7

He mahere tēnei o tētahi kokonga huarahi. E whakaaro hia ana kia hangaia he huarahi torotika mai i te A ki te E (te rārangi whero).

- E hia manomita te roa o taua huarahi?
- E hia te rahi o te koki e tohua ana ki te 'e'?



- Kia tika te whakamahi i te ture a Pythagoras hei tātai i te tāroa o te tapatoru, me te whakamārama i ngā mahi:

Ko tā te ture a Pythagoras e mea ana, ko te tapeke o ngā pūrua o ngā tapa poto, he rite ki te pūrua o te tapa roa o tētahi tapatoru hāngai. Arā:

$$a^2 + b^2 = c^2$$

$$0.6^2 + 0.47^2 = AE^2$$

$$0.76 = AE \text{ (mā te tātaitai, kia 2 ngā mati ā-ira)}$$

- Kia tika hoki te whiriwhiri i te koki e, me tētahi whakamārama pēnei:

E 38° te koki KAE nā te mea ko te 180 te tapeke o ngā koki o tētahi rārangi torotika ($142 + 38 = 180$).

Nō reira, e 52° te koki KEA nā te mea 180 te tapeke o ngā koki o tētahi tapatoru ($38 + 90 + 52 = 180$).

Nō reira 128° te koki e, nā te mea 180 te tapeke o ngā koki i te rārangi torotika ($52 + 128 = 180$).

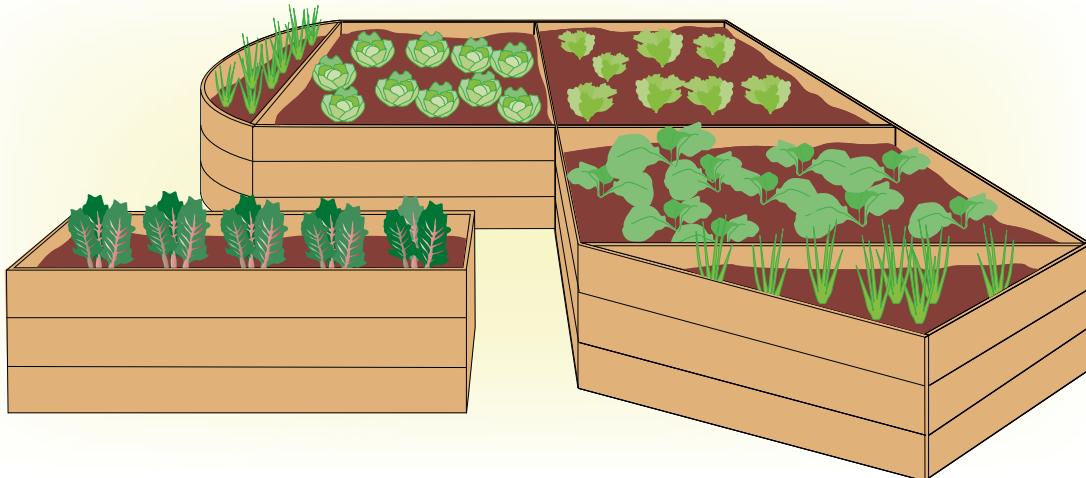
WHANAKETANGA 5a

Te Ine me te Hangā 5a

Rapanga 8

Hoahoatia tētahi māra rewa mō tō kura. Kia whai āhua rerekē te hanga o tō māra, arā pea, he wāhanga tapatoru, he wāhanga porowhita, he wāhanga tapawhā hāngai rānei.

1. Tuhia te hoahoa ki te pepa, me te whakaatu anō i ngā inenga.
2. Tātaihia te rōrahi o te oneone hei whakakī i te māra rewa. Whakamāramahia ngā tātaitanga katoa.



Kia tika te hoahoa i te māra me te whakaatu i ngā inenga tapa.

Ka wāwāhia ngā āhua o te māra, ā, ka whakamahia ngā ture e hāngai ana ki ia āhua hei tātai i te rōrahi.



Wāhanga 3

He Ngohe Whakaako i te Hangā



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 (wh. 111) ngā Whārangi Tārua e hiahiatia ana hei whakatutuki
i ētahi o ngā ngohe. Kei te pae ipurangi o www.nzmaths.co.nz hoki ēnei whārangi tārua.

Whanaketanga 1a

Mātauranga Matua kua Mau kē

Te Tau

- te tatau pānga tahi

Mātauranga Matua hei Ako

- te tautohu i ētahi āhuatanga māmā o tētahi āhua ahu-2, o tētahi āhua ahu-3 rānei: ūna tapa; ūna mata; ūna kokonga; te kōpiko, te torotika rānei o ūna tapa me ūna mata
- te whakatairite me te whakarōpū āhua i runga i ngā āhuatanga māmā pēnei i ēnei: te maha o ngā tapa, o ngā mata, o ngā kokonga rānei; te mātotoru; te rahi; te koi o ngā kokonga; te torotika, te kōpiko rānei o ngā tapa (me ngā mata)
- ngā kupu āhuahanga nei: tapa, mata, kokonga, kōpiko, torotika, rārangī
- te whakamārama i ngā āhua māmā i āna ake kupu

Rauemi kē atu e Hāngai ana

Ngā kōwae ako o nzmaths

- Te Torotoro Āhua

<http://www.nzmaths.co.nz/resource/torotoro-hua>

Hanga Ōrite, Hanga Rerekē

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

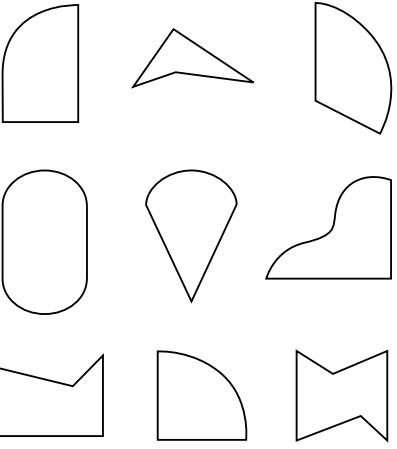
E ako ana ahau ki te whakamārama āhua.

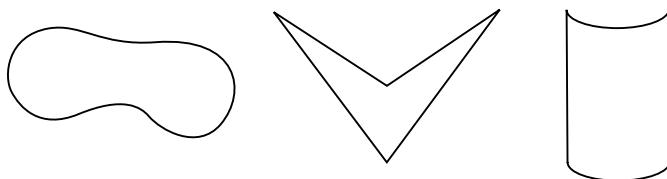
Rauemi

- Whārangi Tārua 1

Kupu matua

koi, kokonga, mata, rārangi kōpiko, rārangi torotika, tapa

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Whakaahuangia te Whārangi Tārua 1, ka tapahi ai i ngā āhua. Whakatakotoria ngā āhua (ētahi o ngā āhua rānei) ki mua i ngā ākonga, ka whakawhitihitit kōrero ai mō ngā āhuatanga ūrite me ngā āhuatanga rerekē.</p> 	<p>Tangohia tētahi o ngā āhua, ka āta whakaaro i tētahi kōrero mō taua āhua.</p> <p>He tauira whakautu:</p> <ul style="list-style-type: none"> • E rima ngā tapa. • He rite ki te whutupōro te āhua. • He rārangi kōpiko hei tuhi i tēnei āhua. • He rārangi kōpiko, he rārangi torotika hoki hei tuhi i tēnei āhua. • Ka haere whakaroto ētahi o ngā tapa. • He rite ki te pū 'U' tēnei āhua. <p>Tangohia kia rua ngā āhua. Whakaaro hia tētahi āhuatanga ūrite o ēnā āhua, me tētahi āhuatanga rerekē.</p> <p>He tauira whakautu:</p> <ul style="list-style-type: none"> • He rārangi torotika tō tēnā āhua, tō tēnā. • Kerekau he rārangi kōpiko o tēnei āhua. • E whā ngā tapa o tēnā āhua me tēnā. • E toru ngā kokonga o tētahi, e whā ō tētahi. • He ūrite ēnei āhua e rua, engari he roa ake tēnei tapa i tēnei. <p>Hoatu he tohutohu hei whiriwhiri mā ngā ākonga i tētahi o ngā āhua. Hei tauira:</p> <ul style="list-style-type: none"> • E Hine, homai tētahi āhua, he kōpiko tētahi wāhangā o ūna tapa. • E Tama, tangohia tētahi āhua e haere whakaroto ana ūna tapa. • E Wi, kei hea tētahi āhua he kōpiko katoa ūna tapa, ā, e haere whakaroto ana tētahi wāhangā?

	<p>Anei taku ture hei kimi mā koutou i ngā āhua e hāngai ana, ka whakarōpū ai ki konei. Hei tauira:</p> <ul style="list-style-type: none"> • He kokonga koi tōna. • E rua, nui ake rānei ūna kokonga koi. • He rārangi torotika, he rārangi kōpiko ūna tapa. • E rima ūna tapa, ko tētahi he rārangi kōpiko.
<p>Ka mahi takirua ngā ākonga. Mā tētahi e whakarite tētahi rōpū āhua. Mā tōna hoa e āta whakaaro he aha ngā āhuatanga ūrite o te rōpū.</p>	<p>Whakaarohipa tētahi āhuatanga o ngā āhua. Whakaemia he rōpū āhua e hāngai ana ki tēnā āhuatanga i whakaarohipa e koe. Kātahi ka tono atu ki tō hoa, māna e āta whakaaro te āhuatanga o te rōpū āhua. Hei tauira:</p>  <p>E haere whakaroto ana tētahi wāhangā o ngā tapa o ēnei āhua.</p>

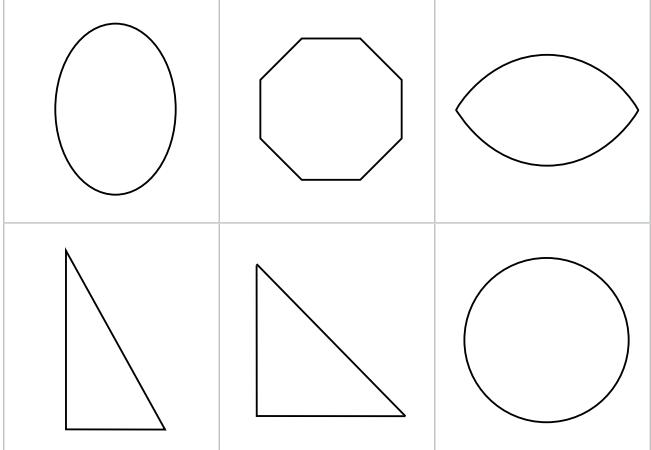
Wharewhare Āhua

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

E ako ana ahau ki te tautohu ā-karu i ngā momo āhua ahu-2.

Rauemi

- Whārangi Tārua 1 & 2
- He porotiti
- He rauata (OHP)

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Whakaahuangia te Whārangi Tārua 1, ka tapahi ai i ngā āhua.</p> <p>Hoatu he papa wharewhare (Whārangi Tārua 2) ki ia ākonga.</p> <p>Māu e whakaatu tētahi o ngā āhua ki te rauata (OHP) mō tētahi wā poto. Mēnā kei te papa wharewhare o te ākonga taua āhua, ka uhia e ia ki te porotiti.</p> <p>Ko te ākonga tuatahi kia uhia katoatia ngā āhua o tana papa wharewhare, ko ia te toa.</p>	<p>He kēmu wharewhare tēnei. Mō te wā poto noa iho ka whakaaturia he āhua ki te rauata. Mēnā he ūrite taua āhua ki tētahi āhua kei tō papa wharewhare, me uhi taua āhua ki te porotiti.</p> <p>Kia uhia katoatia ngā āhua i tō papa, karanga mai ‘Wharewhare’.</p> 

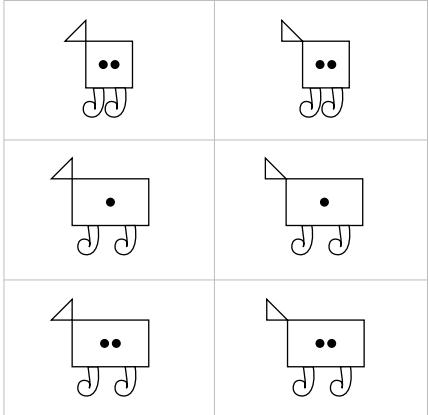
Te Whakarōpū Āhua

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

E ako ana ahau ki te whakarōpū āhua, me te whakamārama anō i ngā rōpū.

Rauemi

- Whārangi Tārua 3

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Whakaahuangia te Whārangi Tārua 3, ka tapahi ai i ngā kāri. Hoatu he huinga kāri ki ia takirua, me te tono kia whakarōpūngia.</p> <p>Kia maha rawa atu ngā whakarōpūtanga, me te tono anō kia whakamāramatia ngā rōpū.</p> 	<p>He mahi takirua tēnei. Anei tētahi huinga kāri mā ia takirua. Ko tā kōrua mahi ko tō hoa, he āta whiriwhiri i ētahi whakarōpūtanga o ēnei kāri.</p> <p>He aha te whakamāramatanga e hāngai ana ki ia rōpū ka hangaia e kōrua?</p> <p>E hia katoa ngā whakarōpūtanga e taea ana e kōrua?</p> <p>He tauira whakarōpūtanga:</p> <ul style="list-style-type: none">• He tapawhā hāngai ngā tinana katoa o ēnei kāri.• He wāhangā kōpiko kei ngā tinana katoa o ēnei kāri.• E titiro whakamua ana ngā upoko o ēnei kāri.• Kotahi te ira o ēnei kāri, ā, e titiro whakamuri ana te katoa.• ...

Whanaketanga 1e

Mātauranga Matua kua Mau kē

Te Tau

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

Te Hanga

- te tautohu i ētahi āhuatanga māmā o tētahi āhua ahu-2, o tētahi āhua ahu-3 rānei: ūna tapa; ūna mata; ūna kokonga; te kōpiko, te torotika rānei o ūna tapa me ūna mata
- te whakatairite, me te whakarōpū āhua i runga i ngā āhuatanga māmā pēnei i ēnei: te maha o ngā tapa, o ngā mata, o ngā kokonga rānei; te mātotoru; te rahi; te koi o ngā kokonga; te torotika, te kōpiko rānei o ngā tapa (me ngā mata)
- ngā kupu āhuahanga nei: tapa, mata, kokonga, kōpiko, torotika, rārangi
- te whakamārama i ngā āhua māmā i āna ake kupu

Mātauranga Matua hei Ako

- te pūmautanga o tētahi āhua, ahakoa pēhea te huri o te noho mai o taua āhua
- ngā momo rārangi nei: rārangi poutū, rārangi huapae
- ngā āhua ahu-2 nei: tapawhā, tapawhā hāngai, tapawhā rite, tapatoru, porowhita, me te tautohu i ēnei āhua i te taiao
- ngā āhua ahu-3 nei: pouaka, poi, rango, me te tautohu i ēnei āhua i te taiao
- te hanga whakaahua ā-hinengaro o ngā āhua māmā
- te whai me te hoatu tohutohu māmā mō te tuhi i tētahi āhua
- te whakaputa kōrero mō ngā āhuatanga rerekē me ngā āhuatanga ūrite o ētahi āhua

He Tūhuratanga Hanga

1e.1 Te Haurua Tapawhā Hāngai (wh. 166)

Rauemi kē atu e Hāngai ana

Ngā Kōwae Ako o nzmaths

- Te Torotoro Āhua
<http://www.nzmaths.co.nz/resource/torotoro-hua>

Whāwhāngia

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

E ako ana ahau i ngā āhua ahu-2 māmā.

Rauemi

- He poraka āhua (kei te Whārangī Tārua 4 ētahi hei whakaahua ki te kāri mārō)
- Whārangī Tārua 5

Kupu matua

kokonga, tapa, tapaono, taparima, tapatoru, tapawhā, tapawhā hāngai, tapawhā rite

Ngā tohutohu	He tauira kōrero mā te pouako
Whakaahuangia ngā āhua kei te Whārangī Tārua 4, ka tapahi ai.	Tangohia tētahi āhua. Tohua mai ūna tapa. Tohua mai ūna kokonga.
Whakatakotoria ngā āhua ki te papa, ka whakawhitiwhiti kōrero ai mō ngā ingoa me ngā āhuatanga māmā o ngā āhua.	Hinewai, e hia ngā tapa o tō āhua? E toru. Nō reira ko te tapatoru te ingoa mō tēnā āhua. E hia ūna kokonga? E toru.
	E toru ngā tapa, e toru ngā kokonga o te tapatoru a Hinewai. Kei a wai tētahi atu tapatoru? E toru anō ngā tapa me ngā kokonga? Āe. E toru ngā kokonga, e toru ngā tapa o ngā tapatoru katoa. Atihana, haere mai ki te tuhi i tētahi tapatoru iti ki te papa tuhituhi. Oriana, māu e tuhi tētahi tapatoru, kia whā ūna kokonga. Kāore e taea. Mēnā e whā ngā kokonga, he tapawhā kē tērā.

Kia pērā anō ngā whakawhitiwhiti kōrero mō ērā atu o ngā āhua. Kia taunga ngā ākonga ki ngā ingoa o ngā āhua me ū rātou āhuatanga māmā nei, hoatu tētahi āhua ki tētahi ākonga me te tono kia katia ūna karu (herea rānei he uhikaru). Mā te whāwhā noa iho i te āhua ka whakaingoatia ai.

Kei te Whārangī Tārua 5 ētahi mahi hei whakaū i tēnei akoranga.

Hei whakawhānui

1. Tonoa ngā ākonga kia kimi mai i ngā āhua māmā i te taiao o te akomanga.
2. Kia pērā anō ngā mahi mō ngā āhua ahu-3 māmā, pērā i te poi, te rango, te mataono rite me te poro tapawhā hāngai.

Whētuia

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

E ako ana ahau i ngā āhua ahu-2 māmā.

Rauemi

- He pepa A4

Kupu matua

kokonga, tapa, tapaono, taparima, tapatoru, tapawhā, tapawhā hāngai, tapawhā rite, whētui

Ngā tohutohu	He tauira kōrero mā te pouako
Hoatu he pepa ki ngā ākonga, me ngā tohutohu kia whētuia hei hanga āhua.	Anei tētahi pepa. He aha te āhua o te pepa? He tapawhā hāngai. Āe rā. E whā ūna tapa, e whā ūna kokonga. He roa ētahi tapa e rua, he poto ētahi tapa e rua. Whētuia te pepa kia puta he tapawhā rite. Whakamāramatia mai te tapawhā rite. E whā ūna tapa. He ūrite te roa o ngā tapa katoa. E whā hoki ūna kokonga. Whētuia te pepa hei hanga tapatoru. Tuhia he rārangī whero ki ūna tapa katoa. Karakarangia ūna kokonga kia kahurangi. Ka hia ngā whētuinga kia puta he tapaono? Ka taea tētahi taparima te hanga mēnā kotahi anahe te whētuinga?

Hei whakawhānui

Kia pērā anō te mahi whētuitui pepa, engari me hoatu he pepa tapatoru hei tīmatatanga.

Āhua Iraira

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

E ako ana ahau i ngā āhua ahu-2 māmā.

Rauemi

- Whārangi Tārua 6 (he pepa iraira)
- He rūri

Kupu matua

ira, kokonga, rārangi huapae, rārangi poutū, tapa, tapaono, taparima, tapatoru, tapawhā, tapawhā hāngai, tapawhā rite

Ngā tohutohu	He tauira kōrero mā te pouako
Hoatu he pepa iraira (Whārangi Tārua 6) ki ngā ākonga, me ngā tohutohu hei tuhi i ngā āhua ahu-2 māmā.	<p>He pepa iraira tēnei. Tuhia he rārangi poutū, kia rima ūna ira. Koia te tapa tuatahi o tētahi tapawhā rite. Tuhia te katoa o te tapawhā rite.</p> <p>Tuhia he rārangi huapae, kia whā ūna ira. Koia te tapa tuatahi o tētahi tapatoru teitei. Tuhia te katoa o te tapatoru.</p> <p>Tuhia he tapawhā hāngai. Kia 7 ngā ira i tētahi tapa, kia 3 i tētahi.</p> <p>Tuhia he tapawhā hāngai, kia rearua te roa o tētahi tapa i te roa o tētahi.</p> <p>Tuhia he taparima. Kia poutū tētahi o ngā tapa, kia huapae tētahi.</p> <p>Tuhia he tapawhā rite, kāore ūna tapa poutū.</p>

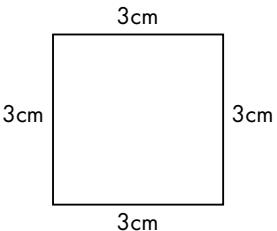
Huri noa i te Āhua

Te Hanga: E ako ana ahau i ngā āhua ahu-2 māmā.

Te Tau: E ako ana ahau i ngā rautaki tatau hei whakaoti tāpiritanga.

Kupu matua

tapaono, taparima, tapatoru, tapawhā, tapawhā hāngai, tapawhā rite

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Tuhia te rapanga nei ki te papa tuhituhi, ka pānui tahi ai me ngā ākonga:</p> <p>Nā Pania tētahi tapawhā rite i tuhi ki tana pukapuka. E toru mitarau (3cm) te roa o tētahi tapa. E hia te roa huri noa i te āhua?</p> 	<p>E pai ana te tuhi pikitia hei āwhina i a tātou. He aha te pikitia e tika ana?</p> <p>He tapawhā rite.</p> <p>Kia hia ngā tapa?</p> <p>Kia whā.</p> <p>Kia ūrite te roa o ia tapa nā te mea he tapawhā rite. E hia te roa o ngā tapa?</p> <p>E 3 mitarau ia tapa.</p> <p>Me tuhi te 3cm ki ia tapa.</p> <p>Tohua mai te ara, huri noa i te tapawhā rite.</p> <p>Me pēhea te tātai i te roa huri noa i te tapawhā rite?</p> <p>Hei tauira rautaki:</p> <ul style="list-style-type: none"> • Tāpirihia kia whā ngā 3: $3 + 3 + 3 + 3 = 12$ • Tatau māwhitiwhiti i ngā 3 e whā: 3, 6, 9, 12 • Rearuatia te 3 ka 6. Rearuatia te 6 ka 12: $3 + 3 = 6$, $6 + 6 = 12$

Kia pērā anō te mahi mō ētahi atu āhua. Whakamahia ngā tau e hāngai ana ki te kaupae tau o te ākonga. Hei tauira:

- Nā Pania tētahi tapatoru i tuhi ki tana pukapuka. E 3 mitarau (3cm) te roa o tētahi tapa, e 6 mitarau (6cm) tētahi, e 7 mitarau (7cm) tētahi. E hia te roa huri noa i te āhua?
- E 20 mita (20m) te roa o tētahi tapa o te papa tākaro poitarawhiti, 10 mita (10m) te roa o tētahi. E hia te roa huri noa i te papa tākaro?
- E 8 mitarau (8cm) te roa huri noa i te tapawhā rite nā Huriwai i tuhi. E hia te roa o ngā tapa?

Āhua ā-Hinengaro 1

1a	1e	2a	2e	3a	3e	4a	4e	5a
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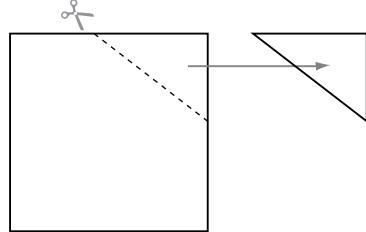
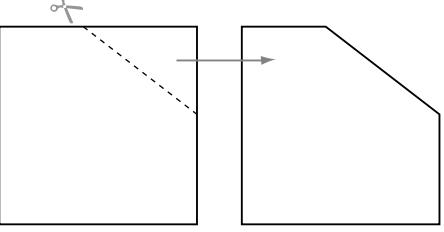
E ako ana ahau ki te whakaahua ā-hinengaro i ngā āhua māmā.

Rauemi

- Whārangī Tārua 6 (he pepa iraira)
- He rūri

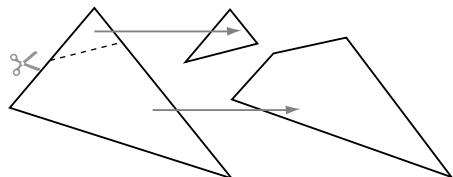
Kupu matua

ira, kokonga, rārangi huapae, rārangi poutū, tapa, tapaono, taparima, tapatoru, tapawhā, tapawhā hāngai, tapawhā rite

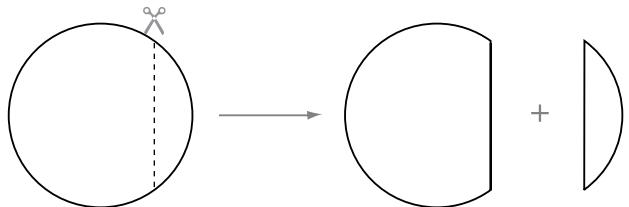
Ngā tohutohu	He tauira kōrero mā te pouako
<p>Tukuna he tohutohu hei whakaahua ā-hinengaro mā ngā ākonga i ētahi āhua māmā, ka tono ai i a rātou kia tuhia ki te pepa.</p>	<p>Āta whakaarohia i roto i tō hinengaro. He tapawhā rite tāu, ā, ka tapahi koe i tētahi o ngā kokonga.</p> <p>Tuhia te wāhangā i tapahia atu. Pēhea nei tōna āhua, he aha tōna ingoa?</p> <p>He tapatoru. E toru ūna tapa, e toru hoki ūna kokonga.</p>  <p>Pēhea nei te āhua o te wāhangā o te tapawhā rite e toe mai ana? Tuhia taua āhua. He aha te ingoa o tēnā momo āhua?</p> <p>He taparima. E rima ūna tapa, e rima hoki ūna kokonga.</p> 

Kia pērā anō te mahi mō ētahi atu āhua. Hei tauira:

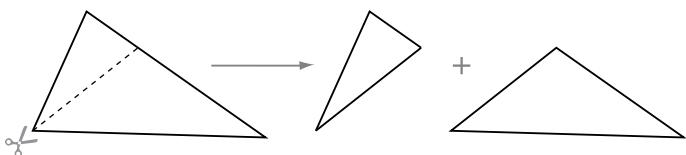
- Te tapahi i tētahi kokonga o te tapatoru:



- Te tapahi poutū i tētahi porowhitia:



- Te tapahi i tētahi tapatoru, mai i tētahi o ūna kokonga:



Tukuna he tohutohu hei āta whakaaro ā-hinengaro mā ngā ākonga i te hanga o ngā mati tau, 0 ki te 9.

Āta whakaarohia ngā tau mai i te kore ki te iwa. Tuhia ngā tau ka hangaia ki te rārangi torotika anake.

Ko te 1, te 4, me te 7.

Tuhia ngā tau ka hangaia ki te rārangi kōpiko anake.

Ko te 0, te 3, te 6, te 8 me te 9.

Tuhia ngā tau ka hangaia ki te rārangi torotika me te rārangi kōpiko.

Ko te 2 me te 5.

Kia pērā anō te mahi mō ngā pūriki me ngā pūmatua o te wakapū reo Māori.

Whanaketanga 2a

Mātauranga Matua kua Mau kē

Te Tau

- ngā rautaki wāwāhi tau māmā

Te Hanga

- te pūmautanga o tētahi āhua, ahakoa pēhea te huri o te noho mai o taua āhua
- ngā momo rārangi nei: rārangi poutū, rārangi huapae
- ngā āhua ahu-2 nei: tapawhā, tapawhā hāngai, tapawhā rite, tapatoru, porowhita, me te tautohu i ēnei āhua i te taiao
- ngā āhua ahu-3 nei: pouaka, poi, rango, me te tautohu i ēnei āhua i te taiao
- te hanga whakaahua ā-hinengaro o ngā āhua māmā
- te whai me te hoatu tohutohu māmā mō te tuhi i tētahi āhua
- te whakaputa kōrero mō ngā āhuatanga rerekē me ngā āhuatanga ūrite o ētahi āhua

Mātauranga Matua hei Ako

- ngā momo tapatoru nei, te tapatoru hikuwaru, te tapatoru waerite, te tapatoru rite me te tapatoru hāngai
- te kite ā-karu i ngā koki ūrite o tētahi taparau
- ngā āhuatanga nei: rārangi whakarara, rārangi pūtahi, rārangi hāngai, koki hāngai, koki iti ake i te koki hāngai, koki nui ake i te koki hāngai, hauroki
- te tuhi ā-ringa me te wāwāhi āhua ahu-2 i runga i te hangarite o aua āhua
- te whai me te hoatu tohutohu mō te tuhi i tētahi āhua
- ngā tikanga hei whakaatu koki hāngai, tapa ūrite, koki ūrite hoki
- te tikanga hei tapa i tētahi koki
- te whakamārama i te hangarite o tētahi āhua māmā i āna ake kupu

He Tūhuratanga Hanga

2a.1 Te Wāwāhi Tapawhā Hāngai (wh. 167)

Rauemi kē atu e Hāngai ana

Ngā Kōwae Ako o nzmaths

- Whētuia Ka Tapahi Ai
<http://www.nzmaths.co.nz/resource/wh-tuia-ka-tapahi-ai>
- Te Tapatoru
<http://www.nzmaths.co.nz/resource/te-tapatoru>

Ngā Rapanga o nzmaths

- He Maha ngā Tapawhā Rite
<http://www.nzmaths.co.nz/sites/default/files/Lots%20of%20Squares%20dot%20paper%20Maori.pdf>
- Te Āhua Rerekē
<http://www.nzmaths.co.nz/sites/default/files/Odd%20Thing%20out%20Maori.pdf>

Ngā Koki o ngā Taparau Māmā

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

E ako ana ahau i ngā tikanga mō te whakaingoa i tētahi āhua me tētahi koki.
E ako ana ahau i ngā āhuatanga o ngā momo tapatoru.

Rauemi

- Whārangi Tārua 7
- He kāri karakara

Kupu matua

akitu/kokonga, koki, koki hāngai, koki ōrite, taparau, tapatoru hāngai, tapatoru hikuwaru, tapatoru rite, tapatoru waerite

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Tuhia he tapawhā hāngai ki te papa tuhituhi, me te tuhi anō i ētahi pū matua ki ūna kokonga.</p> <p>Whakawhitiwhiti kōrero mō te whakaingoa i te tapawhā hāngai me ūna koki.</p>	<p>Titiro ki te tapawhā hāngai nei. Kua tuhia he pū matua ki ia kokonga. Ko ēnei pū matua hei whakaingoa i te tapawhā hāngai. Arā ko te AEHI hei ingoa mō tēnei tapawhā.</p> <p>E hia ngā kokonga o te tapawhā hāngai? E whā.</p> <p>E hia ngā pū matua o tōna ingoa? E whā.</p> <p>Mēnā e toru noa iho ngā pū matua hei whakaingoa i tētahi taparau, he pēhea nei te āhua o taua taparau? He tapatoru. E toru ngā pū matua, nō reira e toru anō ngā kokonga. Mēnā e toru ūna kokonga, he tapatoru tērā.</p> <p>Tuhia he taparau, me te whakaingoa ki ngā pū matua nei: MNOPR. He aha te ingoa o tēnei momo taparau? He taparima.</p> <p>Tuhia he taparau, me te whakaingoa ki ngā pū matua nei: TUW. He aha te ingoa o tēnei momo taparau? He tapatoru.</p>
<p>Tuhia he tapatoru hikuwaru ki te papa tuhituhi, ka whakawhitiwhiti kōrero ai mō ūna koki.</p>	<p>Titiro ki te tapatoru nei. Ko te AEH hei ingoa mōna. E Tama, tohua mai ūna kokonga.</p> <p>Māku e tapahi tētahi mara kāri whero kia hāngai ki te rahi o tēnei kokonga.</p>

Āta whakamāramahia te koki e hāngai ana ki ia kokonga o te tapatoru.

Tapahia tētahi kāri hei tohu i te rahi o tētahi o ngā koki. Whakamahia te kāri hei whakatairite ki te rahi o ērā atu o ngā koki.

Whakamāramahia te ingoa o tēnei momo tapatoru, arā, te tapatoru hikuwaru.

Ko tēnei kāri whero hei tohu i te rahi o te koki o tēnā kokonga. Ko HAE te ingoa o tēnei koki. He aha ai?

Nā te mea ko te rārangī mai i te H ki te A tētahi ringaringa o te koki, ko te rārangī mai i te A ki te E tētahi anō ringaringa.

Ko te aha tētahi atu ingoa mō taua koki?

Ko te EAH.

Āe rā. Ko te mea nui kia noho mai te pū matua o te kokonga ki waenganui i te ingoa mō te koki.

Tohua mai te koki AEH. Me pēhea tātou e mōhio ai mēnā he nui ake, he iti iho rānei taua koki i te koki HAE? Me whakatakoto te mara kāri whero e hāngai ana ki te koki HAE ki te koki AEH. Kātahi ka āta kitea mēnā he nui ake, he iti iho rānei.

Pēhea te koki tuatoru o te tapatoru, te EHA? He iti iho, he nui ake rānei i te koki HAE?

He iti iho.

Raupapahia ngā koki e toru mai i te iti ki te rahi.

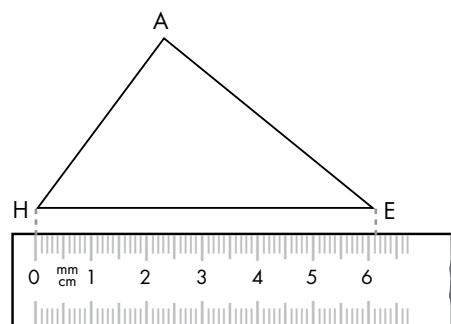
Ko te AEH te iti rawa, ko te EHA kei waenganui, ko te HAE te nui rawa.

He rerekē te rahi o ngā koki katoa o tēnei tapatoru. Āta tirohia ūna tapa. He ūrite te roa, he rerekē rānei te roa o ngā tapa?

Ki tā te karu titiro, he rerekē te roa o tēnā tapa me tēnā.

Whakamātauria te titiro a ū karu. Me pēhea?

Whakamahia he tāhei pepa. Tohua tētahi wāhi tīmatanga, kātahi ka tohu i te roa o ia tapa. Whakamahia rānei he rūri.



Ko te tapatoru hikuwaru te ingoa mō tēnei momo tapatoru nā te mea kāore ūna koki ūrite, kāore hoki ūna tapa ūrite.

<p>Tonoa mā ia ākonga e tuhi tētahi tapatoru hikuwaru. Mā tētahi hoa e whakamātau mēnā he rerekē katoa ngā tapa me ngā koki.</p>	<p>Māu e tuhi tētahi tapatoru hikuwaru ki te pepa. Hoatu ki tētahi hoa, māna e whakamātau mēnā he rerekē katoa ngā koki me ngā tapa.</p>
<p>Kia pērā anō te tūhura i ngā koki o ērā atu o ngā momo tapatoru me te tapawhā hāngai, kia kitea ai ngā tikanga nei:</p>	
<ul style="list-style-type: none"> • he ūrite ngā koki katoa me ngā tapa katoa o te tapatoru rite • he ūrite ētahi koki e rua me ētahi tapa e rua o te tapatoru waerite • he ūrite ngā koki katoa o te tapawhā hāngai 	
<p>Kei te Whārangī Tārua 7 ētahi tapatoru hei whakamātau mā ngā ākonga mēnā he tapatoru rite, he tapatoru waerite, he tapatoru hikuwaru rānei.</p>	
<p>Hei whakawhānui Tūhurangia te ūrite o ngā koki o tētahi tapawhā hāngai ki te hurihangā hauwhā, me te whāngai anō i te kupu ‘koki hāngai’.</p>	

Rārangi Whakarara

1a	1e	2a	2e	3a	3e	4a	4e	5a
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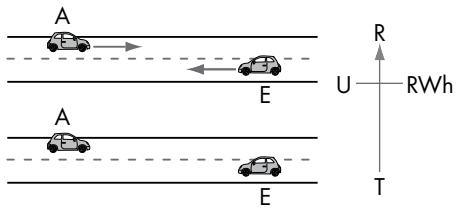
E ako ana ahau i ngā tikanga o te rārangi whakarara.

Rauemi

- Whārangi Tārua 8 & 9

Kupu matua

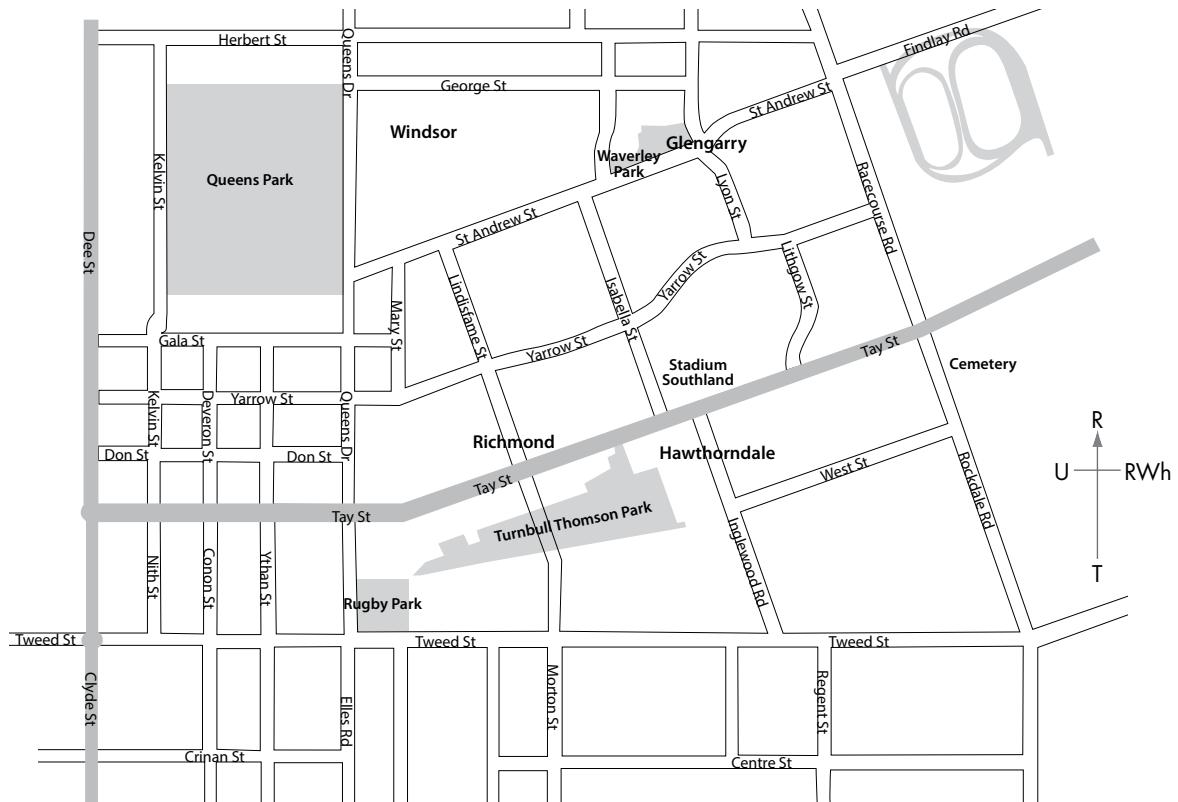
ahunga, hauroki, pūtahi, raki, rāwhiti, tonga, uru, whakarara

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Tuhia ētahi rārangi whakarara ki te papa tuhituhi hei tohu i ētahi ara motukā e rua. Whakawhitihī kōrero mō ngā tikanga o tēnei mea te whakarara.</p>  <p>A E A E</p> <p>U R RWh T</p>	<p>He pikitia tēnei o ētahi rori e rua. Ki tō whakaaro, he aha te tikanga o te rīpeka e noho mai ana i te taha, me ūna pū? Koia hei tohu i te ahunga. Ko te R e tohu ana i te raki, arā, ko te ahunga mai i raro ki runga. Ko te RWh he tuhinga poto mo te rāwhiti, te ahunga mai i te mauī ki te matau. Ko te T hei tohu i te tonga, mai i runga ki raro. Ko te U hei tohu i te uru, te ahunga whakatemauī.</p> <p>He aha te ahunga o ngā rori e rua nei?</p> <p>E ahu ana ki te rāwhiti mēnā e haere whakatematau ana te motukā (motukā A). E ahu ana ki te uru mēnā e haere whakatemauī ana (motukā E).</p> <p>Ki tō titiro, mēnā ka pēnei tonu te haere o ēnei rori e rua ki te rāwhiti, ka pūtahi? Arā ka tūtaki tētahi rori i tētahi? Kāore, nā te mea e haere ana i te ahunga ūrite. Kore rawa tētahi e tūtaki i tētahi.</p> <p>Pēhea mēnā ka pēnei tonu te haere o ēnei rori e rua ki te uru, ka pūtahi, kāore e pūtahi rānei?</p> <p>Kāore e pūtahi. He ūrite te ahunga o ngā rori. Kore rawa tētahi e tūtaki i tētahi.</p> <p>He kupu pāngarau motuhake hei whakaahua i ētahi rārangi e rua mēnā e kore rawa aua rārangi e pūtahi, arā, he ūrite te ahunga o aua rārangi. Ka kīia he rārangi whakarara. He whakarara ēnei rori.</p> <p>E Rangi, haere mai ki te tuhi i tētahi anō rori, kia whakarara tonu ki ēnei.</p> <p>E Mara, māu e tuhi tētahi rori e haere hāngai ana, e whakawhitihī ana i ēnei rori e toru.</p>

Tirohia tētahi mahere tāone, ka tautohu ai i ngā huarahi whakarara. Kei te Whārangī Tārua 8 tētahi tauira mahere.

Titiro ki te mahere huarahi nei o Te Waihōpai. Ko te huarahi o Tweed tētahi o ngā huarahi matua. He aha te ahunga o Tweed?

E ahu whakateuru ana tētahi pito, e ahu ana tētahi pito ki te rāwhiti.



He aha tētahi huarahi e whakarara ana ki a Tweed?

Ko te tīmatanga o Tay me Yarrow, ko Gala me Don ētahi huarahi whakarara ki Tweed.

He aha ētahi huarahi e haere hāngai ana ki a Tweed? Arā, he koki hāngai te tūtakina o aua huarahi me Tweed?

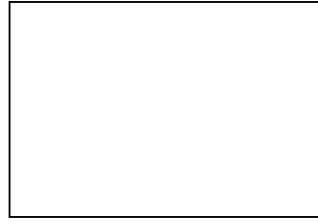
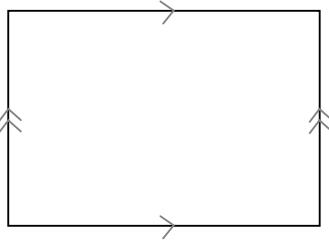
Ko Dee, ko Kelvin, ko Deveron ētahi.

He titaha te ahunga o te huarahi o Hato Anaru. He aha ētahi huarahi whakarara ki a Hato Anaru?

He whakarara te wāhangā o Tay e haere titaha ana. He āhua whakarara hoki tētahi wāhangā o Yarrow.

Pēhea te huarahi o Racecourse? He aha ētahi huarahi e whakarara ana? He aha ētahi e haere hāngai ana?

He whakarara a Inglewood, me Isabella. E haere hāngai ana a Tay me West.

<p>Tonoa ngā ākonga kia tuhi i tētahi tapawhā hāngai, ka whakawhitihitikerero ai mō ngā tapa whakarara, me te tohu hei whakaatu rārangi whakarara.</p>	<p>Tuhia he tapawhā hāngai. E hia ngā tapa, e hia ngā kokonga? E whā.</p>  <p>Pēhea nei te rahi o ngā koki o ngā kokonga? He ūrite, he koki hāngai katoa.</p> <p>Pēhea te roa o ngā tapa? E rua ngā tapa takirua. He ūrite te roa o te tapa runga me te tapa raro. He ūrite hoki te roa o te tapa mauī me te tapa matau.</p> <p>Pēhea te ahunga o ngā tapa? He ūrite te ahunga o te tapa runga me te tapa raro, arā, he whakarara. He whakarara anō hoki te tapa mauī me te tapa matau.</p> <p>Ko tētahi tikanga pāngarau, ko te tuhi i ētahi pere iti hei whakaatu rārangi whakarara. Kia kotahi te pere ki te tapa runga me te tapa raro. Kia rua ki te tapa mauī me te tapa matau.</p> 
<p>Kei te Whārangi Tārua 9 ētahi taparau hei whiriwhiri mā ngā ākonga i ngā tapa whakarara.</p>	<p>Titiro ki ngā taparau kei tēnei whārangi. Ko tāu mahi, he tohu i ngā tapa whakarara o tēnā taparau, o tēnā.</p>
<p>Hei whakawhānui</p> <ul style="list-style-type: none"> • Tūhurangia ngā mata whakarara o ngā āhua ahu-3, pērā i te mataono rite, me ngā momo poro. • Kimihia he rārangi whakarara i te hanga o te akomanga me ngā taonga o roto. 	

Te Whakamārama Āhua

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

E ako ana ahau ki te whakamārama āhua ahu-2 māmā.

Rauemi

- Whārangi Tārua 10

Kupu matua

hauroki, koki, tapa, torotika, whakarara

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Whakaahuangia te Whārangi Tārua 10, ka tapahi ai i ngā kāri. E ono ngā kāri whakamārama āhua, e ono anō ngā kāri e whakaatu ana i aua āhua.</p> <p>Whakamāramahia te kēmu nei hei tākaro mā ngā ākonga.</p>	<p>He kēmu tēnei hei tākaro takirua mā koutou. E rua ngā huinga kāri.</p> <p>He tapawhā hāngai te āhua o tētahi huinga kāri. He whakamāramatanga āhua kei aua kāri.</p> <p>He tapawhā rite te āhua o tētahi huinga kāri, kua tuhia ngā āhua ki aua kāri.</p> <p>Horahia ngā kāri katoa ki te papa, ko ngā mata ki raro kia kore ai e kitea ngā tuhinga, ngā pikitia rānei.</p> <p>Ka whai tētahi o kōrua i tētahi ki te huri i tētahi o ia huinga kāri, arā, he kāri tapawhā hāngai, he kāri tapawhā rite hoki.</p> <p>Mēnā e hāngai ana te pikitia o te āhua ki te whakamārama, ka puritia e koe aua kāri e rua ki a koe.</p> <p>Ina pau katoa ngā kāri, ko te tangata kei a ia te nuinga o ngā takirua kāri, ko ia te toa.</p>
Hei whakawhānui	
<ul style="list-style-type: none">• Hoatu ko ngā kāri whakamārama anake, mā te ākonga e tuhi te āhua e hāngai ana ki te whakamārama.• Tonoa mā ngā ākonga e tuhi whakamārama mō ētahi āhua māmā, me te hoatu ki tētahi hoa, māna e tuhi te pikitia e hāngai ana.	

Te Hanga Āhua

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

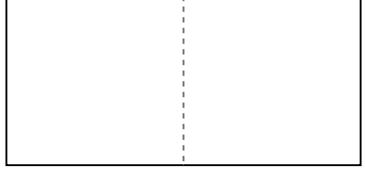
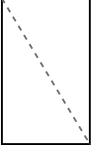
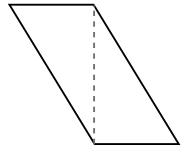
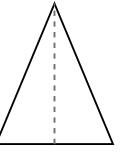
E ako ana ahau i ngā āhuatanga o ngā āhua ahu-2 māmā.

Rauemi

- Whārangi Tārua 11 & 12

Kupu matua

tapā, tapatoru hāngai, tapatoru rite, tapatoru waerite, tapawhā hāngai, tapawhā rite, tapawhā whakarara

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Whakaahuangia te Whārangi Tārua 11, Ka tapahi ai i ngā āhua.</p> <p>Hoatu ngā takirua āhua ki ia ākonga. Tonoa rātou kia whakapiri i te tapa o tētahi āhua ki te tapa o tētahi hei hanga āhua hou.</p>	<p>Tangohia ētahi tapawhā rite e rua he rite anō te rahi. Honoa te tapa o tētahi ki te tapa o tētahi hei hanga i tētahi āhua hou. He aha te āhua hou ka puta?</p> <p>He tapawhā hāngai.</p>  <p>Ka taea tētahi atu āhua hou te hanga mā te whakapiri i ngā tapa o ētahi tapawhā rite e rua?</p> <p>Kāo, koirā anahe te āhua ka puta, ko te tapawhā hāngai.</p> <p>Honoa te tapa o tētahi tapatoru hāngai me te tapa o tētahi atu tapatoru hāngai e ūrite ana te rahi. He aha ngā āhua hou ka taea te hanga?</p>     

Kei te Whārangi Tārua 12 ētahi mahi hei whakaū i tēnei akoranga.

Āhua ā-Hinengaro 2

1a	1e	2a	2e	3a	3e	4a	4e	5a
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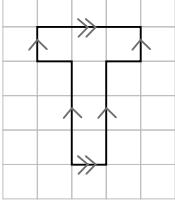
E ako ana ahau ki te whakaahua ā-hinengaro i ngā āhua māmā.

Rauemi

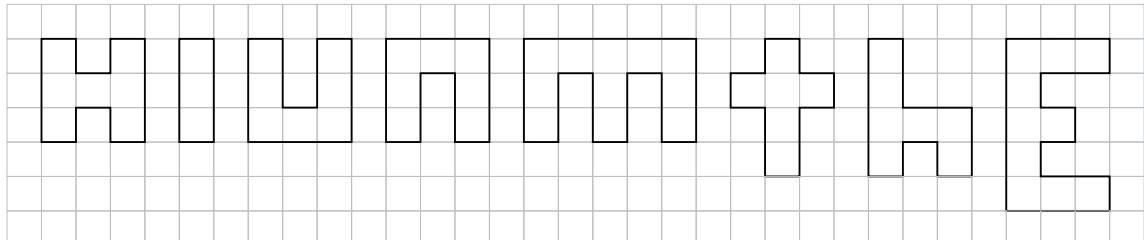
- He pepa tukutuku

Kupu matua

hāngai, kokonga, tapa, taparau, whakarara

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Tonoa ngā ākonga ki te whakaahua ā-hinengaro i te tuhinga o ētahi pū ki te pepa tukutuku. Whakawhitihiti kōrero mō te āhua o aua pū, me ō rātou āhuatanga āhuahanga.</p>	<p>Titiro ki te pepa tukutuku nei. Āta whakaarohia i roto i tō hinengaro te tuhinga o te pū matua ‘T’ ki te pepa tukutuku. Kotahi wāhangā o te pepa tukutuku te whānui o ia wāhangā o te ‘T’.</p> <p>E hia ngā kokonga i te tuhinga o te pūmatua ‘T’? E 8.</p> <p>E hia ngā rārangī hei tuhi i te pūmatua ‘T’? E 8 anō.</p> <p>E hia ūna koki hāngai? E 6 kei roto i te ‘T’, e 2 kei waho.</p> <p>He aha te momo taparau? He tapawaru, nā te mea e 8 ūna tapa.</p> <p>Tēnā, tuhia te pūmatua ‘T’ ki te pepa tukutuku, ka tohu ai i ūna rārangī whakarara.</p> 

Kia pērā anō te mahi mō ētahi atu o ngā pūmatua, pūriki hoki:



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 Hangā

- ngā momo tapatoru nei: te tapatoru hikuwaru, te tapatoru waerite, te tapatoru rite me te tapatoru hāngai
- te kite ā-karu i ngā koki ōrite o tētahi taparau
- ngā āhuatanga nei: rārangi whakarara, rārangi pūtahi, rārangi hāngai, koki hāngai, koki iti iho i te koki hāngai, koki nui ake i te koki hāngai, hauroki
- te tuhi ā-ringa me te wāwāhi āhua ahu-2 i runga i te hangarite o aua āhua
- te whai me te hoatu tohutohu mō te tuhi i tētahi āhua
- ngā tikanga hei whakaatu koki hāngai, tapa ōrite, koki ōrite hoki
- te tikanga hei tapa i tētahi koki
- te whakamārama i te hangarite o tētahi āhua māmā i āna ake kupu

Mātauranga Matua hei Ako

- ngā momo mataraū nei: te poro tapawhā, te poro tapatoru, te mataono rite, te koeko, te koeko tapawhā, te koeko tapatoru
- te whakapiri mai i ētahi āhua māmā (pēnei i te mataono rite) hei hanga tauira
- te kite ā-hinengaro i te āhua o ngā tapanga āhua ahu-3
- te whakamahi i ngā taputapu tā (pērā i te tāporowhitia me te rūri), hei tuhi koki hāngai, hei tuhi taparau māmā
- ngā kupu āhuahanga nei: poro, poro tapawhā, poro tapatoru, mataono rite, koeko, koeko tapawhā, koeko tapatoru, tihi, pūtake
- te whakamārama i ngā momo mataraū māmā i āna ake kupu

He Tūhuratanga Hangā

- 2e.1 He aha te Pānga? (wh. 168)
2e.2 Āhua Hangawhitu (wh. 170)
2e.3 Kimihia te Pū o te Porowhitia (wh. 172)

Āhua Ahu-toru

1a	1e	2a	2e	3a	3e	4a	4e	5a
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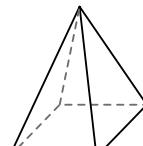
E ako ana ahau i ngā āhua ahu-3.

