

## Ke Ka'ina Wāwae A Me Ke Pānānā

### *'Ōwehe Laulā:*

Ke ho'ohana nei nā kānaka 'epekema i nā palapala 'āina e nānā pono i nā hi'ona 'āina like 'ole e like me nā lua'i pele, na lua pele nui, a me nā lua pele puka ea. Hiki ke palapala i kēia mau hi'ona 'āina me ka GPS (Global Positioning System) pa'alima. Hō'ili'ili 'ia kēia 'ike i ka palapala 'āina kikoho'e e ka lako polokalamu kamepiula GIS (Geographic Information System).

I ka wā kahiko, ua nānā pono ka Hawai'i i nā hi'ona 'āina lua pele a me nā hanana. Ua palapala 'ia kēia mau lōina ma ke 'ano he lono a i 'ole mele. He mau ha'i waha me nā lōina kiko'i ko ka lono. 'O ke mele Hawai'i he mele, he oli, a i 'ole hīmeni. 'O ke mele Hawai'i na'e mele 'ia me nā mea ho'okani like me ka pila ho'okani a pēlā aku.

Ma mua o ka GPS pa'alima a me ka lako polokalamu GIS, ua ho'ohana nā kānaka 'epekema i nā mauha'a 'ē a'e e palapala i nā lōina ma kekahi palapala 'āina. 'O "Ke Ka'ina Wāwae a me Ke Pānānā" kekahi ka'ina hana. Ma kēia ha'awina, e a'o ana nā haumāna e kahaki'i i ka palapala 'āina me "Ke Ka'ina Wāwae a me Ke Pānānā."

### *Nā Pahuhopu:*

E a'o ana ka haumāna:

- e 'ike i ko lākou ka'ina wāwae (pace);
- e ho'ohana i kekahi pānānā (compass);
- e ho'ohana i ko lākou ka'ina wāwae e 'ike i ka mamao ma waena o 'elua wahi; a me
- e kahaki'i i kekahi palapala 'āina me ke ka'ina wāwae a me ke pānānā.

### *Nā Pono Ha'awina:*

- Ka pānānā (compass)
- Ka papa 'ūmi'i (clipboard)
- Ke ana huina li'ili'i a i 'ole ka lula
- Ka līpine ana (measuring tape)
- Ka mīkini helu
- Ka Pepa 'Ike Haumāna: "Ka La'ana Ka'ina Wāwae A Me Ke Pānānā"
- Ka Pepa Ha'awina Haumāna: "Māhele 1: E Huli No Ke Ka'ina Wāwae"
- Ka Pepa Ha'awina Haumāna: "Māhele 2: E Huli No Nā Wahi Huli"

**Ke Ka'ina Wāwae A Me Ke Pānānā**

*Nā Pane I Ke Pepa Ha'awina Haumana:*

Ka La'ana Ka'ina Wāwae:

	<b>Ka Inoa &amp; Ka Helu Wahi Huli</b>	<b>Ke Kuhikuhina Pānānā</b>	<b>Ke Ka'ina Wāwae</b>		<b>Nā Mika o Ke Ka'ina Wāwae Pākahi</b>		<b>Ka Mamao (Nā Mika)</b>
	#1 Ke pākaukau	-----	-----	x	-----	=	-----
	#2 Ka lina pōhina'i	90° (E)	44	x	1.6	=	70.4 m
	#3 Ka pahe'e	225° (SW)	22	x	1.6	=	35.2 m
1.	#4 Nā paiō	<b>270° (W)</b>	29	x	1.6	=	46.4 m
2.	#5 Ka hao pīnana	135° (SE)	21	x	1.6	=	<b>33.6 m</b>

3. Pololei

E Huli No Ke Ka'ina Wāwae:

1. E oko'a ana nā pane.

E Huli No Nā Wahi Huli:

1. Palapala 'āina
- 2-3. E 'oko'a ana nā pakuhi a me nā palapala 'āina i nā wahi. Pono ka palapala 'āina i kekahi pālākiō.