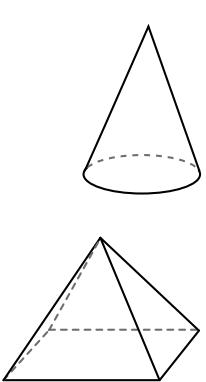
Rauemi

- Whārangi Tārua 13, 14 & 15

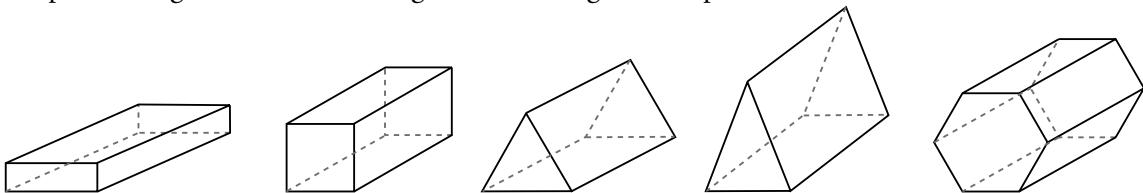
Kupu matua

koeko, koeko porowhita, koeko tapaono, koeko tapatoru, koeko tapawhā hāngai, koeko tapawhā rite, mata, poro, poro tapatoru, poro tapatoru hāngai, poro tapatoru rite, poro tapatoru waerite, poro tapawhā hāngai, poro tapawhā rite, pūtake, tapa, tīhi

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Hoatu he āhua ahu-3 hei whāwhā, hei whakarōpū mā ngā ākonga.</p> <p>Kei te Whārangi Tārua 13 ētahi pikitia, engari he pai ake ngā āhua tūturu.</p>	<p>Anei ētahi āhua hei tirotiro mā koutou. He aha te rerekē o ēnei āhua me ngā āhua pēnei i te tapawhā me te tapatoru? He papatahi te tapawhā, te tapatoru me ērā o ngā āhua. Ka takoto noa ki te papa, kāore e taea te whakatū. He mātotoru ēnei āhua, kāore i papatahi, ka taea te whakatū. He maha ngā mata.</p> <p>Whakarōpūngia ēnei āhua. Whakamāramahia mai he aha i pēnā ai tō whakarōpū i ēnei āhua.</p> <p>Hei tauira whakarōpūtanga:</p> <ul style="list-style-type: none"> • He mea hanga ēnei ki te mata papatahi. • He mata kōpiko kei ēnei āhua. • Ka pīrori ēnei āhua, kāore ēnei. • He porowhita tētahi o ngā mata o ēnei āhua. • E whai tīhi ana ēnei āhua. • ...
<p>Whakawhitiwhiti kōrero mō ngā momo koeko me ngā āhuatanga nei, te mata, te tapa, te tīhi, te pūtake me te kokonga (akitu).</p>	<p>Kia titiro tātou ki tēnei āhua:</p>  <p>E hia ūna mata?</p> <p>E rima.</p> <p>Pēhea nei te āhua o ngā mata?</p> <p>He tapawhā rite te pūtake. He tapatoru ērā atu o ngā mata.</p> <p>Tohua mai ūna tapa. E hia ūna tapa?</p> <p>E whā ngā tapa o te pūtake, e whā hoki ngā tapa mai i te pūtake ki te tīhi. E waru katoa.</p>

	<p>E whai tihi ana tēnei āhua. Kimihia ētahi atu āhua e whai tihi ana. Ko te ingoa o tēnei rōpū āhua, ko te koeko. He koeko katoa ēnei āhua.</p>
	<p>He aha te rerekētanga matua o tēnā koeko o tēnā? He rerekē te āhua o te pūtake. He tapawhā hāngai tētahi, he porowhita tētahi, he tapatoru tētahi, he tapaono tētahi.</p> <p>Hāunga te pūtake, he pēhea nei te āhua o ngā mata o ngā koeko katoa? He tapatoru.</p> <p>Ka riro ko te āhua o te pūtake o te koeko hei ingoa mōna. Anei te koeko porowhita.</p> <p>E Kahu, homai he koeko tapawhā rite.</p> <p>E Miro, he aha te ingoa o tēnei āhua? He koeko tapawhā hāngai.</p> 

Kia pērā anō ngā whakawhitihitinga kōrero mō ngā momo poro:



Hei whakawhānui

- Kimihia ngā momo āhua ahu-3 i te taiao o te akomanga, o te kāinga rānei. Kei te **Whārangī Tārua 14** ētahi whakaahua o ngā momo ipu kai. Tonoa ngā ākonga kia whakaingoa i ngā āhua o ngā ipu.
- Whakaahuangia te **Whārangī Tārua 15** ki te kāri mārō (he pai te whakarahi ake), ka tapahi ai i ngā āhua ahu-2. Tonoa ngā ākonga kia whakapiri i ngā āhua ahu-2 hei hanga āhua ahu-3. Hei tauira, he aha ngā āhua hei hanga i tētahi poro tapatoru rite? Whakamahia te tēpā hei whakapiri i ngā āhua hei hanga i te poro tapatoru rite.

Koia nei ngā āhua ahu-3 ka taea te hanga ki ngā āhua ahu-2 kei te **Whārangī Tārua 15**:

- ✓ he koeko tapawhā rite
- ✓ he poro tapatoru rite
- ✓ he poro tapawhā rite
- ✓ he poro tapatoru waerite
- ✓ he poro tapawhā hāngai
- ✓ he koeko tapawhā hāngai
- ✓ he koeko tapatoru rite
- ✓ he poro tapatoru hāngai

Hauroki

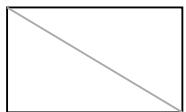
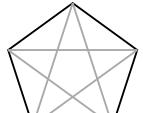
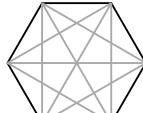
E ako ana ahau i ngā tikanga o ngā hauroki o ētahi tapawhā.

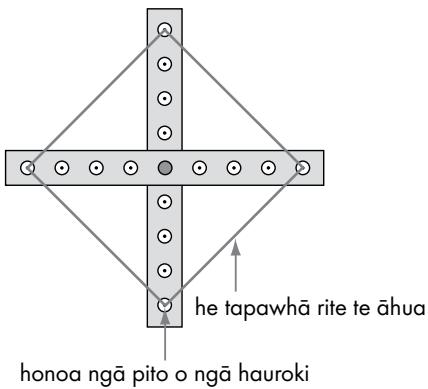
Rauemi

- Kia toru ngā tāhei kāri, rākau rānei, e whai kōhao ana (kei te Whārangi Tārua 16 ētahi whakaahua):
 - ki te takiwā o te 30cm te roa o ētahi tāhei e rua, kia iwa ngā kōhao mai i tētahi pito ki tētahi
 - ki te takiwā o te 20cm te roa o tētahi, kia iwa anō ngā kōhao mai i tētahi pito ki tētahi
 - kia ūrite te tāwhitiwhiti o ngā kōhao, mai i tētahi ki tētahi
- Whārangi Tārua 17
- He pine whakapiri

Kupu matua

hauroki, manu tapawhā, taparara, tapawhā, tapawhā hāngai, tapawhā rite, tapawhā whakarara, tapawhā whakarara rite

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Tuhia he tapawhā hāngai ki te papa tuhituhi, ka whakawhitihiti kōrero ai mō ūna hauroki.</p>  	<p>Titiro ki te tapawhā hāngai nei kua tuhia ki te papa tuhituhi. Kua tuhia hoki he rārangi mai i te kokonga mauī o runga ki te kokonga matau o raro. He aha te ingoa motuhake o tēnā rārangi?</p> <p>Ko te hauroki.</p> <p>Ko te rārangi mai i tētahi kokonga o tētahi taparau ki tētahi atu kokonga, ka kīia he hauroki tērā.</p> <p>E hia ngā hauroki o te tapawhā hāngai?</p> <p>E rua.</p>
<p>Tonoa ngā ākonga kia tūhura i ngā hauroki o ētahi atu taparau. Kei te Whārangi Tārua 17 ētahi taparau hei tuhi mā rātou i ngā hauroki.</p>	<p>Kua tuhia ētahi taparau ki tēnei whārangi. Māu e tuhi ngā hauroki katoa o tēnā taparau o tēnā. Kātahi ka tuhi i te maha o ngā hauroki o tēnā me tēnā ki te tūtohi.</p>    <p>E 2 ngā hauroki o te tapawhā</p> <p>E 5 ngā hauroki o te taparima</p> <p>E 9 ngā hauroki o te tapaono</p>
<p>Hoatu ngā rākau (ngā tāhei kāri mārō rānei) e toru ki ia takirua ākonga, ka arataki i a rātou ki te hono i ētahi rākau e rua hei hanga i ngā hauroki o tētahi tapawhā rite.</p>	<p>Kei te hono au i ngā rākau e rua ki ngā kōhao o waenganui. He ūrite te roa o ia rākau.</p> 

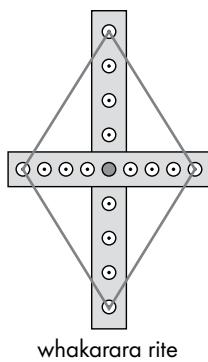


He hauroki ēnei o tētahi tapawhā. Whakaritea ngā hauroki nei kia puta he tapawhā rite, mēnā ka honoa ngā pito o ngā hauroki.

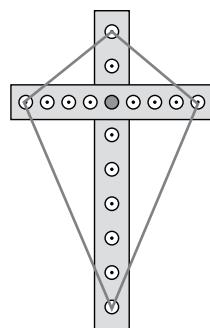
Āta tirotirohia ngā hauroki o te tapawhā rite. He aha ētahi āhuatanga o ngā hauroki?

- He ūrite te roa o ngā hauroki e rua.
- E hono ana ngā hauroki ki waengau.
- He koki hāngai i te pūtahitanga o ngā hauroki.
- He ūrite te tawhiti mai i te pūtahitanga o ngā hauroki ki ia kokonga o te tapawhā rite.

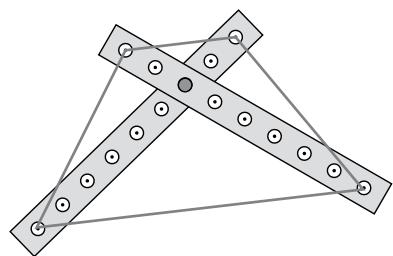
Tukuna ngā ākonga kia tūhura i ngā āhuatanga motuhake o ngā hauroki o ngā āhua nei:



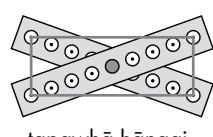
whakarara rite



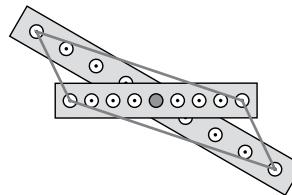
manu tapawhā



tāparara



tapawhā hāngai



tapawhā whakarara

Motuhanga

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

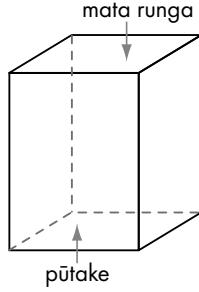
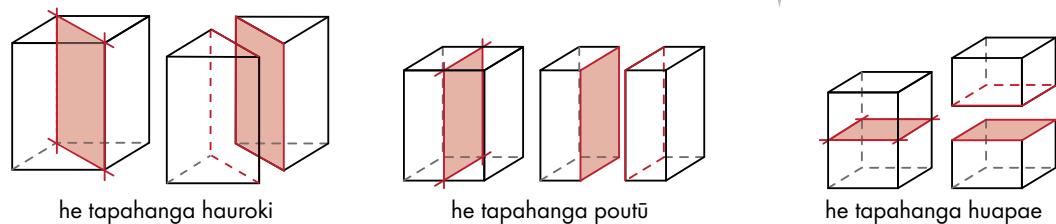
E ako ana ahau ki te whakaahua ā-hinengaro i ngā motuhanga māmā o ētahi āhua ahu-toru.

Rauemi

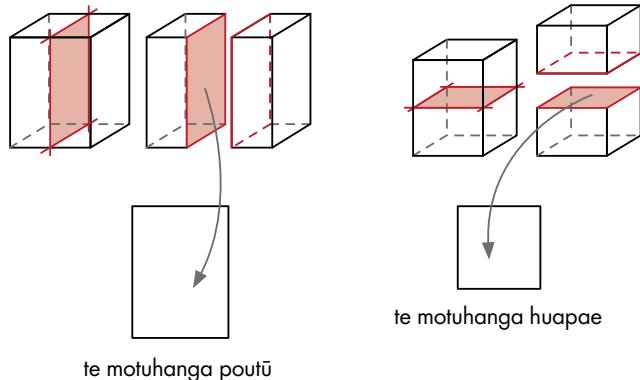
- Whārangī Tārua 18
- He uku me te waea hei tapahi
- He pouaka kāri
- He kutikuti

Kupu matua

āhua ahu-3, hauroki, huapae, motuhanga, poutū, tapahanga

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Tūhuratia ngā motuhanga huapae me ngā motuhanga poutū o te poro tapawhā hāngai.</p> <p>Hei tūhura ā-ringa i ngā motuhanga, me whakamahi he poro uku, ā, ka tapahia ki tētahi waea hei whakaputa i ngā motuhanga.</p> <p>Me whakamahi rānei he pouaka kāri mārō, ā, ka tapahi mā te kutikuti.</p>	<p>Titiro ki tēnei pouaka. He aha te ingoa pāngarau o tōna āhua? He poro tapawhā hāngai.</p>  <p>Whakamāramatia mai te ingoa. He aha i pēnā ai te whakaingoa i tēnei āhua?</p> <p>Nā te mea he tapawhā hāngai te āhua o ngā pito e rua, arā, te pūtake me te mata runga.</p> <p>Ki hea tapahia ai te pouaka kia haurua? Arā, kia rua ngā wāhangā ōrite.</p> <p>Ko tētahi he tapahanga huapae, ko ētahi he tapahanga poutū, ko ētahi he tapahanga i te rārangī hauroki o ngā mata.</p>  <p>he tapahanga hauroki he tapahanga poutū he tapahanga huapae</p>

Tuhia te āhua o te mata o ngā tapahanga. Ka kīia tērā ko te motuhanga.



He ūrite te motuhanga huapae o te poro tapawhā hāngai ki ēhea o ūna mata?

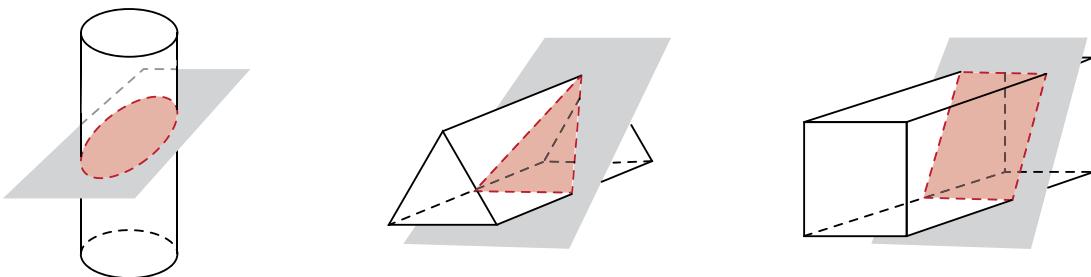
He ūrite te āhua o te motuhanga huapae, te pūtake me te mata runga.

Kia pērā anō te arataki i ngā ākonga ki te tūhura i ngā motuhanga huapae me ngā motuhanga poutū o ētahi atu āhua ahu-3 māmā, pēnei i te poro tapawhā rite, te poro tapawhā hāngai, te rango, te koeko porowhita, te koeko tapawhā hāngai me te koeko tapawhā rite.

Kia taunga ngā ākonga ki tēnei mahi ā-ringa, tonoa rātou kia whakaahua ā-hinengaro i te āhua o te motuhanga o ēnei āhua ahu-3. Kei te **Whārangj Tārua 18** ētahi mahi e hāngai ana.

Hei whakawhānui

Tūhurangia ngā tapahanga hōtiu o ngā āhua ahu-3. Hei tauira:



Waihanga Āhua Ahu-rua

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

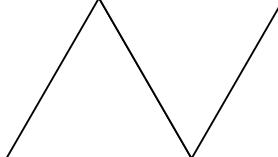
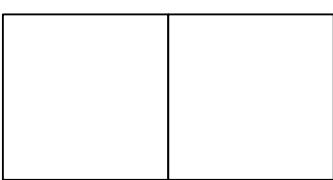
E ako ana ahau ki te whakaahua ā-hinengaro i ngā āhua ka puta i te whakapiringa tahitanga o ētahi āhua ahu-2 māmā.

Rauemi

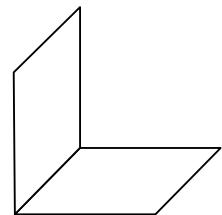
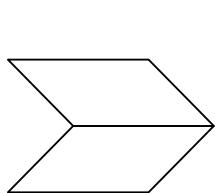
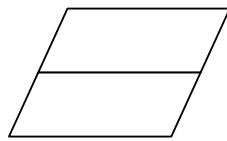
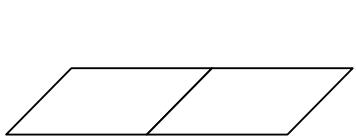
- Whārangi Tārua 19

Kupu matua

āhua ahu-2, tapa

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Whakaahuangia te Whārangi Tārua 19 ki te kāri mārō, ka tapahi ai i ngā āhua.</p> <p>Hoatu ētahi o ngā āhua ki ngā ākonga hei whakapiri mā rātou, hei hanga āhua hou.</p> <p>Whakawhitiwhiti kōrero mō ngā āhua hou ka puta.</p>	<p>Whakamahia ētahi tapatoru rite e rua he ūrite anō te rahi, ka whakapiri ai i te tapa o tētahi ki te tapa o tētahi. E hia ngā āhua hou rerekē ka taea te whakaputa?</p> <p>Kotahi anake te āhua hou ka puta.</p>  <p>He aha te ingoa pāngarau o te āhua hou?</p> <p>He whakarara rite. Arā, he whakarara ngā tapa tauaro, he ūrite te roa o ia tapa.</p> <p>Mēnā ka honoa tahitia ētahi tapawhā rite e rua (he ūrite anō te rahi), te tapa o tētahi ki te tapa o tētahi, e hia ngā āhua hou rerekē ka taea te whakaputa? I te tuatahi, me āta whakaahua i tō hinengaro, ka whakaputa ai i tō matapae. Kātahi ka whakamātau i tāu i matapae ai.</p> <p>Kotahi anake te āhua hou ka taea te whakaputa i te hononga tahitanga o ētahi tapawhā rite e rua. Arā, he tapawhā hāngai.</p>
	 <p>Ina whakapiria ētahi tapawhā whakarara e rua (he ūrite anō te rahi), tētahi tapa ki tētahi, he aha ngā āhua hou ka taea te whakaputa. Me āta whakaaro, ka matapae ai i te tuatahi, kātahi ka whakamātau.</p>

E whā ngā āhua hou ka taea te whakaputa. E rua, he tapawhā whakarara nui, e rua he pere tapaono.



Kia pērā tonu te tūhura i te hononga tahitanga o ēnei āhua (kei te Whārangī Tārua 19):

- ētahi tapatoru waerite e rua (kia ūrite anō te rahi)
- ētahi tapawhā hāngai e rua (kia ūrite anō te rahi)
- ētahi tapatoru hāngai e rua (kia ūrite anō te rahi)
- ētahi whakarara rite e rua (kia ūrite anō te rahi)

Hei whakawhānui

1. Honoa kia whā o ngā āhua māmā nei hei whakaputa āhua hou.
2. Tūhurangia te hononga tahitanga o ētahi āhua ahu-3 e rua. Hei tauira:
 - kia rua ngā mataono rite (kia ūrite anō te rahi)
 - kia rua ngā poro tapawhā hāngai (kia ūrite anō te rahi)
 - kia rua ngā poro tapatoru waerite (kia ūrite anō te rahi)

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 Hanga

- ngā momo matarau nei: te poro tapawhā, te poro tapatoru, te mataono rite, te koeko, te koeko tapawhā, te koeko tapatoru
- te whakakotahi mai i ētahi āhua māmā (pēnei i te mataono rite) hei hanga tauira.
- te kite ā-hinengaro i te āhua o ngā tapanga āhua ahu-3
- te whakamahi i ngā taputapu tā (pērā i te tāporowhita me te rūri), hei tuhi koki hāngai, hei tuhi taparau māmā
- ngā kupu āhuahanga nei: poro, poro tapawhā, poro tapatoru, mataono rite, koeko, koeko tapawhā, koeko tapatoru, tihi, pūtake
- te whakamārama i ngā momo matarau māmā i āna ake kupu

Mātauranga Matua hei Ako

- ngā āhuatanga āhuahanga o ngā rōpū taparau me ngā rōpū matarau. Hei tauira, e rua ngā rārangī whakarara takirua o tētahi tapawhā hāngai; e rua (e toru rānei) ngā koki ōrite o tētahi tapatoru waerite
- te whakarōpū āhua i runga i ngā āhuatanga āhuahanga o aua āhua, me te whakamārama anō i ngā rōpū
- te tautohu, te whakatairite me te tātari i ngā āhuatanga āhuahanga o ngā āhua ahu-2 me ngā āhua ahu-3
- te hanga raumata o ētahi āhua ahu-3 māmā, pēnei i te mataono rite, te poro tapawhā hāngai me te koeko tapawhā hāngai

He Tūhuratanga Hanga

3a.1 Kimihia te Āhua 1 (wh. 173)

3a.2 Kimihia te Āhua 2 (wh. 174)

3a.3 He Tauira Tapatoru (wh. 175)

Rauemi kē atu e Hāngai ana

Ngā Rapanga o nzmaths

- He Tārua i ētahi Āhua

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

Te Whakamārama Āhua

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

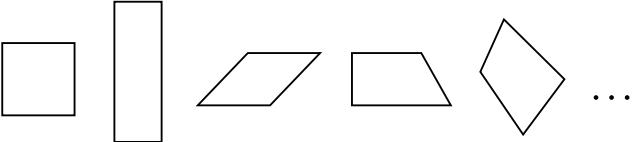
E ako ana ahau ki te whakamārama taparau.

Rauemi

- Whārangī Tārua 20

Kupu matua

hauroki, koki, takirua tapa, tapa, tapa tauaro, whakarara

Ngā tohutohu	He tauira kōrero mā te pouako
Tuhia he tapawhā ki te papa tuhituhi, ka whakawhitihiti kōrero ai mō ūna whakamārama katoa.	Ko tētahi kōrero hei whakamārama i tētahi āhua, ko te whakamōhio i te maha o ūna tapa. Mēnā ka kīia e whā ngā tapa, koia anake te whakamārama, tuhia ngā āhua katoa e hāngai ana. 
Kia pērā anō ngā mahi mō ētahi atu taparau, pēnei i te tapatoru rite, te tapatoru waerite, te tapawhā hāngai, te tapawhā whakarara, te whakarara rite, me ētahi atu. Aratakina ngā ākonga kia āta whakaaro ki ēnei āhuatanga: <ul style="list-style-type: none">• te maha o ngā tapa me ngā kokonga• te rahi o ngā koki• te roa o ngā tapa• ngā tapa whakarara• te maha o ngā hauroki <p>Kei te Whārangī Tārua 20 ētahi mahi hei whakaū i tēnei akoranga.</p>	Whakawhitihiti kōrero kōrua ko tētahi hoa, ka tuhi ai i ngā whakamārama katoa e hāngai ana ki tētahi tapawhā rite. <ul style="list-style-type: none">• E whā ngā tapa torotika.• He koki hāngai ngā koki katoa.• He ūrite te roa o ngā tapa katoa.• He whakarara ngā tapa takirua e noho tauaro ana.

Te Hanga Raumata

1a	1e	2a	2e	3a	3e	4a	4e	5a
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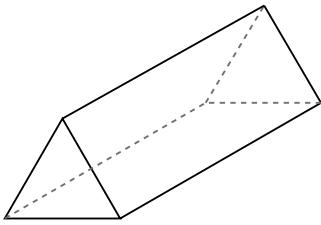
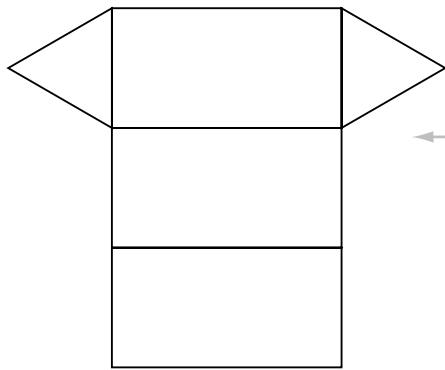
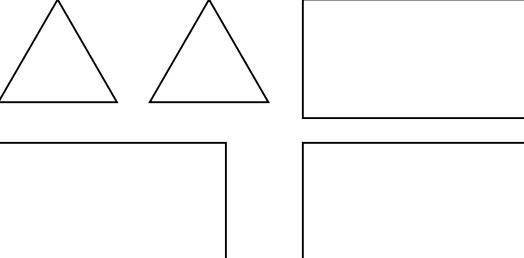
E ako ana ahau ki te hanga matarau māmā.

Rauemi

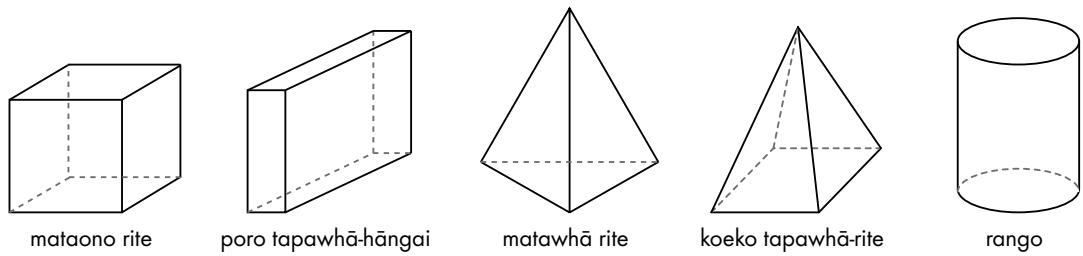
- Whārangi Tārua 21 & 22
- He tēpa

Kupu matua

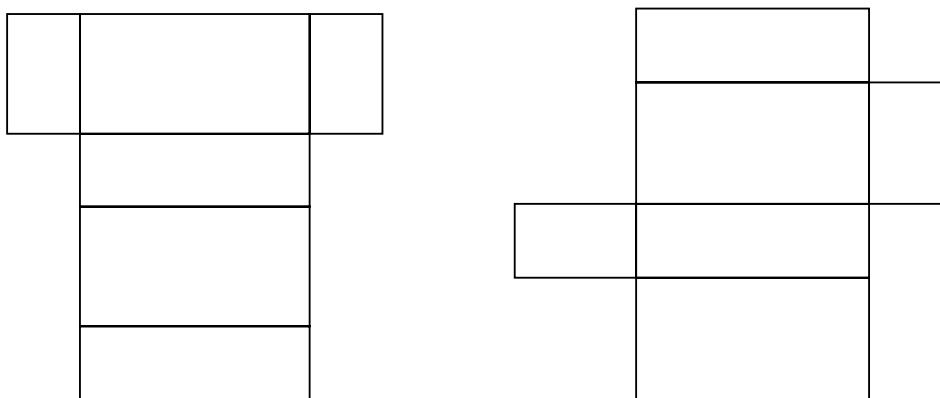
mata, raumata, tapa

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Hoatu he poro tapatoru rite kua hangaia ki te kāri mārō hei tirotiro mā ngā ākonga.</p> <p>Whakawhitihiti kōrero mō te āhua o ia mata, me te hono o tētahi mata ki tētahi.</p>  <p>Tonoa ngā ākonga kia tuhi i te raumata o te poro tapatoru hāngai.</p> 	<p>Titiro ki te matarau nei. He aha tōna ingoa pāngarau? He poro-tapatoru rite.</p> <p>E hia ūna mata?</p> <p>E rima. E rua ki ia pito me ngā mata e toru e hono ana i ngā pito.</p> <p>Inea ngā tapa, ka tuhi ai i ngā mata katoa ki te pepa. He aha ngā āhua o ngā mata?</p> <p>He tapatoru rite ngā pito e rua. He tapawhā hāngai ngā mata e toru e hono ana i ngā pito. He ūrite te rahi o ia tapatoru rite. He ūrite hoki te rahi o ia tapawhā hāngai.</p> <p>Tapahia ngā mata kua tuhia ki te pepa mārō. Me pēhea te honohono i ngā tapa o tēnā mata o tēnā hei hanga i te poro tapatoru rite?</p> <p>Honoa ki te tēpa whakapiri.</p>  <p>He māmā ake te hanga mēnā kāore e tapahia kia wehewehe ngā mata katoa, engari kia waiho tonu ētahi e honohono ana. Titiro ki tēnei pikitia. Kei konei ngā tapatoru rite e rua me ngā tapawhā hāngai e toru o te poro-tapatoru rite.</p> <p>Mā te whētui i ngā tapa me te whakapiri i ētahi ki te tēpa, ka hua mai ai te poro-tapatoru rite.</p>

Whakaahuangia te Whārangi Tārua 21 ki te pepa mārō. Tonoa ngā ākonga kia tūhura i ngā raumata mō ētahi atu matarau māmā. Hei tauira:



Whakawhitihitī kōrero mō ngā raumata rerekē hei hanga i te matarau kotahi. Hei tauira, koinei ētahi o ngā raumata hei hanga i tētahi poro tapawhā hāngai:



Kei te Whārangi Tārua 22 ētahi mahi hei whakaū i tēnei akoranga.

Hei whakawhānui

Tonoa ngā ākonga kia tuhi raumata hei hanga i tētahi matarau māmā, engari kia puare tonu tētahi o ngā mata.

Tūhuratia te hanga pouaka hei tākai i tētahi taonga. Hei tauira, he pouaka mataono rite te āhua hei tākai i tētahi poi. E tika ana kia pā ngā mata katoa o te pouaka ki te mata o te poi.

Whanaketanga 3e

Mātauranga Matua kua Mau kē

Te Tau

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

Te Hanga

- ngā āhuatanga āhuahanga o ngā rōpū taparau me ngā rōpū matarau. Hei tauira, e rua ngā rārangī whakarara takirua o tētahi tapawhā hāngai; e rua (e toru rānei) ngā koki ōrite o tētahi tapatoru waerite
- te whakarōpū āhua i runga i ngā āhuatanga āhuahanga o aua āhua, me te whakamārama anō i ngā rōpū
- te tautohu, te whakatairite me te tātari i ngā āhuatanga āhuahanga o ngā āhua ahu-2 me ngā āhua ahu-3
- te hanga raumata o ētahi āhua ahu-3 māmā, pēnei i te mataono rite, te poro tapawhā hāngai me te koeko tapawhā hāngai

Mātauranga Matua hei Ako

- ngā momo ‘ōrite’ e pā ana ki te hanga o ētahi āhua, arā, te ‘ōrite’, te ‘ōrite te āhua’, me te ‘ōrite te rahi’
- te kite ā-karu mēnā he ūrite te āhua o ētahi hanga e rua
- te hanga, te whakarahi, te whakaiti raumata hei hanga i ngā momo matarau. Hei tauira, te whiriwhiri i te raumata o tētahi poro tapawhā hāngai, kia iti rawa te horahanga mata, engari kia rahi rawa te rōrahi
- te rōpinepine o ētahi taparau

He Tūhuratanga Hanga

3e.1 Te Whakarahi Raumata (wh. 176)

3e.2 Tapatoru Tauoti (wh. 177)

3e.3 Āhua Inaki (wh. 178)

Rauemi kē atu e Hāngai ana

Ngā Kōwae Ako o nzmaths

- Rōpinepine Taparau
http://www.nzmaths.co.nz/resource/r-pinepine-taparau?parent_node=

He Pūtahi Pāngarau

- *He Āhua Ahu-2*. Te Pou Taki Kōrero, 2005.
- *He Āhua Ahu-3 me te Ahunga*. Te Pou Taki Kōrero, 2005.

He Ōrite te Āhua 1

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

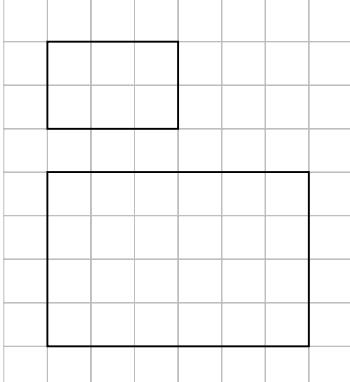
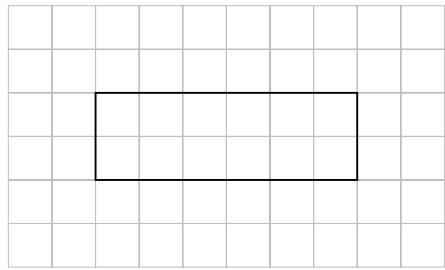
E ako ana ahau i te tikanga o ngā hanga he ōrite te āhua.

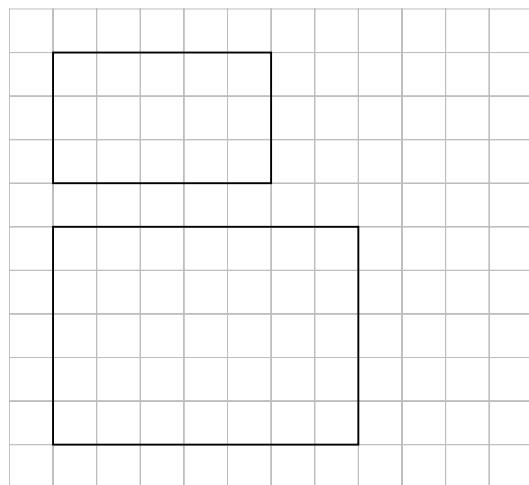
Rauemi

- He pepa tukutuku (kei te Whārangī Tārua 21 tētahi hei whakaahua ina hiahiatia)
- Whārangī Tārua 23

Kupu matua

ōrite te āhua, whakarahi

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Tonoa ngā ākonga kia tuhi i ētahi tapawhā hāngai ki te pepa tukutuku, ko tētahi he whakarahinga o tētahi.</p> <p>Whakawhitihiti kōrero mō te tikanga o tēnei mea te whakarahinga, me te ōrite o te āhua o tēnā me tēnā, ahakoa he rahi ake tētahi i tētahi.</p>  	<p>Tuhia he tapawhā hāngai ki tō pepa tukutuku, kia ono mā te rua ngā tapa.</p> <p>Ki raro iho, tuhia tētahi anō tapawhā hāngai, engari me whakarahi ake ia tapa mā te rearua. E hia te roa o ngā tapa? Tekau mā rua mā te whā.</p> <p>Titiro ki ngā tapawhā hāngai e rua. Ka kīia he ōrite te āhua o ēnei tapawhā hāngai, nā te mea he ōrite te hanga, ahakoa he rahi ake tētahi i tētahi. Ki tā te karu titiro, he āhua roa, he tūpuhi hoki ngā mea e rua.</p> <p>Tuhia tētahi tapawhā hāngai, kia ono mā te rima. Tuhia tētahi anō tapawhā hāngai he ōrite te āhua engari e rua whakareatanga te rahinga ake. He aha tētahi kōrero hei whakaahua i ēnei tapawhā hāngai?</p> <p>E pātata ana ki te tapawhā. He tata ōrite te whānui me te roa o ngā tapawhā hāngai, arā, he kaitā, he mātotoru.</p> <p>Ki tō titiro he ōrite te āhua o ēnei tapawhā hāngai e rua? Āe, e rua e rua he kaitā, he mātotoru.</p> <p>Tērā tētahi tangata, i tonoa ki te whakarahi i tētahi tapawhā hāngai e rima mā te toru. Ko tana tapawhā whakarahi, e whitu mā te rima, ā, ka kīia he whakarahinga mā te rua:</p>



He ōrite te āhua o ngā tapawhā hāngai e rua a te tangata nei, kāore rānei?

Ki tā te karu titiro, kāore i te ōrite te āhua. He tūpuhi ake te tapawhā hāngai tuatahi, he mātotoru ake te tuarua.

Nō reira, he aha te tikanga matua mō te whakarahi i tētahi hanga, kia ōrite tonu te āhua o tēnā me tēnā?

E tika ana kia whakareatia ia tapa ki te tau kotahi. Kāore e tika ana kia tāpiri i te tau kotahi ki te roa o ia tapa.

Kia pērā anō te mahi hei tūhura i te whakarahinga o ētahi atu hanga, me te ōrite o te āhua o tēnā me tēnā. Kei te Whārangī Tārua 23 ētahi mahi hei whakaū i tēnei akoranga.

He Ōrite te Āhua 2

1a	1e	2a	2e	3a	3e	4a	4e	5a
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Te Hanga: E ako ana ahau ki te tikanga o ngā hanga he ōrite te āhua.

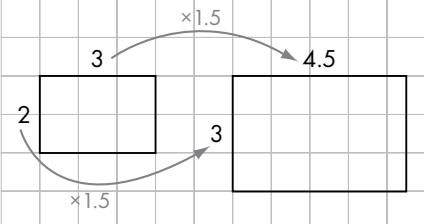
Te Tau: E ako ana ahau i ngā rautaki hei whakaoti whakareatanga.

Rauemi

- Whārangī Tārua 24

Kupu matua

ōrite te āhua, whakarahi

Ngā tohutohu	He tauira kōrero mā te pouako												
<p>Whakaahuangia ngā tapawhā hāngai kei te Whārangī Tārua 24 ki te kāri mārō, ka tapahi ai.</p> <p>Hoatu tētahi huinga tapawhā hāngai ki ia takirua ākonga, ka tono ai i a rātou kia whakarōpūngia ngā tapawhā hāngai he ōrite te āhua.</p> <p>Whakawhitihitī kōrero mō te take e kīia ana he ōrite te āhua.</p>  <p>he whakarahinga mā te 1.5 whakareatanga</p>	<p>Anei tētahi huinga tapawhā hāngai. Tekau mā rua katoa ngā tapawhā hāngai. Ko tā kōrua mahi ko tō hoa, he whakarōpū i ngā tapawhā hāngai, kia ōrite te āhua o ngā tapawhā hāngai o tēnā rōpū o tēnā.</p> <p>He aha kōrua i kī mai nei he ōrite te āhua o ngā tapawhā hāngai e rua nei?</p> <p>Ki tā te karu titiro, he ōrite te āhua. E rua e rua he roa, he tūpuhi.</p> <p>Atu i te titiro a te karu, he aha tētahi atu rautaki e mōhio ai tātou, āe mārika he ōrite te āhua o tētahi me tētahi.</p> <p>Me āta tirotiro ngā tapa, mēnā he whakareatanga ngā tapa o tētahi ki ngā tapa o tētahi. Mō ēnei tapawhā hāngai e rua, e 3 mā te 2 ngā tapa o te mea paku. E 4.5 mā te 3 ngā tapa o te mea nui. He whakareatanga tēnā mā te 1.5. Arā:</p> <table border="1"> <thead> <tr> <th></th> <th>tapawhā hāngai paku</th> <th></th> <th>tapawhā hāngai nui</th> </tr> </thead> <tbody> <tr> <td>tapa roa</td> <td>3</td> <td>×1.5</td> <td>4.5</td> </tr> <tr> <td>tapa poto</td> <td>2</td> <td>×1.5</td> <td>3</td> </tr> </tbody> </table>		tapawhā hāngai paku		tapawhā hāngai nui	tapa roa	3	×1.5	4.5	tapa poto	2	×1.5	3
	tapawhā hāngai paku		tapawhā hāngai nui										
tapa roa	3	×1.5	4.5										
tapa poto	2	×1.5	3										

Te Tūhura Rōpinepine

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

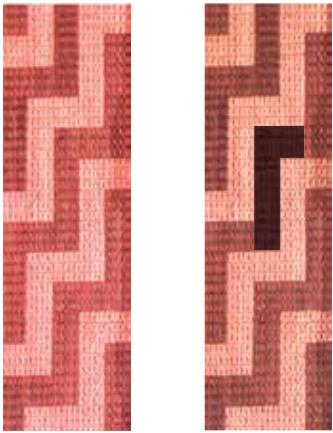
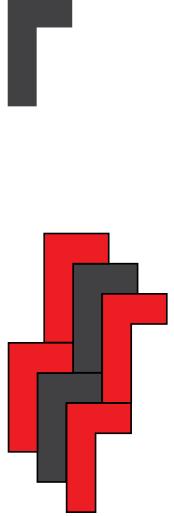
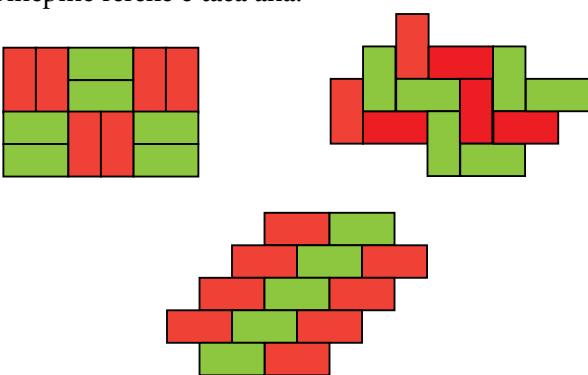
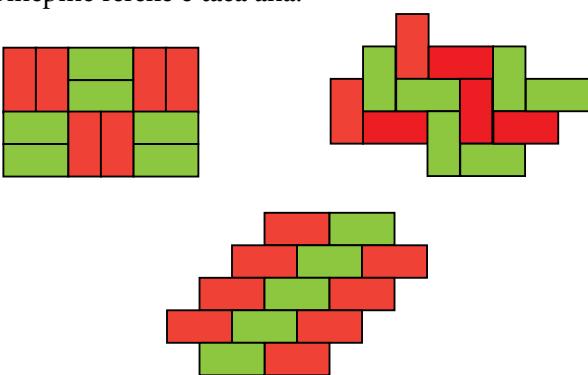
E ako ana ahau i ngā tikanga o te rōpinepine o ētahi matarau.

Rauemi

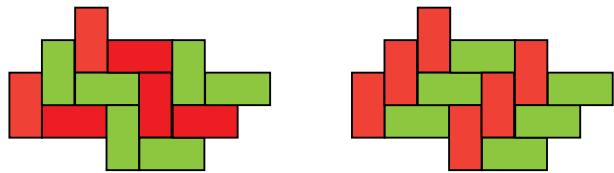
- He pepa tukutuku (whakaahuangia te Whārangi Tārua 21 ina hiahiatia)
- Whārangi Tārua 25

Kupu matua

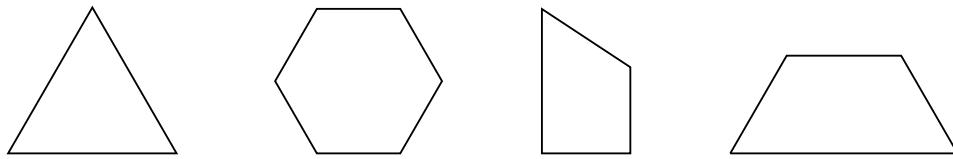
matarau, matarau rite, rōpinepine

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Āta tirotirohia te tauira tukutuku o te poutama, ka tautohu ai i te wāhanga o te tauira e tāruaruatia ana me te āhua o te tāruarua e hua mai ai te tauira.</p>  <p>Whakamāramatia te kupu rōpinepine.</p>	<p>Āta tirohia tēnei tauira tukutuku nei, te poutama. He aha te wāhanga o te tauira e tāruaruatia ana? He pēhea nei te āhua o te tāruarua i tēnā wāhanga o te tauira?</p> <p>Tuhia te wāhanga o te tauira poutama e tāruaruatia ana.</p> <p>Ko tēnā āhua te pūtake o te poutama. Mēnā ka tīmata ki tēnā āhua, ā, ka tāruarua haeretia, ka puta te tauira o te poutama. Ka kīia tērā, he rōpinepine.</p> <p>Ko te tikanga tuku iho o te kupu rōpine, ko te whakanoho i ētahi mea kia piri tata tētahi ki tētahi. Koia i whakamahia ai tēnei kupu tawhito mō tēnei āhuatanga pāngarau. E whakanōhia ana te maha o ēnei āhua pūtake kia piri tata, e hua mai ai te tauira: →</p>  
<p>Hoatu he āhua māmā, pēnei i te tapawhā hāngai, ka tono ai i ngā ākonga kia hanga rōpinepine. Kia rua tekau pea ngā tapawhā hāngai ki ia ākonga (takirua ākonga rānei).</p>	<p>Anei ētahi tapawhā hāngai hei hanga mā i ētahi rōpinepine. Me pēhea te whakanoho i ngā tapawhā hāngai kia piri tata, kāore he āputa i waenganui, kāore e inaki, kia puta ai he tauira. Tuhia ō rōpinepine ki te pepa tukutuku. E hia ngā rōpinepine rerekē e taea ana?</p> 

Karakarangia ngā rōpinepine kia puta ai ētahi tauira atu anō.

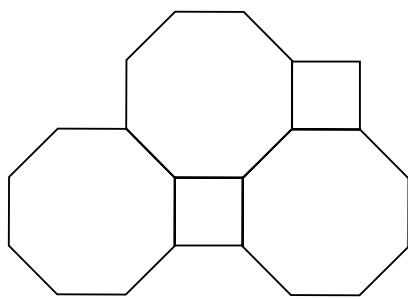


Kia pērā anō te tūhura i te rōpinepine o ētahi atu āhua. Kia māmā te āhua i te tuatahi, kātahi ko ētahi āhua uaua ake. Hei tauira:

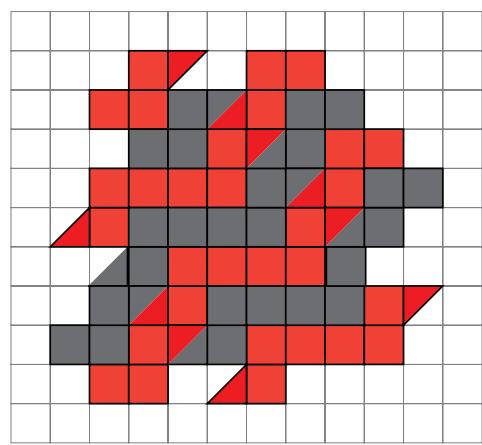
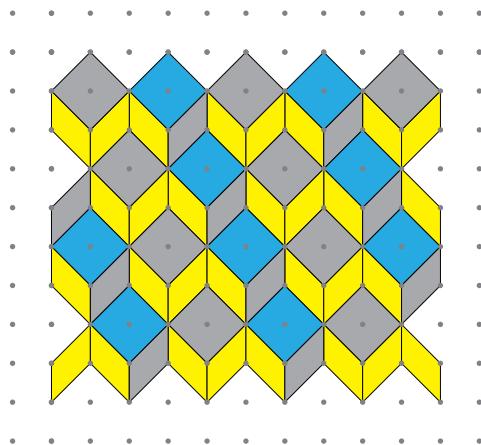


Hei whakawhānui

Tūhurangia te whakamahinga o ētahi āhua e rua hei hanga rōpinepine. Hei tauira, ko te tapawhā rite me te tapawaru rite:



Tonoa mā ngā ākonga e hanga ā rātou ake rōpinepine, ka whakamārama ai i te pūtake. Hei tauira o ētahi:



Kei te Whārangī Tārua 25 ētahi mahi hei whakaū i tēnei akoranga.

Te Horahanga Raumata

1a	1e	2a	2e	3a	3e	4a	4e	5a
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Te Hanga: E ako ana ahau ki te whiriwhiri i te horahanga mata o te raumata o tētahi matarau.

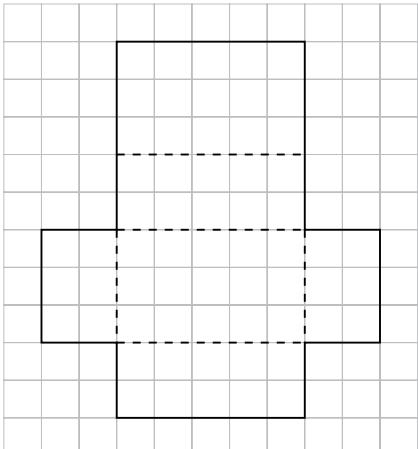
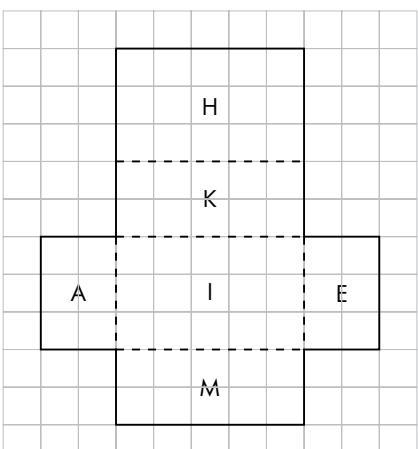
Te Tau: E ako ana ahau i ngā rautaki whakaoti paheko tau.

Rauemi

- Whārangi Tārua 26 & 27

Kupu matua

horahanga mata, matarau, mita pūrua (m^2), mitarau pūrua (cm^2), raumata, tapa

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Hoatu te Whārangi Tārua 26, ka whakawhitihiti kōrero ai mō te raumata me te matarau ka hua mai ina whētuia.</p>  <p>Aratakina ngā ākonga kia tātai i te horahanga mata o te poro.</p> 	<p>Ki tō titiro, he aha te mea kua tuhia nei ki tēnei whārangi? He raumata o tētahi poro tapawhā hāngai. E noho papatahi ana te raumata. Mēnā ka tapahia, ā, ka whētuia ngā rārangī iraira, tērā ka hua mai te poro tapawhā hāngai.</p> <p>Kua tuhia ki te pepa tukutuku, kia māmā ai te kite i ngā inenga o ngā tapa. Kotahi mitarau (1cm) te rahi o ia wāhangā o te pepa tukutuku. Pēhea nei te roa o te poro?</p> <p>E rima mitarau (5cm).</p> <p>E hia nei te horahanga o ngā pito o te poro tapawhā hāngai nei?</p> <p>E 3 mā te 2 ngā inenga, nō reira e 6 mitarau pūrua ($6cm^2$) te horahanga. E 6 ngā tapawhā rite o te pepa tukutuku kei ngā mata o ia pito o te poro tapawhā hāngai.</p> <p>Ki tō whakaaro, he aha te tikanga o te horahanga mata o te poro tapawhā hāngai nei? Tohua mai.</p> <p>Koia ko te horahanga o ūna mata katoa.</p> <p>E hia ngā mata?</p> <p>E ono katoa. E rua kei ia pito, e whā ngā mata e hono ana i ngā pito.</p> <p>Me pēhea te whiriwhiri i te horahanga mata o te poro tapawhā hāngai nei?</p> <p>Whiriwhiria te horahanga o ia mata, ka tāpiri ai.</p> <p>Hei tauira tātaitanga:</p> <p>A me te E: $3 \times 2 = 6cm^2$ Tapeke = $12cm^2$</p> <p>H me te I: $5 \times 3 = 15cm^2$ Tapeke = $30cm^2$</p> <p>K me te M: $5 \times 2 = 10cm^2$ Tapeke = $20cm^2$</p> <p>Hui katoa: $12 + 30 + 20 = 62cm^2$</p>

Tuhia te rapanga nei ki te papa tuhituhi, koia hei horopaki mō te tātai horahanga mata. Tonoa mā ngā ākonga e whakaotī:

Ko tā te pakihī a Roimata, he hoko ranunga nati. E whakaaro ana ia kia hanga i ētahi pouaka 10,000 hei hoko i ngā nati. Ko te 5cm mā te 3cm mā te 2cm te rahi o ngā pouaka. Mēnā e \$5 te utu ā-mita pūrua ($\$5/m^2$) o te kāri, e hia te utu mō te kāri hei hanga i ngā pouaka 10,000?

He aha ngā mōhiotanga matua i tēnei rapanga?

Ko te rahi o te pouaka: $5\text{cm} \times 3\text{cm} \times 2\text{cm}$

Ko te maha o ngā pouaka: 10,000

Ko te utu o te kāri hei hanga i ngā pouaka: $\$5/m^2$

He aha te mahi tuatahi hei whakaotī i tēnei rapanga?

Ko te tātai i te horahanga o te kāri mō te pouaka kotahi.

Kua oti kē tēnā mahi i mua nei, arā, ko te 62cm^2 .

Me aha ināianei?

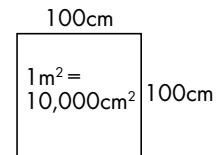
Whakareatia te horahanga o te pouaka kotahi ki te 10,000, koia te horahanga kāri hei hanga i ngā pouaka 10,000. Arā, $62\text{cm}^2 \times 10,000 = 620,000\text{cm}^2$.

Koia te rahi o te kāri e hiahitia ana, hei mitarau pūrua (cm^2). E mōhio ana tātou ki te utu ā-mita pūrua (m^2). Nō reira me aha?

Me huri te $620,000\text{cm}^2$ hei mita pūrua (m^2).

E hia nei ngā mitarau pūrua kei roto i te mita pūrua kotahi? 100cm te roa o ia tapa o tētahi mita pūrua. Nō reira me whakarea te 100 ki te 100, ka $10,000\text{cm}^2$.

He ūrite te $10,000\text{cm}^2$ ki te 1m^2 , nō reira e hia mita pūrua (m^2) e ūrite ana ki te $620,000\text{cm}^2$?



$$\begin{array}{c|c} \text{cm}^2 & \text{m}^2 \\ \hline 10,000 & 1 \\ \hline \end{array} \quad \begin{matrix} \times 62 & & & \times 62 \\ 620,000 & & & \square \end{matrix}$$

Nō reira e 62m^2 hei hanga i ngā pouaka 10,000. E $\$5$ te utu ā-mita pūrua, nō reira e hia te tapeke o te utu?

Ko te $\$310$ – whakareatia te $\$5$ ki te 62.

Kei te Whārangī Tārua 27 ētahi atu rapanga hei whakaū i tēnei akoranga.

Hei whakawhānui

Tūhuratia te horahanga mata o te poro tapatoru (mēnā e taunga ana ngā ākonga ki te whiriwhiri horahanga tapatoru).

Whanaketanga 4a

Mātauranga Matua kua Mau kē

Te Tau

- te whakaawhiwhi tau
- te ōrau me ngā ōwehenga māmā
- ngā hautau ōrite

Te Hangā

- ngā momo ‘ōrite’ e pā ana ki te hanga o ētahi āhua, arā, te ‘ōrite’, te ‘ōrite te āhua’, me te ‘ōrite te rahi’
- te kite ā-karu mēnā he ōrite te āhua o ētahi hanga e rua
- te hanga, te whakarahi, te whakaiti raumata hei hanga i ngā momo matarau, hei tauira, te whiriwhiri i te raumata o tētahi poro tapawhā hāngai, kia iti rawa te horahanga mata, engari kia rahi rawa te rōrahi
- te rōpinepine o ētahi taparaū

Mātauranga Matua hei Ako

- ngā tikanga o te taurahi o ētahi taparaū he ōrite te āhua
- te whakamahi i ngā tikanga pānga riterite hei tātai i ngā tapa o ētahi taparaū he ōrite te āhua
- te tuhi hoahoa āwhata
- ngā tikanga koki roto nei: 180° te tapeke o ngā koki roto o tētahi tapatoru; e 360° te tapeke o ngā koki roto o tētahi tapawhā
- te tātai i ngā koki roto o ngā momo taparaū
- te kite ā-karu me te tuhi i ngā momo tirohanga ki tētahi āhua ahu-3 māmā
- te tuhi, te hanga rānei i tētahi āhua ahu-3, mai i ūna momo tirohanga ahu-2
- ngā āhuatanga āhuahanga e rōpinepine ai ētahi āhua ahu-2
- te waihanga me te tuhi rōpinepine

He Tūhuratanga Hangā

4a.1 MīereMāhau (wh. 179)

Rauemi kē atu e Hāngai ana

Ngā Kōwae Ako o nzmaths

- Te Waihanga
<http://www.nzmaths.co.nz/resource/te-waihanga>
- Rōpinepine Taparaū
http://www.nzmaths.co.nz/resource/r-pinepine-taparaū?parent_node=

Ngā Rapanga o nzmaths

- Te Hanga Mataono Rite
<http://www.nzmaths.co.nz/sites/default/files/CarriesFirstCubesMaori.pdf>
- Te Pā Tūwatawata
<http://www.nzmaths.co.nz/sites/default/files/CastleMaori.pdf>

He Pūtahi Pāngarau

- *He Āhua Ahu-2*. Te Pou Taki Kōrero, 2005.
- *He Āhua Ahu-3 me te Ahunga*. Te Pou Taki Kōrero, 2005.
- *Te Whakarahi me te Whakaahua Āwhata*. Te Pou Taki Kōrero, 2005.

He Ōwehenga Tapa

1a	1e	2a	2e	3a	3e	4a	4e	5a
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E ako ana ahau ki te whiriwhiri i te taurahi o ētahi āhua whakarahi e rua, me te whakamahi taurahi hei tātai i te roa o tētahi tapa.

Rauemi

- Whārangi Tārua 28

Kupu matua

ōwehenga, tapa, taurahi

Ngā tohutohu	He tauira kōrero mā te pouako									
<p>Whakaaturia te tapawhā hāngai takirua tuatahi kei te Whārangi Tārua 28, ka whakawhitihitī kōrero ai mō te whiriwhiri i te roa o te tapa e tohua ana.</p>	<p>Titiro ki ngā tapawhā hāngai e rua nei. He ōrite te āhua o tēnā me tēnā. Kua tuhia te roa o ngā tapa o te tapawhā hāngai paku, engari ko te tapa poto anake o te tapawhā hāngai nui e whakaaturia ana. Me pēhea te whiriwhiri i te tapa roa?</p> <p>Hei tauira whakautu:</p> <ol style="list-style-type: none"> 1. Titiro ki ngā tapa poto o ia tapawhā hāngai. Kua whakarahia mā te reatoru. Kia pērā anō te whakarahainga o ngā tapa roa, arā, me whakarea ki te toru. Whakareatia te 4 mitarau ki te 3, ka 12 mitarau. 2. Titiro ki ngā tapa e rua o te tapawhā hāngai paku. He rearua te rahinga ake o tētahi i tētahi. Nō reira me pērā anō ngā tapa o te tapawhā hāngai nui. Whakareatia te 6 mitarau ki te 2, ka 12 mitarau. <p>Anei tētahi tūtohi hei whakarāpopoto i te pānga o tētahi tapa ki tētahi me te pānga o tētahi tapawhā hāngai ki tētahi:</p> <table border="1"> <tr> <th></th> <th>taipa poto</th> <th>taipa roa</th> </tr> <tr> <th>tapawhā hāngai paku</th> <td>x2 2 → 4</td> <td>x3 ? → 6</td> </tr> <tr> <th>tapawhā hāngai nui</th> <td>x3 6 → ?</td> <td>x2 ? → 4</td> </tr> </table>		taipa poto	taipa roa	tapawhā hāngai paku	x2 2 → 4	x3 ? → 6	tapawhā hāngai nui	x3 6 → ?	x2 ? → 4
	taipa poto	taipa roa								
tapawhā hāngai paku	x2 2 → 4	x3 ? → 6								
tapawhā hāngai nui	x3 6 → ?	x2 ? → 4								

	<p>E hia whakareatanga te whakarahinga ake o tētahi o ngā tapawhā hāngai i tētahi?</p> <p>I whakarahia mā te reatoru. Arā, ka whakareatia ia tapa o te tapawhā hāngai paku ki te 3 hei whiriwhiri i ngā tapa o te tapawhā hāngai nui.</p> <p>Ka kīia tēnā ko te taurahi. Ko te 3 te taurahi o ēnei tapawhā hāngai e rua.</p>
	<p>Kia pērā anō te arataki i ngā ākonga i ētahi atu o ngā āhua whakarahi takirua kei te Whārangī Tārua 28. Kia taunga ngā ākonga ki tēnei mahi, me tuku kia mahi takitahi, takirua rānei.</p>

Te Whakarahi Āhua me te Horahanga

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

Te Hanga: E ako ana ahau ki te whakamahi i te taurahi hei whiriwhiri i te horahanga o tētahi āhua whakarahi.

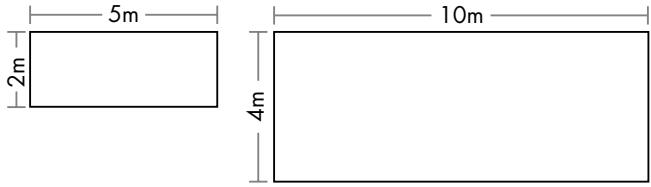
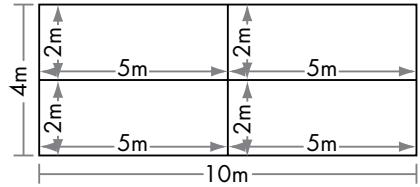
Te Tau: E ako ana ahau i ngā rautaki whakaoti whakareatanga.

Rauemi

- Whārangi Tārua 29

Kupu matua

horahanga, pūrua, tapa, taurahi

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Tuhia te rapanga nei ki te papa tuhituhi, ka whakawhitiwhiti kōrero ai.</p> <p>E peita ana a Āwhina i tētahi pakitara, e 5 mita mā te 2 mita te rahi. E toru rita (3l) peita ka pau i a ia.</p> <p>Tērā tētahi anō pakitara, 10 mita mā te 4 mita te rahi. Nā te mea he rearua ngā tapa o tētahi o ngā pakitara i tētahi, ka whakaaro a Āwhina kia rearua anō te rōrahi peita. Arā, e ai ki tāna, ka 6 rita (6l) hei peita i tēnei o ngā pakitara.</p> <p>Kei te tika tēnei whakaaro o Āwhina, kāore rānei i te tika?</p>	<p>Tuhia he pikitia o ngā pakitara e rua nei e peititia ana e Āwhina. Tuhia ngā inenga o ngā tapa.</p>  <p>Ki taku titiro he ōrite te āhua o ēnei pakitara e rua nei. He aha ai?</p> <p>Nā te mea he rearua te whakarahinga o tētahi i tētahi. Ko te rua te taurahi, ina whakareatia ngā tapa o te pakitara paku ki te rua, ka hua mai ngā tapa o te pakitara nui.</p> <p>E hia ngā pakitara iti e kapi katoa ai te pakitara nui? E whā. E rua ki raro, e rua ki runga.</p>  <p>E hia te horahanga o te pakitara iti me te pakitara nui? E 5 mita mā te 2 te pakitara iti, ko te 10 mita pūrua 10m² te horahanga ($5 \times 2 = 10$). Tekau mita mā te 4 te pakitara nui, ko te 40 mita pūrua ($10 \times 4 = 40$).</p> <p>Nō reira e 4 whakareatanga te rahinga ake o te horahanga o tētahi pakitara i tētahi, engari e whakaaro ana a Āwhina kia rearuatia te rōrahi peita.</p> <p>Kāore i te tika te whakaaro o Āwhina. Me whakarea ki te 4 nā te mea e 4 whakareatanga te rahinga ake o te horahanga o te pakitara nui.</p>

Kia pērā anō te tūhura i te horahanga o ētahi atu tapawhā whakarahi. Tuhia ngā inenga tapa, te taurahi me ngā horahanga ki tētahi tūtohi kia kitea ai ngā pānga. Kei te Whārangi Tārua 29 ētahi tauira tūtohi.

Titiro ki te tūtohi nei. Kua tuhia ngā inenga tapa o tētahi tapawhā hāngai iti, me te whakaatu anō i te taurahi. He wāhi hei tuhi māu i ngā inenga tapa o te tapawhā whakarahi, me te horahanga o ia tapawhā hāngai.

Māu e whakaoti te tūtohi, ka āta whakaaro ai i te pātai nei: Ina whakarahaia tētahi tapawhā hāngai mā te rearua, ka ahatia te horahanga?

Whakawhitiwhiti kōrero mō te horahanga o ngā tapawhā hāngai whakarahi.

Titiro ki te tūtohi tuatahi, ko te 2 te taurahi o ngā tapawhā hāngai. Pēhea nei te whakareatanga ake o te horahanga? Ka whakareatia ki te 4.

	tapawhā hāngai iti	taurahi	tapawhā hāngai nui
tapa roa	2cm	2	4cm
tapa whānui	3cm		6cm
horahanga	6cm ²	×4	24cm ²

tapa roa	4cm	2	8cm
tapa whānui	2cm		4cm
horahanga	8cm ²	×4	32cm ²

tapa roa	5cm	2	10cm
tapa whānui	3cm		6cm
horahanga	15cm ²	×4	60cm ²

tapa roa	6cm	2	12cm
tapa whānui	4cm		8cm
horahanga	24cm ²	×4	96cm ²

Kia oti katoa ngā tūtohi te tirotiro me te whakawhitiwhiti kōrero mō te whakareatanga ake o te horahanga, ka hua mai ngā pānga nei:

- Mēnā ko te 2 te whakareatanga ake o ngā tapa o tētahi tapawhā hāngai, ko te 2^2 (4) te whakareatanga ake o tōna horahanga.
- Mēnā ko te 3 te whakareatanga ake o ngā tapa o tētahi tapawhā hāngai, ko te 3^2 (9) te whakareatanga ake o tōna horahanga.
- Mēnā ko te 4 te whakareatanga ake o ngā tapa o tētahi tapawhā hāngai, ko te 4^2 (16) te whakareatanga ake o tōna horahanga.

Nō reira ko te whakawhānuitanga o ēnei pānga:

- Mēnā ko te x te whakareatanga ake o ngā tapa o tētahi tapawhā hāngai, ko te x^2 te whakareatanga ake o tōna horahanga.

Ngā Koki Roto o te Tapatoru

1a	1e	2a	2e	3a	3e	4a	4e	5a
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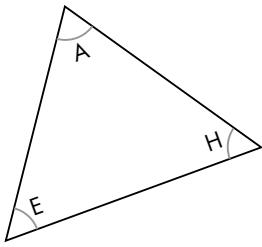
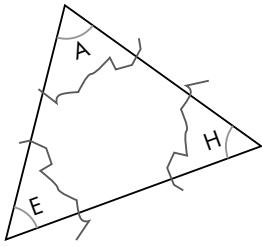
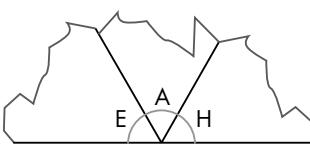
E ako ana ahau ki te tātai i ngā koki o tētahi tapatoru.

Rauemi

- Whārangi Tārua 30 & 31
- He kāri mārō

Kupu matua

koki roto, tapatoru

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Tonoa ngā ākonga kia tuhi i tētahi tapatoru ki te kāri mārō, ka tapahi ai. Kia rerekē te āhua me te rahi o te tapatoru a tēnā ākonga, a tēnā.</p> <p>Aratakina ngā ākonga kia mārama ki te tikanga, ko te 180° te tapeke o ngā koki roto o tētahi tapatoru, ahakoa te āhua me te rahi o taua tapatoru.</p> <p>Hoatu te Whārangi Tārua 30 ka tono ai i ngā ākonga kia ine i ngā koki o ngā tapatoru, kātahi ka tāpiria.</p>	<p>Tuhia he tapatoru ki te kāri mārō. Kāore he aha mō te āhua me te rahi o te tapatoru. Ka rerekē te tapatoru a tēnā, a tēnā o koutou. Tohua ngā koki e toru o tō tapatoru.</p>  <p>Tapahia tō tapatoru.</p> <p>Tīhaea ngā kokonga e toru kia wehewehe ai.</p>  <p>Whakatakotoria ngā kokonga e toru, kia piri tata tētahi ki te taha o tētahi, kāore he āputa ki waenganui, kāore hoki e inaki.</p>  <p>Huri haere ki te titiro i te mahi a tēnā me tēnā. He aha tētahi āhuatanga e kitea mai ana?</p> <p>E takoto mai ana ngā kokonga o ngā tapatoru katoa ki tētahi rārangī torotika.</p>

	<p>E hia putu kei roto i te hurihangā haurua, arā, tētahi rārangī torotika?</p> <p>180°.</p>  <p>Nō reira ina tāpirihia ngā koki e toru o tētahi tapatoru, he aha te tapeke?</p> <p>Ko te 180 putu (180°).</p> <p>Me pēhea te whakamātau i tēnei tikanga?</p> <p>Mā te tuhi i ētahi atu tapatoru me te ine i ngā koki, kātahi ka tāpiria.</p> <p>Kei te Whārangi Tārua 30 ētahi tapatoru hei ine mā koutou i ngā koki. Tuhia te rahi o ngā koki, ka tāpiri ai. He aha te tapeke? Āta whakamahia te ine-koki kia tino tika ngā inenga.</p>
Whakawhitihitī kōrero mō te tātai i te koki o tētahi tapatoru.	<p>Titiro ki te tapatoru nei kua tuhia ki te papa tuhituhi. E whakaaturia ana te rahi o ētahi koki e rua. Me pēhea te tātai i te rahi o te koki tuatoru?</p> <p>Ina tāpiria, ko te 180° te tapeke o ngā koki katoa. Arā te whārite $A + 80 + 40 = 180$. Nō reira me tango te 120 (te $80 + 40$) i te 180 hei tātai i te rahi o te A. Arā, ko te 60° te rahi o te koki A.</p>
Kei te Whārangi Tārua 31 ētahi tātaitanga hei whakaū i tēnei kaupapa.	<p>Hei whakawhānui</p> <p>Kia pērā anō te arataki i ngā ākonga kia mārama ki te tikanga ko te 360° te rahi o ngā koki roto o tētahi tapawhā, ahakoa te āhua o taua tapawhā me tōna rahi.</p>

Tirohanga

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

E ako ana ahau ki te tuhi i te āhua o tētahi hanga ahu-3 mai i ngā tirohanga rerekē.

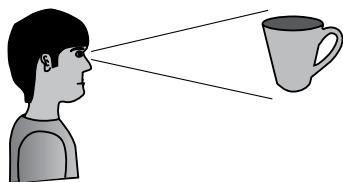
Rauemi

- Whārangī Tārua 32 & 33
- He kāri mārō

Kupu matua

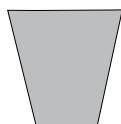
tirohanga, tirohanga matau, tirohanga mauī, tirohanga mua, tirohanga runga (ā-manu)

Ngā tohutohu	He tauira kōrero mā te pouako
Whakawhitihiti kōrero mō ngā momo tirohanga ki tētahi mea. Hei tauira, ko te tinana tangata, ko tētahi kapu.	Titiro ki ngā pikitia e toru nei o tētahi tangata (Whārangī Tārua 32). He aha ngā wāhangā tinana e kitea ana i ngā pikitia e toru nei?
	 E kitea ana a runga o tana upoko, me ūna pokohiwi.
	 E kitea ana a mua o tana tinana – tōna kanohi, ūna ringaringa me ūna waewae.
	 E kitea ana te taha o tana tinana – te taha o tōna upoko me tōna kanohi, tētahi o onā ringaringa, me tētahi o ūna waewae.
	Ka kīia tētahi o ngā pikitia nei he ‘tirohanga runga’, ko tētahi he ‘tirohanga mua’, ko tētahi he ‘tirohanga mauī’. Ko tēhea tēhea?



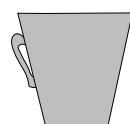
Titiro ki te pikitia o tētahi kapu me te tangata e titiro atu ana ki taua kapu (**Whārangi Tārua 32**). Koia te tirohanga mua.

Whakatūria tētahi kapu ki tō tēpu, ka tū anō koe kia pēnei tō titiro atu ki te kapu. He pēhea nei te āhua e kite nā koe? He rango hema. Arā, he whānui a runga ka whāiti haere ki raro. Kāore e kitea ana te porowhita o te kapu, kāore hoki e kitea ana te kakau o te kapu.

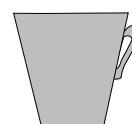


Pēhea nei te āhua o te tirohanga mauī me te tirohanga matau? Tuhia ēnei tirohanga ki tō pukapuka. He ūrite, he rerekē rānei ēnei tirohanga e rua?

Ko te mea anake e rerekē ana, ko te wāhi e hono atu ana te kakau. Kei te taha mauī i te tirohanga mauī, kei te taha matau i te tirohanga matau.

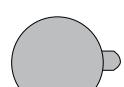


tirohanga mauī

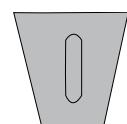


tirohanga matau

Tuhia hoki te tirohanga runga me te tirohanga muri o te kapu.

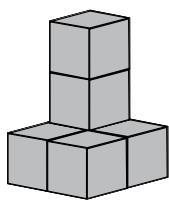


tirohanga runga



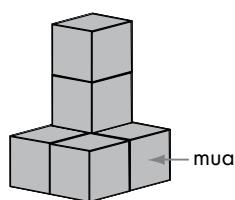
tirohanga muri

Whakamahia ētahi poraka mataono rite hei hanga i tētahi āhua ahu-3 māmā. Hei tauira:



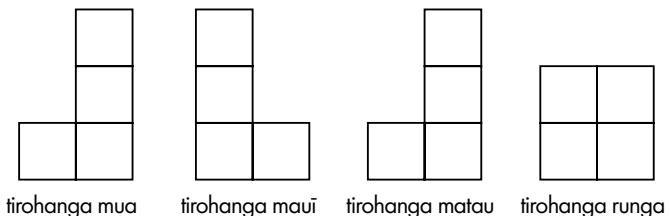
Tonoa ngā ākonga kia tuhi i ngā tirohanga ki tēnei āhua.

Haere mai ki te titiro ki tēnei āhua kua hangaia nei ki ētahi mataono rite. Mēnā ka kīia koinei te mata mua o te āhua, tuhia ētahi atu o ngā tirohanga ki tō pepa.



He aha te rerekētanga o te tirohanga mauī me te tirohanga matau?

I te tirohanga mauī, kei te taha mauī te wāhanga teitei, i te tirohanga matau, kei te taha matau te wāhanga teitei. Koia anake.



Hoatu ētahi poraka mataono rite hei hanga mā ngā ākonga i ētahi āhua ahu-3 (kaua e nui ake pea i te 10 ngā poraka). Tonoa rātou kia tuhi i ngā momo tirohanga ki te āhua.

Kia taunga ngā ākonga ki te tuhi i ngā momo tirohanga o tētahi mea kei mua tonu i te aroaro, tonoa rātou kia whakaahua ā-hinengaro i tētahi mea (kāore i mua i te aroaro), me te tuhi anō i ngā momo tirohanga ki taua mea. Hei tauira:

- Tuhia te tirohanga mua, te tirohanga runga me te tirohanga mauī o te akomanga.
- Tuhia te tirohanga mua, te tirohanga runga me te tirohanga mauī o tētahi tūranga pukapuka.
- Tuhia te tirohanga mua, te tirohanga runga me te tirohanga mauī o tētahi papa tākaro whutupōro (me onā pou piro).
- Tuhia te tirohanga mua, te tirohanga runga me te tirohanga mauī o tētahi whutupōro.
- Tuhia te tirohanga mua, te tirohanga runga me te tirohanga mauī o tētahi pahikara.
- Tuhia te tirohanga mua, te tirohanga runga me te tirohanga mauī o tētahi papawīra.

Hei whakawhānui

Whakaaturia ngā tirohanga ki tētahi āhua ahu-3 māmā, ka tono ai i ngā ākonga kia hangaia taua āhua ahu-3. Kei te Whārangī Tārua 33 ētahi.

Hoahoa Āwhata

1a	1e	2a	2e	3a	3e	4a	4e	5a
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Te Hanga: E ako ana ahau ki te tuhi hoahoa āwhata o tētahi mea māmā.

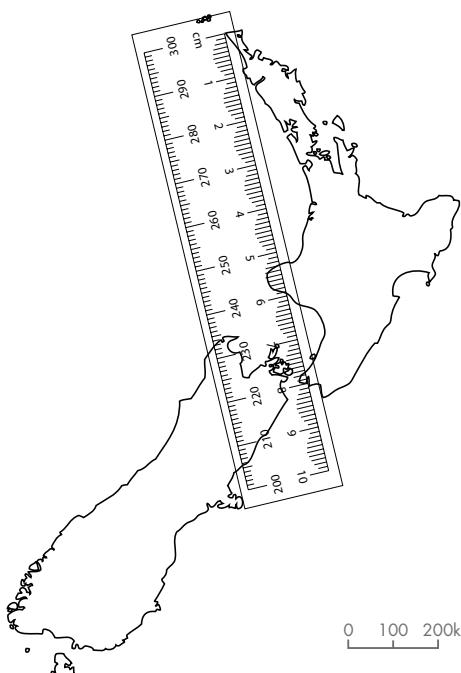
Te Tau: E ako ana ahau ki te whiriwhiri ūwehenga.

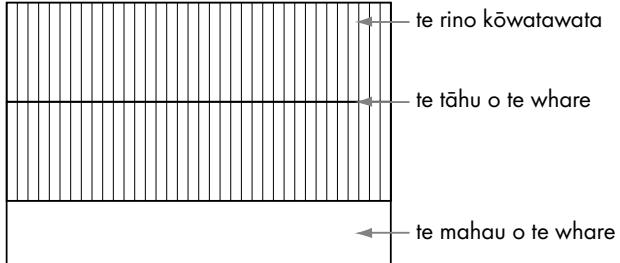
Rauemi

- Whārangi Tārua 34

Kupu matua

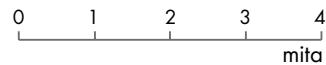
āwhata, hoahoa

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Tirohia he pukapuka mahere whenua, ka whakawhitiwhiti kōrero ai mō tēnei mea te āwhata o tētahi mahere. Kei te Whārangi Tārua 34 ētahi mahere hei tauira.</p> <p>He pai hoki te tirotiro i ētahi mahere huarahi o ētahi tāone me ngā āwhata o ērā.</p>	<p>Titiro ki te mahere whenua māmā nei o Aotearoa. He aha ki ō whakaaro te tikanga o te rārangi me ūna tohu? Kei konei te tohu km, nō reira he tohu tēnā o ngā tāwhitiwhiti i te mahere.</p> <p>Āe rā. Arā te nui o Aotearoa, kei te takiwā o te 2,200 manomita mai i Te Rerenga Wairua ki Rakiura. Kāore e taea te 2,200 manomita te whakaatu ki te pepa. Nō reira ka whakamahia pea he mitarau (cm) i te pepa hei tohu i ia 100km tūturu o te whenua. Ka kīia tērā ko te āwhata o te mahere.</p> <p>Me pēhea te whakamahi i te āwhata hei kimi i te tawhiti mai i te hiku ki te upoko o Te Ika-a-Māui? Ina inea te āwhata, tērā e kitea ko ia mitarau (cm) i te mahere he rite ki te 100km i te whenua tūturu. Ka inea te tawhiti mai i te hiku ki te upoko, ko te 8 mitarau (8cm). Nō reira, kei te takiwā o te 800km i te rārangi torotika.</p> 

	<p>He aha te mahere tuarua i te whārangī? Ko te motu o Rangiauria ki te tai tonga o Te Waipounamu.</p> <p>He aha ngā kōrero mō te āwhata o tēnā mahere? Ina whakatairitea te moutere ki te rahi o Aotearoa whānui, he paku. Nō reira he iti ake te āwhata o te mahere. Ko ia mitarau i te mahere o Rangiauria e tohu ana i te 2km noa iho i te whenua tūturu o Rangiauria.</p> <p>Ka tika, he nui a Aotearoa whānui, nō reira he nui anō tōna āwhata e pai ai te tuhi ki te pepa. He iti a Rangiauria, nō reira he iti anō tōna āwhata.</p> <p>Aotearoa 1cm = 100km Rangiauria 1cm = 2km</p>
Aratakina ngā ākonga kia tuhi hoahoa āwhata o tētahi whare māmā, he tapawhā hāngai te āhua.	<p>Mēnā kei te rangi koe e tiro whakararo ana ki tō tātou akomanga, he aha te āhua e kite nā koe?</p> <p>He tapawhā hāngai te āhua, me te kite anō i te rārangi o te tāhu o te whare, me tētahi anō mō te mahau.</p> <p>Tuhia te āhua ki tō pukapuka.</p>  <p>Ināianei me ine ngā tapa o te whare. Whakamahia he rūri mita hei ine i ngā tapa ki te mita haurua e pātata ana. Tuhia ngā inenga ki te hoahoa o te whare.</p> <p>Ko tā tātou mahi, he tuhi hoahoa āwhata o te whare. I te tuatahi me tirotiro te inenga roa rawa. He aha te inenga roa rawa o tō tātou akomanga nei?</p> <p>Ko tōna roa – ko te 16 mita.</p> <p>Koirā te inenga roa rawa hei tuhi ki te pepa. Nō reira he aha tētahi inenga mō te hoahoa e hāngai ana ki te 16 mita tūturu o te whare?</p> <p>Ākene pea ko te 16cm. He māmā tērā.</p>

Āe, he māmā tēnā āwhata. Ko ia mita (m) tūturu o te akomanga ka rite ki te mitarau (cm) kotahi i te pepa. Nō reira ka tuhia tētahi tapa roa o te whare i te tuatahi, kia 16cm te roa i te pepa.

Kia pēnei te whakaatu i te āwhata: 1cm = 1m



Mā koutou e whakaoti te hoahoa āwhata o te akomanga. Me āta aro ki te āwhata mō ngā tapa katoa.

He whakaaro ēnei mō ētahi atu mea hei tuhi hoahoa āwhata mā ngā ākonga:

- te tirohangā taha ki tētahi tūru
- tētahi whare motukā
- ū rātou rūma moe
- ētahi rau rākau
- he pahikara
- te teitei o ētahi tipu (pēnei i te kānga, te karoti, te rīwai me te rīki i te māra kai)

Whanaketanga 4e

Mātauranga Matua kua Mau kē

Te Tau

- te ōwehenga me te pāpātanga
- te taupū māmā

Te Hangā

- ngā tikanga o te taurahi o ētahi taparau he ūrite te āhua
- te whakamahi i ngā tikanga pānga riterite hei tātai i ngā tapa o ētahi taparau he ūrite te āhua
- te tuhi hoahoa āwhata
- ngā tikanga koki roto nei: 180° te tapeke o ngā koki roto o tētahi tapatoru; e 360° te tapeke o ngā koki roto o tētahi tapawhā
- te tātai i ngā koki roto o ngā momo taparau
- te kite ā-karu me te tuhi i ngā momo tirohanga ki tētahi āhua ahu-3 māmā
- te tuhi, te hangā rānei i tētahi āhua ahu-3, mai i ūna momo tirohanga ahu-2
- ngā āhuatanga āhuahanga e rōpinepine ai ētahi āhua ahu-2
- te waihanga me te tuhi rōpinepine

Mātauranga Matua hei Ako

- ngā tikanga koki, pēnei i te koki tāhapa, te koki hāpūpū, te koki rārangī, te koki huripū, te koki rāwaho, te koki whakahāngai, te koki whakarārangī me te koki whakahuripū
- te tātai i ngā koki o ētahi rārangī pūtahi
- te tūhura i te pānga kei waenganui i te pūtoro me te paenga o tētahi porowhita, me te pānga kei waenganui i te maha o ngā tapa me te maha o ngā hauroki o tētahi taparau

He Tūhuratanga Hanga

4e.1 Koki Taparau (wh. 180)

4e.2 Te Koki Pū o te Taparau (wh. 181)

Rauemi kē atu e Hāngai ana

Ngā Kōwae Ako o nzmaths

- Te Paenga Porowhita
<http://www.nzmaths.co.nz/resource/te-paenga-porowhita>

He Pūtahi Pāngarau

- *He Āhua Ahu-2.* Te Pou Taki Kōrero, 2005.
- *He Āhua Ahu-3 me te Ahunga.* Te Pou Taki Kōrero, 2005.
- *Te Whakarahi me te Whakaahua Āwhata.* Te Pou Taki Kōrero, 2005.

He Momo Koki

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

E ako ana ahau i ngā tikanga o ētahi momo koki.

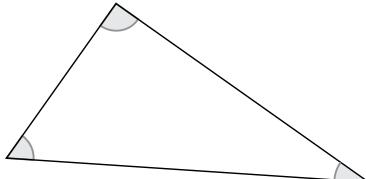
Rauemi

- Whārangi Tārua 35 & 36

Kupu matua

koki hāngai, koki hāpūpū, koki huripū, koki rārangi, koki rāwaho, koki tāhapa

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Hoatu te Whārangi Tārua 35 ki ngā ākonga, ka tono ai kia whakarōpūngia ngā koki ki ngā rōpū e toru nei:</p> <ul style="list-style-type: none">• he iti ake i te koki hāngai (90°)• kei waenganui i te koki hāngai me te koki rārangi (te 90° me te 180°)• he nui ake i te koki rārangi (180°) <p>Whakawhitihiti kōrero mō ngā ingoa e toru nei, te koki tāhapa, te koki hāpūpū me te koki rāwaho.</p>	<p>Tuhia he koki hāngai ki tō pepa. Tirohia te Whārangi Tārua 35, ka tohu ai i ngā koki he iti ake i te koki hāngai. Tuhia aua koki ki te tūtohi i taua whārangi.</p> <p>He kupu pāngarau motuhake mō te koki iti ake i te koki hāngai. Ka kīia he koki tāhapa, he koki koi rānei. He kupu tawhito te ‘awa tāhapa’, ina he koi te pikō o te awa i te wahapū. Tuhia tētahi koki tāhapa ki tō pepa. Pēhea nei te iti ake o tō koki tāhapa i te koki hāngai?</p> <p>He tino iti ake (he haurua pea te iti ake, he paku noa te iti ake ...).</p> <p>Tuhia he koki rārangi ki tō pepa. Tirohia te Whārangi Tārua 35, ka tohu ai i ngā koki he nui ake i te koki hāngai, engari he iti ake i te koki rārangi. Tuhia aua koki ki te tūtohi i taua whārangi.</p> <p>He kupu pāngarau motuhake mō aua koki kei waenganui i te koki hāngai me te koki rārangi. Ka kīia he koki hāpūpū. He kupu tawhito te ‘hāpūpū’, ina kua kore i koi te mata o tētahi toki. Tuhia tētahi koki hāpūpū ki tō pepa. Pēhea nei te iti ake o tō koki hāpūpū i te koki rārangi?</p> <p>He tino iti ake, he pātata ki te koki hāngai (kei waenganui pū pea i te koki hāngai me te koki rārangi, he paku noa te iti ake i te koki rārangi ...).</p> <p>He aha ki ō koutou whakaaro te koki huripū? Āta whakaarohia te tikanga o te kupu ‘huripū’. Ko te hurihangā kotahi tōna rite.</p> <p>Tuhia he koki huripū ki tō pepa. Tirohia te Whārangi Tārua 35, ka tohu ai i ngā koki he nui ake i te koki rārangi, engari he iti ake i te koki huripū. Tuhia aua koki ki te tūtohi i taua whārangi.</p>

	<p>He kupu pāngarau motuhake mō aua koki kei waenganui i te koki rārangi me te koki huripū. Ka kīia he koki rāwaho. Tuhia tētahi koki rāwaho ki tō pepa. Pēhea nei te iti ake o tō koki rāwaho i te koki huripū?</p> <p>He tino iti ake, he pātata ki te koki rārangi (kei waenganui pū pea i te koki rārangi me te koki huripū, he paku noa te iti ake i te koki rāwaho ...).</p>
<p>Whakawhitihiti kōrero mō ngā ‘koki roto’ o tētahi taparau.</p> <p>Tirohia ētahi taparau ka āta tohu ai i ngā momo koki.</p>	<p>Titiro ki te tapatoru kua tuhia nei ki te papa tuhituhi. Āta whakaaro hia he aha ngā ‘koki roto’ o te tapatoru nei. E hia ngā koki roto o te tapatoru?</p> <p>E toru.</p> <p>Mā wai e tohu ngā koki roto?</p>  <p>Pēhea nei te āhua o ngā koki roto e toru nei?</p> <p>Te āhua nei he koki hāngai tētahi, e rua he koki tāhapa, arā, he iti ake i te 90°.</p> <p>Titiro ki ngā taparau kei te Whārangī Tārua 36. Tohua ēnei momo koki o ia taparau ki ētahi tae rerekē:</p> <ul style="list-style-type: none"> • koki tāhapa • koki hāngai • koki hāpūpū • koki rāwaho

He Tātaitanga Koki

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

Te Hanga: E ako ana ahau ki te whakamahi i ngā tikanga koki hei tātai i te rahi o tētahi koki.

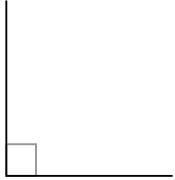
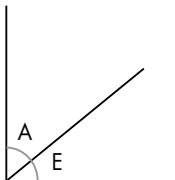
Te Tau: E ako ana ahau ki te kōwhiri i te rautaki tau e tino whaihua ana hei whakaoti rapanga e whai wāhi mai ana te tāpiri, te tango, te whakarea me te whakawehe.

Rauemi

- Whārangi Tārua 37

Kupu matua

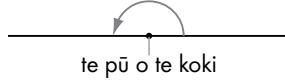
koki whakahāngai, koki whakahuripū, koki whakarārangī

Ngā tohutohu	He tauira kōrero mā te pouako
Aratakina ngā ākonga kia mārama ki te tikanga o te koki whakahāngai.	<p>Titiro ki te koki hāngai nei kua tuhia ki te papa tuhituhi. E hia putu te rahi o te koki hāngai?</p> <p>E 90 putu.</p> 
	<p>Mēnā ka wāwāhia te koki hāngai nei kia rua ngā koki, arā, te koki A me te koki E, e hia te tapeke o aua koki e rua?</p> <p>Ko te 90 putu.</p> 
	<p>Tuhia tētahi rerenga tāpiritanga me ētahi rerenga tangohanga e hāngai ana.</p> $A + E = 90$ $90 - A = E$ $90 - E = A$ <p>Ka kīia te koki A me te koki E he koki whakahāngai, nā te mea ina tāpiria, ka rite ki te koki hāngai, arā, te 90 putu (90°).</p> <p>Mēnā ko te 35 putu tētahi o ngā koki whakahāngai, he aha tētahi?</p> <p>Ko te 55 putu. Ina tāpiria te 55 ki te 35, ka 90, arā, ko te koki hāngai tēnā.</p>

Aratakina ngā ākonga kia mārama ki te tikanga o te koki whakarārangi.

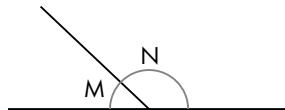
Titiro ki te koki rārangī nei kua tuhia ki te papa tuhituhi. He hurihangā haurua tōna rite. E tohua ana te pū o te koki. E hia putu te rahi o te koki rārangī?

180 putu.



Mēnā ka wāwāhia te koki rārangī nei kia rua ngā koki iti, arā, te koki M me te koki N, e hia te tapeke o aua koki e rua?

Ko te 180 putu.



Tuhia tētahi rerenga tāpiritanga me ētahi rerenga tangohanga e hāngai ana.

$$M + N = 180$$

$$180 - M = N$$

$$180 - N = M$$

Ka kīia te koki M me te koki N he koki whakarārangi, nā te mea ina tāpiria, ka rite ki te koki rārangī, arā, te 180 putu (180°).

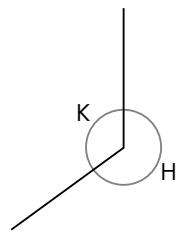
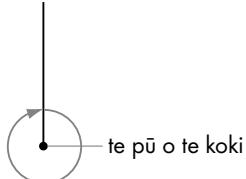
Mēnā ko te 35 putu tētahi o ngā koki whakarārangi, he aha tētahi?

Ko te 145 putu. Ina tāpiria te 145 ki te 35, ka 180, arā, ko te koki rārangī tēnā.

Aratakina ngā ākonga kia mārama ki te tikanga o te koki whakahuripū.

Titiro ki te koki kua tuhia nei ki te papa tuhituhi. He hurihangā kotahi. Ka kīia he koki huripū, nā te mea e huri katoa ana i tōna pū. E hia putu te rahi o te koki huripū?

E 360 putu.



Mēnā ka wāwāhia te koki huripū nei kia rua ngā koki iti, arā, te koki H me te koki K, e hia te tapeke o aua koki e rua?

Ko te 360 putu.

Tuhia tētahi rerenga tāpiritanga me ētahi rerenga tangohanga e hāngai ana.

$$H + K = 360$$

$$360 - H = K$$

$$360 - K = H$$

Ka kīia te koki H me te koki K he koki whakahuripū, nā te mea ina tāpiria, ka rite ki te koki huripū, he hurihangā kotahi, arā, te 360 putu (360°).

Mēnā ko te 220 putu tētahi o ngā koki whakahuripū, he aha tētahi?

Ko te 140 putu. Ina tāpiria te 140 ki te 220, ka 360, arā, ko te koki huripū tēnā.

Kei te Whārangī Tārua 37 ētahi tātaitanga koki hei whakaotī mā ngā ākonga.

Te Pūtoro me te Paenga

1a	1e	2a	2e	3a	3e	4a	4e	5a
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Te Hanga: E ako ana ahau i te pānga kei waenganui i te pūtoro me te paenga o tētahi porowhita.

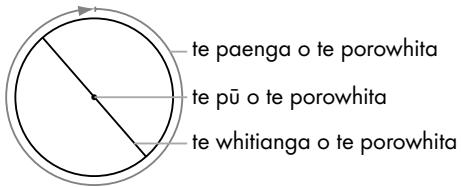
Te Tau: E ako ana ahau ki te whiriwhiri i te pānga kei waenganui i ētahi taurangi e rua.

Rauemi

- He rango maha (kia rerekē te rahi)
- He aho

Kupu matua

pae (π), paenga, pānga, porowhita, pūtoro, whitianga

Ngā tohutohu	He tauira kōrero mā te pouako															
E hoki ki te tirotiro i te tikanga o te paenga o tētahi porowhita, te whitianga me te pūtoro.	<p>Titiro ki te porowhita kua tuhia nei ki te papa tuhituhi. Tohua mai te paenga o te porowhita. Koia ko te roa o te rārangī huri amio i te porowhita.</p> <p>Pēhea te whitianga o te porowhita? Tohua mai te whitianga. Koia ēnei ko ngā rārangī e whakawhiti ana i te porowhita mai i tētahi taha ki tētahi, me te pā anō ki te pū o te porowhita.</p>  <p>Mēnā ka hauruatia te whitianga, ka rite ki te aha? Ka rite ki te pūtoro o te porowhita, koia te roa o te rārangī mai i te pū o te porowhita ki te paenga.</p>															
Tonoa ngā ākonga kia ine i te paenga me te whitianga o tētahi rango (porowhita rānei). Tuhia ngā inenga ki tētahi tūtohi, ka whakawhitiwhiti kōrero ai mō te pānga kei waenganui i te whitianga me te paenga.	<p>Anei tētahi rango, he porowhita te ahua o te pūtake o ngā rango. He aha tētahi huarahi hei ine i te paenga o ēnei rango? E pai ana te whakamahi aho. Tākaitia te rango ki te aho, ka āta tohu ai i te roa o te aho i te tākaitanga kotahi. Kātahi ka inea tēnei wāhangā o te aho ki te rūri.</p> <p>Ka hoatu he rango ki tēnā ki tēnā o koutou. Inea te paenga me te whitianga o te rango. Tuhia ngā inenga ki te tūtohi nei i te papa tuhituhi.</p> <table border="1"> <thead> <tr> <th>Ingoa</th> <th>Whitianga</th> <th>Paenga</th> </tr> </thead> <tbody> <tr> <td>Hinewai</td> <td></td> <td></td> </tr> <tr> <td>Ākuhata</td> <td></td> <td></td> </tr> <tr> <td>Merehēni</td> <td></td> <td></td> </tr> <tr> <td>....</td> <td></td> <td></td> </tr> </tbody> </table>	Ingoa	Whitianga	Paenga	Hinewai			Ākuhata			Merehēni				
Ingoa	Whitianga	Paenga														
Hinewai																
Ākuhata																
Merehēni																
....																



Kia āta tirotiro i ngā whitianga me ngā paenga. He aha te pānga e kitea mai ana?

Ko te paenga, kei te takiwā o te toru te whakareatanga ake i te whitianga.

Whakawehhea te paenga ki te whitianga o ia rango, ka tuhi atu ai ki te tūtohi.

Ingoa	Whitianga	Paenga	<u>Paenga</u> <u>Whitianga</u>
Hinewai			
Ākuhata			
Merehēni			
....			

E kitea ana, he paku nui ake i te 3 te whakawehenga o te paenga ki te whitianga, ahakoa te rahi o te rango.

Mēnā he tino tika ā tātou inenga, ko te 3.14 te whakawehenga o te paenga ki te whitianga. He tau motuhake te 3.14, ka kīa ko te ‘pi’ tōna ingoa, ko te ‘pae’ tōna whakahuatanga, ko te ‘π’ tōna tohu. He pū kiriki te pi (π).

Kua kite tātou i tētahi ture pāngarau mō te porowhita. Arā, ahakoa te rahi o te porowhita:

- Whakareatia te whitianga ki te π , ka hua ko te paenga ($P = \pi \times wh$)
- Whakawehhea te paenga ki te π , ka hua ko te whitianga: $wh = \frac{P}{\pi}$

Tirohia ētahi tātaitai me te whakamahinga o te pātuhi mō te π .

Tirohia ā koutou tātaitai, ka kimi ai i te pātuhi mō te π . Pēhia taua pātuhi, he aha te tau ka puta?

Ko te 3.1415927.

Koia te tau motuhake nei, te π , kia whitu ngā mati ā-ira.

Mēnā e 3cm te whitianga o tētahi porowhita, he aha te whakataunga tata mō tōna paenga?

Ko te 9cm. Whakareatia te whitianga (te 3) ki te π (e pātata ana ki te 3), ka 9. E tika ana kia paku nui ake i te 9, nā te mea he paku nui ake te π i te 3.

Me pēhea te whakamahi tātaitai hei tātai i te paenga o tēnei porowhita?

Pēhia te pātuhi mō te π , kātahi ka whakareatia ki te 3. Ka hua ko te 9.424778.

He aha te whakaawhiwhinga kia rua ngā mati ā-ira?
Ko te 9.42.

Hoatu ētahi rapanga hei whakaoti mā ngā ākonga. Tonoa ngā ākonga kia whakatau tata i te tuatahi, kātahi ka whakamahi i te tātaitai hei whiriwhiri i te otinga tōtika. Me whakaawhiwhi kia rua ngā mati ā-ira. Hei tauira:

- E 4.5cm te whitianga o tētahi porowhita, e hia tōna paenga?
- E 7.4cm te whitianga o tētahi kēne. E hia mitarau (cm) tōna paenga?
- 15.6m te paenga o te porowhita kei te pū o tētahi papa tākarō poiwhana. E hia mita tōna whitianga?
- 1.65m te paenga o tētahi wīra pahikara. E hia mita tōna whitianga?
- E 3.5m te pūtoro o tētahi porowhita, e hia mitarau (cm) tōna paenga?

Te Koki Roto o te Taparau

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

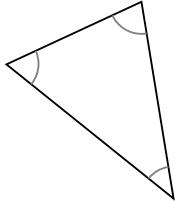
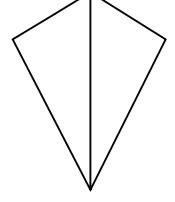
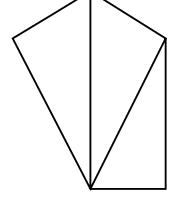
E ako ana ahau i te pānga kei waenganui i te maha o ngā tapa o tētahi taparau me ūna koki roto.