## Ke Ka'ina Wāwae A Me Ke Pānānā

### *Ka Ho'omākaukau Ha'awina:*

1. E koho i kekahi wahi no kēia ha'awina e kōkua i ka papa holo'oko'a.
2. E ana i kekahi laina 100 mika ma ia wahi (inā 50 mau mika ka laina, hiki i nā haumāna ke ka'ina wāwae i 'elua mau manawa).
3. E ho'okama'āina i nā pānānā papa. E ho'oma'ama'a e huli i nā pānānā kuhikuhina mai kekahi wahi a i kekahi wahi 'ē a'e.
4. E ho'onohonoho i 'elima mau 'āpana pahu pepa kala (inā loa'a, ho'ohana i ka pepaānue) a i 'ole nā cone ma ke pā kula no nā wahi huli (waypoints). E ho'ohelu i nā wahi huli 1 a i 5. 'O ka wahi huli 1 ka ho'omaka. Pono nā haumāna e ho'omaka me ka wahi huli 1 a ho'omau i ke ka'ina pololei. E kū ma ka wahi helu 1 a ho'ohana i ka pānānā e ho'oholo i ka 'ao'ao e ho'omau ai i ka wahi helu 2. E kākau i kēia 'ao'ao ma ke 'ano kēkelē ma lalo o ke kōlamu "Ke Kuhikuhina Pānānā" ma ka Pepa Ha'awina Haumana: Māhele 2: E Huli No Nā Wahi Huli." E palapala i nā kuhikuhina pānānā no nā wahi helu 2 a i 3, 3 a i 4, a me 4 a i 5 ma mua o ke kope 'ana i ka pepa ha'awina no nā haumāna.

### *Ke Ka'ina Hana Ha'awina:*

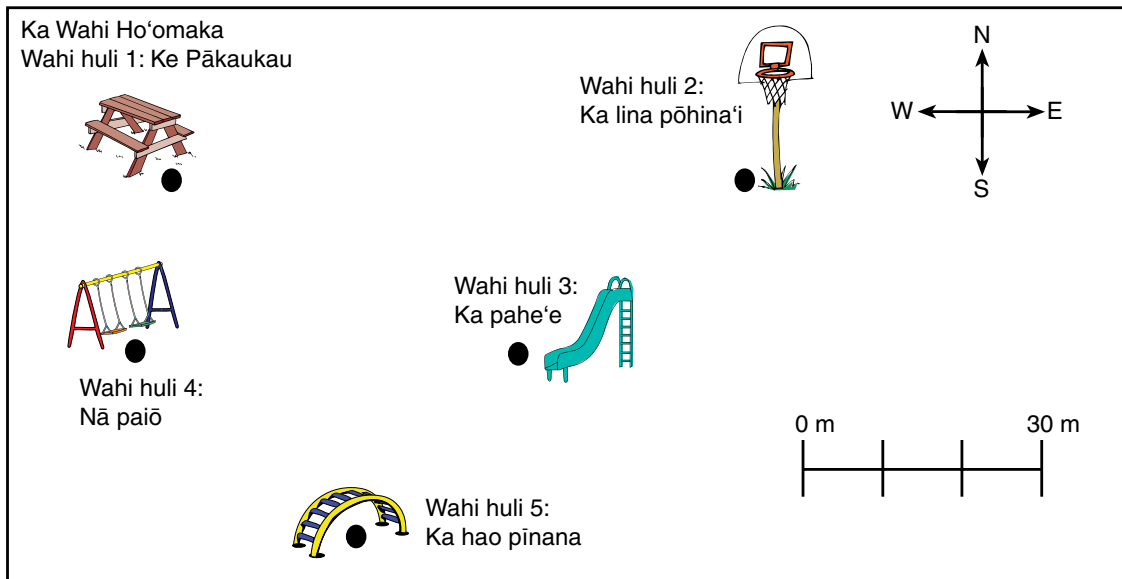
1. E nīnau i nā haumāna e wehewehe pehea e hele ai i ka hale ha'uki, ke ke'ena, a me ka hale kinoea kokoke i ke kula. E nīnau i nā haumāna he aha nā mea like i ko lākou mau pane (ka 'ao'ao a me ka mamao). E wehewehe i nā haumāna e huli ana lākou i nā wahi huli (objects) ma ke kula. E loa'a ana lākou i ke pānānā akā pono lākou e huli i ke ka'ina wāwae (pace) i nā wahi huli a pau. E ho'ohana ana nā haumāna i ka 'ike o lākou e 'ohi ai no ka ho'okumu 'ana i kekahi palapala 'āina o kēia wahi.
2. E kāka'ahi i ka Pepa Ha'awina Haumana: "Māhele 1: E Huli No Ke Ka'ina Wāwae." E kōkua i nā haumāna e hahai i nā kuhikuhi e ho'oholo i ko lākou ka'ina wāwae 'awelika.
3. E kāka'ahi i nā mīkini helu a me ka Pepa 'Ike Haumana: "Ka La'ana Ka'ina Wāwae A Me Ke Pānānā," he la'ana kēia o ka palapala 'āina i ho'okumu 'ia me ka 'ikepili ka'ina wāwae a me ke pānānā. E hō'ike i nā haumāna (1) pehea e ho'oholo ai i nā kuhikuhina pānānā ke nānā aku i ka palapala 'āina a me (2) pehea e ho'oholo ai i ka mamao o ke ka'ina wāwae. E noi i nā haumāna e ho'opiha i nā pahu hakahaka 'elua ma ka pakuhi.
4. E kāka'ahi i nā pānānā, papa 'ūmi'i, a me ka Pepa Ha'awina Haumana: "Māhele 2: E Huli No Nā Wahi Huli" kahi i kākau i nā pānānā kuhikuhina. E ho'oma'ama'a pehea e ho'ohana ai i nā pānānā. E alaka'i i nā haumāna i ka wahi ho'omaka (Wahi Huli 1). E noi iā lākou e kākau i nā wahi huli (waypoints) a me ke ka'ina wāwae (pace) no nā 'ao'ao pānānā ma ka Pepa Ha'awina Haumana: "Māhele 2: E Huli No Nā Wahi Huli."
5. E ho'i i ka papa a noi i nā haumāna e ho'opiha i ke kōlamu "Nā Mika No Ke Ka'ina Wāwae Pākahi" ma ka pakuhi. Ua like ka helu i kēia kōlamu me nā wahi huli a pau (no ko lākou "Nā Mika No Ke Ka'ina Wāwae Pākahi" ho'omaulia ma ka Pepa Ha'awina Haumana: "Māhele 1: E Huli No Ke Ka'ina Wāwae"). E noi i nā haumāna e ho'omaulia i ka mamao o nā wahi huli a pau.
6. E kāka'ahi i nā ana huina a me nā lula. E hō'ike i nā haumāna e kahaki'i i ka palapala 'āina o ko lākou pā kula me nā mauha'a a me ka 'ikepili i 'ohi 'ia. E ho'omaopopo iā lākou e ho'okomo i kekahi pālākiō (scale) ma ka palapala 'āina.