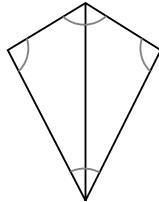
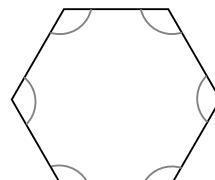
Rauemi

- Whārangī Tārua 38

Kupu matua

hauroki, koki roto, taparau, taparau-rite, tapatoru

Ngā tohutohu	He tauira kōrero mā te pouako																								
<p>E hoki ki te tirotiro i te tapeke o ngā koki roto o tētahi tapatoru (hei tauira, tirohia te ngohe <i>Ngā Koki Roto o te Tapatoru</i>, whārangī 48 o tēnei pukapuka).</p> <p>Aratakina ngā ākonga kia mārama ki te tapeke o ngā koki roto o tētahi taparau.</p>	<p>Titiro ki te tapatoru kua tuhia nei ki te papa tuhituhi. Ina tāpiria ūna koki, e hia te tapeke?</p> <p>Ko te 180 putu (180°).</p>  <p>Ahakoa te āhua o te tapatoru, ko te 180 putu tonu te tapeke o ūna koki roto.</p> <p>Ināianei, kua honoa atu tētahi anō tapatoru. E rua ngā tapatoru, he aha te āhua kua puta?</p> <p>He tapawhā.</p>  <p>Ka tika, e rua ngā tapatoru e hono tahi ana, ka puta he tapawhā. Mēnā ka honoa tētahi anō tapatoru, he aha te āhua ka puta?</p> <p>He taparima.</p>  <p>Āe rā. E toru ngā tapatoru e hono tahi ana, he taparima te āhua ka puta. Anei te tūtohi hei whakaoti.</p>																								
<table border="1"> <thead> <tr> <th>Te maha o ngā tapatoru</th> <th>Te āhua ka hua mai</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>tapatoru</td> </tr> <tr> <td>2</td> <td>tapawhā</td> </tr> <tr> <td>3</td> <td>taparima</td> </tr> <tr> <td>4</td> <td></td> </tr> <tr> <td>5</td> <td></td> </tr> <tr> <td>6</td> <td></td> </tr> <tr> <td>7</td> <td></td> </tr> <tr> <td>8</td> <td></td> </tr> <tr> <td></td> <td>tapa-12</td> </tr> <tr> <td></td> <td>tapa-20</td> </tr> <tr> <td></td> <td>tapa-50</td> </tr> </tbody> </table>	Te maha o ngā tapatoru	Te āhua ka hua mai	1	tapatoru	2	tapawhā	3	taparima	4		5		6		7		8			tapa-12		tapa-20		tapa-50	
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8																									
	tapa-12																								
	tapa-20																								
	tapa-50																								

	<p>He aha te tauira e kitea mai ana i te tūtohi? Ina tāpiria te 2 ki te maha o ngā tapatoru, ka hua ko te maha o ngā tapa o te āhua.</p> <p>E kitea ana tētahi atu pānga? Pēhea te pānga o te maha o ngā tapa me te maha o ngā tapatoru?</p> <p>Āe rā. Ina tangohia te 2 i te maha o ngā tapa, ka hua ko te maha o ngā tapatoru hei hanga i te āhua.</p> <p>Titiro ki tēnei tapawhā me ūna tapatoru e rua o roto. Kua tohua ngā koki o ngā tapatoru. He aha te tapeke o ēnei koki katoa?</p> <p>Ko te 360 putu (360°). E rua ngā tapatoru, ko te 180 putu te tapeke o ngā koki o tētahi tapatoru, nō reira ka whakareatia te 180 ki te 2, ka 360.</p> <p>Whakaotia te tūtohi tuatahi kei te Whārangī Tārua 38.</p>
<p>Whakawhitihiti kōrero mō te taparau rite me te tātai i te rahi o tētahi o ngā koki roto.</p> 	<p>Titiro ki te tapaono nei. He aha te ingoa motuhake o tēnei momo tapaono?</p> <p>He tapaono rite nā te mea he ūrite te roa o ngā tapa e 6 katoa.</p> <p>E whakaaturia ana he tohu ki ngā koki roto katoa o te tapaono rite. He aha tētahi kōrero mō ngā koki roto?</p> <p>He ūrite ngā koki roto katoa o te tapaono rite.</p> <p>Ki tō titiro, he pēhea nei te rahi o tētahi o ngā koki?</p> <p>He nui ake i te koki hāngai (90°), he iti ake i te 180°. Ki tā te karu titiro, kei waenganui pū pea. He koki hāpūpū.</p> <p>He aha tētahi huarahi hei tātai i te rahi o tētahi o ngā koki o te tapaono rite?</p> <p>E mōhio ana tātou ki te tapeke o ngā koki o tētahi tapaono, ko te 720° (he mea hanga te tapaono ki ētahi tapatoru e 4, ā, ko te 180° te tapeke o ngā koki o ia tapatoru, $180 \times 4 = 720$). Nō reira ka whakawheha te 720° ki te 6 nā te mea e ono ngā koki ūrite. Ko te 120° tērā, koia te rahi o ngā koki roto o tētahi tapaono rite.</p> <p>Tātaihia te rahi o ngā koki roto o ngā taparau rite i te tūtohi tuarua kei te Whārangī Tārua 38. Tuhia ki te tūtohi.</p>
<p>Hei whakawhānui Tūhuratia te pānga kei waenganui i te maha o ngā tapa o tētahi taparau me te maha o ūna hauroki.</p>	

Whanaketanga 5a

Mātauranga Matua kua Mau kē

Te Tau

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

Te Hanga

- ngā tikanga koki, pēnei i te koki tāhapa, te koki hāpūpū, te koki rārangi, te koki huripū, te koki rāwaho, te koki whakahāngai, te koki whakarārangi me te koki whakahuripū
- te tātai i ngā koki o ētahi rārangi pūtahi
- te tūhura i te pānga kei waenganui i te pūtoro me te paenga o tētahi porowhita, me te pānga kei waenganui i te maha o ngā tapa me te maha o ngā hauroki o tētahi taparau

Mātauranga Matua hei Ako

- ngā tikanga o ngā koki ka hua mai i te rārangi e haukoti ana i ētahi rārangi whakarara: koki tauaro, koki tauroto, koki taurite, koki tauwhiti
- te tūhura, te whakaputa me te whakamahi ture hei tātai āhuatanga āhuahanga, hei tauira, te pūtoro o tētahi porowhita, te hauroki o tētahi tapawhā hāngai, te rārangi weherua o tētahi tapatoru rite

He Tūhuratanga Hanga

- 5a.1 Porowhita Rāwaho (wh. 182)
5a.2 Pūwaenga Tapatoru (wh. 183)

Rauemi kē atu e Hāngai ana

Ngā Rapanga o nzmaths

- Te Pū o te Porowhita
<http://www.nzmaths.co.nz/sites/default/files/VincesProblemMaori.pdf>
- He Tapatoru, He Tapawhā Rite
<http://www.nzmaths.co.nz/sites/default/files/SolsServiettesMaori.pdf>
- He Rango Poi Tēnehi
<http://www.nzmaths.co.nz/sites/default/files/TennisBallMaori.pdf>

He Hononga Koki

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

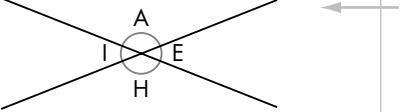
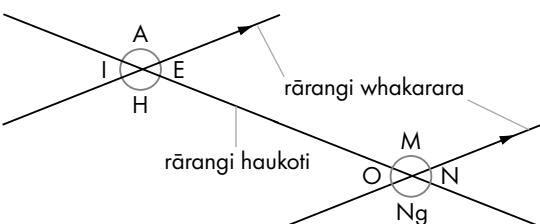
E ako ana ahau i ngā tikanga o ngā koki ka hua mai i te rārangi e haukoti ana i ētahi rārangi whakarara.

Rauemi

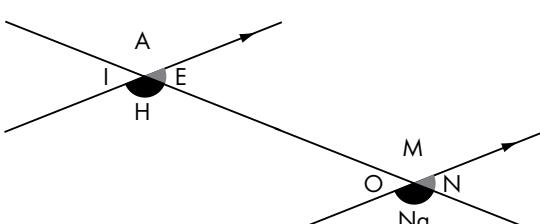
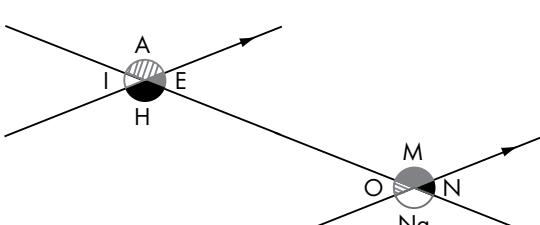
- Whārangi Tārua 39

Kupu matua

koki tauaro, koki taurite, koki tauroto, koki tauwhiti, koki whakarārangi, rārangi pūtahi, rārangi whakarara

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Tuhia he rārangi pūtahi ki te papa tuhituhi, ka whakawhitihitī kōrero ai mō ngā koki (tirohia te ngohe <i>He Tātaitaunga Koki</i>, kei te whārangi 59).</p> 	<p>He rārangi pūtahi ēnei. E pūtahi ana tētahi i tētahi. Tohua mai ngā koki ka hua mai i ēnei rārangi pūtahi. E whā ngā koki.</p> <p>He aha ētahi hononga o ngā koki e whā nei?</p> <ul style="list-style-type: none"> • E whā ngā koki whakarārangi takirua: te A me te E, te E me te H, te H me te I, te I me te A. Ko te 180 putu te tapeke o ēnei koki whakarārangi takirua. • E rua ngā koki tauaro takirua: te A me te H, te E me te I. He ūrite te rahi o ēnei koki tauaro takirua. <p>Whakamāramatia mai, he aha i ūrite ai ngā koki tauaro nei? Kia titiro ki ngā koki tauaro nei, te A me te H: He koki whakarārangi te A me te E: $A + E = 180$, nō reira $A = 180 - E$ He koki whakarārangi te E me te H: $E + H = 180$, nō reira $H = 180 - E$ E rua e rua, he ūrite te koki A me te koki H ki te tangohanga $180 - E$. Nō reira he ūrite ēnei koki tauaro e rua nei, te A me te H.</p>
<p>Whakaaturia he rārangi e pūtahi ana ki ētahi rārangi whakarara e rua.</p> <p>Whakawhitihitī kōrero mō ngā hononga koki ka hua mai, arā ngā koki taurite.</p>	<p>E rua ngā rārangi whakarara e whakaaturia ana i konei, me tētahi rārangi e haukoti ana i aua rārangi whakarara e rua. He ūrite te pūtahitanga o te rārangi haukoti me te rārangi whakarara tuatahi ki te pikitia i mua nei. Arā, e kitea ana ngā koki e whā nei, te A, te E, te H, me te I:</p> 

	<p>E whā atu anō ngā koki ka hua mai i te pūtahitanga o te rārangi haukoti me te rārangi whakarara tuarua. Arā, ko te M, te N, te Ng, me te O. He aha ētahi hononga koki e kitea atu ana?</p> <p>E ai ki tā te karu titiro, he ūrite ngā koki takirua nei, te A me te M, te E me te N, te H me te Ng, te I me te O.</p> <p>Atu i te titiro a te karu, me pēhea tātou e mōhio ai?</p> <p>Mēnā ka nekehia te pūtahitanga tuatahi kia tau ki runga i te pūtahitanga tuarua, ka tau mārire tētahi koki ki runga i tētahi.</p> <p>He pēnei nā te mea he ūrite te ahunga o ngā rārangi whakarara e rua. Ka whakamahi pea i te pepa whaituhi.</p> <p>Ka kīia ēnei koki takirua ūrite he koki taurite. Arā:</p> <ul style="list-style-type: none"> • He koki taurite te A me te M. • He koki taurite te E me te N. • He koki taurite te H me te Ng. • He koki taurite te I me te O.
Whakawhitihiti kōrero mō ngā koki tauroto.	<p>Titiro ki te koki E me te koki M. Ka kīia ēnā koki he koki tauroto. He aha ki tō whakaaro i tapaina ai ki te koki tauroto?</p> <p>Nā te mea e tau ana, e noho ana rānei ki roto i ngā rārangi whakarara e rua me te rārangi haukoti.</p> <p>Āta whakaarohia te hononga o ēnei koki tauroto e rua. Ina tāpiria, ko te 180 putu (180°) te tapeke. Koia nei te take:</p> <ul style="list-style-type: none"> • He koki whakarārangī te A me te E: $A + E = 180$. • He ūrite te A me te M (he koki taurite: $A = M$). • Nō reira $M + E = 180^\circ$. <p>E kitea ana ētahi atu koki tauroto i te whakaahua nei? Āe, he koki tauroto hoki te H me te O. E noho ana ki roto i ngā rārangi whakarara e rua me te rārangi hauroki.</p>

	<p>Ko te 180° hoki te tapeke o ēnā koki tauroto?</p> <p>Āe rā:</p> <ul style="list-style-type: none"> • He koki whakarārangī te I me te H: $I + H = 180$. • He ūrite te I me te O (he koki taurite: $I = O$). • Nō reira $H + O = 180^\circ$. 
Whakawhitihiti kōrero mō ngā koki tauwhiti.	<p>Āta tirohia te koki H me te koki M. He aha ki tō titiro te hononga o tētahi ki tētahi?</p> <p>He ūrite te rahi o ēnei koki. Koia nei te take:</p> <ul style="list-style-type: none"> • He koki taurite te H me te Ng: $H = Ng$. • He koki tauaro te Ng me te M: $Ng = M$. • Nō reira $H = M$. <p>Ko te kupu motuhake mō ēnā koki e rua, ko te koki tauwhiti. Ina whakawhitihiti i te rārangī haukoti, kei reira te koki tauwhiti e noho ana.</p> <p>He aha ētahi atu koki tauwhiti e kitea atu ana?</p> <p>Ko te E me te O.</p> 
Kei te Whārangī Tārua 39 ētahi tātaitanga koki hei whakaotī mā ngā ākonga, otirā hei whakawhitihiti kōrero.	

He Taparima*

Te Hanga: E ako ana ahau ki te waihanga taparima mā te whakamahi tāporowhita, ki te tuhi hoahoa āwhata, ki te whakamahi hoki i te ture a Pythagoras hei tātai i ngā tapa o tētahi tapatoru hāngai.

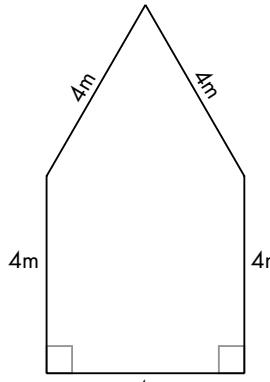
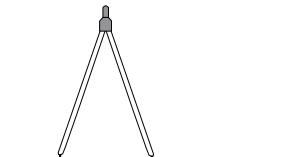
Te Tau: E ako ana ahau ki te whiriwhiri i te pānga kei waenganui i ētahi rahinga e rua, ki te whakaotι hoki i ngā tātaitanga e whai taupū ana.

Rauemi

- He tāporowhita
- He rūri

Kupu matua

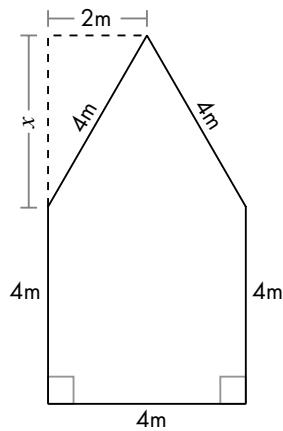
hoahoa āwhata, taparima, tapatoru hāngai, tāporowhita, tāroa, te ture a Pythagoras

Ngā tohutohu	He tauira kōrero mā te pouako
<p>Whakawhitiwhiti kōrero mō te whakamahi tāporowhita me te rūri hei tuhi hoahoa āwhata.</p> <p>Aratakina ngā ākonga kia waihanga koki hāngai, tapatoru waerite hoki.</p>	<p>Titiro ki te pikitia nei. Ko te taha pea o tētahi whare? He aha te āhua?</p> <p>He taparima.</p>  <p>Kōrero mai mō ētahi āhuatanga o te taparima nei.</p> <ul style="list-style-type: none"> • E rua ūna koki hāngai. • He ūrite te roa o ia tapa. • He hononga o tētahi tapawhā rite me tētahi tapatoru rite e noho ana ki runga. <p>He koki hāngai i te hononga o ngā pakitara me te papa o te whare. Me pēhea te whakamahi tāporowhita hei waihanga koki hāngai?</p> <p>Tuhia te rārangī pūtake.</p> <p>Tohua te pū o te koki hāngai.</p> <p>Rohaina te tāporowhita, kia 2 mitarau pea te whātoro. Poua te tāporowhita ki te pū o te koki, ka tuhi ai i ētahi tohu e rua ki te rārangī pūtake.</p> 

*He mea pūtake mai tēnei ngohe i te kōwae ako o nzmaths: *How High? and Other Problems*. <http://www.nzmaths.co.nz/resource/how-high-and-other-problems>

	<p>Whakawhanauia ake te roha o te tāporowhita. Poua ki ngā wāhi e rua i tohua ai i te rārangi pūtake, ka tā ai i ētahi pewa ki runga ake i te pū o te koki.</p>
	<p>Honoa te pū o te koki me te pūtahitanga o ngā pewa e rua, anā, kua hua mai he koki hāngai, e 90° te rahi.</p>
	<p>He tapatoru waerite te wāhangā runga o te whare. Me pēhea te whakamahi tāporowhita hei waihangā tapatoru waerite?</p>
	<p>Tuhia te pūtake o te tapatoru i te tuatahi.</p>
	<p>Rohaina te tāporowhita kia rite ki te roa o ngā tapa rite e rua o te tapatoru. Poua te tāporowhita ki ia pito o te rārangi pūtake, ka tā ai i ētahi pewa e rua ki runga ake.</p>
	<p>Honoa te haukotinga o ngā pewa e rua ki ia pito o te rārangi pūtake, anā, kua hua mai te tapatoru waerite.</p>
<p>Tukuna ngā ākonga kia tuhi i tētahi hoahoa āwhata o te taha o te whare. Tirohia te ngohe <i>Hoahoa Āwhata</i>, whārangi 89 o tēnei pukapuka hei āwhina ina hiahiatia.</p>	<p>Tuhia tētahi hoahoa āwhata o te whare mā te whakamahi anake i te tāporowhita me te rūri. Whakamahia te tāporowhita hei waihangā i ngā koki hāngai me ngā tapa o te tuanui o te whare.</p>

Whakawhitihiti kōrero mō te āta whiriwhiri i te teitei o te whare, mā te whakamahi i te ture a Pythagoras. Tirohia te ngohe *Te Ture a Pythagoras*, whārangī 113 o te pukapuka *Hei Tautoko i te Marautanga Pāngarau: Te Ine*.



Me pēhea te whakamahi i tō hoahoa āwhata hei whiriwhiri i te teitei o te whare?

Hei tauira whakautu (mō te āwhata 1cm = 1m):

Inea te teitei i te hoahoa āwhata. E pātata ana ki te 7.5cm. Hurihia tēnei hei inenga tūturu o te whare. Arā, ko ia mitarau i te hoahoa e rite ana ki te mita tūturu o te whare. Nō reira ko te 7.5m te teitei o te whare.

Me pēhea te whakamahi i ngā inenga o ngā tapa o te whare hei whiriwhiri i te teitei o te whare?

Hangaia he tapatoru hāngai ki te taha o te tuanui o te whare. Ko te ‘x’ hei tohu i te roa hei whiriwhiri, kātahi ka tāpiri i te 4, koia te teitei o te whare.

Ko te 2m te roa o te tapa poto o te tapatoru hāngai nā te mea he haurua o te pūtake o te whare.

Ka whakamahi i te ture a Pythagoras hei tātai i te tapa o tētahi tapatoru hāngai. E mea ana te ture, he ōrite te pūruatanga o te tāroa ki te tapeke o ngā pūruatanga o ngā tapa poto. Nō reira:

$$x^2 + 2^2 = 4^2$$

$$x^2 = 4^2 - 2^2$$

$$x^2 = 12$$

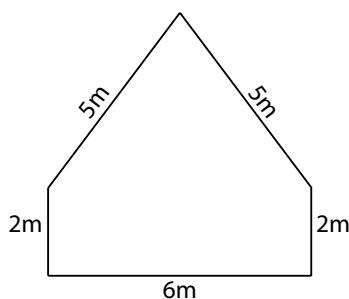
$$x = 3.464 \text{ (mā te tātaitai, kia 3 ngā mati ā-ira)}$$

Tāpiria te 4, ko te 7.464m te teitei o te whare.

Ki tō titiro ko tēhea te huarahi e tino tōtika ai te whiriwhiri i te teitei o te whare?

Ko te tātaitanga mā te ture a Pythagoras, nā te mea he uaua kia tino tōtika te tuhi hoahoa āwhata me te ine i te roa i te whārangī.

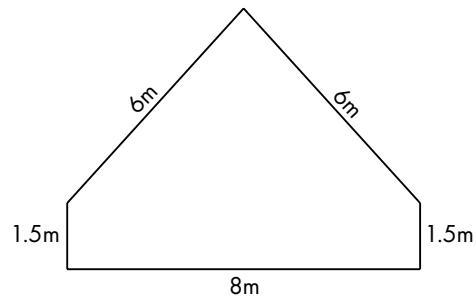
Hoatu ētahi atu rapanga pēnei hei whakaoti mā ngā ākonga. Hei tauira:



Hei whakawhānui

Hoatu he rapanga hei tātai mā te ākonga i te horahanga o te taparima. Hei tauira:

Koia nei te hoahoa o te taha o tētahi whare. E peitatia ana e Horowai tēnei tapa o te whare. Kotahi rita te rōrahi peita e kapi ai te 4m^2 o te whare. \$15 te utu ā-rita o te peita. E hia te utu kia rua ngā kiri peita?





Wāhanga 4

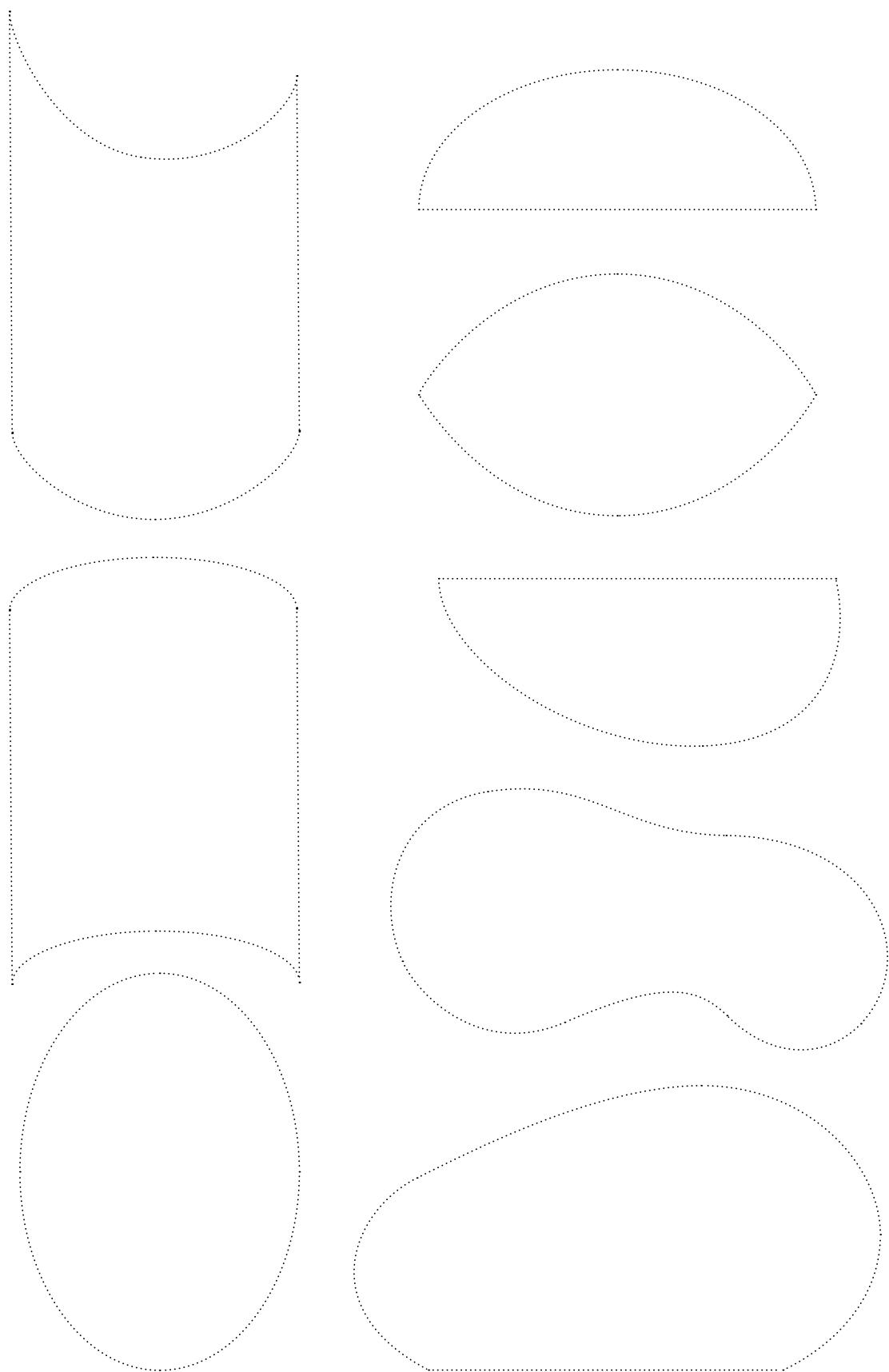
Ngā Whārangi Tārua*

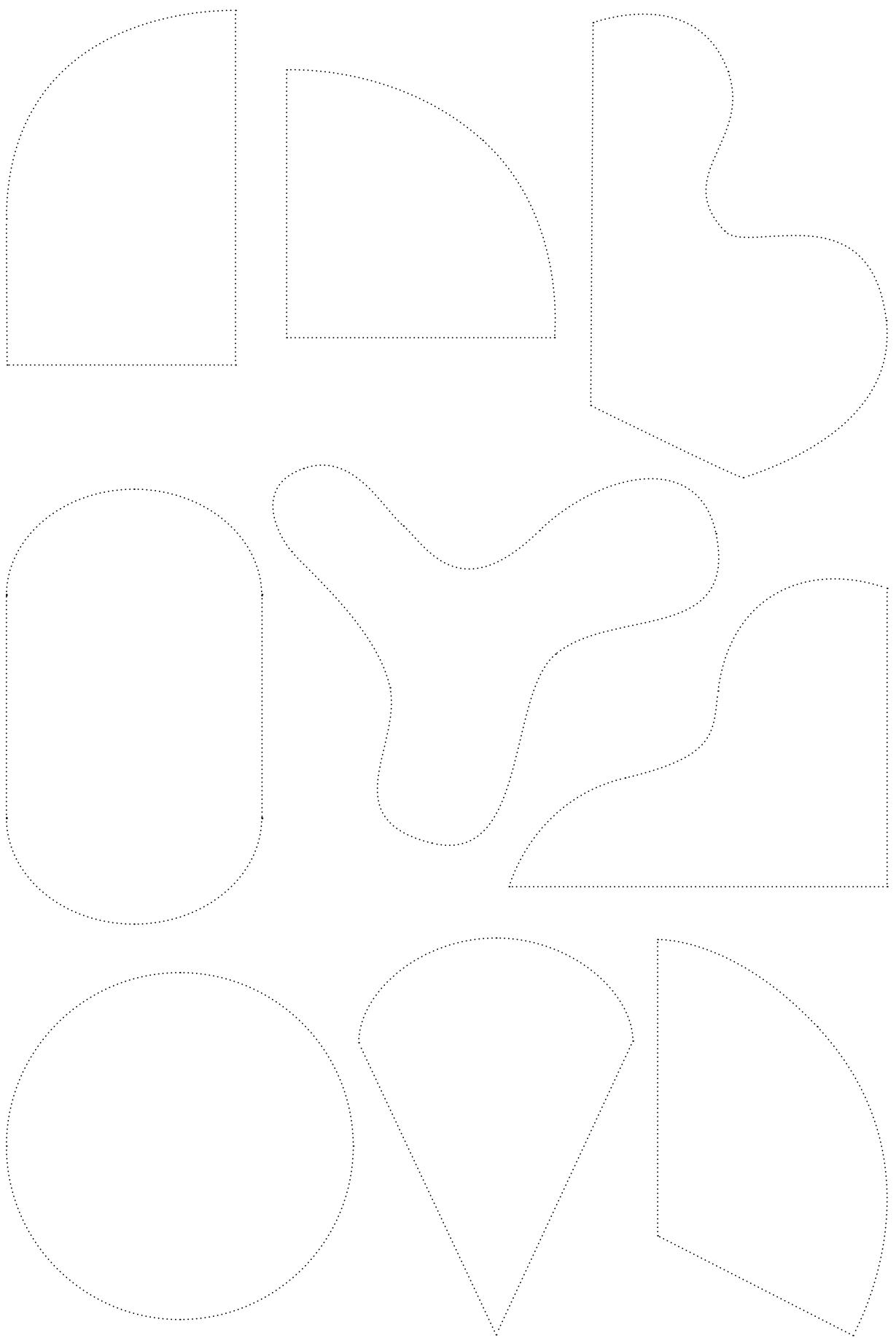


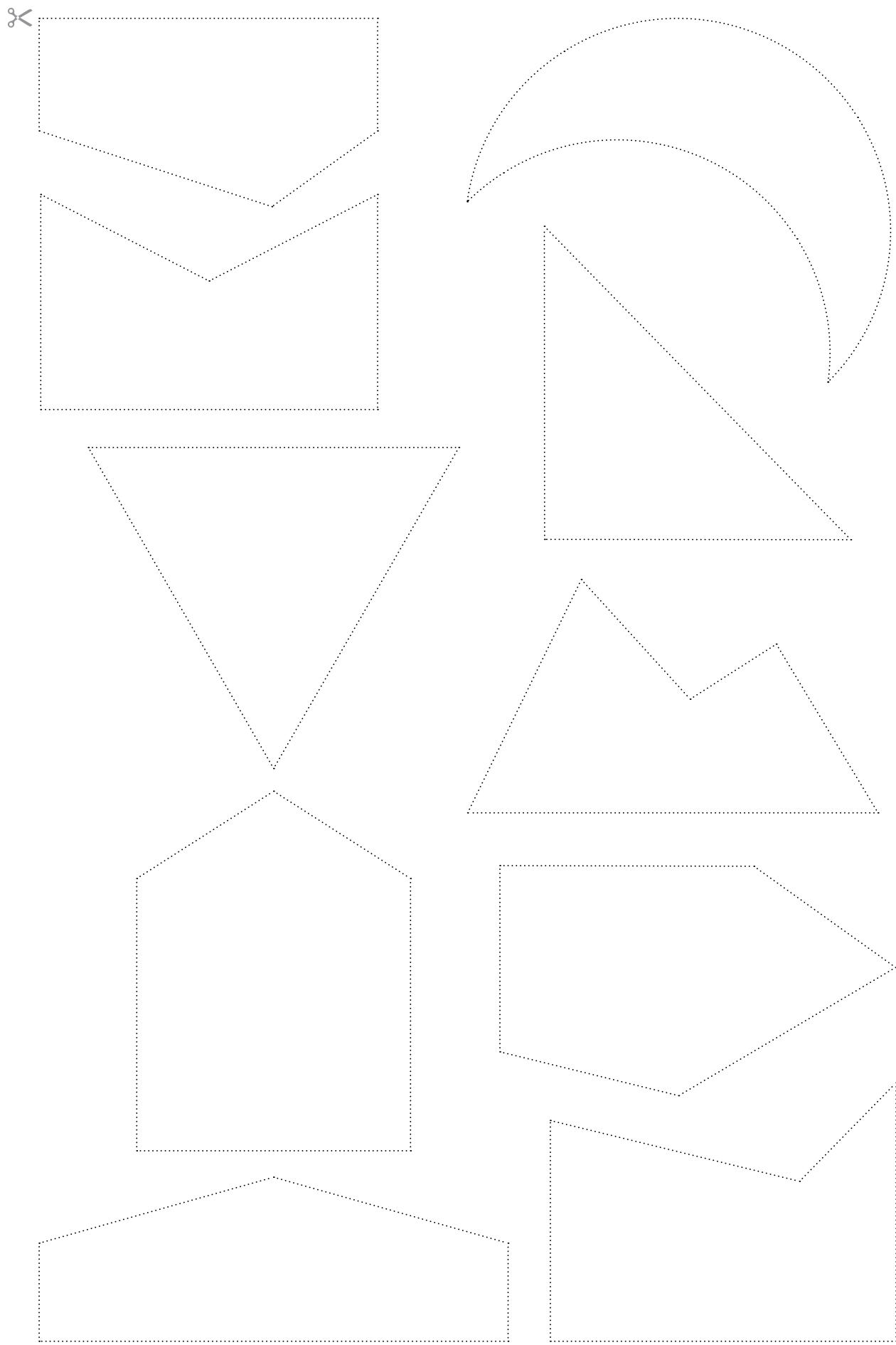
Koinei ngā Whārangi Tārua e hāngai ana ki ngā ngohe whakaako o roto i te Wahanga 3 o tēnei pukapuka. Whakamahia he kutikuti hei tapahi i ngā rārangī iraira o ngā Whārangi Tārua.

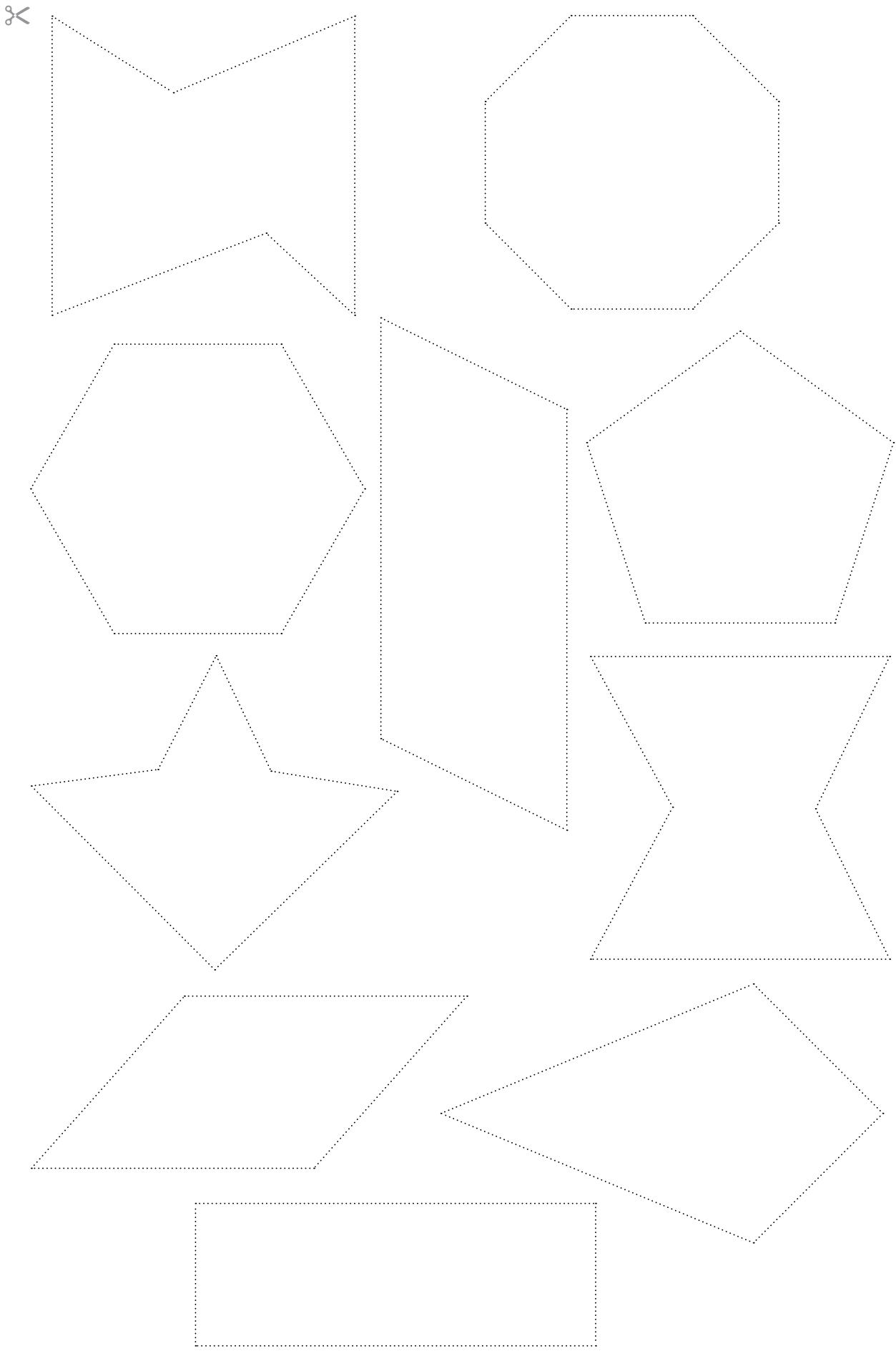
He Āhua Ahu-rua 1

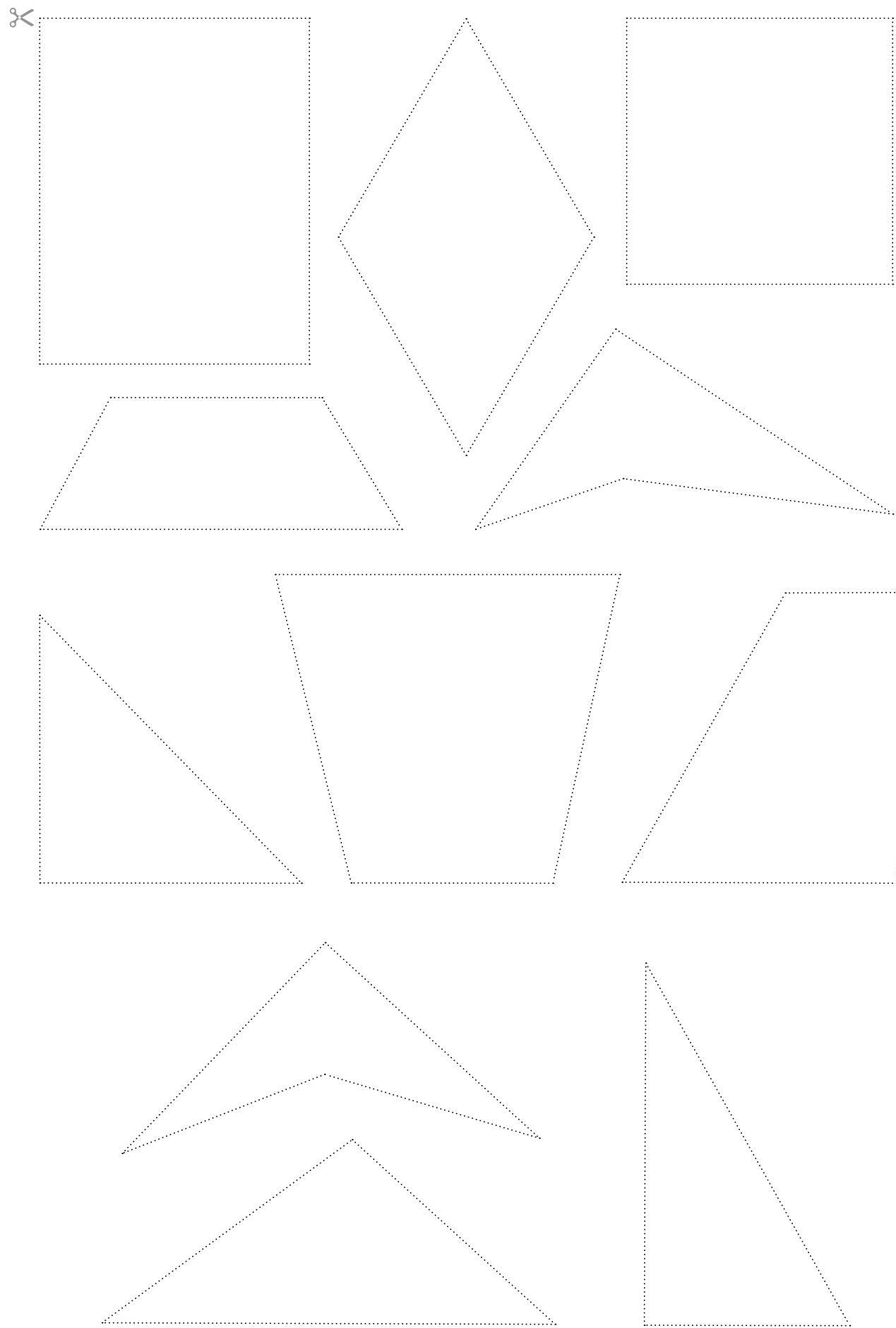
Te Hanga
Whārangī Tārua 1





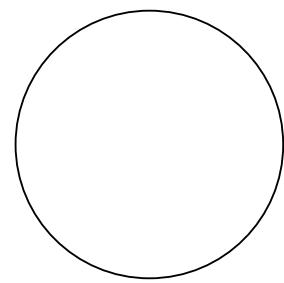
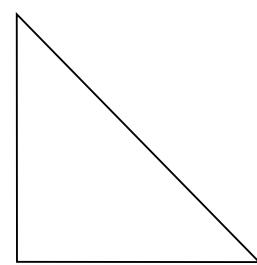
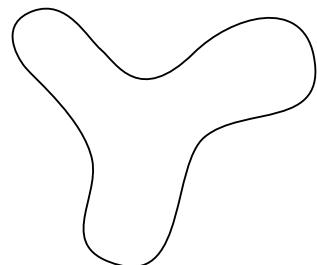
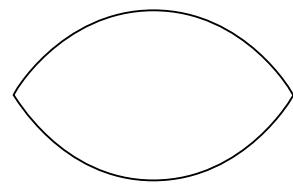
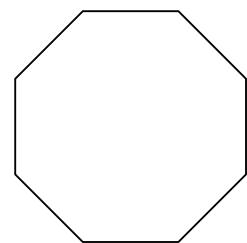
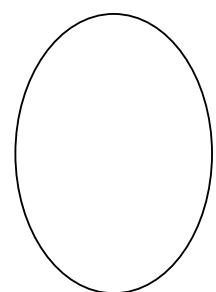






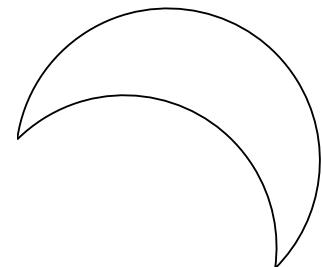
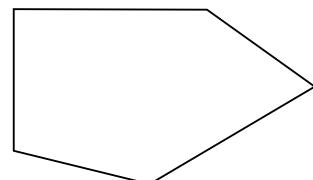
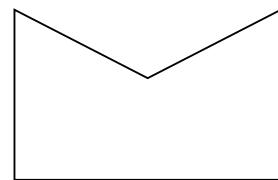
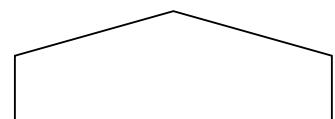
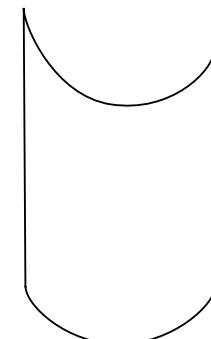
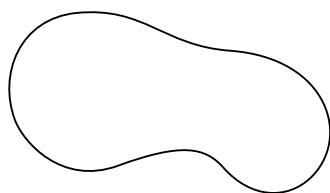
Wharewhare Āhua Ahu-rua

Te Hanga
Whārangi Tārua 2



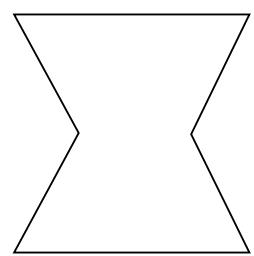
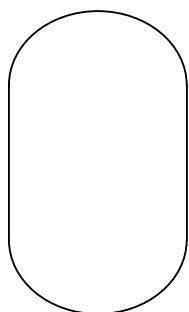
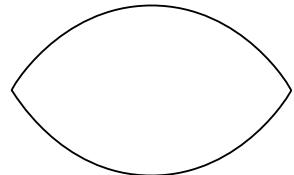
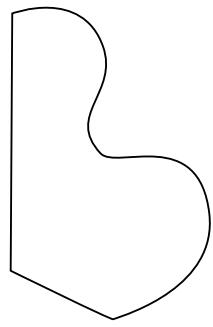
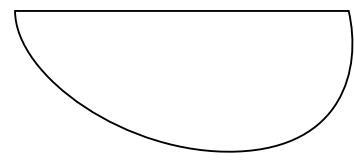
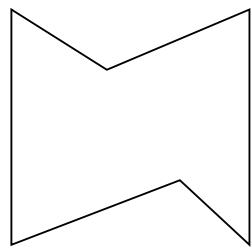
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Whārangi Tārua 2



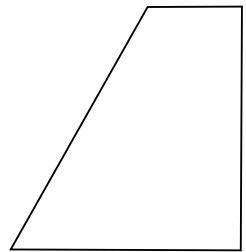
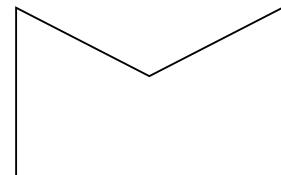
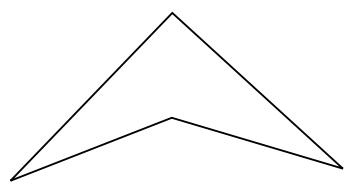
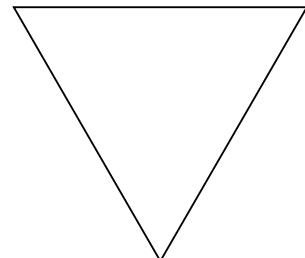
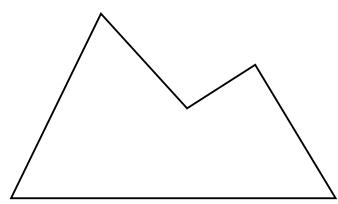
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Whārangi Tārua 2



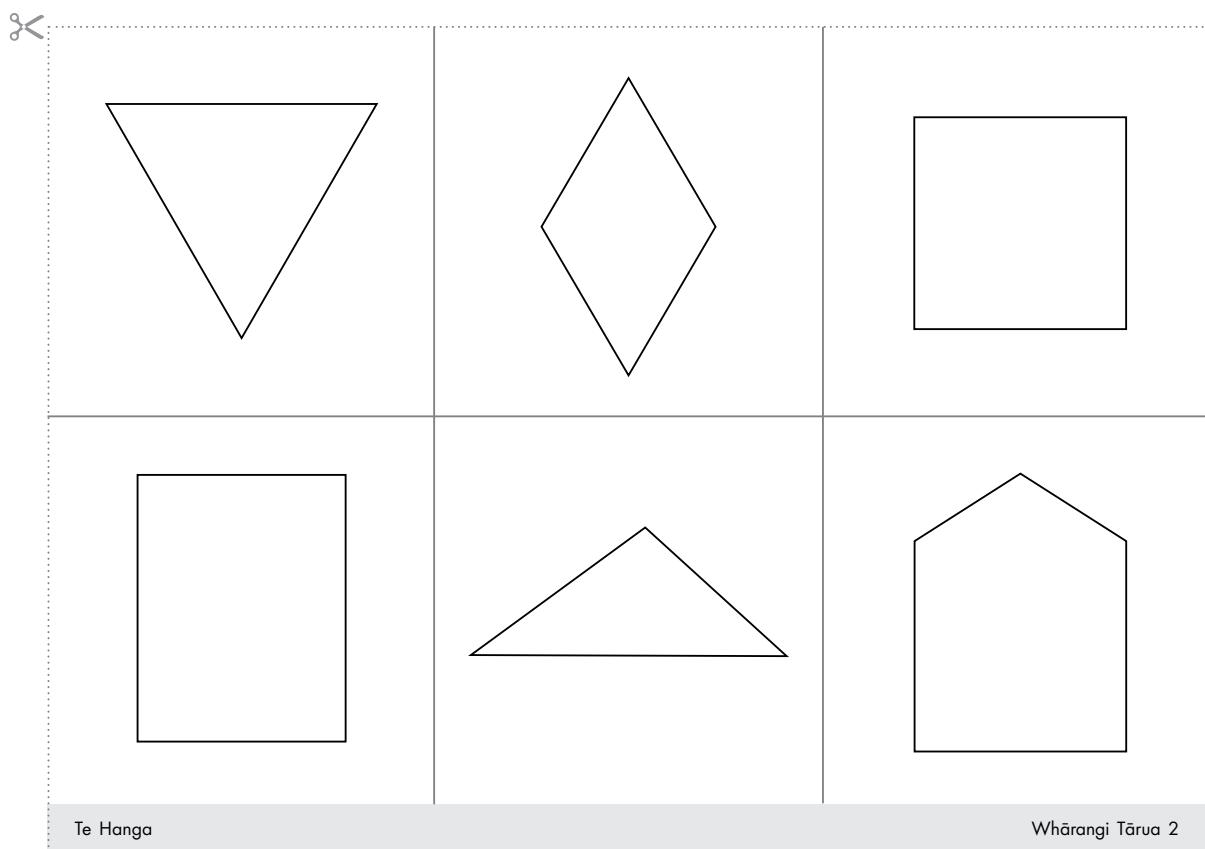
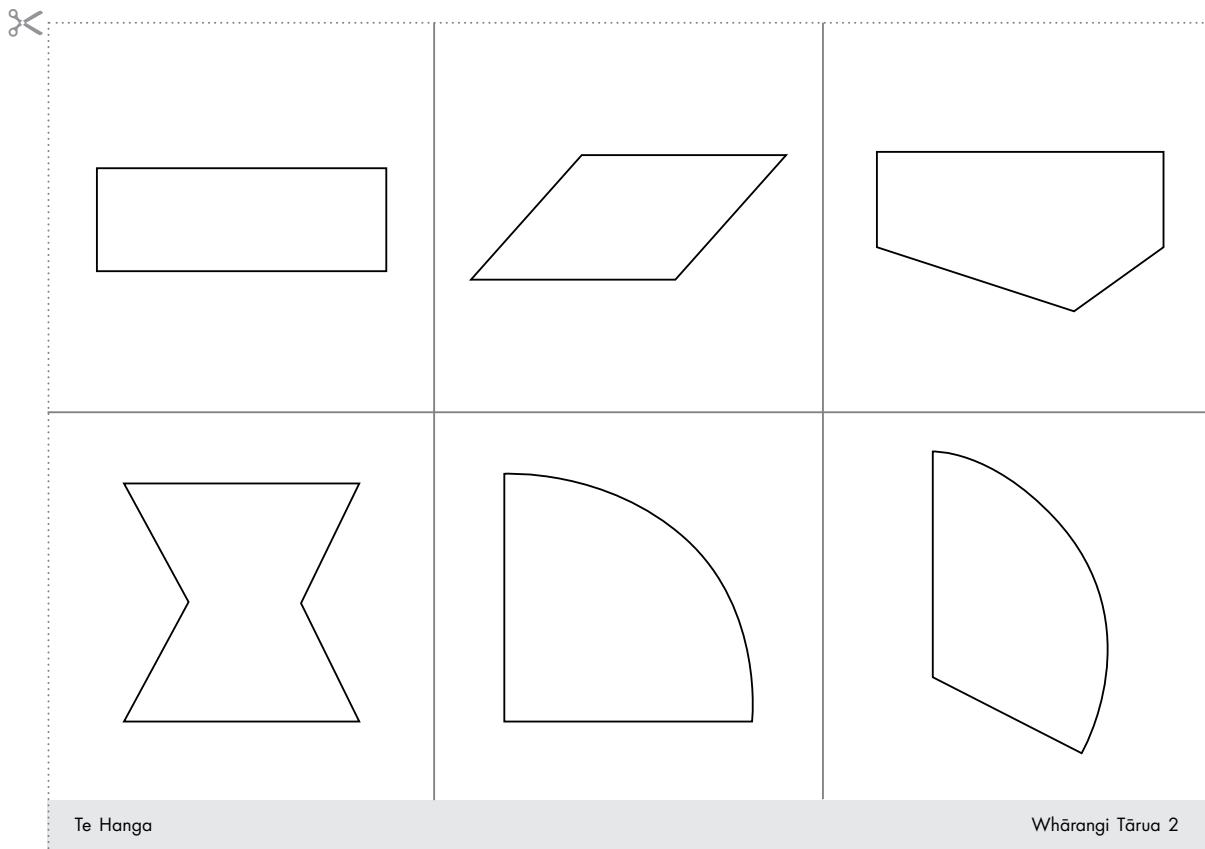
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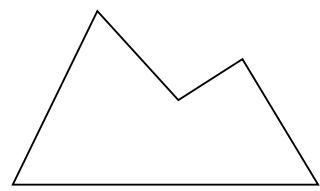
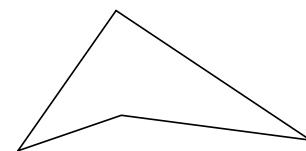
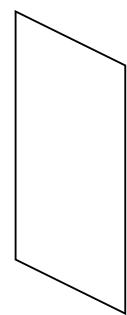
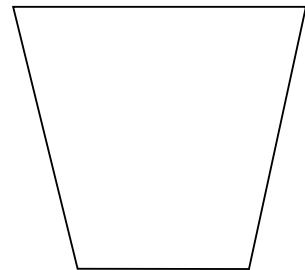
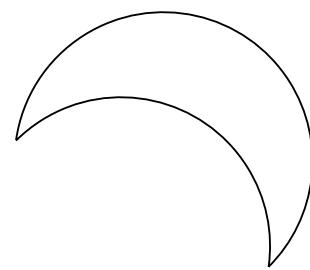
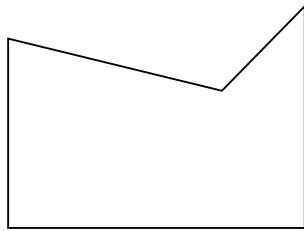
Whārangi Tārua 2



Te Hanga

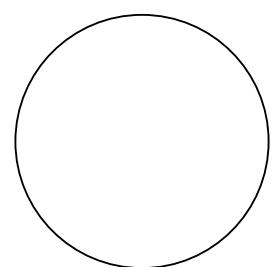
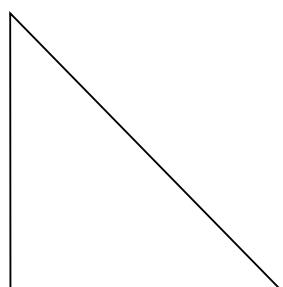
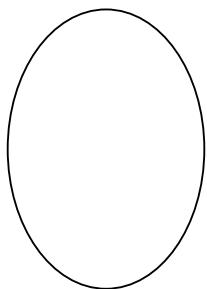
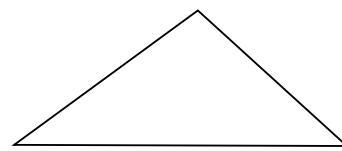
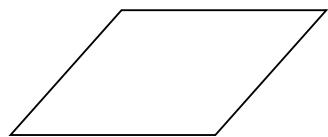
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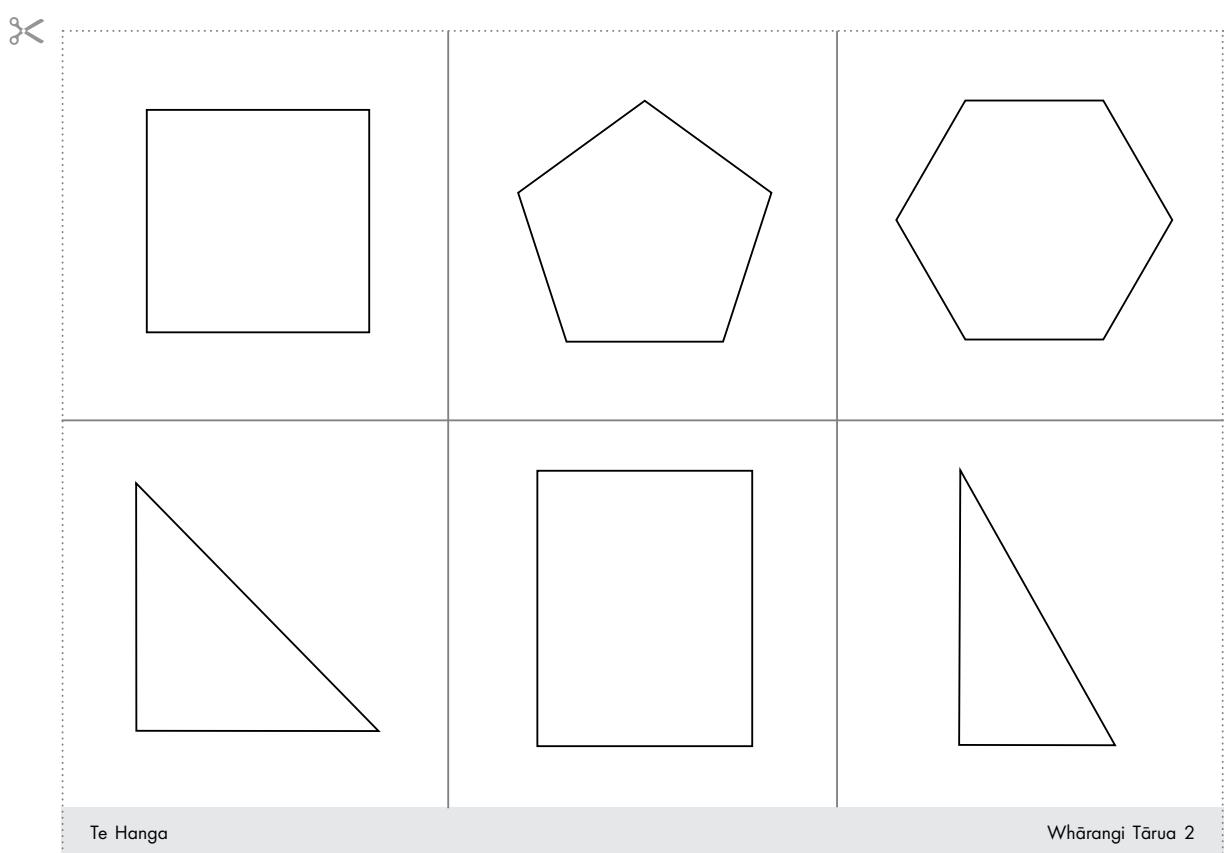
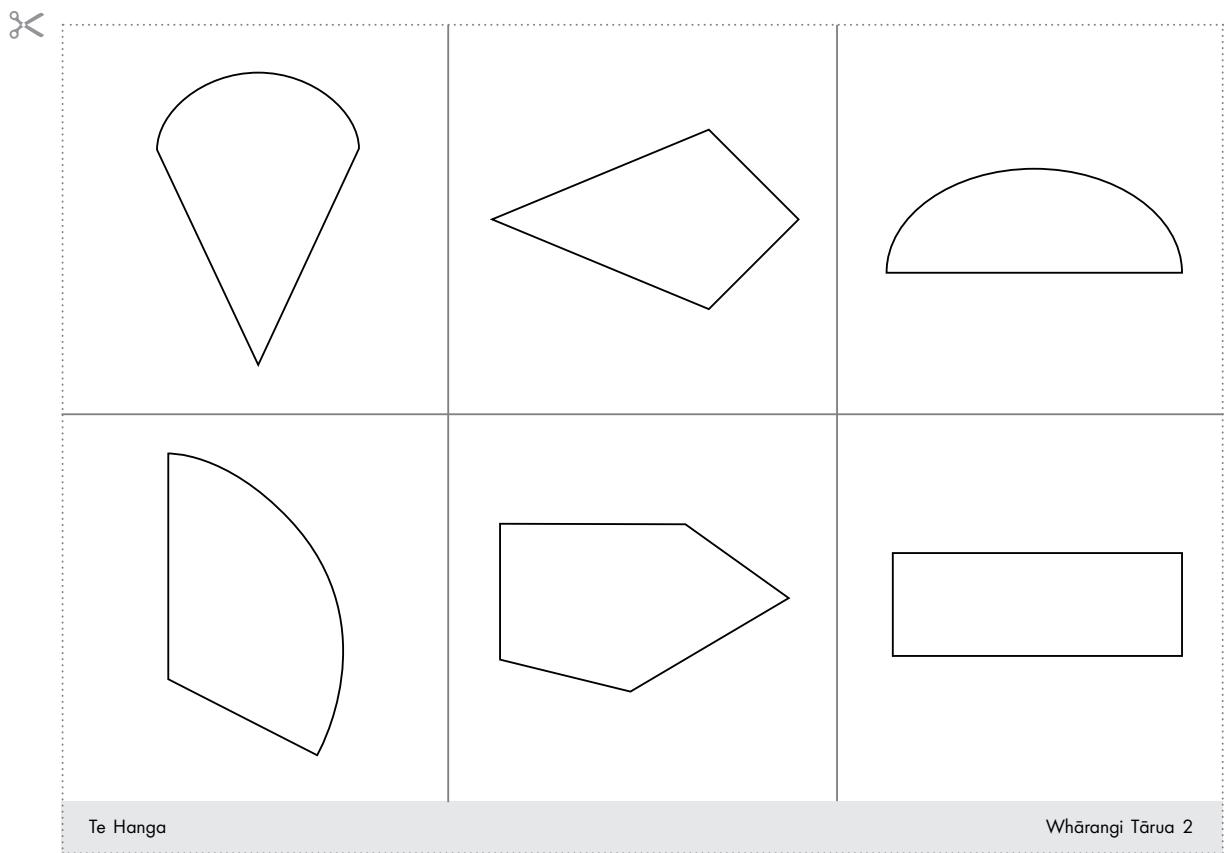
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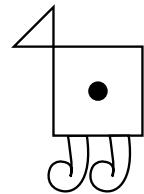
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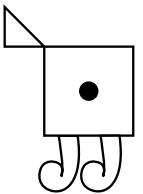


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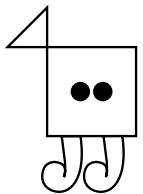
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Whārangi Tārua 3



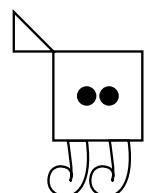
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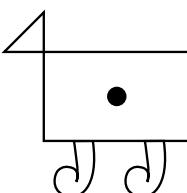
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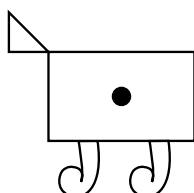
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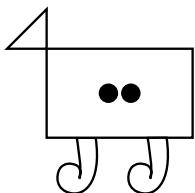
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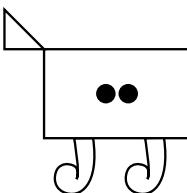
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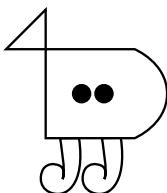
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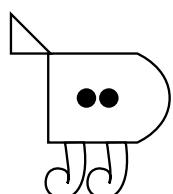
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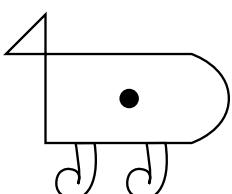
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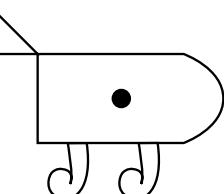
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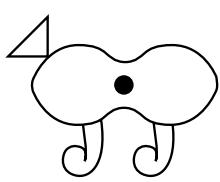
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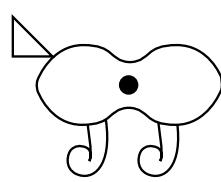
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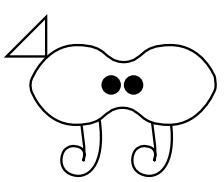
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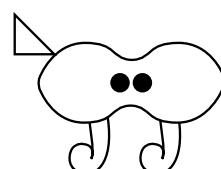
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Te Hanga Whārangi Tārua 3



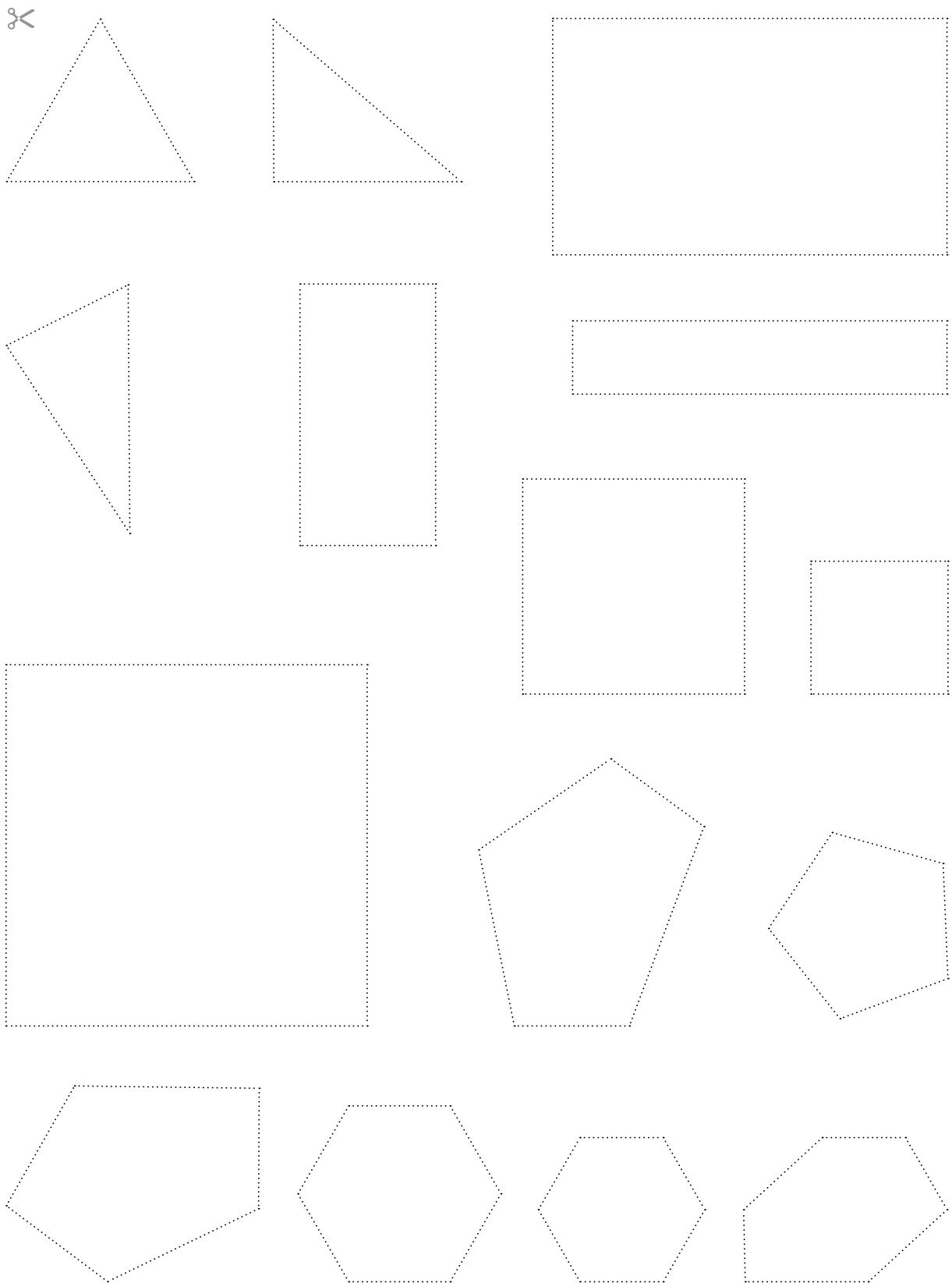
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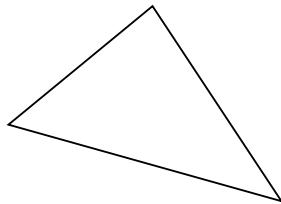


Te Hanga Whārangi Tārua 3

He Āhua Ahu-rua 2

Te Hanga
Whārangī Tārua 4





He _____ tēnei āhua.

E _____ ūna tapa.

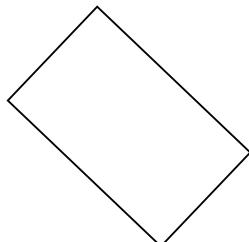
E _____ ūna kokonga.



He _____ tēnei āhua.

E _____ ūna tapa.

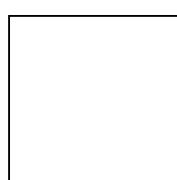
E _____ ūna kokonga.



He _____ tēnei āhua.

E _____ ūna tapa.

E _____ ūna kokonga.

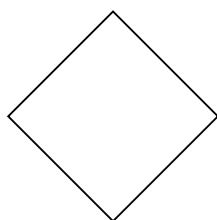


He _____ tēnei āhua.

E _____ ūna tapa.

E _____ ūna kokonga.

He ūrite te roa o ūna _____ katoa.

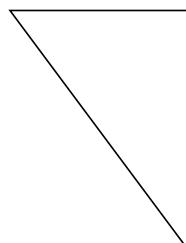


He _____ tēnei āhua.

E _____ ūna tapa.

E _____ ūna kokonga.

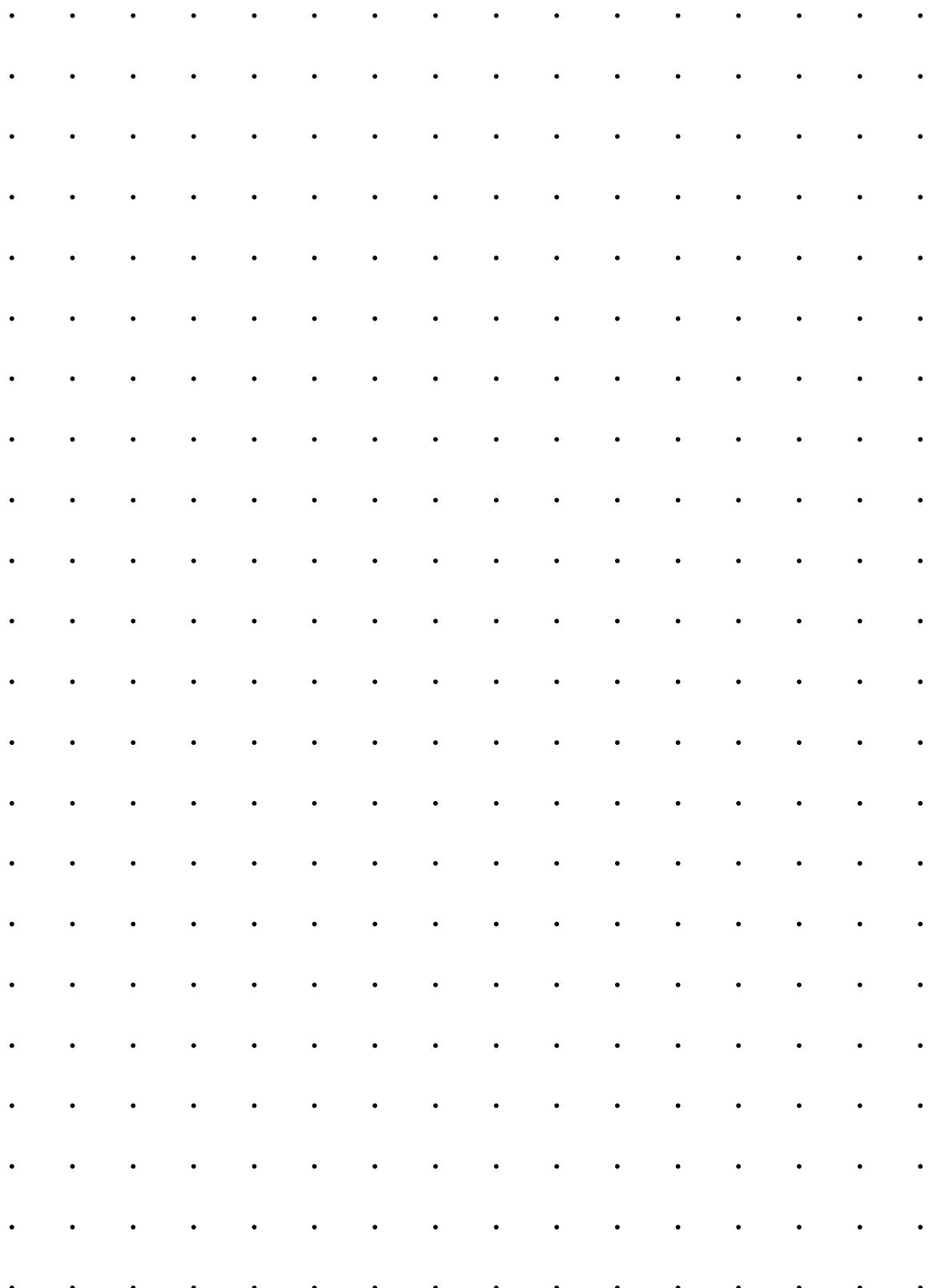
He ūrite te roa o ūna _____ katoa.

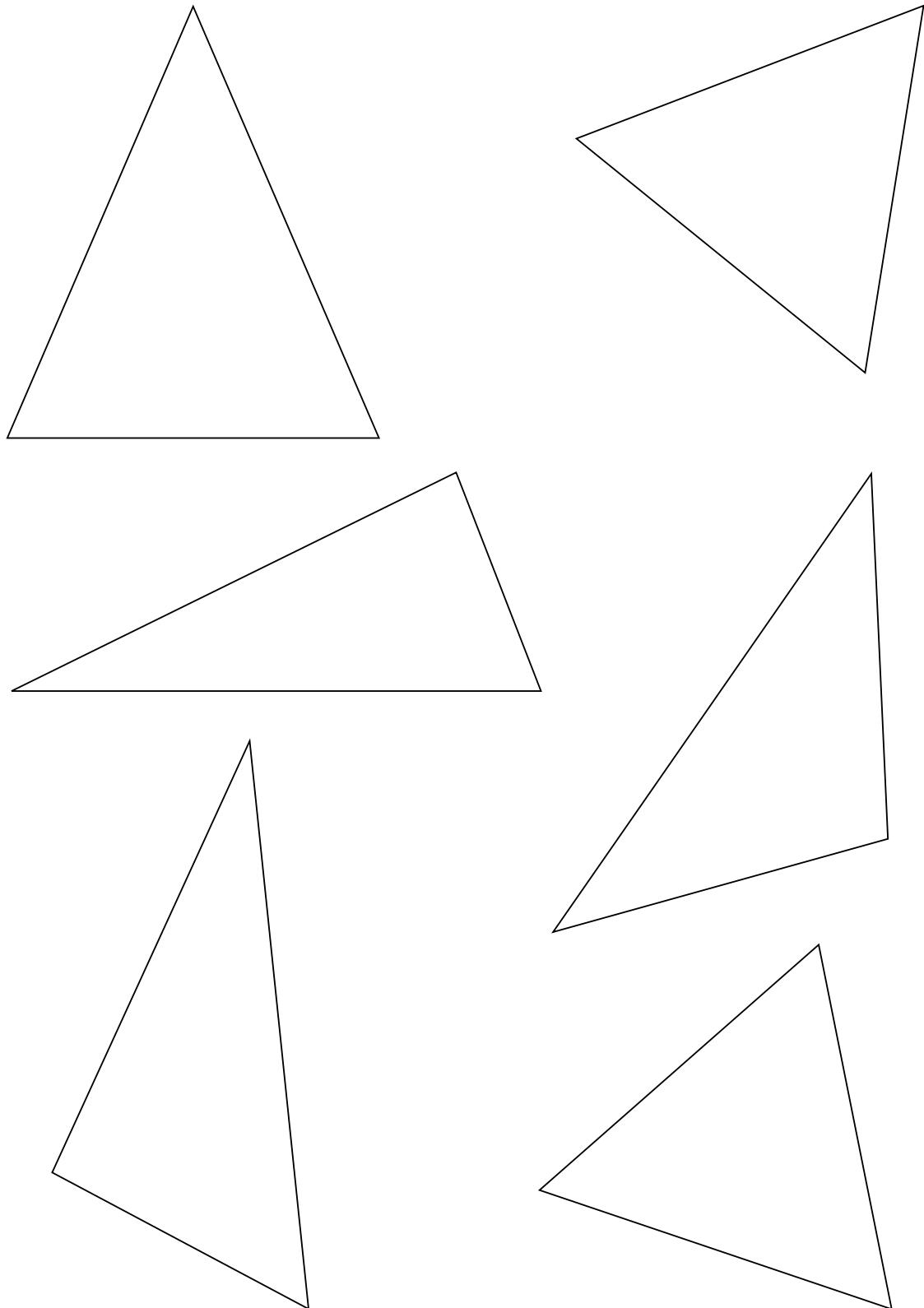


He _____ tēnei āhua.

E _____ ūna tapa.

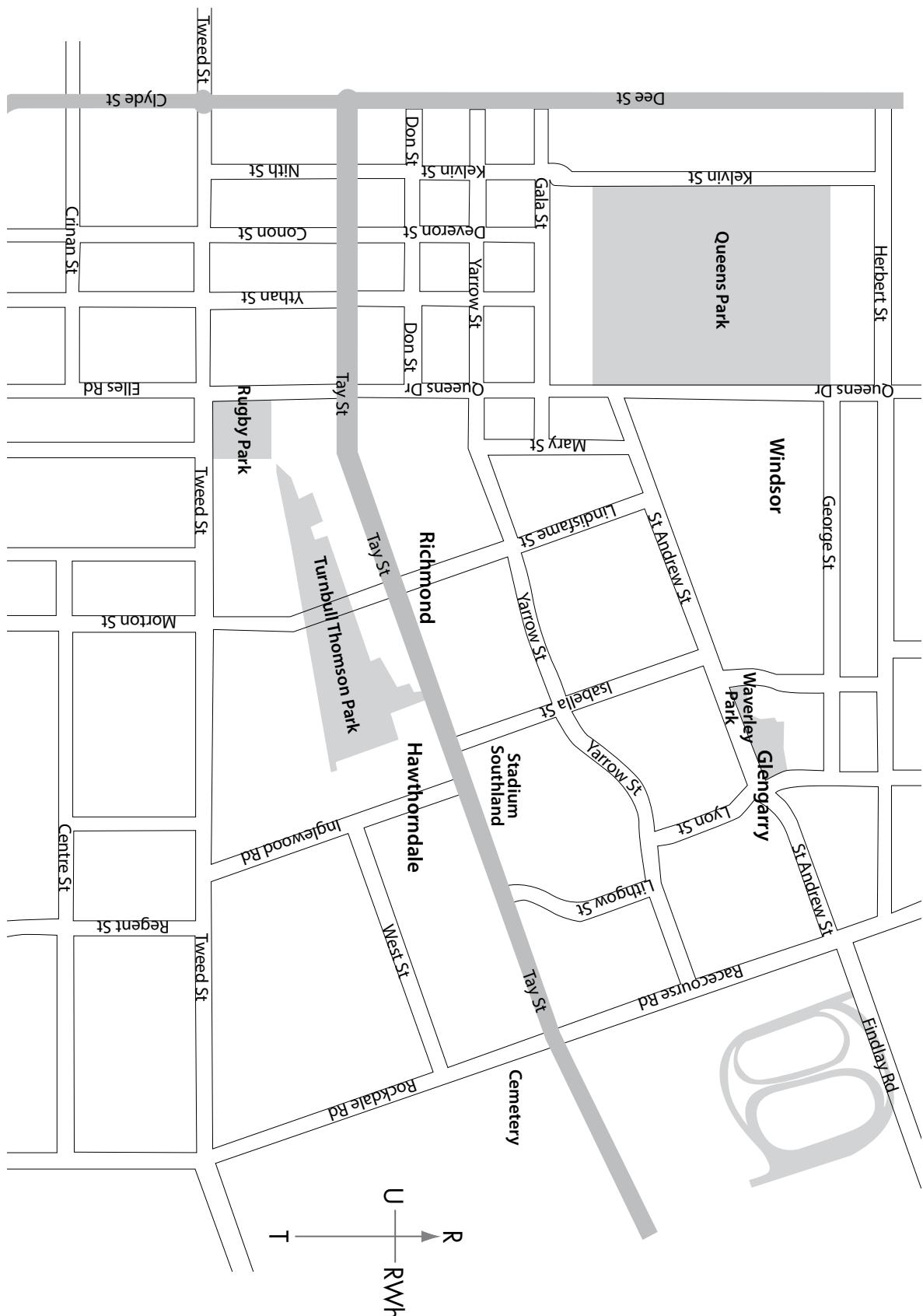
E _____ ūna kokonga.

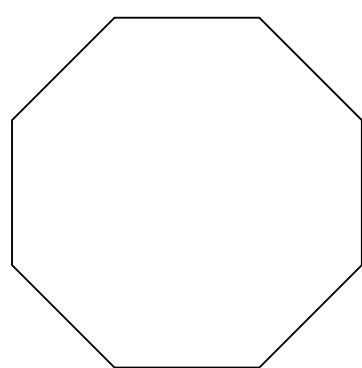
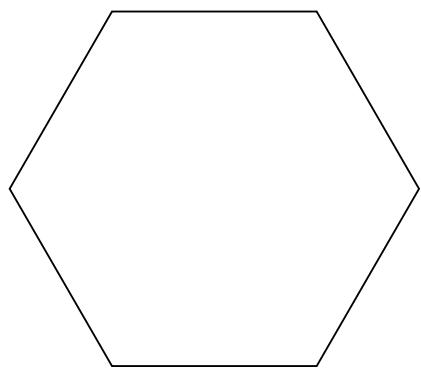
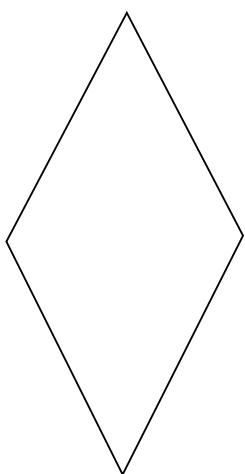
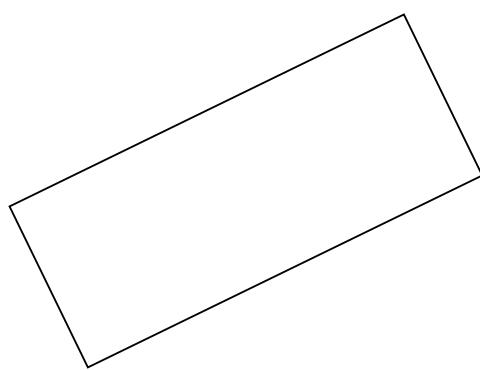
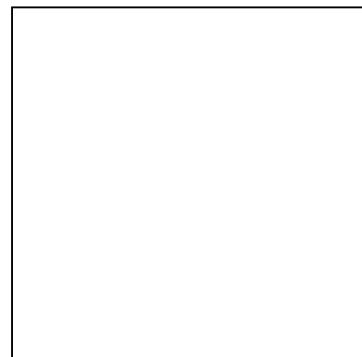
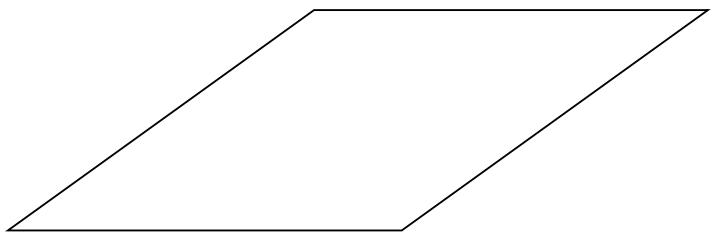




Huarahi Whakarara: Te Waihōpai

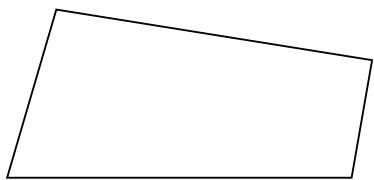
Te Hanga
Whārangī Tārua 8





Te Whakamārama Āhua Ahu-rua 2

Te Hanga
Whārangī Tārua 10



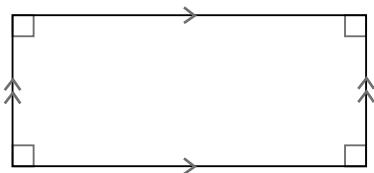
- E whā ngā tapa o tēnei āhua.
- He torotika ngā tapa katoa.
- E whā ngā kokonga.
- He rerekē te rahi o ngā koki katoa o ngā kokonga.
- He rerekē te roa o ia tapa.

Te Hanga

Whārangī Tārua 10

Te Hanga

Whārangī Tārua 10



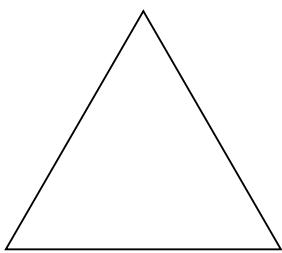
- E whā ngā tapa o tēnei āhua.
- He torotika ngā tapa katoa.
- E rua ngā takirua tapa whakarara.
- He roa tētahi takirua tapa, he poto tētahi takirua tapa.
- E whā ngā koki hāngai.

Te Hanga

Whārangī Tārua 10

Te Hanga

Whārangī Tārua 10



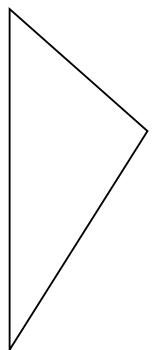
- E toru ngā tapa o tēnei āhua.
- He torotika ngā tapa katoa.
- E toru ngā kokonga.
- He ūrite te roa o ia tapa.

Te Hanga

Whārangī Tārua 10

Te Hanga

Whārangī Tārua 10



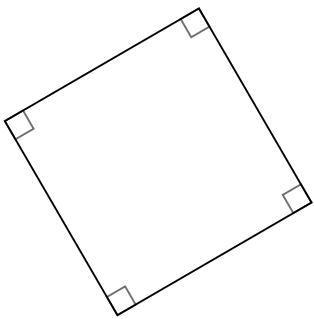
- E toru ngā tapa o tēnei āhua.
- He torotika ngā tapa katoa.
- He poutū tētahi o ngā tapa.
- He rerekē te roa o ia tapa.

Te Hanga

Whārangī Tārua 10

Te Hanga

Whārangī Tārua 10



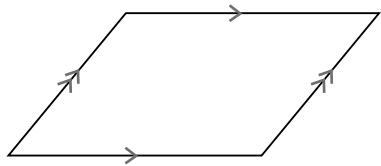
- E whā ngā tapa o tēnei āhua.
- He torotika ngā tapa katoa.
- E whā ngā koki hāngai.
- He ūrite te roa o ia tapa.
- He tītaha ngā tapa.

Te Hanga

Whārangi Tārua 10

Te Hanga

Whārangi Tārua 10



- E whā ngā tapa o tēnei āhua.
- He torotika ngā tapa katoa.
- He huapae ētahi tapa e rua, he whakarara hoki.
- He tītaha ētahi tapa e rua, he whakarara hoki.

Te Hanga

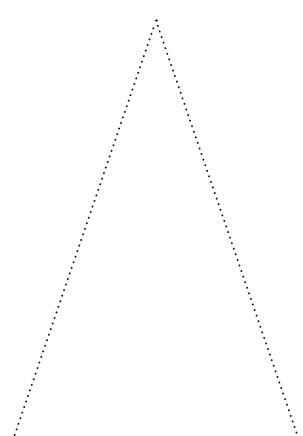
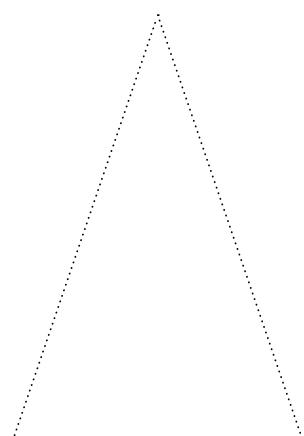
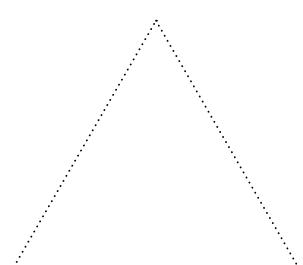
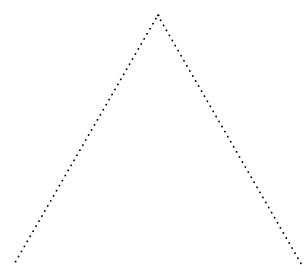
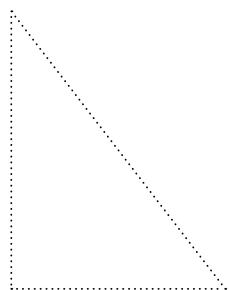
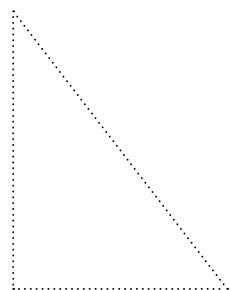
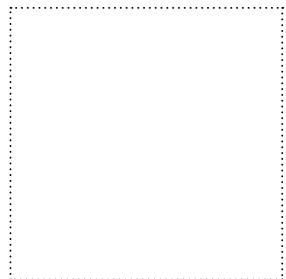
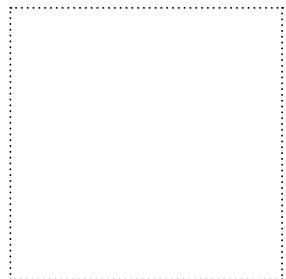
Whārangi Tārua 10

Te Hanga

Whārangi Tārua 10

Te Honohono Āhua

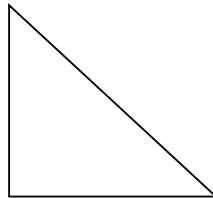
Te Hanga
Whārangī Tārua 11



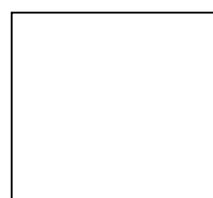
1. Tuhia tētahi rārangi kotahi ki tēnei āhua kia puta ai ētahi tapatoru e rua. He aha ngā momo tapatoru?

2. Tuhia ētahi rārangi ki tēnei āhua kia puta ai ētahi tapatoru e toru. He aha ngā momo tapatoru?

3. Tuhia he rārangi ki tēnei āhua kia puta ai ētahi tapatoru hāngai e rua.

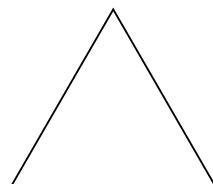


4. Tuhia he rārangi ki tēnei āhua kia puta ai ētahi tapawhā hāngai e rua.



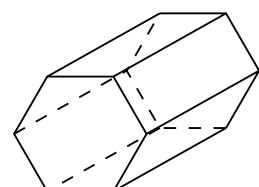
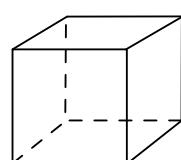
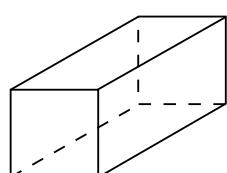
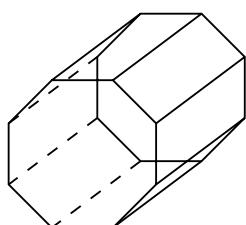
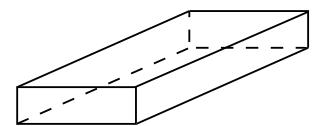
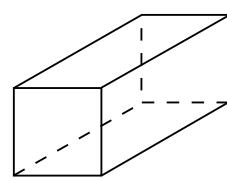
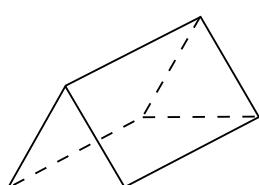
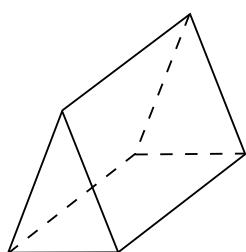
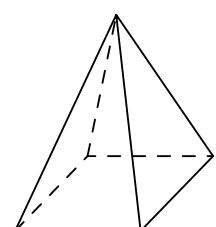
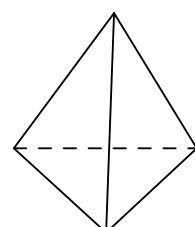
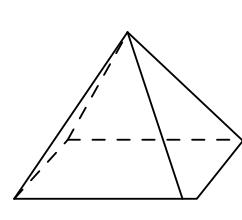
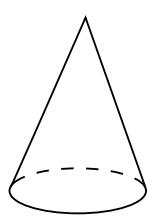
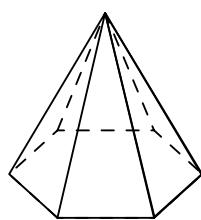
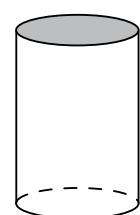
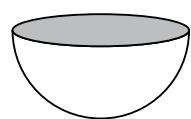
5. Tuhia tētahi rārangi kotahi ki tēnei āhua kia puta ai tētahi tapawhā rite. He aha te āhua tuarua ka puta?

6. Tuhia tētahi rārangi kotahi kia puta ai ētahi tapatoru e rua. He aha ngā momo tapatoru?



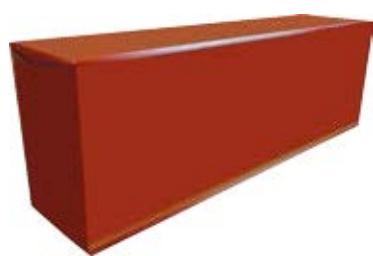
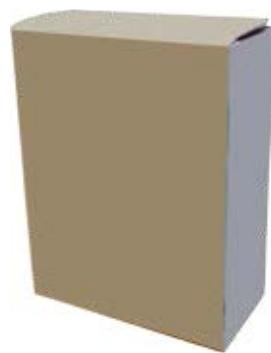
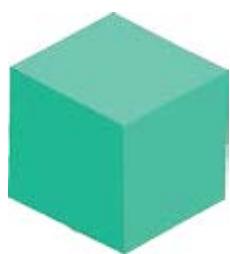
He Āhua Ahu-toru

Te Hanga
Whārangī Tārua 13



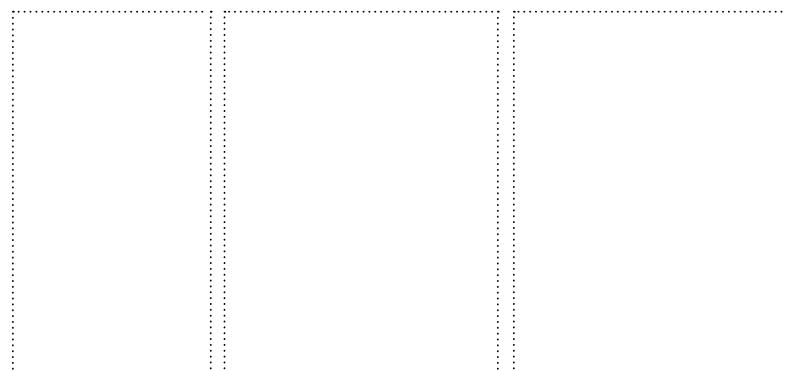
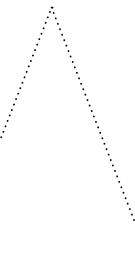
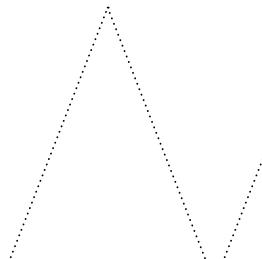
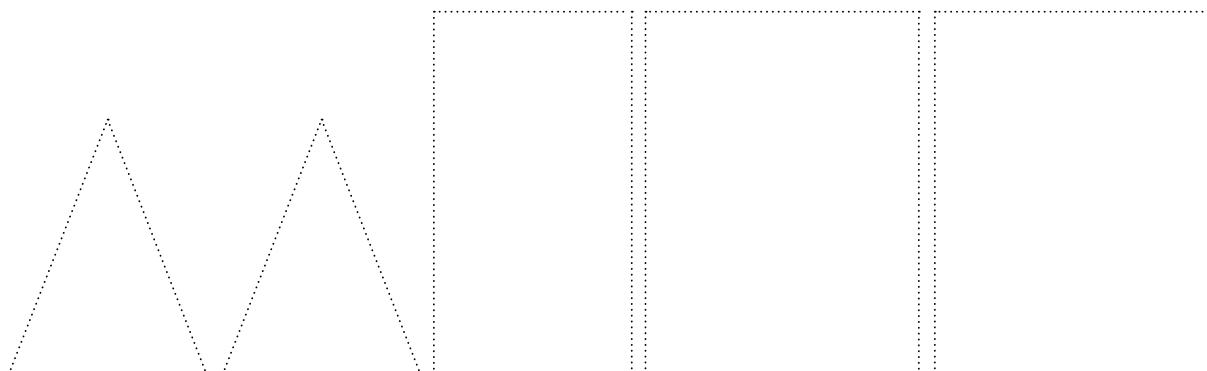
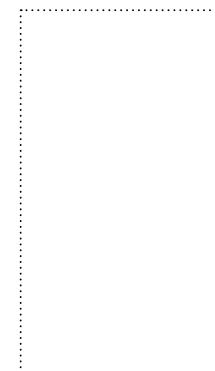
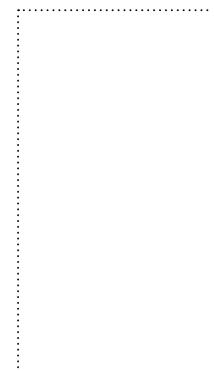
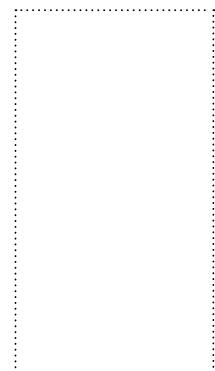
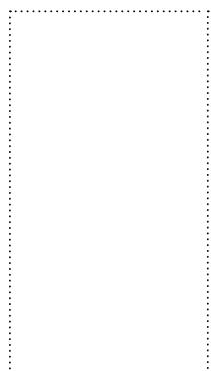
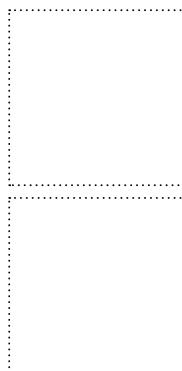
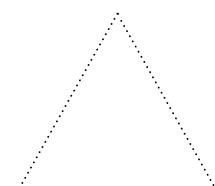
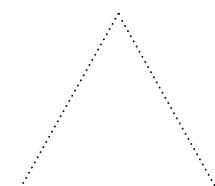
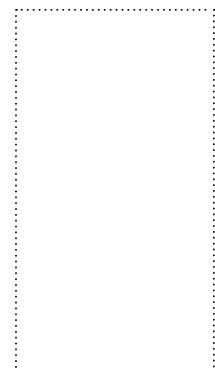
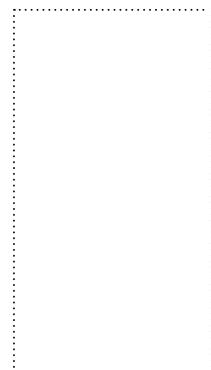
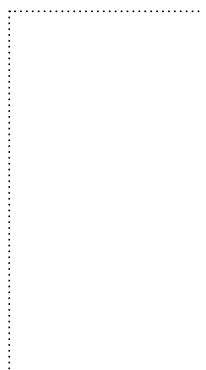
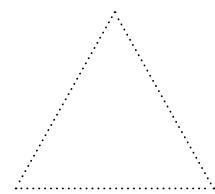
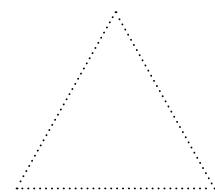
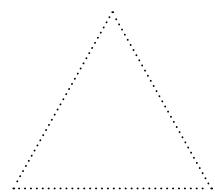
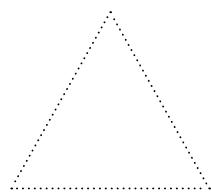
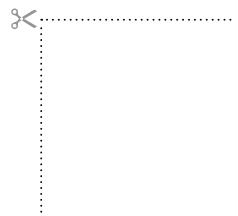
Ngā Hanga Ahu-toru o ia Rā

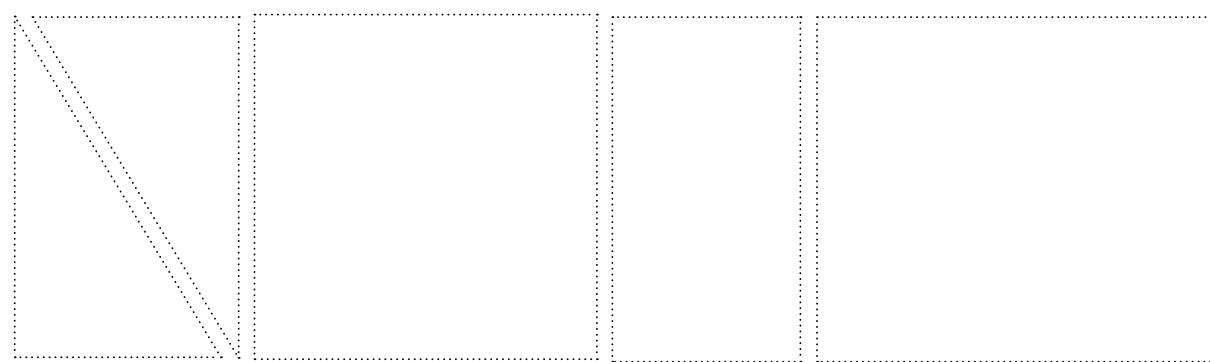
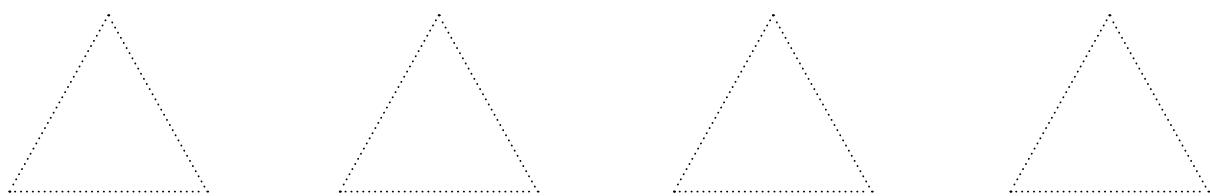
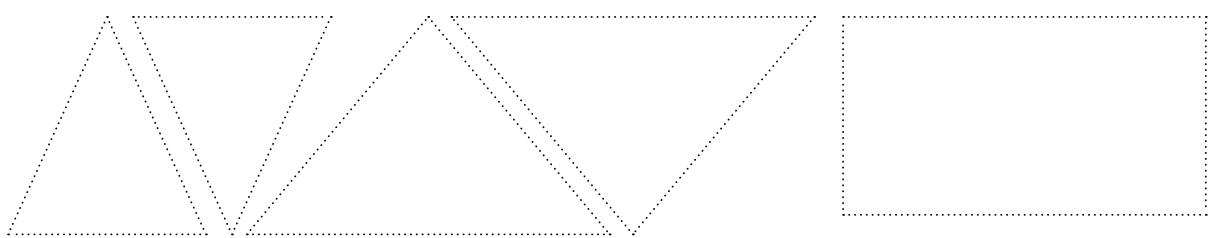
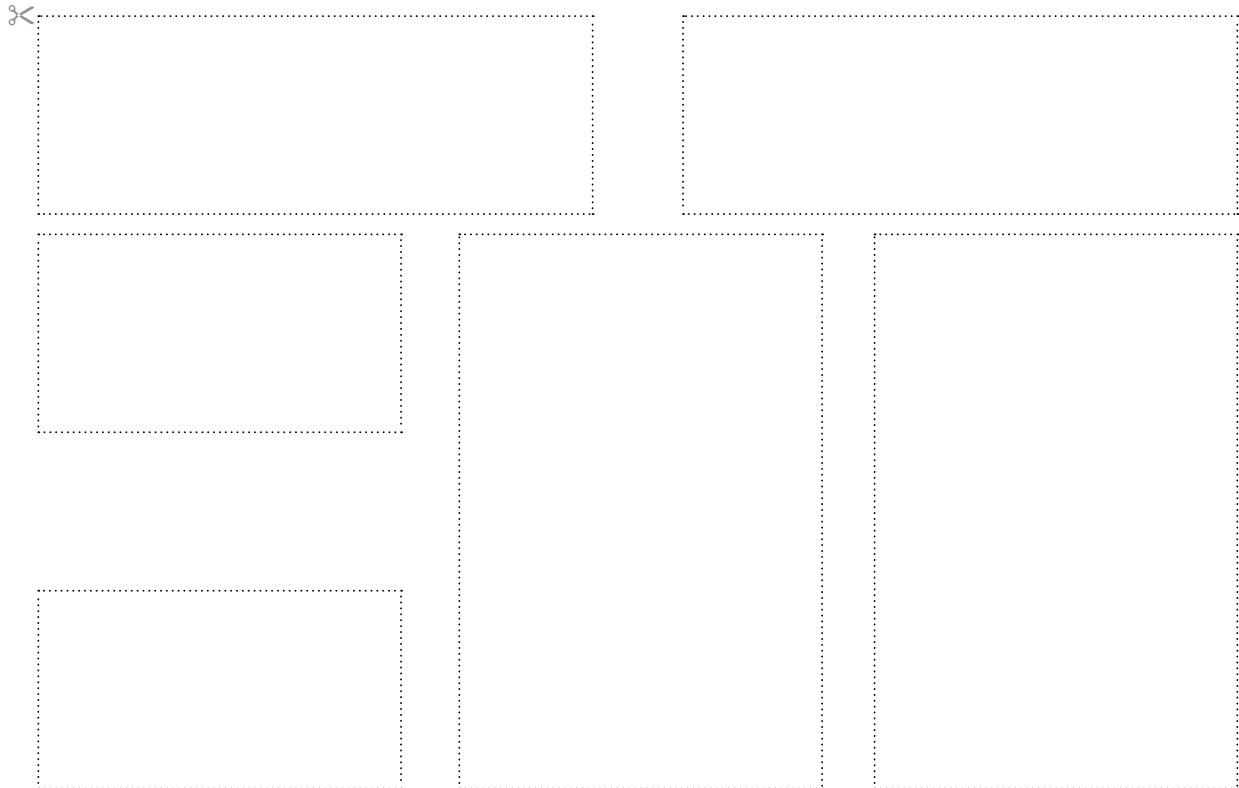
Te Hanga
Whārangi Tārua 14

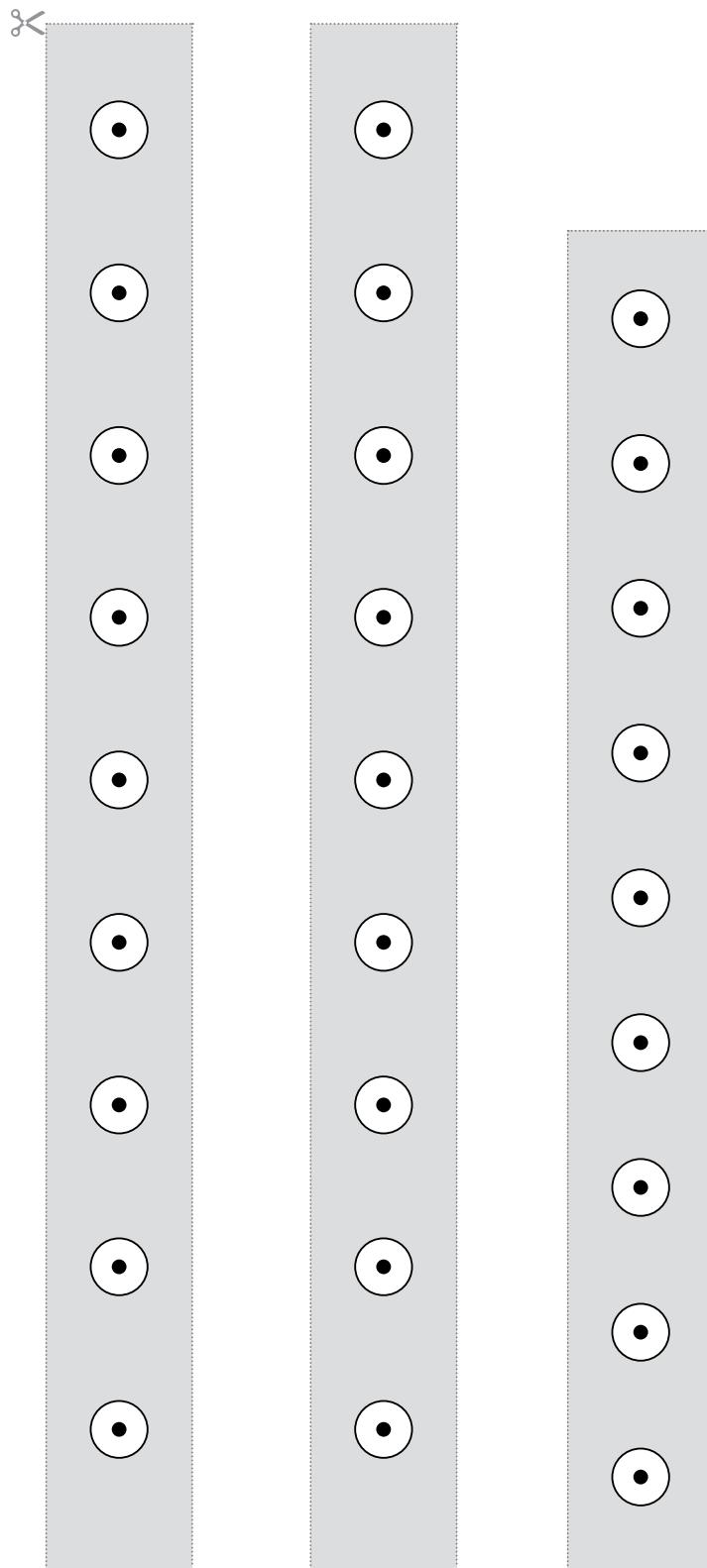


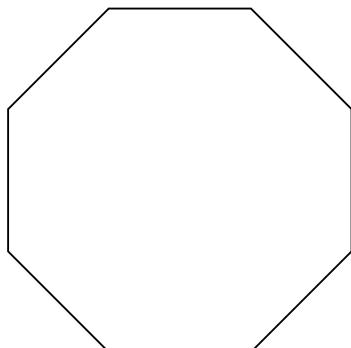
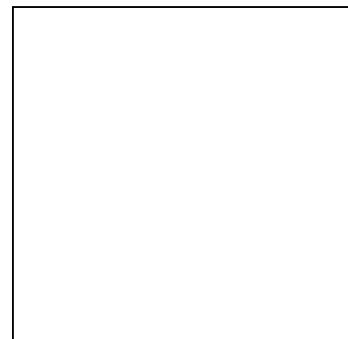
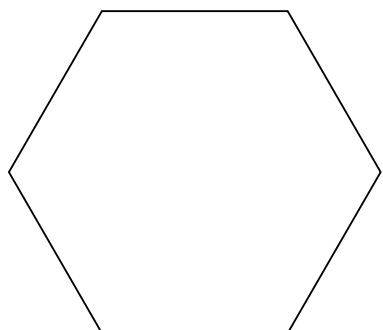
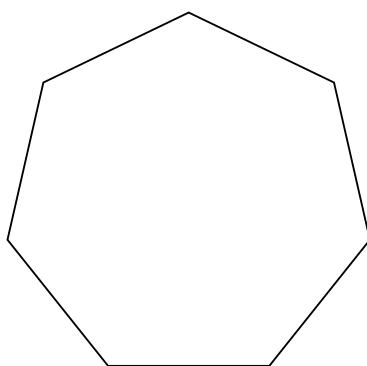
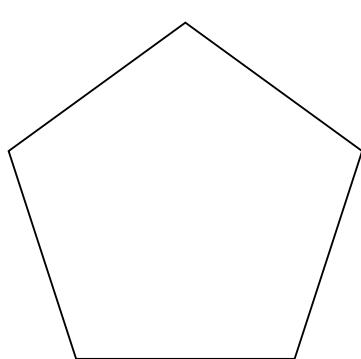
Hangaia he Āhua Ahu-toru

Te Hanga
Whārangī Tārua 15



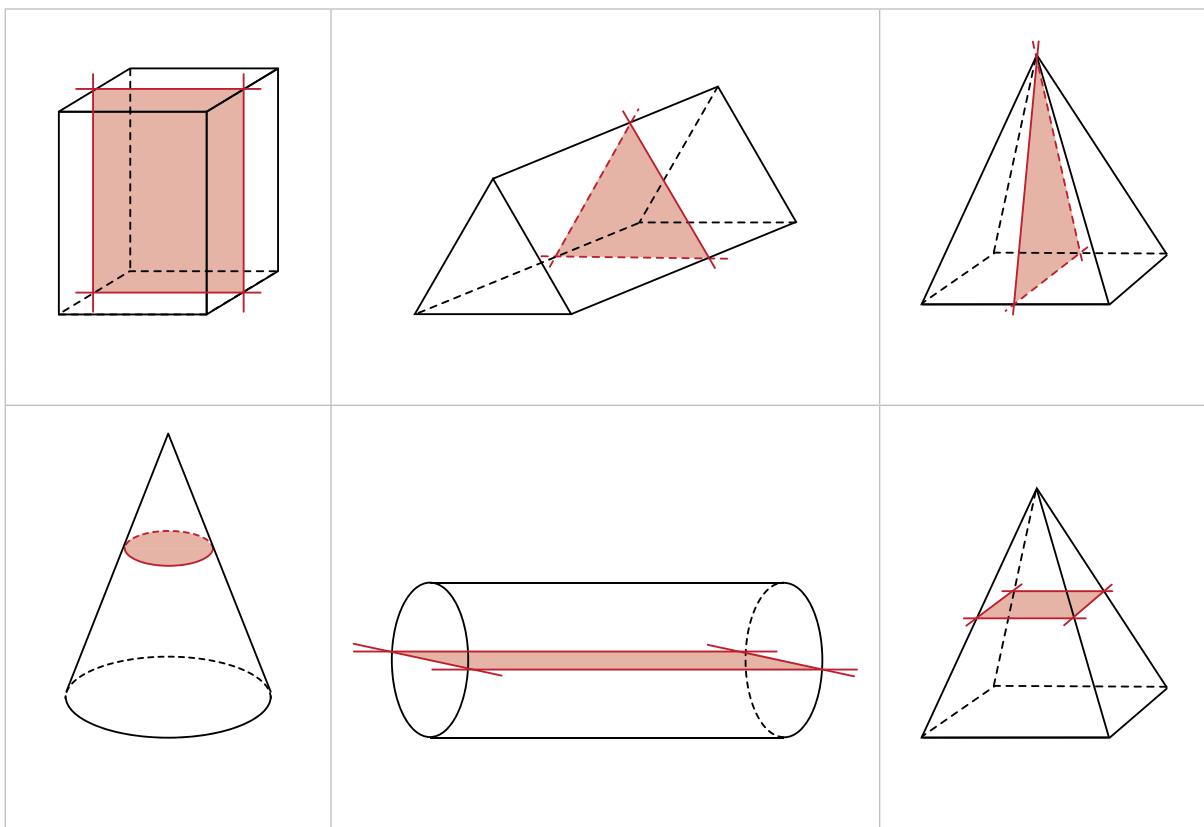




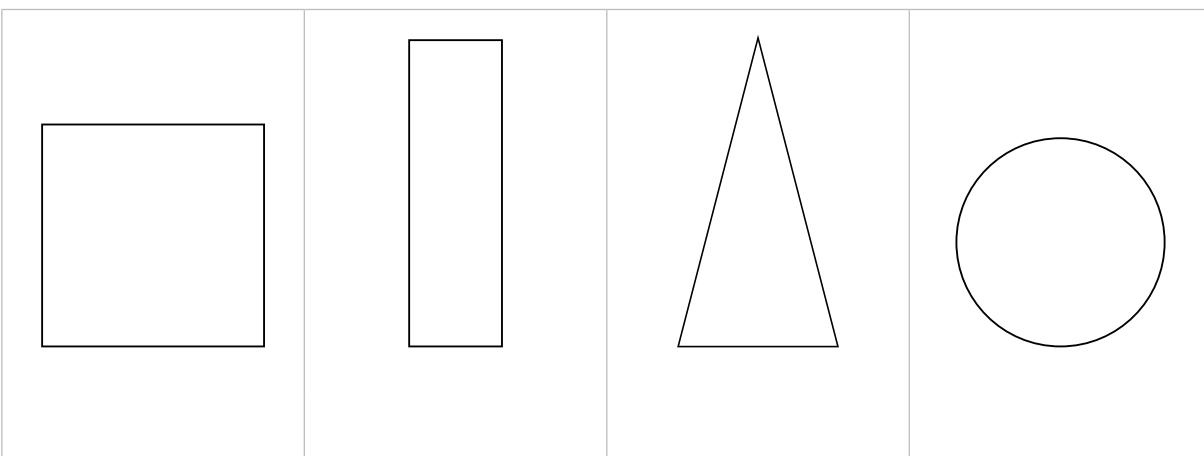


Te taparau	Te maha o ngā hauroki
tapawhā	
taparima	
tapaono	
tapawhitu	
tapawaru	

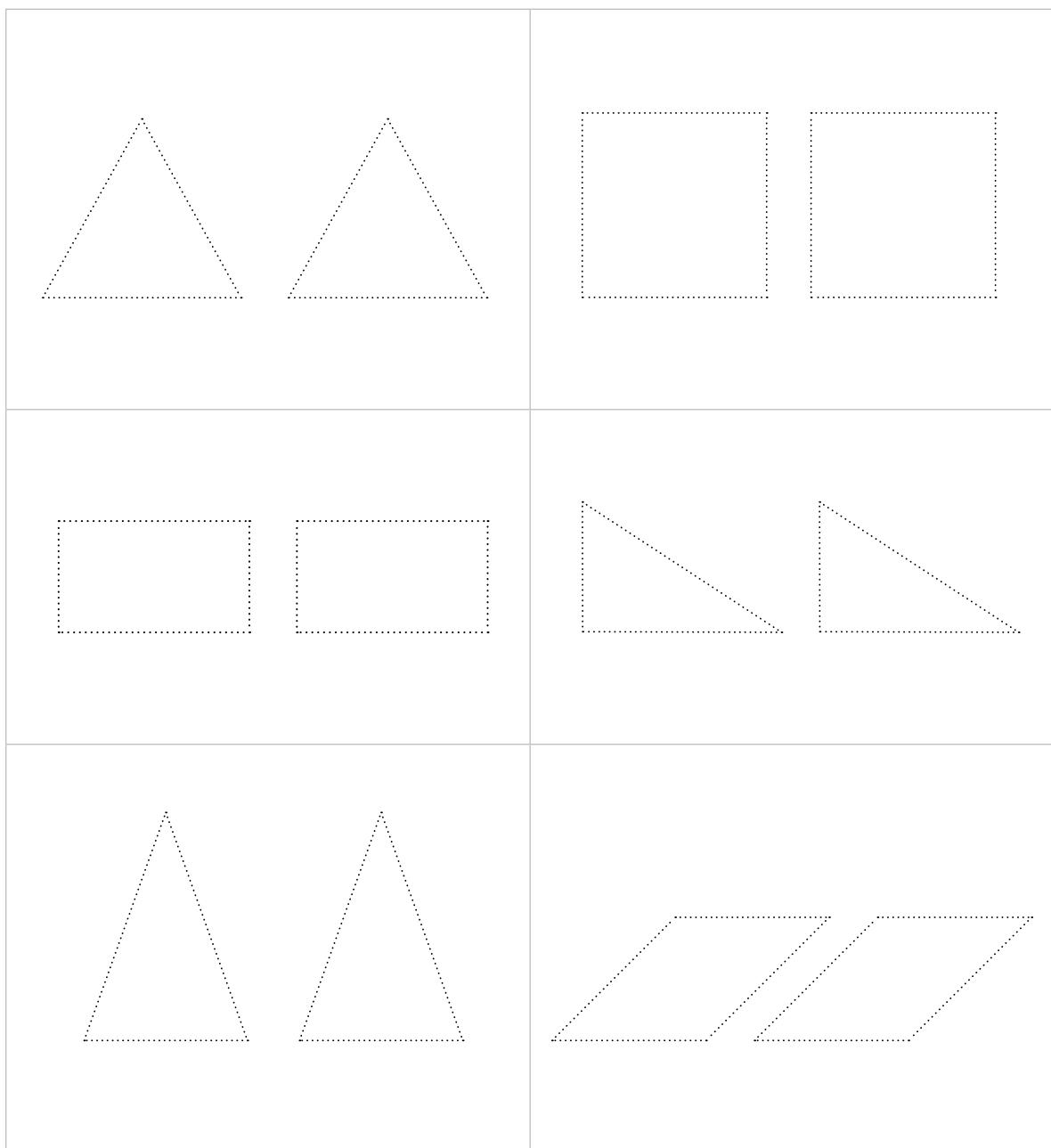
Tuhia te āhua o ngā motuhanga o ēnei āhua ahu-3. Tuhia kia tika ngā inenga:



Koia nei ngā motuhanga o ētahi āhua ahu-3. Whakamāramatia mai ētahi tapahanga āhua ahu-3 e rua hei whakaputa i ēnei motuhanga:



8<



Tuhia te āhua e hāngai ana ki ngā whakamārama, me te tuhi anō i te ingoa. I ētahi whakamārama, e rua, nui ake rānei ngā āhua e hāngai ana:

1. E rua ngā takirua tapa whakarara. E whā ngā kokonga.
2. E toru ngā tapa torotika. E rua ngā koki ūrite.
3. E toru ngā takirua tapa whakarara. E ono ngā kokonga.
4. E toru katoa ngā koki, e 90° te rahi o tētahi.
5. E whā ngā tapahanga e taea ana hei wāwāhi i tēnei āhua kia haurua.
6. He mutunga kore ngā tapahanga e taea ana hei wāwāhi i tēnei āhua kia haurua.

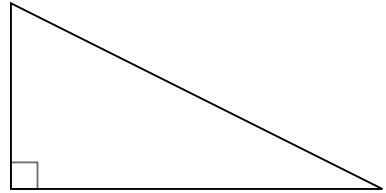
Pepa Tukutuku

Te Hanga
Whārangi Tārua 21



1. Koinei tētahi o ngā pito o tētahi poro-tapatoru:

- He aha te ingoa o te poro-tapatoru?
- Tuhia ngā tapawhā hāngai e toru hei hanga i tēnei poro-tapatoru, me te whakaatu anō i ngā inenga o ngā tapa.



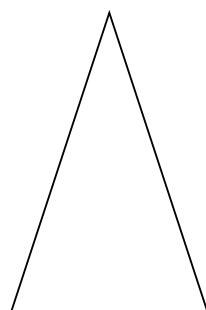
2. Koinei te pūtake o tētahi koeko:

- He aha te ingoa o te koeko?
- He aha te āhua o ērā atu o ngā mata o te koeko nei?
- Tuhia ērā atu o ngā mata me te whakaatu anō i ngā inenga o ngā tapa.



3. Koinei tētahi o ngā mata o tētahi koeko tapawhā rite:

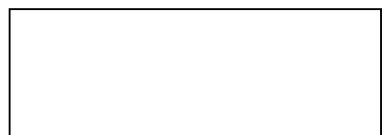
- Tuhia te āhua o te pūtake me te whakaatu anō i ngā inenga o ngā tapa.



4. Koinei tētahi o ngā mata e rima o tētahi poro.

E toru ngā mata o tēnei poro he ūrite ki tēnei:

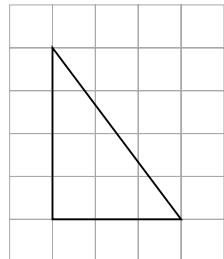
- He aha te ingoa o te poro?
- Tuhia tētahi o ngā pito o tēnei poro me te whakaatu anō i ngā inenga.



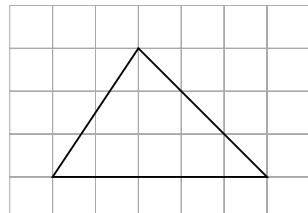
He Ārite te Āhua 1

Te Hanga
Whārangi Tārua 23

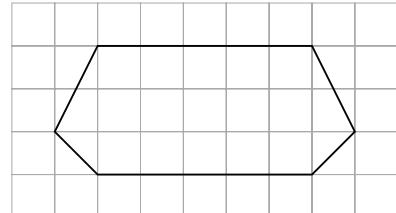
1. Tuhia tēnei tapatoru ki tō pepa tukutuku. Tuhia tētahi anō tapatoru kia ārite te āhua, engari kia rahi ake. Whakamāramatia mai he aha i ī ārite ai te āhua.



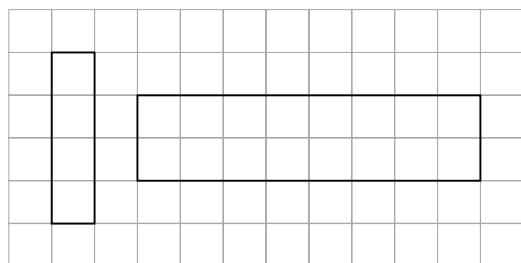
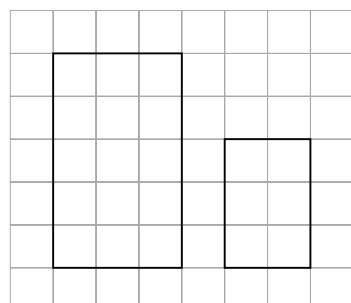
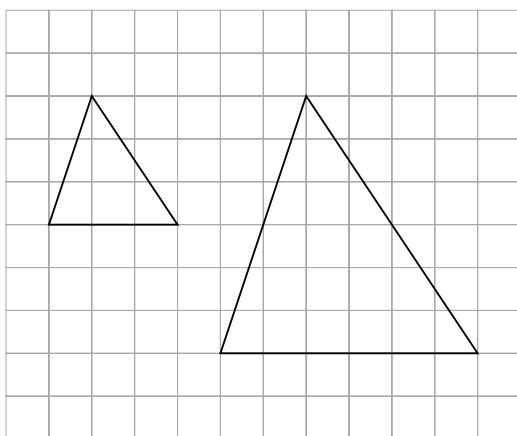
2. Tuhia tēnei tapatoru ki tō pepa tukutuku. Tuhia tētahi anō tapatoru kia ārite te āhua, engari kia rahi ake. Whakamāramatia mai he aha i ī ārite ai te āhua.



3. Tuhia tēnei tapaono ki tō pepa tukutuku. Tuhia tētahi anō tapatoru kia ārite te āhua, engari kia rahi ake. Whakamāramatia mai he aha i ī ārite ai te āhua.



4. Āta tirohia ēnei hanga takirua, ka kī mai ai mēnā he ī ārite te āhua o tētahi me tētahi. Whakamāramatia mai he aha i pēnā ai ī whakaaro.

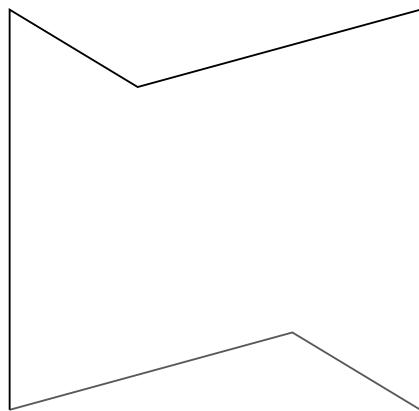
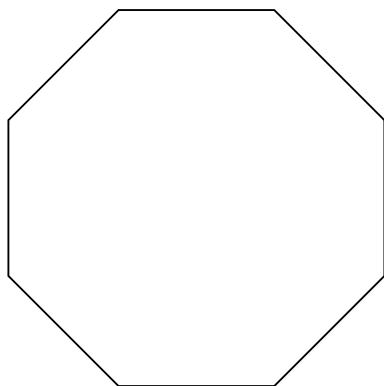
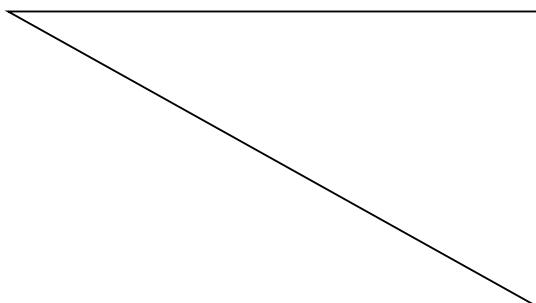
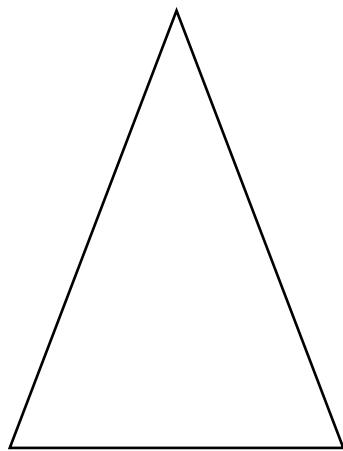
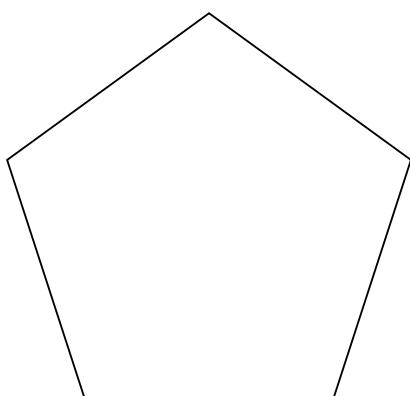


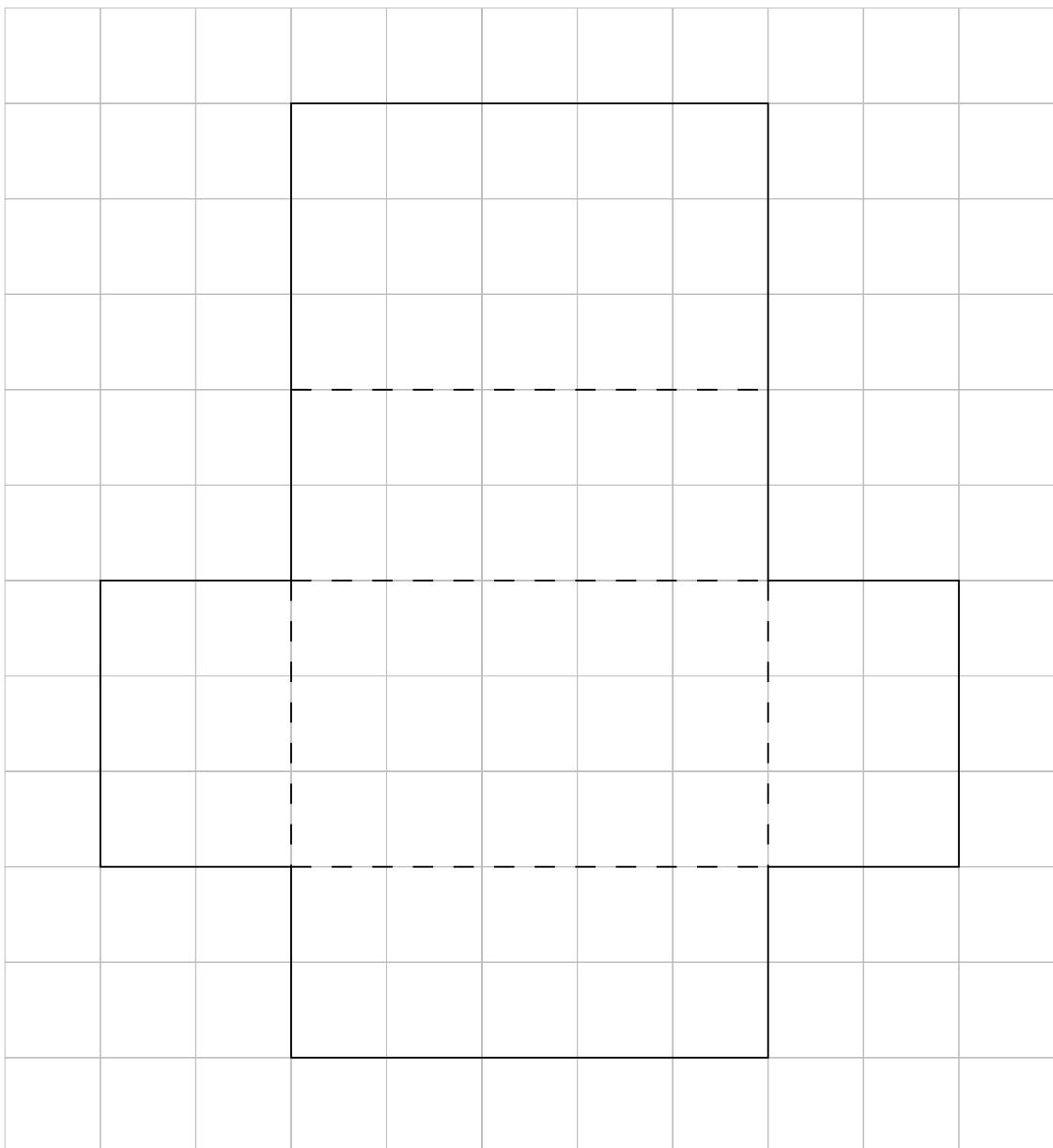
He Ārite te Āhua 2

Te Hanga
Whārangī Tārua 24

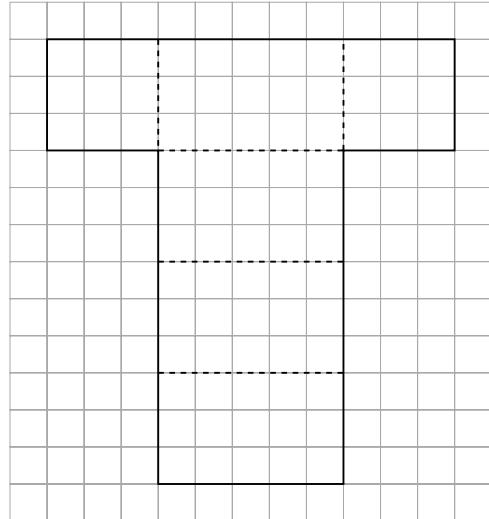
A large grid of handwriting practice lines. The grid consists of 10 horizontal rows and 10 vertical columns, creating a total of 100 squares for writing practice. Each square is defined by a dotted outer border and a solid inner border. The grid is intended for children to practice letter formation and word placement.

Āta tirotirohia ēnei āhua. Ki tō titiro, ka taea ēnei āhua te tāruarua hei hanga rōpinepine, kāore rānei? Whakamātauria tāu i whakatau ai. Tuhia ētahi o ngā rōpinepine.

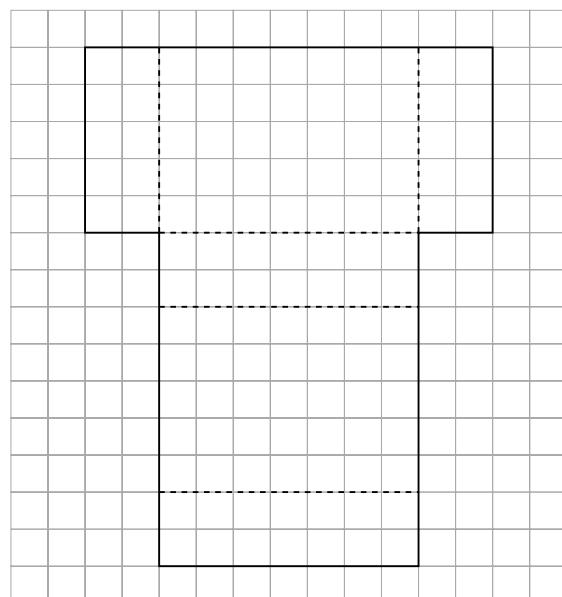




- He aha te āhua ka puta ina whētuia tēnei raumata?
- Whiriwhiria te horahanga mata o tēnei āhua.

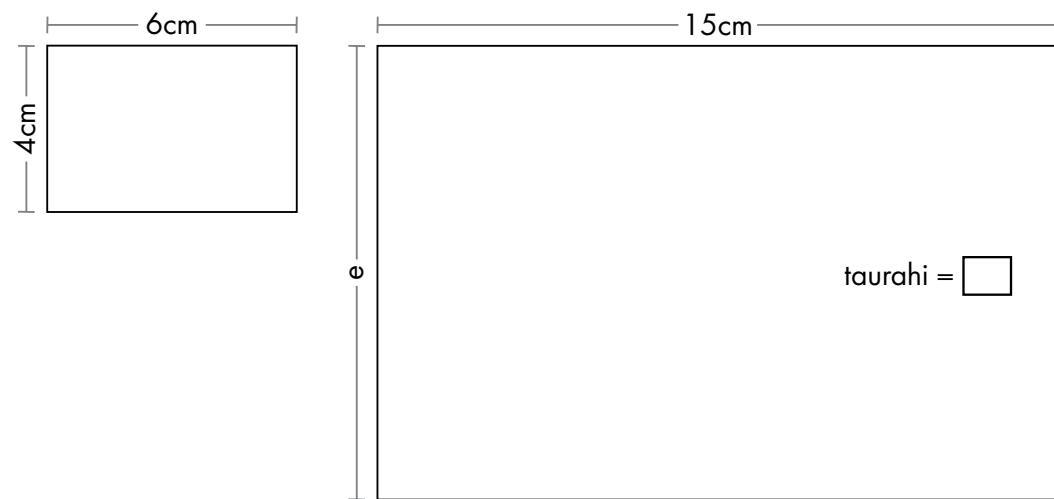
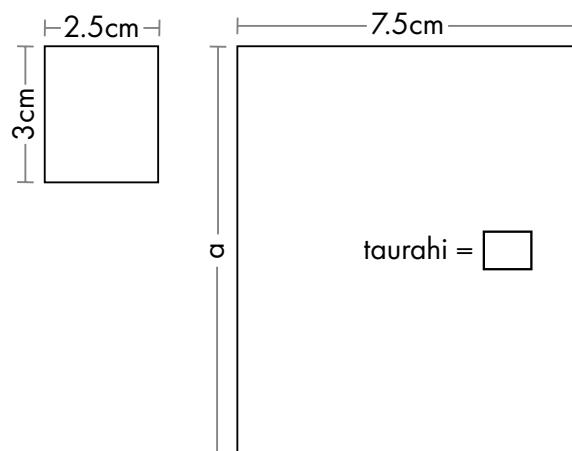
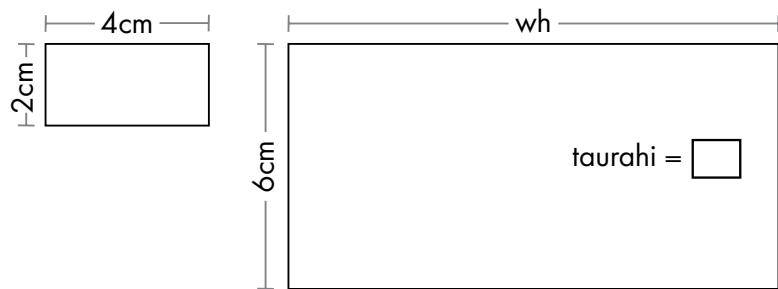


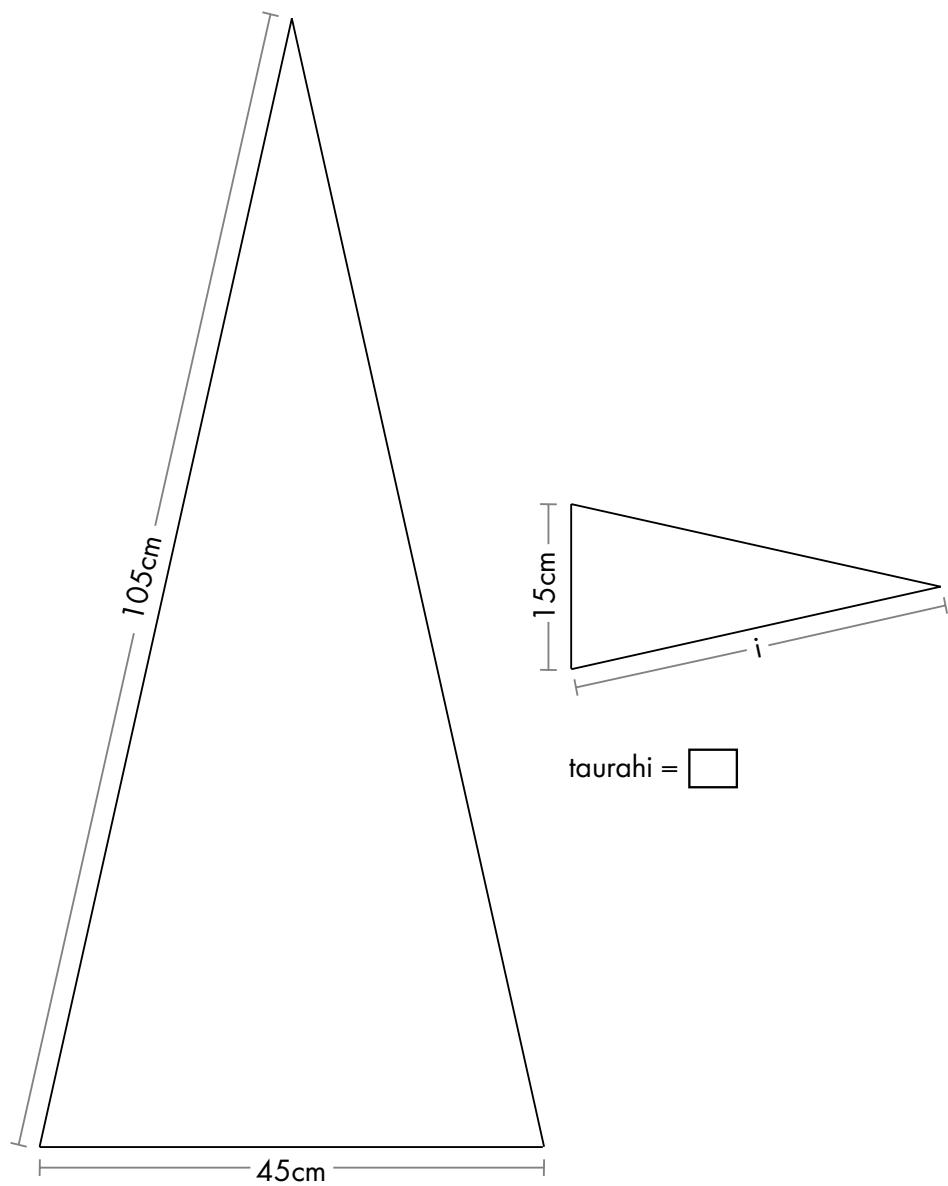
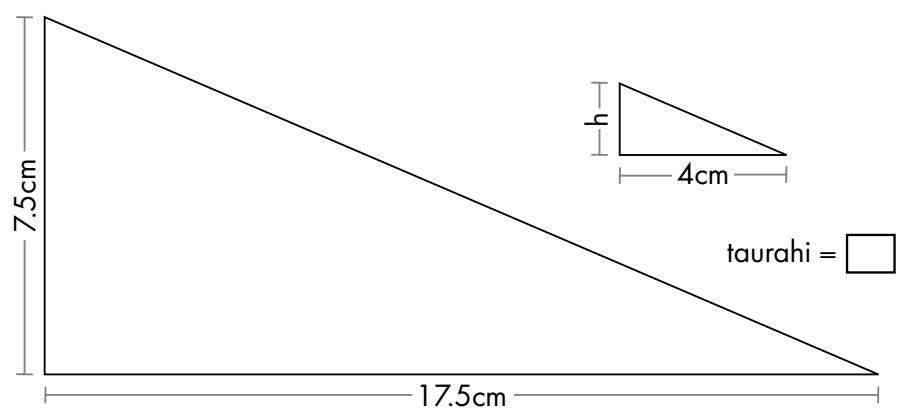
- He aha te āhua ka puta ina whētuia tēnei raumata?
- Whiriwhiria te horahanga mata o tēnei āhua.



- E \$7 te utu ā-mita pūrua ($\$7/m^2$) mō te momo kāri hei hanga i ētahi pouaka 250. He poro-tapawhā rite te āhua o te pouaka, ko te 3cm mā te 3cm mā te 5cm ūna tapa. E hia te utu mō te kāri hei hanga i ēnei pouaka 250?
- E \$3.50 te utu ā-mita pūrua ($\$3.50/m^2$) mō te momo kāri hei hanga i ētahi pouaka 1,200. He poro-tapawhā hāngai te āhua o te pouaka, ko te 2cm mā te 5cm mā te 6cm ūna tapa. E hia te utu mō te kāri hei hanga i ēnei pouaka 1,200?

Tuhia te roa o ngā tapa e tohua ana, me te whakaatu anō i te taurahi mō ēnei āhua takirua:





Te Whakarahi Āhua me te Horahanga

Te Hanga
Whārangī Tārua 29

1. He mea whakarahi ētahi tapawhā iti kia hua mai ai he tapawhā nui. Ko te 2 te taurahi mō ngā whakarahinga. Tuhia ngā inenga o ngā tapa me ngā horahanga ki ngā wāhi e wātea ana i te tūtohi. Kua oti te mea tuatahi hei tauira:

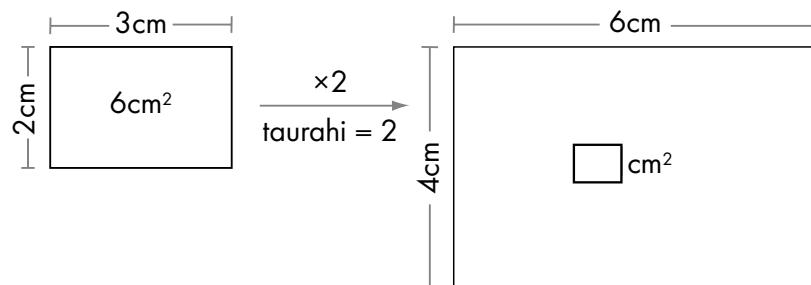
	tapawhā hāngai iti	taurahi	tapawhā hāngai nui
tapa roa	2cm	2	4cm
tapa whānui	3cm		6cm
horahanga	6cm ²		24cm ²

tapa roa	4cm	2	
tapa whānui	2cm		
horahanga			

tapa roa	5cm	2	
tapa whānui	3cm		
horahanga			

tapa roa	6cm	2	
tapa whānui	4cm		
horahanga			

Mēnā ko te 2 te taurahi o te whakarahinga o tētahi tapawhā hāngai iti, ka ahatia te horahanga? He aha te pānga e kitea mai ana i te tūtohi i runga nei?



2. He mea whakarahi ētahi tapawhā iti kia hua mai ai he tapawhā nui. Ko te 3 te taurahi mō ngā whakarahinga. Tuhia ngā inenga o ngā tapa me ngā horahanga ki ngā wāhi e wātea ana i te tūtohi. Kua oti te mea tuatahi hei tauira:

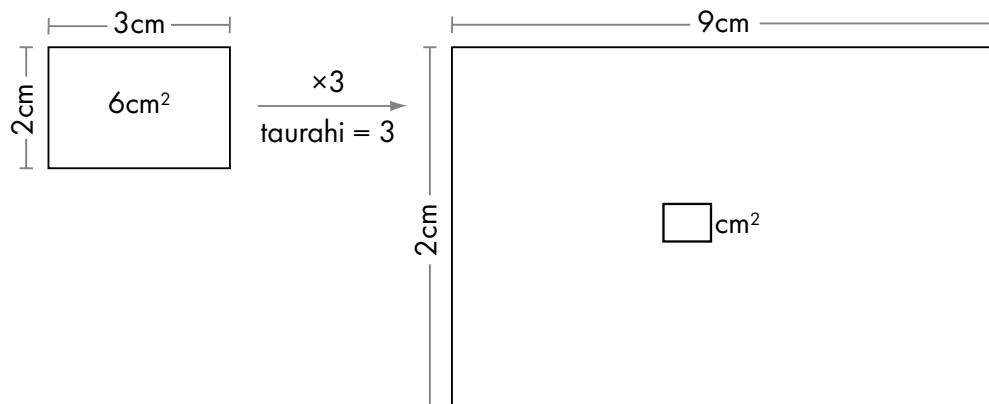
	tapawhā hāngai iti	taurahi	tapawhā hāngai nui
tapa roa	2cm	3	6cm
tapa whānui	3cm		9cm
horahanga	6cm ²		54cm ²

tapa roa	4cm	3	
tapa whānui	2cm		
horahanga			

tapa roa	5cm	3	
tapa whānui	3cm		
horahanga			

tapa roa	6cm	3	
tapa whānui	4cm		
horahanga			

Mēnā ko te 3 te taurahi o te whakarahinga o tētahi tapawhā hāngai iti, ka ahatia te horahanga? He aha te pānga e kitea mai ana i te tūtohi i runga nei?



3. He mea whakarahi ētahi tapawhā iti kia hua mai ai he tapawhā nui. Ko te 4 te taurahi mō ngā whakarahinga. Tuhia ngā inenga o ngā tapa me ngā horahanga ki ngā wāhi e wātea ana i te tūtohi. Kua oti te mea tuatahi hei tauira:

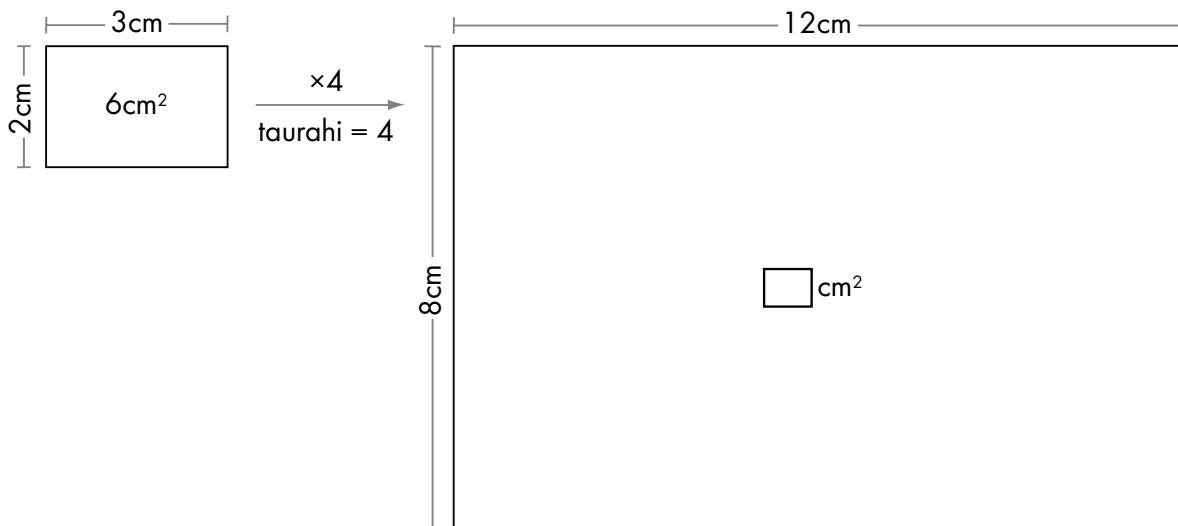
	tapawhā hāngai iti	taurahi	tapawhā hāngai nui
tapa roa	2cm	4	8cm
tapa whānui	3cm		12cm
horahanga	6cm ²		96cm ²

tapa roa	4cm	4	
tapa whānui	2cm		
horahanga			

tapa roa	5cm	4	
tapa whānui	3cm		
horahanga			

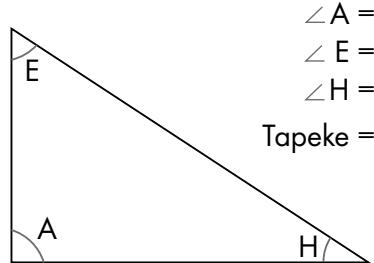
tapa roa	6cm	4	
tapa whānui	4cm		
horahanga			

Mēnā ko te 4 te taurahi o te whakarahinga o tētahi tapawhā hāngai iti, ka ahatia te horahanga? He aha te pānga e kitea mai ana i te tūtohi i runga nei?



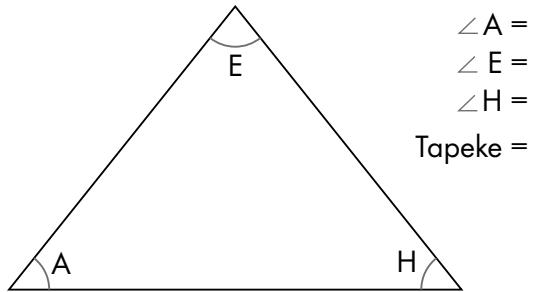
Koki Tapatoru 1

Te Hanga
Whārangī Tārua 30



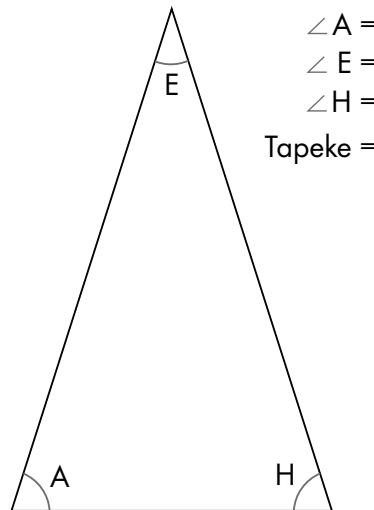
$$\begin{aligned}\angle A = \\ \angle E = \\ \angle H =\end{aligned}$$

Tapeke =



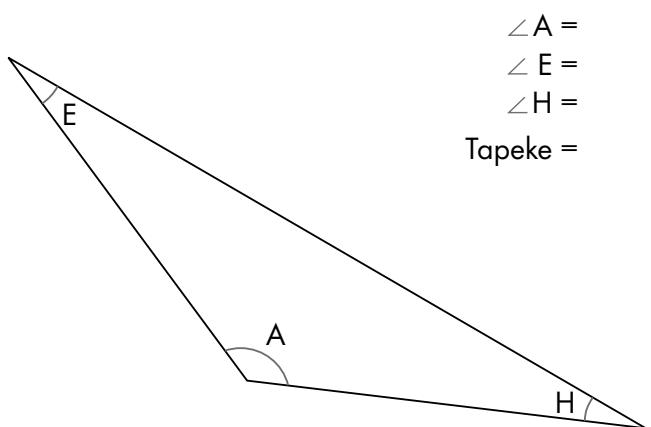
$$\begin{aligned}\angle A = \\ \angle E = \\ \angle H =\end{aligned}$$

Tapeke =



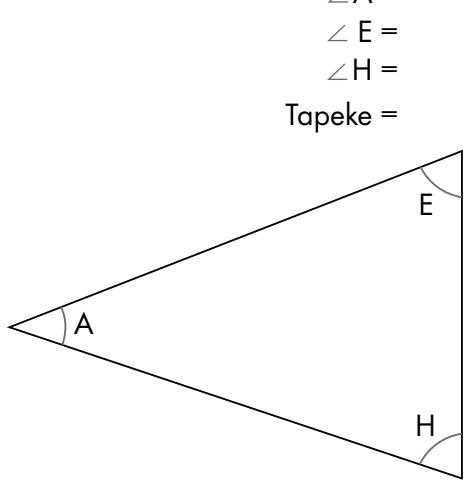
$$\begin{aligned}\angle A = \\ \angle E = \\ \angle H =\end{aligned}$$

Tapeke =



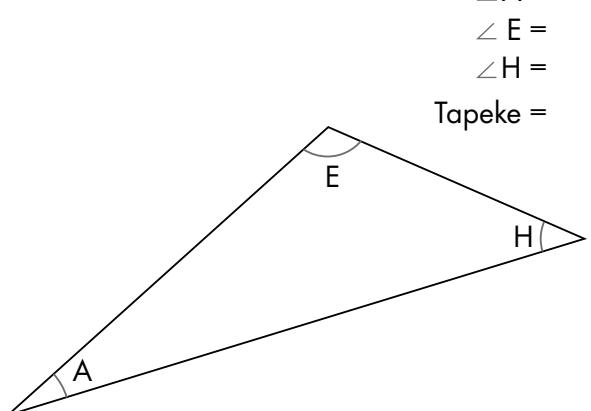
$$\begin{aligned}\angle A = \\ \angle E = \\ \angle H =\end{aligned}$$

Tapeke =



$$\begin{aligned}\angle A = \\ \angle E = \\ \angle H =\end{aligned}$$

Tapeke =

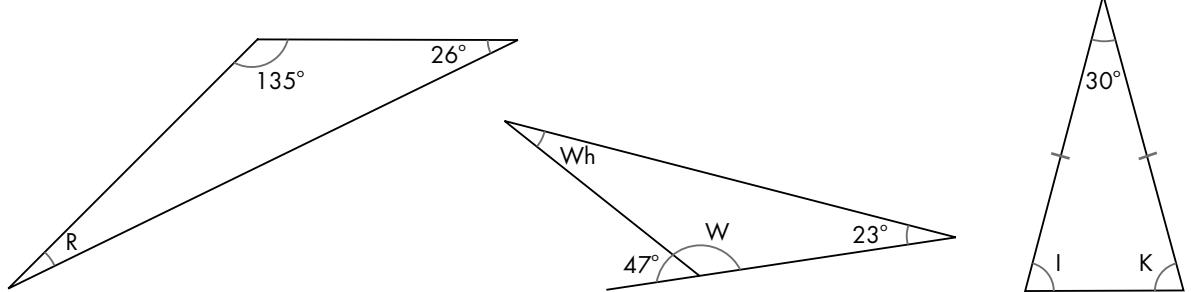
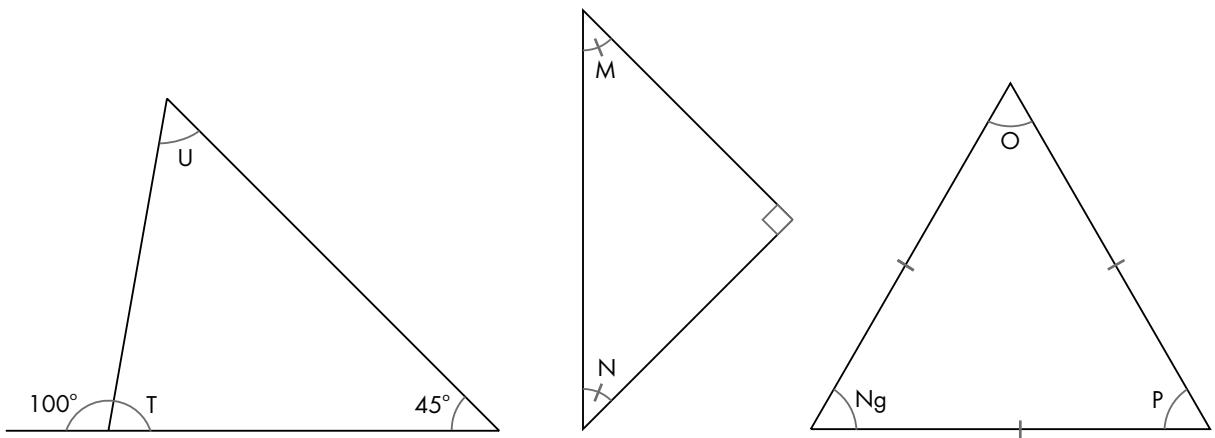
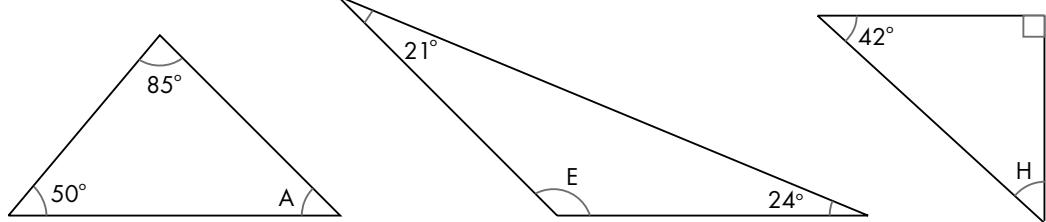


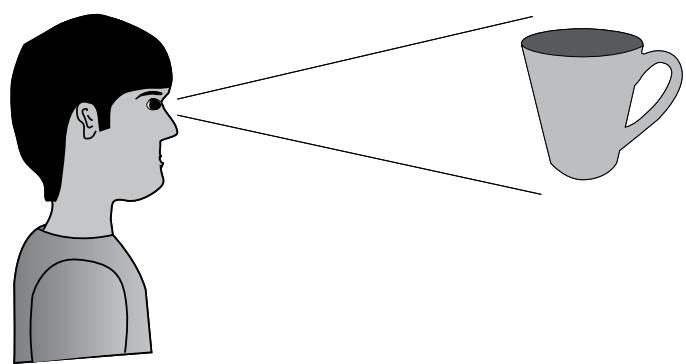
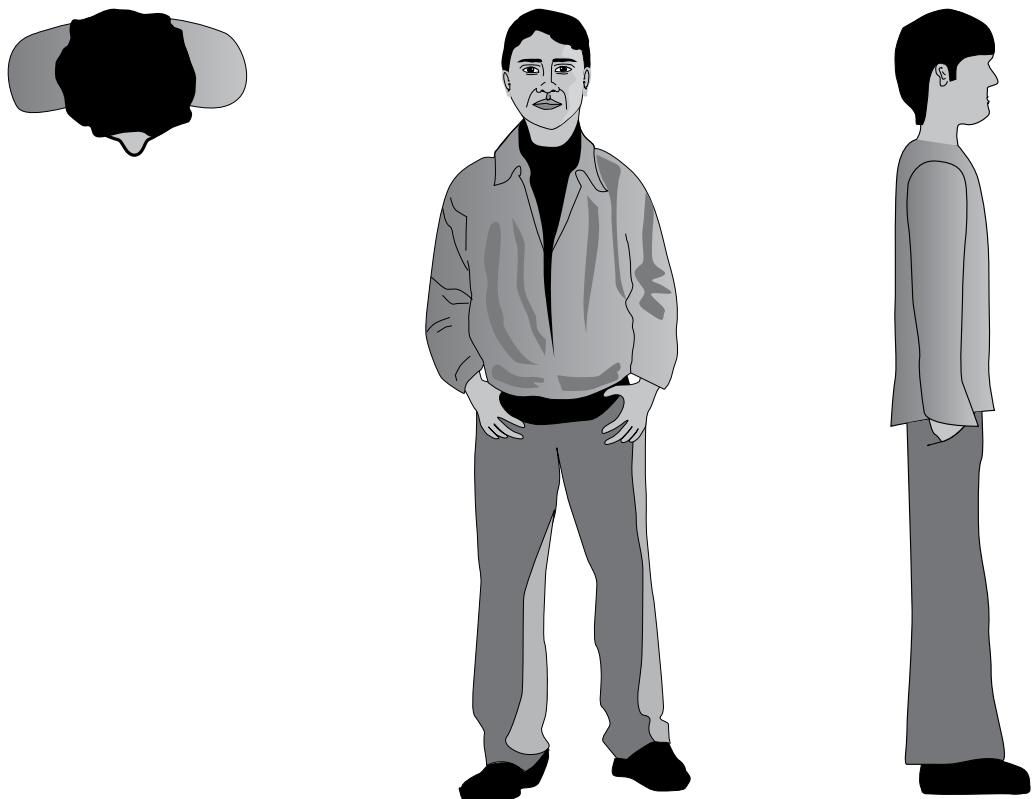
$$\begin{aligned}\angle A = \\ \angle E = \\ \angle H =\end{aligned}$$

Tapeke =

Koki Tapatoru 2

Te Hanga
Whārangī Tārua 31



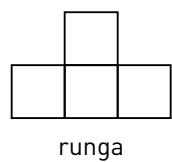


Tirohanga 2

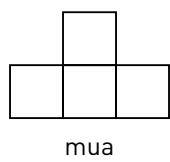
Te Hanga
Whārangī Tārua 33

Koia nei ngā tirohanga ki ētahi āhua ahu-3, kua hangaia ki te poraka mataono rite.
Māu e hanga ngā āhua:

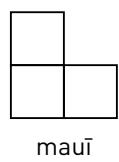
1.



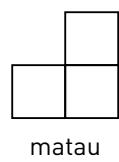
runga



mua

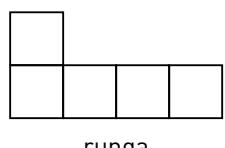


mauī

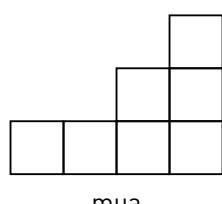


matau

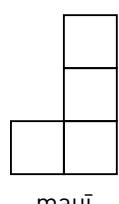
2.



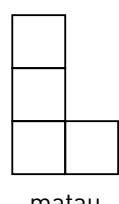
runga



mua

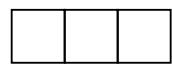


mauī

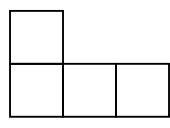


matau

3.



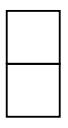
runga



mua

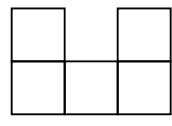


mauī

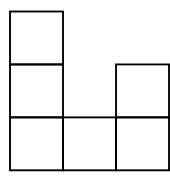


matau

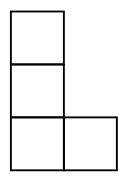
4.



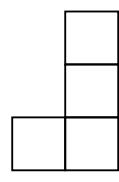
runga



mua

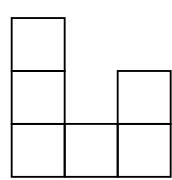


mauī

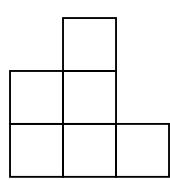


matau

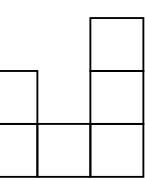
5.



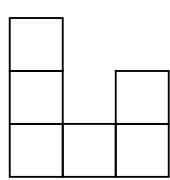
runga



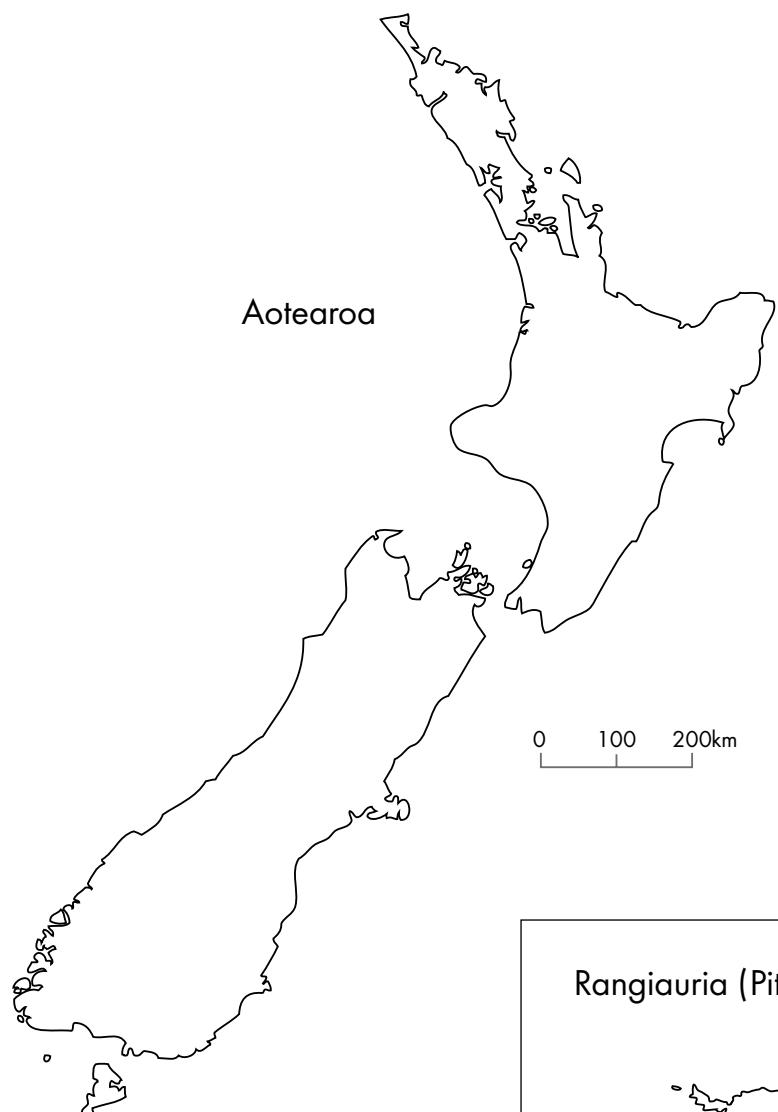
mua



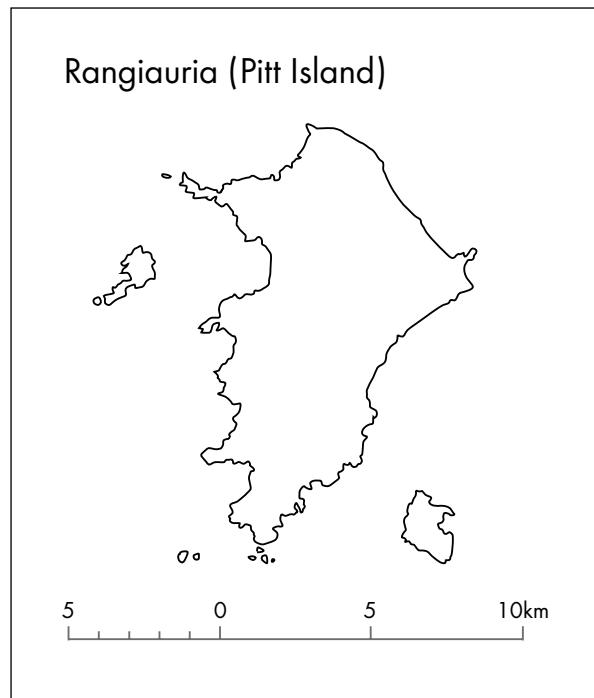
mauī

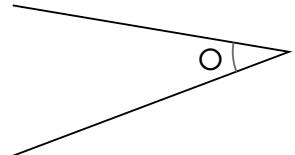
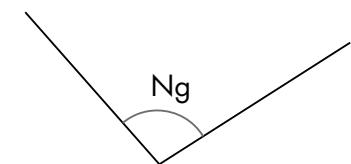
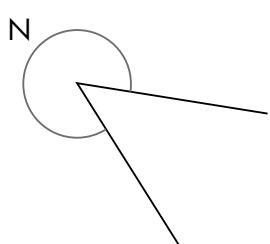
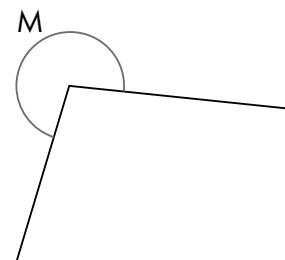
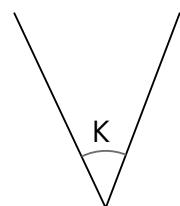
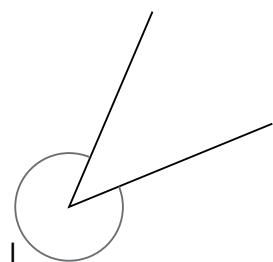
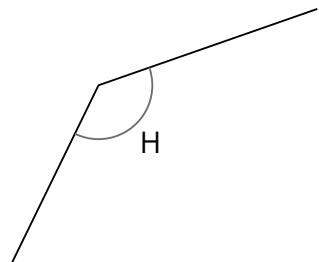
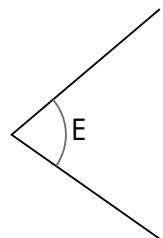
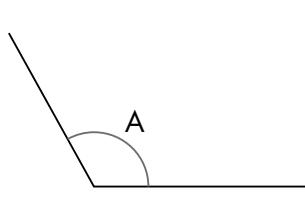


matau



Rangiauria (Pitt Island)

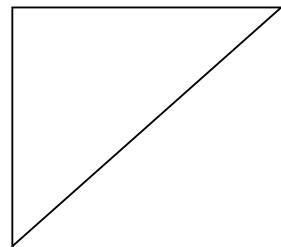
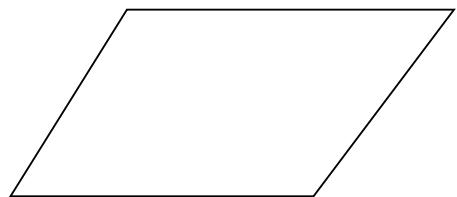
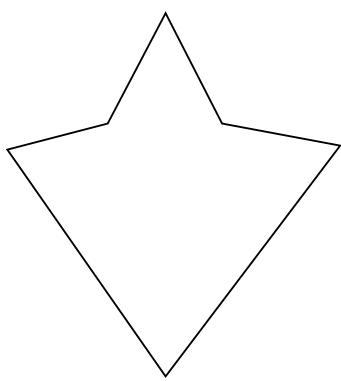
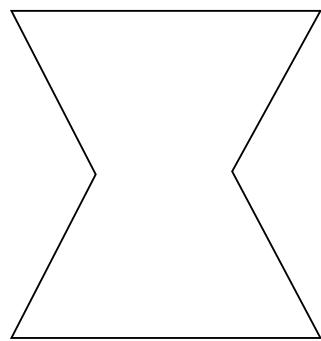
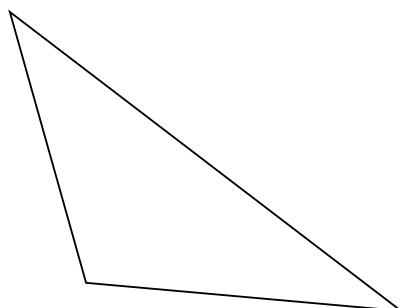
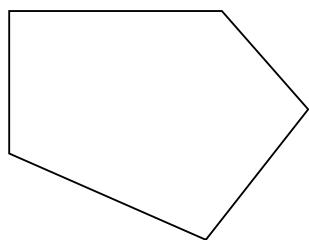
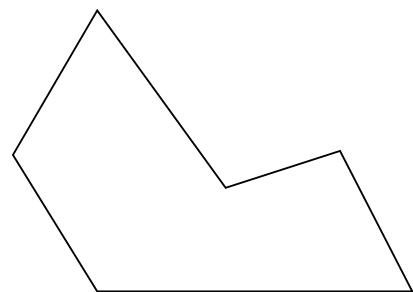
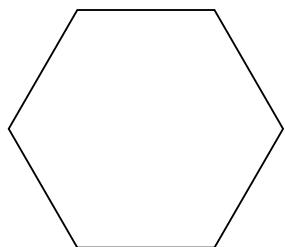
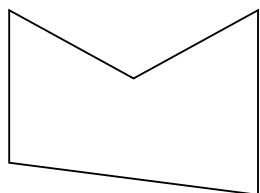




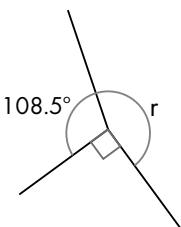
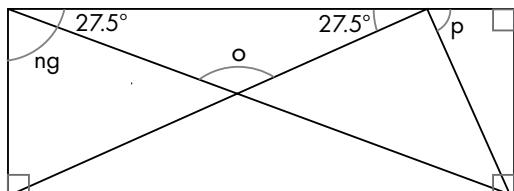
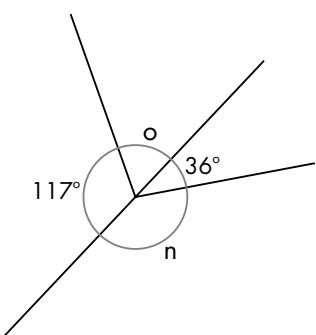
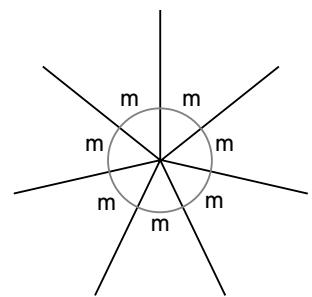
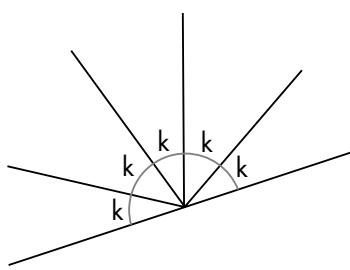
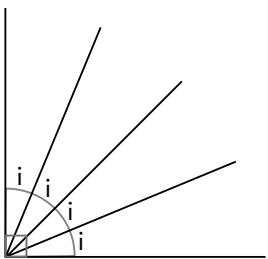
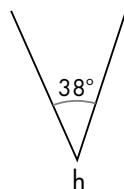
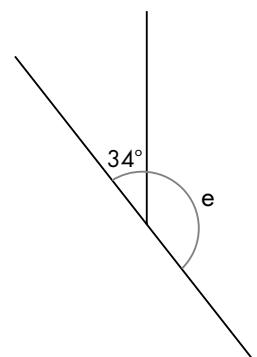
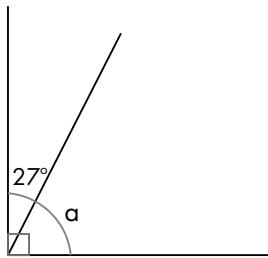
He iti ake i te koki hāngai	Kei waenganui i te koki hāngai me te koki rārangī	He nui ake i te koki rārangī

Koki Taparau 1

Te Hanga
Whārangi Tārua 36



Tātaihia te rahi o ngā koki e tohua ana. Tuhia he paku whakamārama ki te taha (hei tauira: koki whakahuripū = 360°):



Tuhia mēnā kei te tika, kei te hē rānei ēnei kōrero:

- He koki whakahāngai te 38° me te 62° .
- He koki whakahuripū te 112.5° me te 247.5° .
- He koki whakarārangī te 37.25° me te $142\frac{1}{4}^\circ$.
- He koki whakahuripū ētahi koki hāngai e whā.

Tūtohi 1: Te tapeke o ngā koki roto o te taparau

Te maha o ngā tapatoru e hono tahi ana	Te āhua ka hua mai	Te tapeke o ngā koki roto o te āhua
1		
2		
3		
4		
5		
	tapawaru	
	tapaiwa	
	tapa-10	
	tapa-11	
	tapa-12	
	tapa-20	
25		
48		

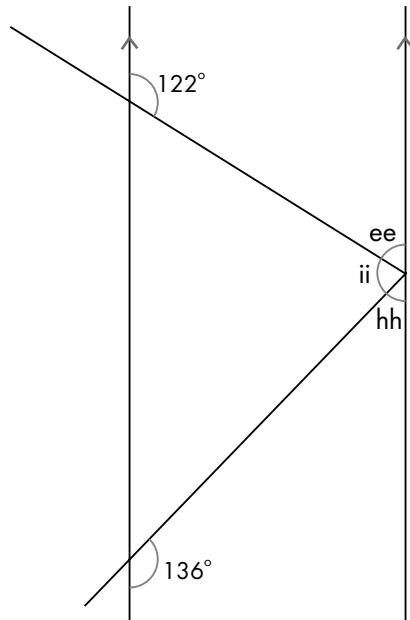
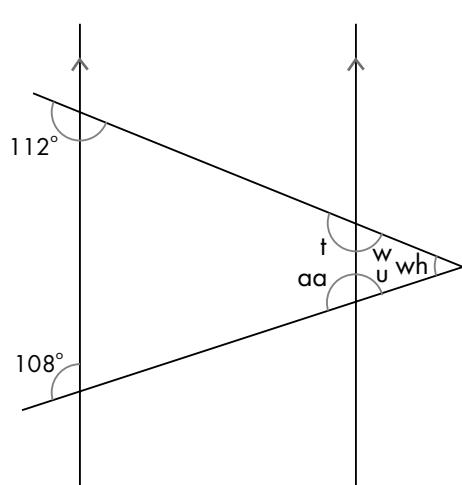
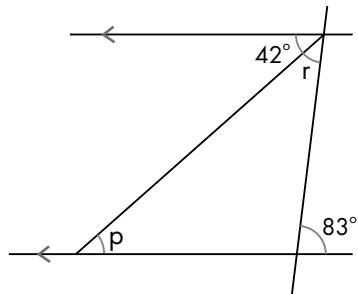
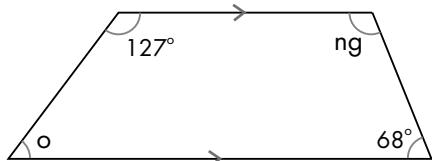
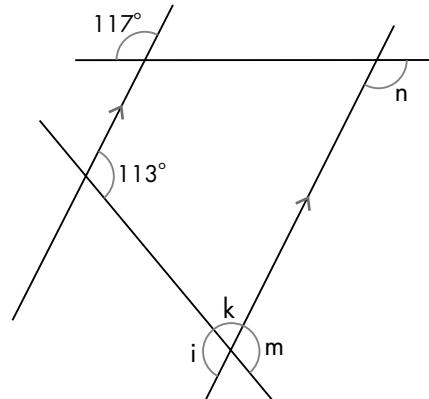
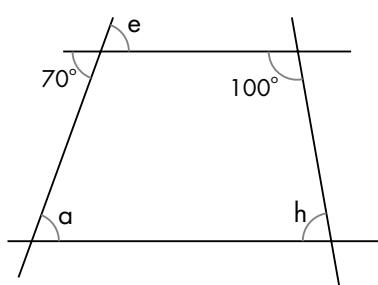
Tūtohi 2: Te rahi o ngā koki roto o te taparau rite

Te taparau rite	Te tapeke o ngā koki roto o te taparau	Te rahi o ia koki roto o te taparau rite
tapatoru rite		
tapawhā rite		
taparima rite		
tapaono rite		
tapawhitu rite		
tapawaru rite		
tapaiwa rite		
tapa-10 rite		
tapa-12 rite		
tapa-20 rite		

Tātaitanga Koki 2

Te Hanga
Whārangī Tārua 39

Tātaihia te rahi o ngā koki e tohua ana. Tuhia hoki te whakamārama e hāngai ana (hei tauira: he ōrite nā te mea he koki tauaro):





Wāhanga 5

He Tūhuratanga Hanga



He tūhuratanga ēnei ngohe i ētahi āhuatanga āhua ahu-2, āhua ahu-3 hoki, me te whai wāhi anō o te mātauranga me ngā rautaki tau. E āhua huaki ana ēnei ngohe, mā te ākonga (te rōpū ākonga rānei) e āta whiriwhiri ngā mahi me ngā rautaki hei whakaoti i ngā ngohe.

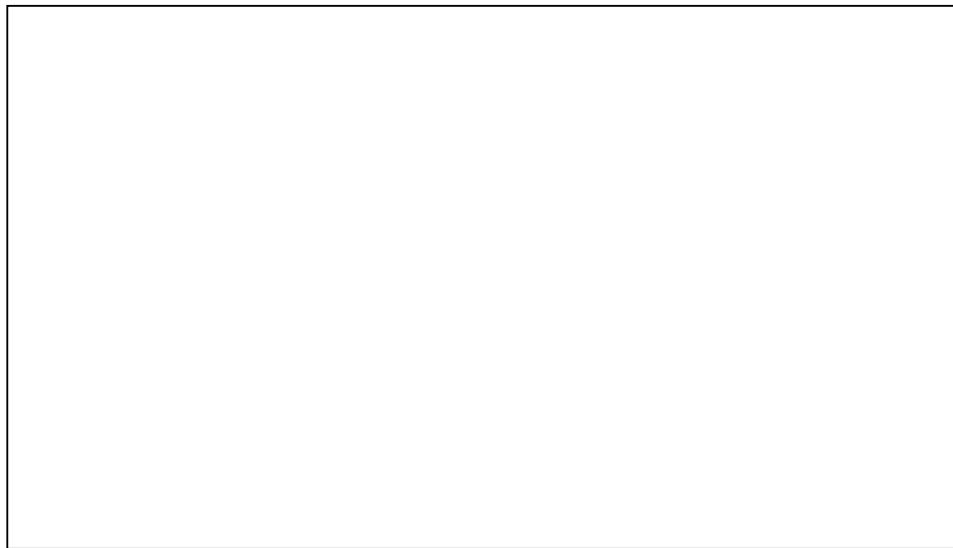
He pai tonu te tono kia whakawhitiwhiti kōrero mō ngā mahi, ngā rautaki i whāia, me ngā otinga i puta. Ākene pea me mahi takirua ngā ākonga.

E hāngai ana ētahi o ngā ngohe ki ngā kaupae maha o Te Mahere Tau. Arā, mā te whakamahi tau māmā ka hāngai ki ngā kaupae māmā, ā, mā te whakamahi tau uaua ka hāngai ki ngā kaupae o runga me ngā rautaki o reira.

E hia ngā wāwāhitanga rerekē ka taea e koe kia rua ngā wāhanga ūrite o tēnei āhua?

Whakamāramatia te āhua o ia haurua.

Tuhia ētahi rārangi e toru hei wāwāhi i tēnei tapawhā hāngai kia whitu ūna wāhanga:



Tuhia ngā ingoa o ngā āhua ka puta i tēnei wāwāhitanga.

E pai ana te whakamahi poraka āhua hei tūhura i ēnei pātai:

1. Whakaingoatia ēnei āhua:



2. E hia ngā tapatoru rite hei hanga i te tapawhā whakarara rite?
Tuhia he pikitia hei whakaatu i tō whakautu.

3. E hia ngā tapatoru rite hei hanga i te taparara waerite?
Tuhia he pikitia hei whakaatu i tō whakautu.

4. E hia ngā taparara waerite hei hanga i te tapaono rite?
Tuhia he pikitia hei whakaatu i tō whakautu.

5. E hia ngā tapatoru rite hei hanga i te tapaono rite?
Tuhia he pikitia hei whakaatu i tō whakautu.

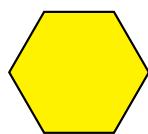
6. E hia ngā tapawhā whakarara rite hei hanga i te tapaono rite?
Tuhia he pikitia hei whakaatu i tō whakautu.

7. E hia ngā tapawhā whakarara rite hei hanga i te taparara waerite?
Tuhia he pikitia hei whakaatu i tō whakautu.

8.

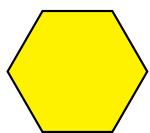


Ko te 2 te horahanga.



Nō reira e hia te horahanga o tēnei?

9.



Ko te 12 te horahanga.



Nō reira e hia te horahanga o tēnei?

10.



Ko te 8 te horahanga.



Nō reira e hia te horahanga o tēnei?

11.

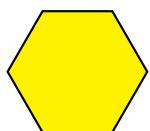


Ko te 15 te horahanga.



Nō reira e hia te horahanga o tēnei?

12.



Ko te 50 te horahanga.



Nō reira e hia te horahanga o tēnei?

13.



Ko te 8 te horahanga.



Nō reira e hia te horahanga o tēnei?

14.

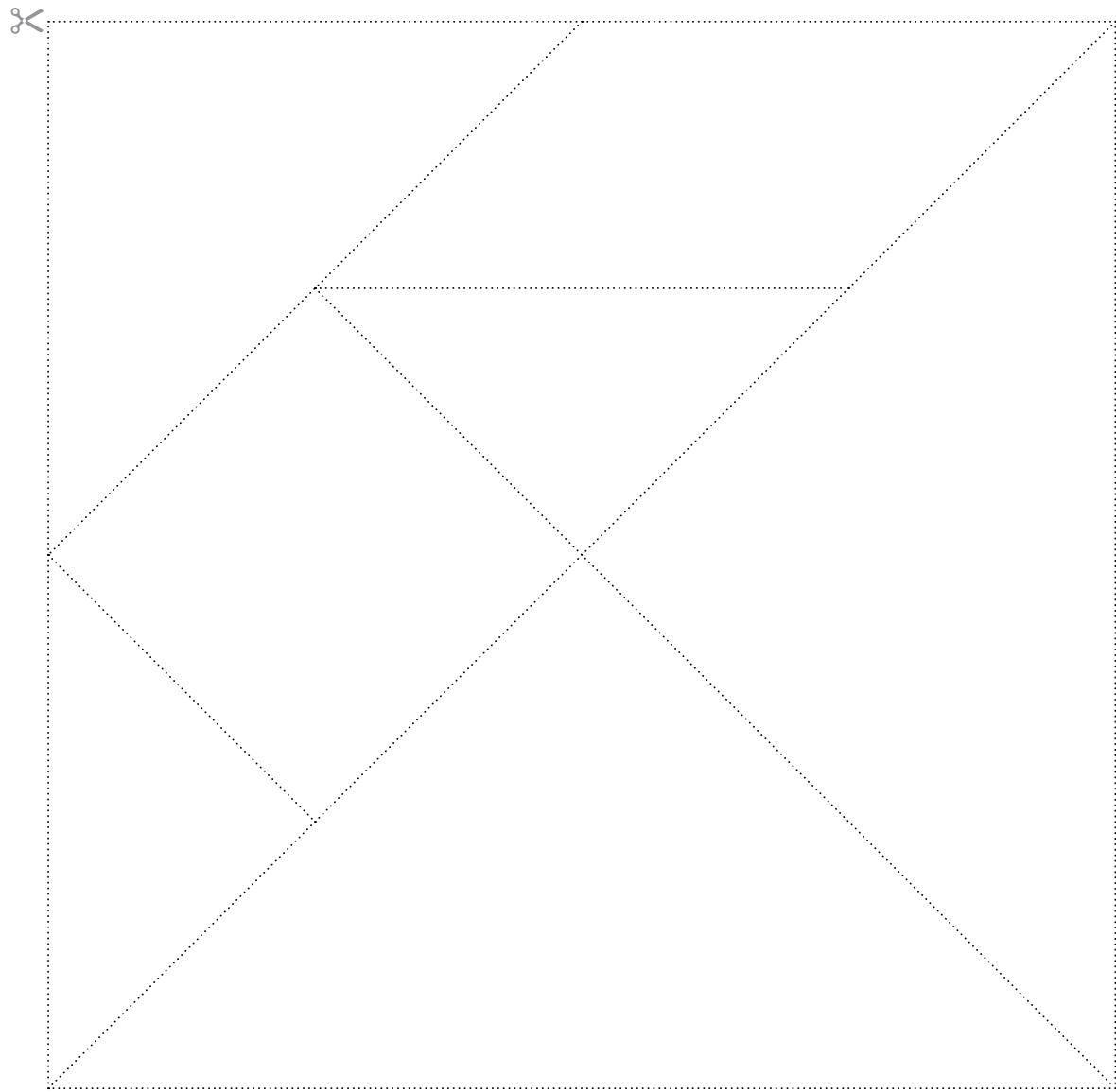


Ko te 6 te horahanga.



Nō reira e hia te horahanga o tēnei?

Whakaahuangia ki te kāri mārō, ka tapahi ai hei hanga i te huinga āhua hangawhitu:

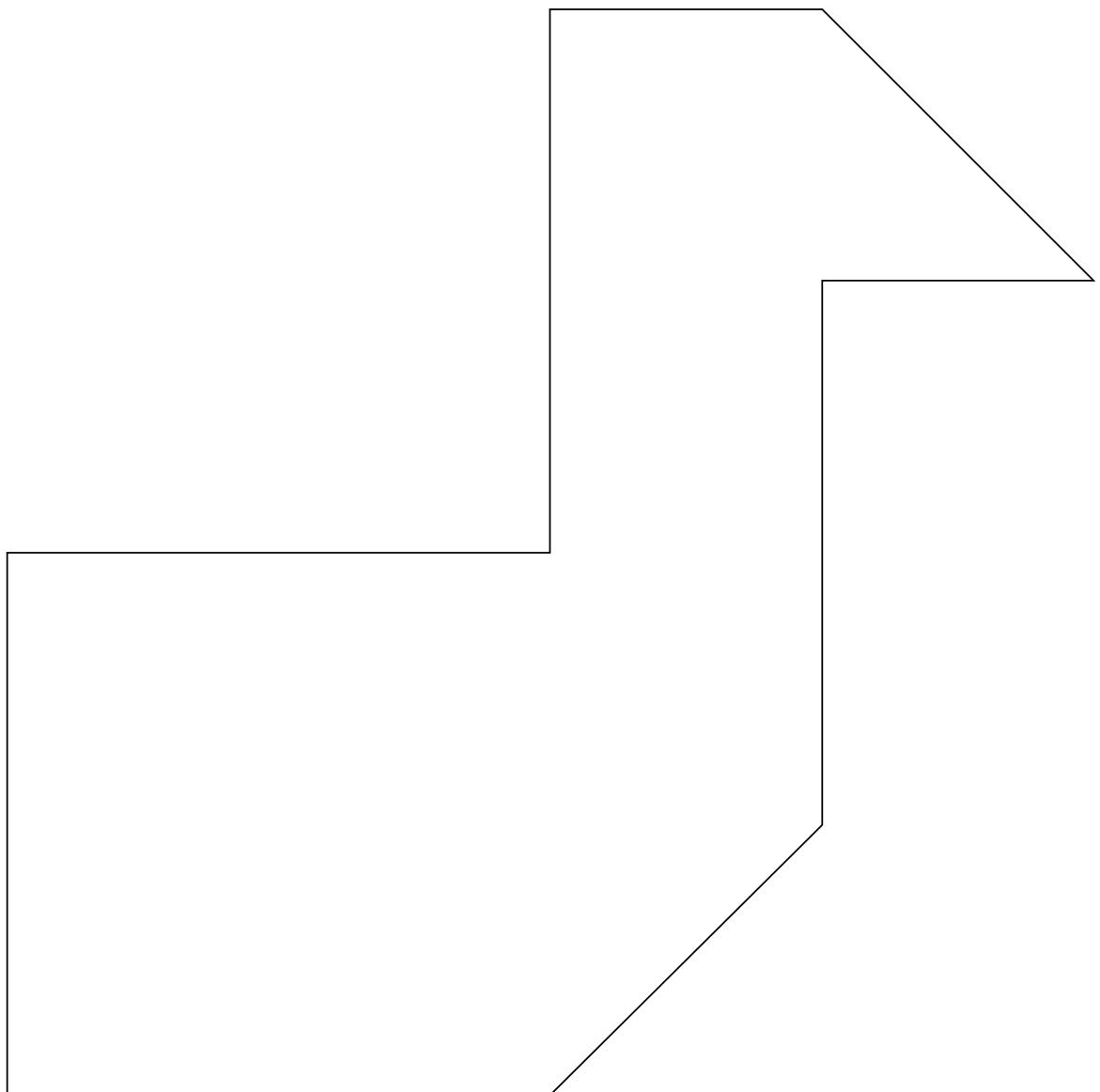


1. E hia ngā āhua rerekē i te huinga āhua hangawhitu?
2. Tuhia ngā ingoa o ngā āhua o te huinga āhua hangawhitu.
3. Whakatakotoria ngā tapatoru nui e rua, tapa ki te tapa hei hanga i tētahi āhua hou. E hia ngā āhua hou ka taea te hanga ki ēnei tapatoru e rua nei? Tuhia aua āhua.
4. Whakamahia ētahi tapatoru e toru hei hanga i tētahi tapawhā rite. Tuhia he pikitia.
5. Whakamahia ētahi āhua e whā hei hanga i tētahi tapawhā rite. Tuhia he pikitia.

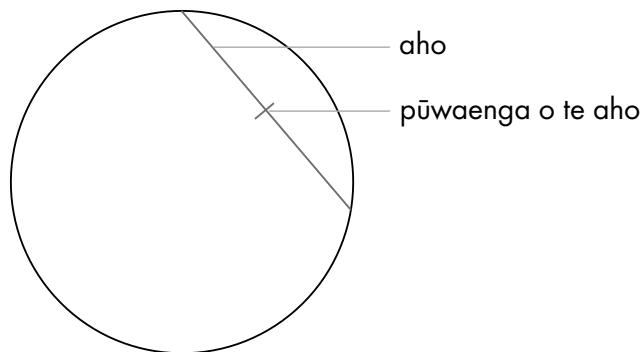
6. Whakamahia ētahi āhua e toru hei hanga i tētahi tapawhā whakarara. Tuhia he pikitia.
7. Māu e whakatakoto ngā āhua hangawhitu hei hanga i tētahi āhua rerekē. Tuhia te tapa waho o te āhua kua hangaia e koe. Hoatu tēnei pikitia ki tō hoa. Ko tāna mahi he āta whakaaro i te whakatakoto o ngā āhua hangawhitu kia rite ki te āhua i hangaia e koe.

Hei tauira:

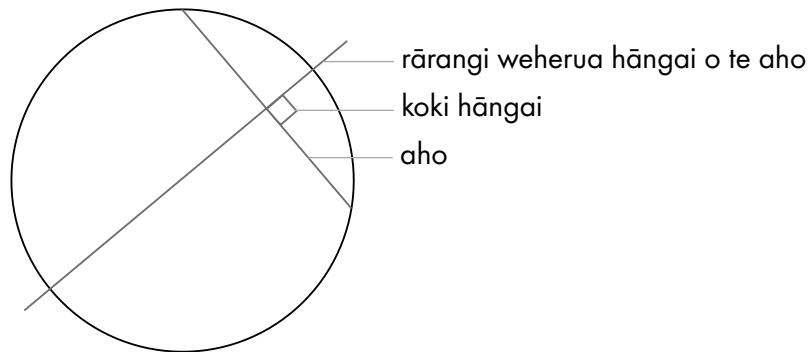
Me pēhea te whakatakoto i ētahi o ngā āhua hangawhitu hei hanga i tēnei āhua?



- Whakamahia he tāporowhita hei tuhi i tētahi porowhita āhua nui nei ki tō whārangi. Tuhia he rārangi mai i tētahi wāhi i te paenga o te porowhita ki tētahi. Kaua taua rārangi e pā ki te pū o te porowhita. Ka kīia tēnei momo rārangi he aho o te porowhita.



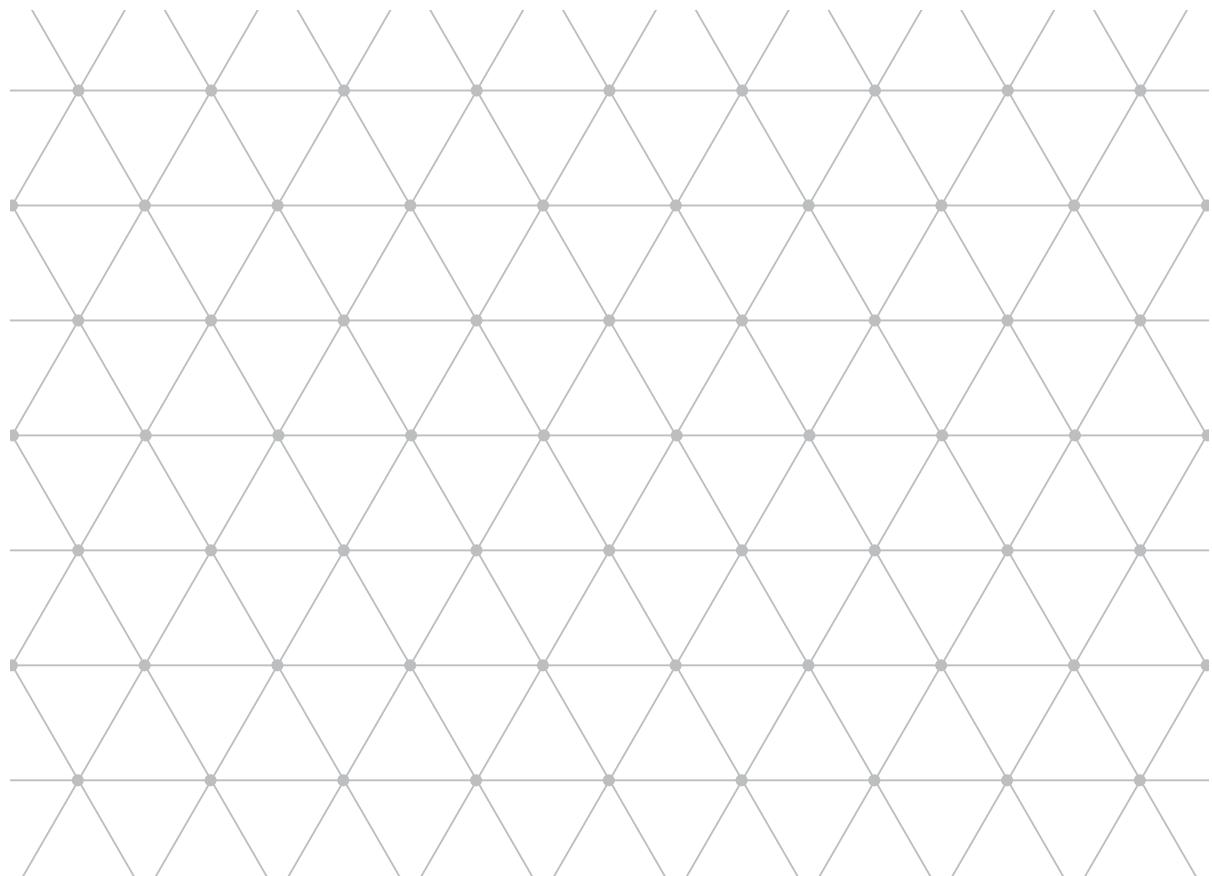
- Whakamahia he rūri hei tohu i te pūwaenga o te aho i tuhia e koe.
- Whakamahia te tāporowhita hei waihanga i te rārangi weherua hāngai o te aho, arā, he rārangi e haukoti ana i te pūwaenga o te aho i te koki hāngai.



- Kia toru pea ngā tāruaruatanga o tēnei mahi. Arā, tuhia tētahi anō aho o te porowhita me te waihanga i tōna rārangi weherua hāngai.
- He aha tētahi āhuatanga o ngā rārangi weherua hāngai e kitea mai ana?
- Tīkina tētahi rango, pērā i tētahi kēne, ka whaituhi ai i te porowhita o tōna pūtake. Me pēhea te whiriwhiri i te wāhi noho o te pū o tēnei porowhita? Whāia te huarahi e whakaaro ana koe hei tautohu i te pū o te porowhita. Whakamāramatia mai.

Tuhia he rārangi ki te tukutuku tapatoru kei raro iho nei hei whakaatu i ēnei āhua:

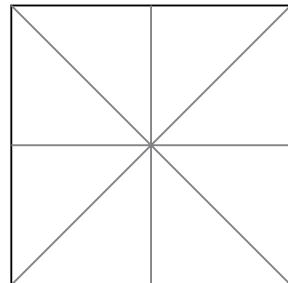
1. he tapatoru rite
2. he tapatoru waerite (kaua e tuhi tapatoru rite)
3. he tapatoru hāngai
4. he tapatoru hikuwaru
5. he tapawhā whakarara (kaua e tuhi tapawhā rite, tapawhā whakarara rite rānei)
6. he tapawhā hāngai (kaua e tuhi tapawhā rite)
7. he tapawhā hikuwaru
8. he taparara waerite
9. he taparima
10. he tapaono rite
11. he tapawhitu
12. he tapawaru



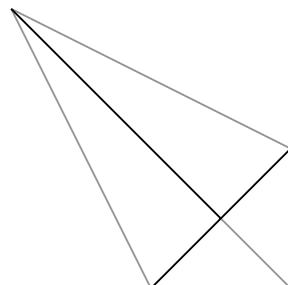
Whāia ngā tohutohu nei mō te whētuitui i tētahi pepa:

1. Tīkina atu he pepa, ko te tapawhā rite te āhua. Ki te takiwā o te 20cm te roa o ia tapa.

2. Whētuia te pepa kia puta ēnei rārangi:

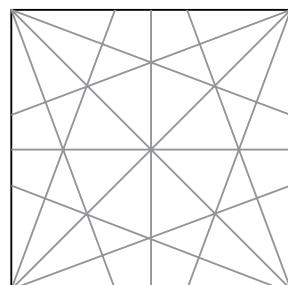


3. Whētuia kia puta he manu tapawhā.
Arā, whētuia te tapa runga kia tau ki runga i te hauroki. Whētuia hoki te tapa mauī kia tau ki te hauroki:



4. Mārohatia te manu tapawhā, ā, kia pēnā anō te whētui i ngā kokonga katoa kia puta he manu tapawhā.

5. Mārohatia te pepa. E tika ana kia pēnei te āhua o ngā rārangi whētui:

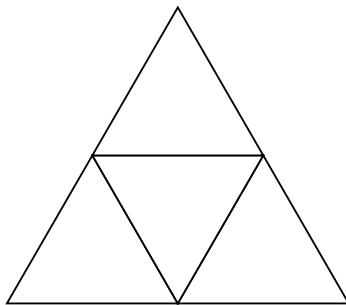


6. Kimihia ngā momo āhua i ngā rārangi whētui. Tuhia ngā tapa o ngā āhua ki ngā tae rerekē. Tuhia te ingoa o ia āhua ki te taha. Kimihia ngā momo āhua pēnei i te tapatoru waerite, te taparara, te taparima, te tapawaru rite, me ētahi atu.

7. Kimihia ngā koki nei, ka tohu ai: he koki hāngai, he koki iti ake i te koki hāngai, he koki nui ake i te koki hāngai, he koki nui ake i te koki rārangi.

8. Tohua ngā rārangi whakarara.

Kua honoa ngā pūwaenga o ngā tapa o te tapatoru nui hei whakaputa i ētahi tapatoru iti e whā.



1. He aha te momo o te tapatoru nui me ngā tapatoru iti?
2. E hia mitarau (cm) te roa o ngā tapa o te tapatoru nui? E hia mitarau (cm) te roa o ngā tapa o ngā tapatoru iti?
3. Kia pērā anō te wāwāhi i ngā tapatoru iti e whā. Arā, honoa ngā pūwaenga o ngā tapa hei whakaputa i ētahi tapatoru iti ake. E hia katoa ēnei tapatoru iti ake?
4. Kia pērā anō te mahi hei wāwāhi i ēnei tapatoru iti. E hia katoa ngā tapatoru iti ake ināianei?
5. Whakaotia te tūtohi nei:

wāwāhitanga	0	1	2	3	4	5	6
te maha o ngā tapatoru iti	1	4					

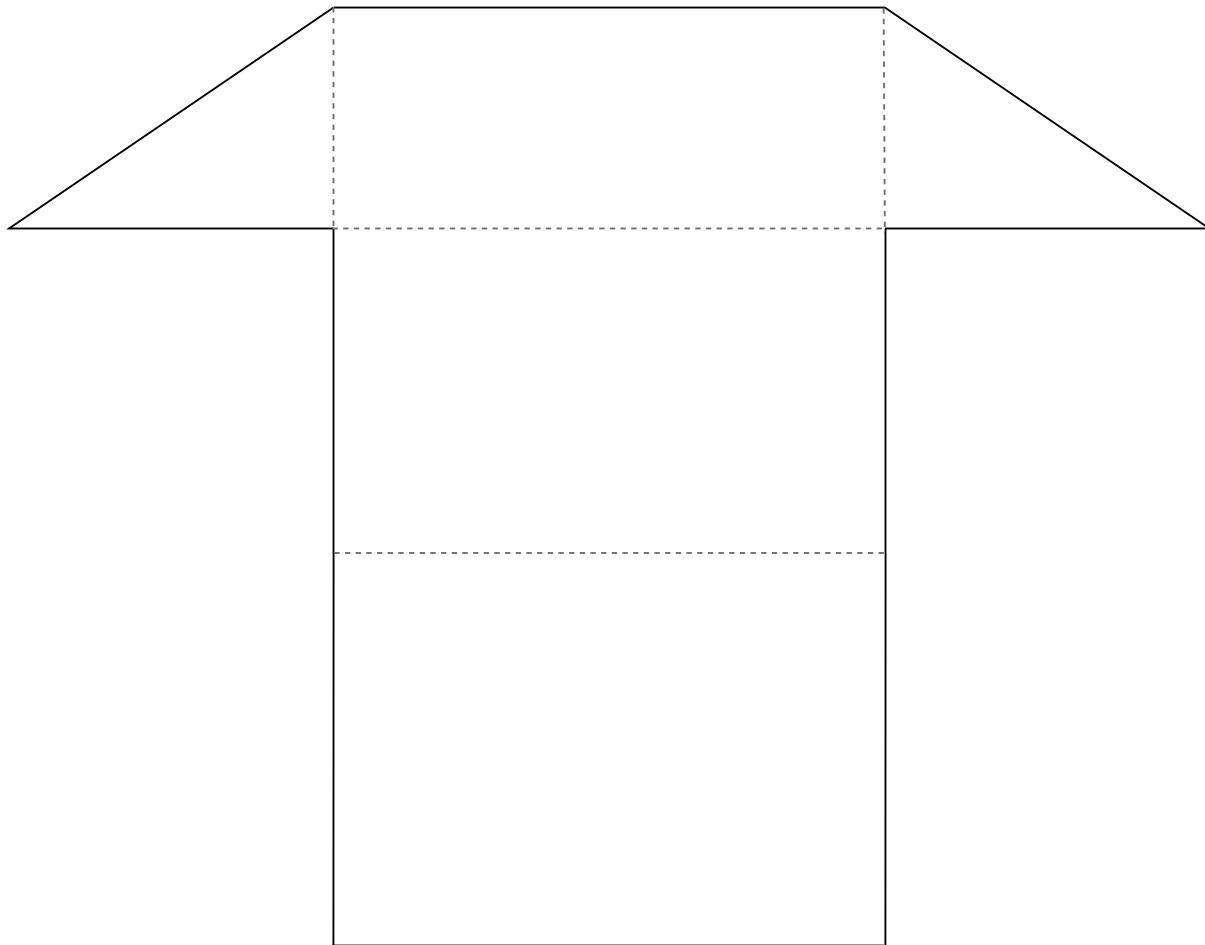
6. Inea tētahi o ngā tapa o ia wāwāhitanga tapatoru. Tuhia ki te tūtohi nei:

wāwāhitanga	0	1	2	3	4	5	6
te maha o ngā tapatoru iti	1	4					
te roa o ngā tapa							

7. He aha ngā tauira e kitea ana i ngā tūtohi e rua nei?

* He mea tango mai i te pae tukutuku o nzmaths: <http://www.nzmaths.co.nz/ihumanea-p-ngarau>

Ko te raumata tēnei o tētahi pouaka. Ina whētuia ngā rārangi iraira, ka hua mai te pouaka:



1. He aha te ingoa o te hanga o tēnei pouaka?
2. Inea ngā tapa o tēnei pouaka, ka tuhi ai i te raumata ki tētahi kāri mārō. Tapahia, ka hanga ai i te pouaka.
3. Inea te rōrahi onepū ka uru ki roto i tēnei pouaka.
4. Mēnā ka rearuatia ngā inenga o ngā tapa katoa, ka pēheatia nei te rōrahi onepū ka uru ki roto?
5. Mēnā he mataono rite te hanga o te pouaka, ā, ka rearuatia ūna tapa katoa, ka pēheatia tōna rōrahi? Whakamātauria tāu i whakaaro ai.

1. E taea ana tētahi tapatoru te tuhi, kia 1cm, 1cm me te 3cm te roa o ngā tapa?
2. E taea ana tētahi tapatoru te tuhi, kia 1cm, 1cm me te 2cm te roa o ngā tapa?
3. Whakamāramatia ō whiriwhiringa whakaaro mō ngā pātai o runga ake nei.
4. E hia ngā tapatoru e taea ana te tuhi, ko te 12cm te paenga, ā, he tauoti te roa o ia tapa?

Tuhia ngā inenga tapa ki tētahi tūtohi, ka tuhi ai i te momo tapatoru ki te taha, arā, he tapatoru hāngai, he tapatoru hikuwaru, he tapatoru waerite, he tapatoru rite rānei. Hei tīmatanga:

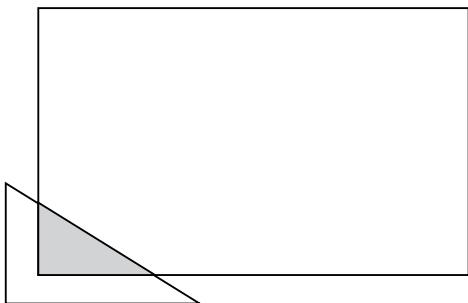
Te roa ngā ngā tapa (cm)	Te momo tapatoru
3, 4, 5	tapatoru hāngai
...	

5. E hia ngā tapatoru e taea ana te tuhi, ko te 24cm te paenga, ā, he tauoti te roa o ia tapa?

Rauemi

Ētahi āhua kua tapahia i te kāri mārō, pēnei i te tapawhā rite, te tapawhā hāngai, te tapatoru rite me te tapatoru hāngai.

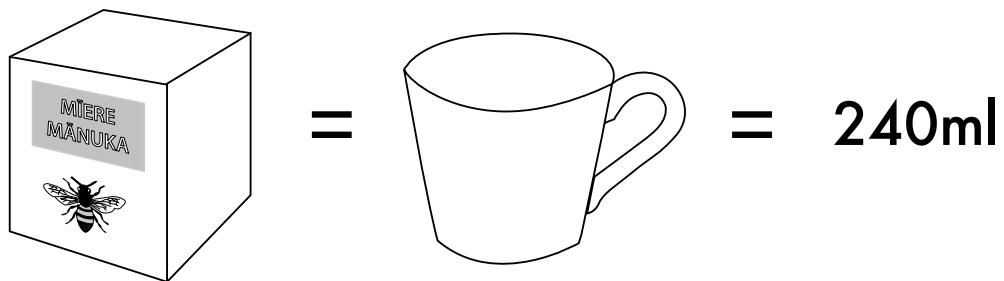
I tēnei pikitia kua whakatakotoria tētahi wāhanga o te tapatoru hāngai ki runga i te tapawhā hāngai. Kua puta he āhua hou i te wāhi e inaki ana ēnei āhua e rua:



1. He aha te āhua hou kua hua mai i te inakitanga o te tapatoru hāngai ki runga i te tapawhā hāngai?
2. Ka taea te whakaputa tētahi tapatoru waerite i te inakitanga o ētahi āhua e rua? Tuhia he pikitia.
3. Whakamahia ētahi tapatoru rite e rua. Whakatakotoria kia inaki tētahi i tētahi, kia hua mai ai he tapatoru rite anō i te inakitanga. Tuhia he pikitia.
4. He aha ētahi atu momo tapatoru ka taea te hanga i te inakitanga o ētahi tapatoru rite e rua? Tuhia he pikitia.
5. Whakamahia ētahi tapatoru rite e rua. Whakatakotoria kia inaki tētahi i tētahi, kia hua mai ai he whakarara rite i te inakitanga. Tuhia he pikitia.
6. Ka taea tētahi taparima te hanga i te inakitanga o ētahi āhua e rua? Tuhia he pikitia.

Ko Merekara te rangatira o te umanga MīereMāhau.

E hiahia ana ia kia hangaia tētahi pouaka hei hoko i te mīere kotahi kapu te rōrahi. E ai ki tana hoa, he ūrite te 1 kapu ki te 240ml. He ūrite hoki te 1ml ki te 1cm³.



1. He aha ētahi inenga mō te pouaka? Whakaaro hia kia toru ngā pouaka he rerekē ngā inenga o tēnā me tēnā, engari kia kotahi kapu tonu te rōrahi.
2. Tuhia te raumata o tētahi o ngā pouaka ki te kāri me ngā inenga o ngā tapa.
3. Hangaiā tēnei pouaka. Whakamātauria kia kitea ai mēnā ka uru te kotahi kapu onepū ki roto.
4. Whiriwhiria te horahanga o te kāri hei hanga i tēnei pouaka [hei aha noa ngā wāhanga whakapiri].
5. He nui te utu o te kāri hei hanga i ēnei momo pouaka, engari he iti ake i te ipu kirihi, waihoki he pai ake mō te taiao. He aha ngā inenga o te pouaka kotahi kapu te rōrahi, engari he iti rawa atu te kāri hei hanga i te pouaka?
6. He aha ngā inenga o tētahi pouaka e 2 kapu te rōrahi? Hangaiā te pouaka, ka whakamātau ai i tōna rōrahi. (Whakamahia pea kia rua ngā kapu onepū.)

* He mea tango mai i te pae tukutuku o nzmaths: <http://www.nzmaths.co.nz/ihumanea-p-ngarau>

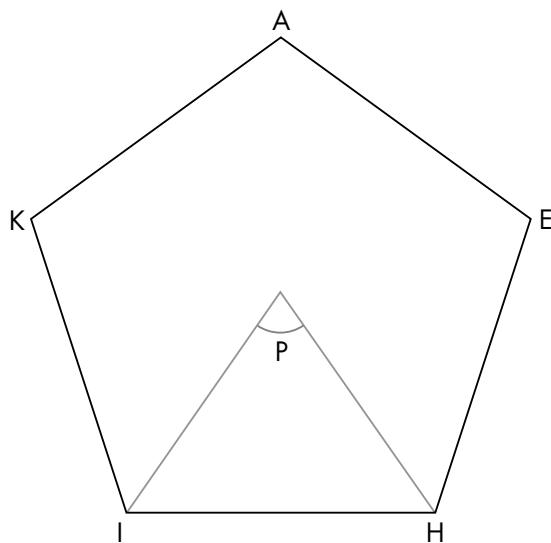
He tūhuratanga koki tapatoru

1. Ka taea tētahi tapatoru te tuhi kia rua ūna koki hāpūpū? Whakamāramatia mai.
2. Ka taea tētahi tapatoru te tuhi kia toru ūna koki tāhapa? Whakamāramatia mai.
3. Ka taea tētahi tapatoru te tuhi kia kotahi tōna koki rāwaho? Whakamāramatia mai.

He tūhuratanga koki tapawhā

1. Ka taea tētahi tapawhā te tuhi kia kotahi tōna koki tāhapa? Whakamāramatia mai.
2. Ka taea tētahi tapawhā te tuhi kia rua ūna koki tāhapa? Whakamāramatia mai.
3. Ka taea tētahi tapawhā te tuhi kia toru ūna koki tāhapa? Whakamāramatia mai.
4. Ka taea tētahi tapawhā te tuhi kia whā ūna koki tāhapa? Whakamāramatia mai.
5. Ka taea tētahi tapawhā te tuhi kia rua ūna koki rāwaho? Whakamāramatia mai.

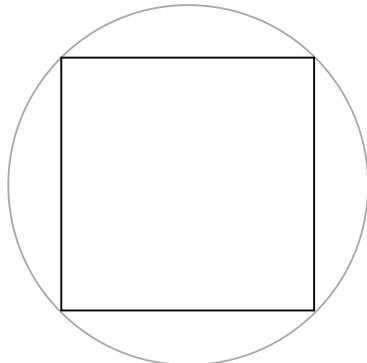
He taparima rite tēnei āhua. Kua honoa te pū o te taparima me ētahi kokonga pātata e rua. Ko te koki e tohua ana (P), tētahi o ngā koki pū o te taparima:



1. E hia katoa ngā koki pū o te taparima?
2. Whakaaturia ngā koki pū katoa o te taparima.
3. He aha tētahi āhuatanga o ngā koki pū e kitea ana i te pikitia?
4. Me pēhea te whiriwhiri i te rahi o tētahi o ngā koki pū?
5. Ka pēnei anō te whiriwhiri i te rahi o te koki pū o tētahi taparima hikuwaru?
Whakamāramatia mai.
6. He aha te momo tapatoru PHI?
7. Whiriwhiria te rahi o te koki $\angle PIH$ me te koki $\angle PHI$.
8. Whiriwhiria te rahi o te koki pū o tētahi tapaono rite.

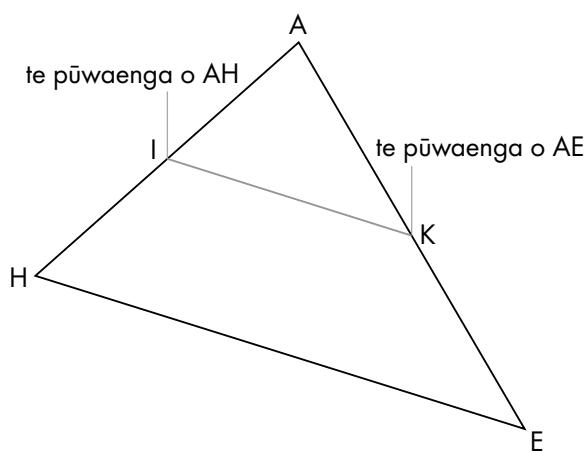
* He mea tango mai i te pae tukutuku o nzmaths: <http://www.nzmaths.co.nz/ihumanea-p-ngraru>

Ko te porowhita rāwaho te ingoa o te porowhita kua tuhia nei kia pā ki ngā kokonga katoa o te tapawhā rite:



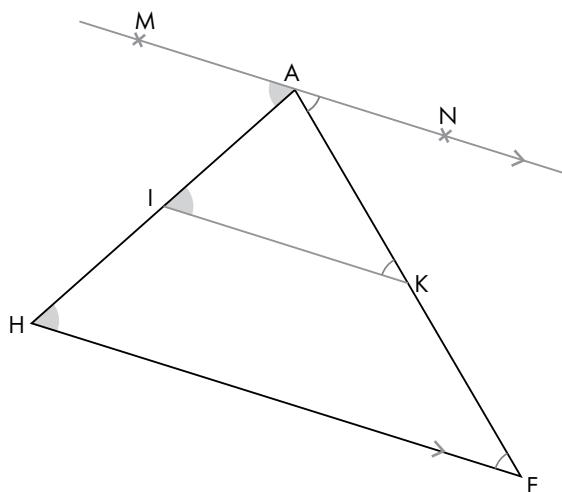
1. Māu e tuhi tētahi tapawhā rite me tōna porowhita rāwaho.
2. He aha tō mahi hei kimi i te pū o te porowhita?
3. He aha koe i mōhio ai ki te pūtoro o te porowhita?
4. Tūhuratia te pānga o te pūtoro o te porowhita me te tapa o te tapawhā rite.
5. Mēnā e 2 cm te tapa o te tapawhā rite, he aha te huarahi hei tātai i te pūtoro o te porowhita?
6. Mēnā ka rearuatia te tapa o te tapawhā rite (arā, tapa = 4cm) ka rearuatia anō te pūtoro o te porowhita? Whakamāramatia mai.

Tuhia ētahi tapatoru e whā, kia rerekē te āhua o tēnā me tēnā. Honoa ngā pūwaenga o ētahi tapa e rua o ngā tapatoru. Hei tauira:



He aha te pānga o te rārangi e hono ana i ngā pūwaenga o ētahi o ngā tapa e rua (te rārangi IK i te whakaahua i runga nei), me tērā atu tapa o te tapatoru (te tapa EH i te whakaahua i runga nei)?

Me pēhea e hāponotia ai tēnei āhuatanga, ahakoa te āhua o te tapatoru? Hei āwhina, tuhia he rārangi e pūtahi ana ki te kokonga A, e whakarara ana ki te tapa EH. Āta whakaaro hia te koki $\angle MAH$ me ngā koki tauwhiti o roto i ngā tapatoru (te $\angle AIK$ me te $\angle AHE$).



* He mea tango mai i te pae tukutuku o nzmaths: <http://www.nzmaths.co.nz/ihumanea-p-ngarau>



Wāhanga 6

Te Kuputaka



Māori → Ingarihi

aho	1. chord (of a circle) 2. sine (<i>tohu</i> : sin) 3. string
ahu ~nga	1. dimension (of space) 2. direction, bearing (<i>kupu kē atu</i> : aŋa, aro ~nga) 3. orientation
āhua	shape (<i>kupu kē atu</i> : hanga)
āhua ahu-rua	two-dimensional figure (<i>whakapotonga</i> : āhua ahu-2)
āhua ahu-toru	three-dimensional figure, solid (shape) (<i>whakapotonga</i> : āhua ahu-3)
āhua ahu-3 mata kōpiko	curved solid
āhua ahu-3 mata kōpiko, mata papatahi	solid with curved and flat surfaces
āhua kōpiko	curvilinear shape
āhuahanga	geometry
āhuatanga	attribute, feature, property
āhuatanga pūmau	invariant property (<i>takenga mai</i> : āhuatanga – property; pūmau – fixed, constant, permanent)
āhuatanga taurangi	variant property (<i>takenga mai</i> : āhuatanga – property; taurangi – variable)
ahu-rua	two-dimensional (<i>whakapotonga</i> : ahu-2)
ahu-tahi	one-dimensional (<i>whakapotonga</i> : ahu-1)
ahu-toru	three-dimensional (<i>whakapotonga</i> : ahu-3)
akitu	vertex (<i>takenga mai</i> : akitu – point end, summit <i>kupu kē atu</i> : kokonga)
ānau	simple curve (<i>kupu kē atu</i> : kōpiko māmā)
ānau huaki	simple open curve
ānau kati	simple closed curve
āputa	gap
āwhata	scale (for showing measurement) (<i>takenga mai</i> : arawhata - ladder)
āwhata ōwehenga	ratio scale
āwhata rārangī	line scale
āwhata tauākī	statement scale
hangā	1. shape (<i>kupu kē atu</i> : āhua) 2. build, make, create
hāngai	perpendicular, right angled (<i>takenga mai</i> : hāngai – across, at right angles, astride)
hangarite	symmetrical, symmetry (<i>takenga mai</i> : hangā – shape; rite – alike, corresponding)
hangawhitu	tangram (<i>takenga mai</i> : hangā – shape; whitu – seven)
hāpono ~tia	prove

hāpūpū	obtuse (angle) (<i>takenga mai</i> : blunt)
haukoti ~a ~nga	intercept
hauroki	diagonal
hihi	ray
hikuwaru	irregular, asymmetric (<i>takenga mai</i> : hikuwaru – crooked, asymmetrical)
hoahoa ~ina	diagram, plan (<i>takenga mai</i> : hoahoa – plan of a house)
hoahoa āwhata	scale diagram
hoahoa inerite	isometric diagram
horahanga	area (<i>takenga mai</i> : hora – spread out)
horahanga mata	surface area
hōtiu	oblique (<i>takenga mai</i> : hōtiu – oblique, inclined)
huapae	horizontal (<i>kupu kē atu</i> : pae, whakapae)
inaki	overlap
ine-koki	protractor
inerite	isometric (<i>takenga mai</i> : ine – measure; rite – alike, corresponding)
kapa	row
cape	crescent
kōaro	1. anticlockwise 2. inverse
koeko	cone, pyramid
koeko hāngai	right cone, right pyramid
koeko hōtiu	oblique cone, oblique pyramid
koeko-tapaono (rite)	hexagonal pyramid (regular)
koeko-tapatoru (rite)	triangular pyramid (regular) (<i>kupu kē atu</i> : matawhā [rite])
koeko-tapawhā hāngai	rectangular pyramid
koeko-tapawhā rite	square pyramid
koeko-tapāwhā rite hōtiu	oblique square pyramid
koki	angle
koki hāngai	right angle (<i>tohu</i> :)
koki hāpūpū	obtuse angle (<i>takenga mai</i> : koki – angle; hāpūpū – blunt)
koki huripū	whole angle, full turn
koki pātata	adjacent angle
koki pū	centre angle
koki rārangī	straight line angle (<i>kupu kē atu</i> : koki torotika)
koki rāwaho	reflex angle

koki roto	interior angle
koki tāhapa	acute angle (<i>takenga mai</i> : koki – angle; <i>tāhapa</i> – at an acute angle <i>kupu kē atu</i> : koki koi)
koki tauaro	opposite angle
koki taurite	corresponding angle
koki tauroto	co-interior angle
koki tauwhiti	alternate angle
koki waho	exterior angle
koki whakahāngai	complementary angles (<i>takenga mai</i> : koki – angle; <i>whaka</i> – causative prefix, to make; <i>hāngai</i> – perpendicular)
koki whakahuripū	conjugate angles (<i>takenga mai</i> : koki – angle; <i>whaka</i> – causative prefix, to make; <i>huri</i> – turn; <i>pū</i> – origin, heart, centre)
koki whakarārangī	supplementary angles (<i>takenga mai</i> : koki – angle; <i>whaka</i> – causative prefix, to make; <i>rārangī</i> – line)
kokonga	corner
kōpapa	concave
kōpiko	curve
kōpiko huaki	open curve
kōpiko kati	closed curve
koropuku	convex
mahere	map, plan
mahere āwhata	scale map
manomita	kilometre (<i>tohu</i> : km <i>kupu kē atu</i> : kiromita)
manu tapawhā	kite shape (<i>takenga mai</i> : manu – bird; <i>tapawhā</i> – quadrilateral)
mata	face (of a solid figure)
mataono rite	cube
mataono rite a Soma	Soma cube
mataono rite-rau	polycube
matapae ~hia ~tia	predict
mataraū (rite)	polyhedron (regular) (<i>takenga mai</i> : mata – face; rau – hundred, multitude)
mata-rua tekau (rite)	icosahedron (regular)
mata-tekau mā rua (rite)	dodecahedron (regular)
matawaru (rite)	octahedron (regular)
matawhā (rite)	tetrahedron (regular) (<i>kupu kē atu</i> : koeko-tapatoru [rite])
mātotoru	thick
maurea	helix (<i>takenga mai</i> : maurea – tiger shell)

mita	metre (<i>tahu: m takenga mai: he kupu whakawhiti oro mai i te reo Ingarihi</i>)
mitamano	millimetre (<i>tahu: mm kupu kē atu: miramita</i>)
mita pūrua	square metre (<i>tahu: m²</i>)
mita pūtoru	cubic metre (<i>tahu: m³</i>)
mitarau pūrua	square centimetre (<i>tahu: cm²</i>)
mitarau pūtoru	cubic centimetre (<i>tahu: cm³</i>)
mokowā	space, spatial (<i>kupu kē atu: wā</i>)
motuhanga	cross-section (<i>takenga mai: motu – severed, cut</i>)
motuhanga hōtiu	oblique cross-section
motuhanga pae	horizontal cross-section (<i>kupu kē atu: motupae</i>)
motuhanga pūtake	frustum (<i>takenga mai: motu – severed, cut; pūtake – base</i>)
ōrite	1. congruent 2. equal (<i>tahu: =</i>)
ōrite te āhua	similar
ōrite te rahi	equivalent
otinga	answer, product, quotient, result, solution (<i>takenga mai: oti – finished</i>)
ōwehenga	ratio (<i>takenga mai: ō – of, belonging to; wehe – detach, divide</i>)
pae	pi (<i>tahu: π takenga mai: He kupu whakawhiti oro mai i te reo Kiriki.</i>)
pae hapa	margin of error
paenga	circumference, perimeter
paenga (o te) porowhita haurua	semicircumference
pāngā	function, relation (<i>takenga mai: pā – connected with kupu kē atu: hononga</i>)
pāngā riterite	proportional relationship
papa	board, chart, plane, surface
papa kōputaputa	peg board (<i>takenga mai: papa – board, surface kōputaputa – pitted, full of holes</i>)
papariki	tile (<i>takenga mai: papa – anything broad, flat and hard; riki – small</i>)
papatahi	flat
papa tīrau	geoboard (<i>takenga mai: papa – board; tīrau – peg, stick</i>)
pātapa	1. tangent (to a curve) (<i>takenga mai: pā – connected with, touch; tapa – edge</i>) 2. tangent (trigonometry) (<i>tahu: tan</i>)
pātata	adjacent
pepa tukutuku	grid paper
pere tapaono	chevron (<i>kupu kē atu: kaokao</i>)
pere tapawhā	arrow head shape
pewa	arc (<i>takenga mai: pewa – anything bow-shaped</i>)

pewanga	sector
poi	sphere (<i>takenga mai</i> : poi – ball <i>kupu kē atu</i> : poi rite)
poi haurua	hemisphere (<i>kupu kē atu</i> : poi rite haurua)
poihema	ovoid (<i>takenga mai</i> : poi – sphere; hema – tapering)
poirapa	ellipsoid (<i>takenga mai</i> : poi – sphere; rapa – spread out, extended)
poro	1. prism (<i>takenga mai</i> : poro – butt end, block) 2. block (<i>kupu kē atu</i> : poraka)
poro āhuatanga ake	attribute block
porohema	oval (<i>takenga mai</i> : poro [porowhita] – circle; hema – tapering)
pororapa	ellipse (<i>takenga mai</i> : poro [porowhita] – circle; rapa – spread out, extended)
poro-tapaono	hexagonal prism
poro-taparara	trapezoidal prism
poro-tapatoru	triangular prism
poro-tapawaru	octagonal prism
poro-tapawhā hāngai	rectangular prism, cuboid
poro-tapawhā rite	square prism
poro-tapawhā rite hōtiu	oblique square prism
porotiti	counter, disk
porowhita ~tia	circle (<i>kupu kē atu</i> : porohita ~tia)
porowhita haurua	semicircle
porowhita pātapa	tangential circles
porowhita pūrite	concentric circles
porowhita rāroto	incircle
porowhita rāwaho	circumcircle
pou	column
poutū	vertical (<i>kupu kē atu</i> : poupou)
pū	1. exponent, indice, power (<i>takenga mai</i> : pū – heap, stack, bundle <i>kupu kē atu</i> : taupū) 2. centre (<i>kupu kē atu</i> : pokapū)
pūmau ~tanga	conserve, conservation (remain unchanged)
pūrite	concentric (<i>takenga mai</i> : pū – centre; rite – alike, corresponding)
pūtahi	intersect (<i>takenga mai</i> : pūtahi – join, meet)
pūtoro	radius (<i>takenga mai</i> : pū – centre; toro – stretch forth, extend)
putu	degree (angle and temperature) (<i>tohu:° takenga mai</i> : putu – lie one upon another <i>kupu kē atu</i> : tākiri [kupu whakawhitī])
pūwaenga	midpoint (of a line segment) (<i>takenga mai</i> : pū [pūwāhi] – point; waenga – the middle, midst)

pūwāhi	point (on a graph, line, plane, or in space) (<i>takenga mai</i> : pū – origin, centre; wāhi – place, locality)
pūwāhi whakarārangī	colinear points
rahi ~nga	amount, dimension, numerous, quantity, plentiful, size (<i>kupu kē atu</i> : nui)
rango	cylinder (<i>takenga mai</i> : rango – roller)
rango hōtiu	oblique cylinder
rapanga	problem (<i>takenga mai</i> : rapa – seek, look for)
rārangi	line
rārangi hāngai	perpendicular line
rārangi hangarite	line of symmetry, axis of symmetry (<i>kupu kē atu</i> : tuaka hangarite)
rārangi hōtiu	oblique line
rārangi huapae	horizontal line
rārangi kōpiko	curved line
rārangi pātapa	tangential line
rārangi poro	line segment
rārangi poutū	vertical line
rārangi pūtahi	concurrent lines, intersecting lines
rārangi torotika	straight line
rārangi weherua	1. bisector 2. median of a triangle
rārangi weherua hāngai	perpendicular bisector
rārangi whakarara	parallel line
rārangi whakawhiti	transversal
rauata	overhead projector
raumata	net (of a solid figure) (<i>takenga mai</i> : raumata – mesh of a net)
rautaki āhuahanga	geometric strategy
rearua	double
rite	alike, equal, regular, similar (in proportion)
roa ~nga	length, long
rohe	boundary (<i>kupu kē atu</i> : paenga, paetaha)
rōpinepine	mosaic, tessellation, tiling (<i>takenga mai</i> : rōpine – place close together)
rōpū	category, group
rōrahi	volume (<i>takenga mai</i> : rō [roto]– inside; rahi – size)
ruarua	few (<i>kupu kē atu</i> : torutoru)
rūri	ruler (<i>takenga mai</i> : He kupu whakawhiti oro mai i te reo Ingarihi. <i>kupu kē atu</i> : tauine)

taha	side
tāhāngai	set square (<i>takenga mai</i> : tā – print; hāngai [koki hāngai] – right angle)
taitapa	frame
takiwā	region (of space or time)
tapa	edge
tapahanga	segment (<i>takenga mai</i> : tapa – cut, split)
tapa pātata	adjacent side
tapa tauaro	opposite side
tapaiwa (rite)	nonagon (regular)
tapaono (rite)	hexagon (regular)
taparara	trapezium (<i>takenga mai</i> : tapa [tapawhā] – quadrilateral; rara [whakarara] – parallel)
taparau (rite)	polygon (regular) (<i>takenga mai</i> : tapa – margin, edge; rau – multitude; rite – alike, corresponding <i>kupu kē atu</i> : tapamaha [rite])
taparara waerite	isosceles trapezium
taparima (rite)	pentagon (regular)
tapa-tekau (rite)	decagon (regular)
tapa-tekau mā rua	dodecagon (regular)
tapatoru	triangle
tapatoru hāngai	right-angled triangle
tapatoru hikuwaru	scalene triangle
tapatoru koki hāpūpū	obtuse-angled triangle
tapatoru koki tāhapa	acute-angled triangle
tapatoru kōpiko	curvilinear triangle
tapatoru rite	equilateral triangle
tapatoru waerite	isosceles triangle
tapawaru (rite)	octagon (regular)
tapawhā	quadrilateral (<i>takenga mai</i> : tapa – margin, edge; whā – four)
tapawhā hāngai	rectangle, oblong
tapawhā rite	square
tapawhā rite-rau	polyomino
tapawhā rite-rima	pentomino
tapawhā whakarara	parallelogram
tapawhā whakarara rite	rhombus, diamond shape (<i>kupu kē atu</i> : whakarara rite, taimana)
tapawhitu (rite)	heptagon (regular)
tāporowhita	compass (for drawing circles) (<i>takenga mai</i> : tā – print; porowhita – circle <i>kupu kē atu</i> : taputapu tuhi porowhita)

tarawhiti	torus (<i>takenga mai</i> : tarawhiti – hoop, ring, encircle)
tāroa	hypotenuse (<i>takenga mai</i> : tāroa – long)
tāruarua	repeat
tauaro	opposite (<i>kupu kē atu</i> : anganui)
taunga	co-ordinate, position (<i>takenga mai</i> : taunga – resting place, anchorage <i>kupu kē atu</i> : takotoranga)
taurahi	scale factor for enlargement (<i>takenga mai</i> : tau – number; rahi – size <i>kupu kē atu</i> : tau whakarahi)
teitei	altitude, height, high, tall (<i>kupu kē atu</i> : tāroaroa [of a person], tiketike)
tihi	apex (<i>takenga mai</i> : tihi – summit, top, peak)
tika	accurate, correct, valid (<i>kupu kē atu</i> : tōtika)
tirohangā	view
tirohangā (mai i te taha) matau	right side view
tirohangā (mai i te taha) mauī	left side view
tirohangā (mai i) mua	front view
tirohangā (mai i) muri	rear view
tirohangā (mai i) runga	plan view (<i>kupu kē atu</i> : tirohangā ā-manu)
tōrino	spiral
toropū hāngai	apothem (<i>takenga mai</i> : toro – stretch forth, extend; pū – centre; hāngai – perpendicular)
tukutuku	grid
tukutuku inerite	isometric grid
ture	formula, rule (<i>kupu kē atu</i> : tikanga tātai)
ture a Pythagoras	theorem of Pythagoras
tūtohi	table (e.g. of data)
tūtohi tukutuku	array
waerite	isosceles (<i>takenga mai</i> : wae – leg, foot; rite –alike, corresponding)
waihangā ~tia	build, construct, create, generate
wāwāhi ~a	break down, partition (<i>kupu kē atu</i> : wāhi ~a)
weherua ~tia	bisect (<i>takenga mai</i> : wehe – divide; rua – two)
whāiti	narrow (<i>kupu kē atu</i> : kūiti)
whaituhi ~a	trace (<i>takenga mai</i> : whai – follow; tuhi – write)
whakaahua ā-hinengaro	mental image
whakaahuahanga	representation
whakaoti ~a	solve, complete
whakarahi ~a ~nga	enlarge, enlargement (<i>kupu kē atu</i> : whakanui ~a)

whakarara	parallel (<i>takenga mai</i> : whakarara – mark in parallel lines)
whakarōpū ~ngia	classify, group
whakatairite ~a	compare (<i>kupu kē atu</i> : whakataurite ~a)
whakatau tata	estimate
whakatekaraka	clockwise (<i>kupu kē atu</i> : ā-karaka)
whānui	breadth, wide, width
whārangī tārua	blackline master, copymaster
whārite	equation (<i>takenga mai</i> : whārite – balance by an equivalent)

Ingarihi → Māori

accurate, correct	tika (<i>kupu kē atu: tōtika</i>)
acute angle	koki tāhapa (<i>takenga mai: koki – angle; tāhapa – at an acute angle</i> <i>kupu kē atu: koki koi</i>)
acute-angled triangle	tapatoru koki tāhapa
adjacent	pātata
adjacent angle	koki pātata
adjacent side	tapa pātata
alternate angle	koki tauwhiti
altitude	teitei (<i>kupu kē atu: tiketike</i>)
angle	koki
answer	otinga (<i>takenga mai: oti – finished</i>)
anticlockwise	kōaro
apex	tīhi (<i>takenga mai: tīhi – summit, top, peak</i>)
apothem	toropū hāngai (<i>takenga mai: toro – stretch forth, extend; pū – centre; hāngai – perpendicular</i>)
arc	pewa (<i>takenga mai: pewa – anything bow-shaped</i>)
area	horahanga (<i>takenga mai: hora – spread out</i>)
array	tūtohi tukutuku
arrow head shape	pere tapawhā
attribute	āhuatanga
attribute block	poro āhuatanga ake
axis of symmetry	rārangī hangarite (<i>kupu kē atu: tuaka hangarite</i>)
bearing	ahu ~nga (<i>kupu kē atu: anga, aro ~nga</i>)
bisect	weherua ~tia (<i>takenga mai: wehe – divide; rua – two</i>)
bisector	rārangī weherua
blackline master	whārangī tārua
block	poro (<i>kupu kē atu: poraka</i>)
boundary	rohe (<i>kupu kē atu: paenga, paetaha</i>)
breadth	whānui
break down, partition	wāwāhi ~a (<i>kupu kē atu: wāhi ~a</i>)
build, create, make	waihangā ~tia (<i>kupu kē atu: hangā</i>)
category, group	rōpū
centre	pū (<i>kupu kē atu: pokapū</i>)
centimetre	mitarau (<i>tohu: cm kupu kē atu: henemita</i>)

centre angle	koki pū
chevron	pere tapaono (<i>kupu kē atu:</i> kaokao)
chord (of a circle)	aho
circle	porowhita ~tia (<i>kupu kē atu:</i> porohita ~tia)
circumcircle	porowhita rāwaho
circumference	paenga
classify, group	whakarōpū ~ngia
clockwise	whakatekaraka (<i>kupu kē atu:</i> ā-karakaka)
closed curve	kōpiko kati
co-interior angle	koki tauroto
colinear points	pūwāhi whakarārangī
column	pou
compare	whakatairite ~a (<i>kupu kē atu:</i> whakataurite ~a)
compass (for drawing circles)	tāporowhita (<i>takenga mai:</i> tā – print; porowhita – circle <i>kupu kē atu:</i> taputapu tuhi porowhita)
complementary angles	koki whakahāngai (<i>takenga mai:</i> koki – angle; whaka – causative prefix, to make; hāngai – perpendicular)
complete	whakaoti ~a
concave	kōpapa
concentric	pūrite (<i>takenga mai:</i> pū – centre; rite – alike, corresponding)
concentric circles	porowhita pūrite
cone, pyramid	koeko
congruent	ōrite
conjugate angles	koki whakahuripū (<i>takenga mai:</i> koki – angle; whaka – causative prefix, to make; huri – turn; pū – origin, heart, centre)
conserve, conservation (remain unchanged)	pūmau ~tanga
construct	waihangā ~tia
convex	koropuku
co-ordinate, position	taunga (<i>takenga mai:</i> taunga – resting place, anchorage <i>kupu kē atu:</i> takotoranga)
copymaster	whārangī tārua
corner	kokonga
correct	tika (<i>kupu kē atu:</i> tōtika)
corresponding angle	koki taurite
counter, disk	porotiti
create, build, make	waihangā ~tia

crescent	ka pe
cross-section	motuhanga (<i>takenga mai</i> : motu – severed, cut)
cube	mataono rite
cubic centimetre	mitarau pūtoru (<i>tohu</i> : cm ³)
cubic metre	mita pūtoru (<i>tohu</i> : m ³)
cuboid	poro-tapawhā hāngai
curve	kōpiko
curved line	rārangī kōpiko
curved solid	āhua ahu-3 mata kōpiko
curvilinear shape	āhua kōpiko
curvilinear triangle	tapatoru kōpiko
cylinder	rango (<i>takenga mai</i> : rango – roller)
decagon (regular)	tapa-tekau (rite)
degree (angle and temperature)	putu (<i>tohu</i> : ° <i>takenga mai</i> : putu – lie one upon another <i>kupu kē atu</i> : tākiri [kupu whakawhitī])
diagonal	hauroki
diagram	hoahoa ~ina (<i>takenga mai</i> : hoahoa – plan of a house)
dimension (of space)	ahu ~nga
dimension, size	rahi ~nga
direction	ahu ~nga (<i>kupu kē atu</i> : anga, aro ~nga)
dodecagon (regular)	tapa-tekau mā rua
dodecahedron (regular)	mata-tekau mā rua (rite)
double	rearua
edge	tapa
ellipse	pororapa (<i>takenga mai</i> : poro [porowhita] – circle; rapa – spread out, extended)
ellipsoid	poirapa (<i>takenga mai</i> : poi – sphere; rapa – spread out, extended)
enlarge, enlargement	whakarahi ~a ~nga (<i>kupu kē atu</i> : whakanui ~a)
equal	ōrite (<i>tohu</i> : =)
equation	whārite (<i>takenga mai</i> : whārite – balance by an equivalent)
equilateral triangle	tapatoru rite
equivalent	ōrite te rahi
estimate	whakatau tata
exponent	pū (<i>takenga mai</i> : pū – heap, stack, bundle <i>kupu kē atu</i> : taupū)
exterior angle	koki waho
face (of a solid figure)	mata

feature, property	āhuatanga
flat	papatahi
formula, rule	ture (<i>kupu kē atu</i> : tikanga tātai)
frame (e.g. of a picture)	taitapa
front view	tirohangā (mai i) mua
frustum	motuhangā pūtake (<i>takenga mai</i> : motu – severed, cut; pūtake – base)
function, relation	pāngā (<i>takenga mai</i> : pā – connected with <i>kupu kē atu</i> : hononga)
gap	āputa
geoboard	papa tīrau (<i>takenga mai</i> : papa – board; tīrau – peg, stick)
geometric strategy	rautaki āhuahanga
geometry	āhuahanga
grid	tukutuku
grid paper	pepa tukutuku
group	rōpū
height, high, tall	teitei (<i>kupu kē atu</i> : tiketike)
helix	maurea (<i>takenga mai</i> : maurea – tiger shell)
hemisphere	poi haurua (<i>kupu kē atu</i> : poi rite haurua)
heptagon (regular)	tapawhitu (rite)
hexagon (regular)	tapaono (rite)
hexagonal prism	poro-tapaono
hexagonal pyramid (regular)	koeko-tapaono (rite)
horizontal	huapae (<i>kupu kē atu</i> : pae, whakapae)
horizontal cross-section	motuhangā pae (<i>kupu kē atu</i> : motupae)
horizontal line	rārangī huapae
hypotenuse	tāroa (<i>takenga mai</i> : tāroa – long)
icosahedron (regular)	mata–rua tekau (rite)
incircle	porowhita rāroto
intercept	haukoti ~a ~nga
interior angle	koki roto
intersect	pūtahi (<i>takenga mai</i> : pūtahi – join, meet)
intersecting lines	rārangī pūtahi
invariant property	āhuatanga pūmau (<i>takenga mai</i> : āhuatanga – property; pūmau – fixed, constant, permanent)
inverse	kōaro
irregular, asymmetric	hikuwaru (<i>takenga mai</i> : hikuwaru – crooked, asymmetrical)

isometric	inerite (<i>takenga mai</i> : ine – measure; rite – alike, corresponding)
isometric diagram	hoahoa inerite
isometric grid	tukutuku inerite
isosceles	waerite (<i>takenga mai</i> : wae – leg, foot; rite – alike, corresponding)
isosceles trapezium	taparara waerite
isosceles triangle	tapatoru waerite
kilometre	manomita (<i>tohu</i> : km <i>kupu kē atu</i> : kiromita)
kite shape	manu tapawhā (<i>takenga mai</i> : manu – bird; tapawhā – quadrilateral)
left side view	tirohangā (mai i te taha) mauī
length, long	roa ~nga
line	rārangi
line of symmetry	rārangi hangarite (<i>kupu kē atu</i> : tuaka hangarite)
line scale	āwhata rārangi
line segment	rārangi poro
long	roa
map, plan	mahere
margin of error	pae hapa
median of a triangle	rārangi weherua
mental image	whakaahua ā-hinengaro
metre	mita (<i>tohu</i> : m <i>takenga mai</i> : He kupu whakawhiti oro mai i te reo Ingarihi.)
midpoint (of a line segment)	pūwaenga (<i>takenga mai</i> : pū [pūwāhi] – point; waenga – the middle, midst)
millimetre	mitamano (<i>tohu</i> : mm <i>kupu kē atu</i> : mirimita)
narrow	whāiti (<i>kupu kē atu</i> : kūiti)
net (of a solid figure)	raumata (<i>takenga mai</i> : raumata – mesh of a net)
nonagon (regular)	tapaiwa (rite)
oblique	hōtiu (<i>takenga mai</i> : hōtiu – oblique, inclined)
oblique cone	koeko hōtiu
oblique cross-section	motuhanga hōtiu
oblique cylinder	rango hōtiu
oblique line	rārangi hōtiu
oblique pyramid	koeko hōtiu
oblique square prism	poro-tapawhā rite hōtiu
oblique square pyramid	koeko-tapāwhā rite hōtiu
oblong, rectangle	tapawhā hāngai

obtuse angle	koki hāpūpū (<i>takenga mai</i> : koki – angle; hāpūpū – blunt)
obtuse-angled triangle	tapatoru koki hāpūpū
octagon (regular)	tapawaru (rite)
octagonal prism	poro-tapawaru
octahedron (regular)	matawaru (rite)
one-dimensional	ahu-tahi (<i>whakapotonga</i> : ahu-1)
open curve	kōpiko huaki
opposite	tauaro (<i>kupu kē atu</i> : anganui)
opposite angle	koki tauaro
opposite side	tapa tauaro
orientation	ahu ~nga
oval	porohema (<i>takenga mai</i> : poro [porowhita] – circle; hema – tapering)
overhead projector	rauata
overlap	inaki
ovoid	poihema (<i>takenga mai</i> : poi – sphere; hema – tapering)
parallel	whakarara (<i>takenga mai</i> : whakarara – mark in parallel lines)
parallel line	rārangi whakarara
parallelogram	tapawhā whakarara
peg board	papa kōputaputa (<i>takenga mai</i> : papa – board, surface; kōputaputa – pitted, full of holes)
pentagon (regular)	taparima (rite)
pentomino	tapawhā rite-rima
perimeter	paenga
perpendicular	hāngai (<i>takenga mai</i> : hāngai – across, at right angles, astride)
perpendicular bisector	rārangi weherua hāngai
perpendicular line	rārangi hāngai
pi	pae (<i>tohu: π takenga mai</i> : He kupu whakawhiti oro mai i te reo Kiriki.)
plan	mahere
plane (surface)	papa
plan view	tirohanga (mai i) runga (<i>kupu kē atu</i> : tirohanga ā-manu)
point (on a graph, line, plane, or in space)	pūwāhi (<i>takenga mai</i> : pū – origin, centre; wāhi – place, locality)
polycube	mataono rite-rau
polygon (regular)	taparau (rite) (<i>takenga mai</i> : tapa – margin, edge; rau – multitude; rite – alike, corresponding <i>kupu kē atu</i> : tapamaha [rite])
polyhedron (regular)	matarau (rite) (<i>takenga mai</i> : mata – face; rau – hundred, multitude)

polyomino	tapawhā rite-rau
position	taunga (<i>takenga mai</i> : taunga – resting place, anchorage <i>kupu kē atu</i> : takotoranga)
predict	matapae ~hia
prism	poro (<i>takenga mai</i> : poro – butt end, block)
problem	rapanga (<i>takenga mai</i> : rapa – seek, look for)
product, answer, outcome	otinga (<i>takenga mai</i> : oti – finished)
property, feature	āhuatanga
proportional relationship	pāngā riterite
protractor	ine-koki
prove	hāpono ~tia
pyramid, cone	koeko
quadrilateral	tapawhā (<i>takenga mai</i> : tapa – margin, edge; whā – four)
radius	pūtoro (<i>takenga mai</i> : pū – centre; toro – stretch forth, extend)
ratio	ōwehenga (<i>takenga mai</i> : ō – of, belonging to; wehe – detach, divide)
ratio scale	āwhata ūwehenga
ray	hihi
rear view	tirohangā (mai i) muri
rectangle, oblong	tapawhā hāngai
rectangular prism	poro-tapawhā hāngai
rectangular pyramid	koeko-tapawhā hāngai
reflex angle	koki rāwaho
region (of space or time)	takiwā
regular	rite
relation, function	pāngā (<i>takenga mai</i> : pā – connected with <i>kupu kē atu</i> : hononga)
repeat	tāruarua
representation	whakaahuahanga
result	otinga (<i>takenga mai</i> : oti – finished)
rhombus	tapawhā whakarara rite (<i>kupu kē atu</i> : whakarara rite, taimana)
right angle	koki hāngai (<i>tohu</i> : )
right-angled triangle	tapatoru hāngai
right cone	koeko hāngai
right pyramid	koeko hāngai
right side view	tirohangā (mai i te taha) matau
row	kapa

ruler	rūri (<i>takenga mai</i> : He kupu whakawhiti oro mai i te reo Ingarihi <i>kupu kē atu</i> : tauine)
scale	āwhata (for showing measurement) (<i>takenga mai</i> : arawhata – ladder)
scale diagram	hoahoa āwhata
scale factor for enlargement	taurahi (<i>takenga mai</i> : tau – number; rahi – size <i>kupu kē atu</i> : tau whakarahi)
scale map	mahere āwhata
scalene triangle	tapatoru hikuwaru
sector	pewanga
segment	tapahanga (<i>takenga mai</i> : tapa – cut, split)
semicircle	porowhita haurua
semicircumference	paenga (o te) porowhita haurua
set square	tāhāngai (<i>takenga mai</i> : tā – print; hāngai [koki hāngai] – right angle)
shape	āhua (<i>kupu kē atu</i> : hanga)
side	taha
similar (in appearance)	ōrite te āhua
similar (in proportion)	rite
simple closed curve	ānau kati
simple curve	ānau (<i>kupu kē atu</i> : kōpiko māmā)
simple open curve	ānau huaki
sine	aho (<i>tohu</i> : sin)
size	rahi ~nga
solid with curved and flat surfaces	āhua ahu-3 mata kōpiko, mata papatahi
solution	otinga (<i>takenga mai</i> : oti – finished)
solve, complete	whakaoti ~a
Soma cube	mataono rite a Soma
space, spatial	mokowā (<i>kupu kē atu</i> : wā)
sphere	poi (<i>takenga mai</i> : poi – ball <i>kupu kē atu</i> : poi rite)
spiral	tōrino
square	tapawhā rite
square centimetre	mitarau pūrua (<i>tohu</i> : cm ²)
square metre	mita pūrua (<i>tohu</i> : m ³)
square prism	poro-tapawhā rite
square pyramid	koeko-tapawhā rite
statement scale	āwhata tauākī
straight line	rārangī torotika

straight line angle	koki rārangi (<i>kupu kē atu</i> : koki torotika)
string	aho, tuaina
strip (e.g. piece of paper)	ngaku
sufficient	rawaka
supplementary angles	koki whakarārangi (<i>takenga mai</i> : koki – angle; whaka– causative prefix, to make; rārangi – line)
surface	papa
surface area	horahanga mata
symmetry, symmetrical	hangarite (<i>takenga mai</i> : hanga – shape; rite – alike, corresponding)
table (e.g. of data)	tūtohi
tangent (to a curve)	pātapa (<i>takenga mai</i> : pā – connected with, touch; tapa – edge)
tangent (trigonometry)	pātapa (<i>tohu</i> : tan)
tangential circles	porowhita pātapa
tangential line	rārangi pātapa
tangram	hangawhitu (<i>takenga mai</i> : hanga – shape; whitu – seven)
tessellation	rōpinepine (<i>takenga mai</i> : rōpine – place close together)
test	whakamātau ~ria
tetrahedron (regular)	matawhā (rite) (<i>kupu kē atu</i> : koeko-tapatoru [rite])
theorem of Pythagoras	ture a Pythagoras
thick	mātotoru
three-dimensional	ahu-toru (<i>whakapotonga</i> : ahu-3)
three-dimensional figure, solid (shape)	āhua ahu-toru (<i>whakapotonga</i> : āhua ahu-3)
tile	papariki (<i>takenga mai</i> : papa – anything broad, flat and hard; riki – small)
tiling	rōpinepine (<i>takenga mai</i> : rōpine – place close together)
torus	tarawhiti (<i>takenga mai</i> : tarawhiti – hoop, ring, encircle)
total	tapeke
trace	whaituhi ~a (<i>takenga mai</i> : whai – follow; tuhi – write)
transversal	rārangi whakawhiti
trapezium	taparara (<i>takenga mai</i> : tapa [tapawhā] – quadrilateral; rara [whakarara] – parallel)
trapezoidal prism	poro-taparara
triangle	tapatoru
triangular prism	poro-tapatoru
triangular pyramid (regular)	koeko-tapatoru (rite) (<i>kupu kē atu</i> : matawhā [rite])
two-dimensional	ahu-rua (<i>whakapotonga</i> : ahu-2)

two-dimensional figure	āhua ahu-rua (<i>whakapotonga</i> : āhua ahu-2)
variant property	āhuatanga taurangi (<i>takenga mai</i> : āhuatanga – property; taurangi – variable)
vertex	akitu (<i>takenga mai</i> : akitu – point end, summit <i>kupu kē atu</i> : kokonga)
vertical	poutū (<i>kupu kē atu</i> : poupou)
vertical line	rārangi poutū
volume	rōrahi (<i>takenga mai</i> : rō [roto] – inside; rahi – size)
west	uru (<i>kupu kē atu</i> : rātō)
whole angle	koki huripū
wide	whānui
width	whānui