## Ke Ka'ina Wāwae A Me Ke Pānānā La'ana

**Nā Kuhikuhi:** E ho'ohana i ka 'ike ma lalo nei e ho'opiha i nā pahu hakahaka.

Ka Inoa & Ka Helu Wahi Huli	Ke Kuhikuhina Pānānā	Ke Ka'ina Wāwae		Nā Mika o Ke Ka'ina Wāwae Pākahi		Ka Mamao (Nā Mika)
#1 Ke pākaukau	-----	-----	x	-----	=	-----
#2 Ka lina pōhina'i	90° (E)	44	x	1.6	=	70.4 m
#3 Ka pahe'e	225° (SW)	22	x	1.6	=	35.2 m
1. #4 Nā paiō		29	x	1.6	=	46.4 m
2. #5 Ka hao pīnana	135° (SE)	21	x	1.6	=	

\*Ua like nā helu i ke kōlamu Nā Mika o Ke Ka'ina Wāwae Pākahi me nā wahi huli a pau.  
 Ua huli i nā mika o ke ka'ina wāwae pākahi ma ka Pepa Ha'awina Haumana: "E Huli No Ke Ka'ina Wāwae."



3. Pololei a i 'ole 'A'ole Pololei: Ho'ohana ka Lono a me ka GPS e palapala i ka 'ike o nā hi'ona lua pele.

## Māhele 1: E Huli No Ke Ka‘ina Wāwae

Ho‘ohana nā kānaka ‘epékema i nā palapala ‘āina e palapala a me kia‘i i nā hi‘ona ‘āina, e like me nā ‘ā pele, nā lua pele nui a me nā puka lua pele. Ma kēia ha‘awina, e ho‘ohana i “Ke Ka‘ina Wāwae A Me Ke Pānānā” e ‘ohi i ka ‘ikepili e kahaki‘i i kekahi palapala ‘āina.

‘O ke ka‘ina wāwae ke ke‘ehi ‘elua. No ka huli ‘ana i ke ka‘ina wāwae, e hele wāwae ma kekahi laina i ana ‘ia i 100 mau mika. E ho‘omaka me kou wāwae hema a e helu i nā manawa o kou wāwae ‘ākau e hehi ma ka honua. E hana kēia i ‘elua manawa, a laila e palapala i ka helu i ka pahu ma lalo nei.

No ka huli ‘ana i ke ka‘ina wāwae ‘awelika, e ho‘ohui i nā ka‘ina wāwae no ka manawa mua a me ka manawa lua āu i hele wāwae ai ma ka laina 100 mika, a laila pu‘unaue i kēia helu i ka helu 2. ‘O kēia kekahi la‘ana, inā 60 ke ka‘ina wāwae no ka manawa mua a 64 ke ka‘ina wāwae no ka manawa lua, a laila 62 ka‘ina wāwae ka ‘awelika no 100 mau mika pākahi.  $(60 + 64) \div 2 = 62$

**E Huli I Ke Ka‘ina Wāwae ‘Awelika:**

Ka mua: 100 mau mika: \_\_\_\_\_

+

Ka lua: 100 mau mika: \_\_\_\_\_

=

\_\_\_\_\_  $\div 2$

= \_\_\_\_\_

(ka ‘awelike no 100 mau mika pākahi)

No ka huli ‘ana i ka mamao o ke ka‘ina wāwae pākahi, e pu‘unaue 100 mau mika i ke ka‘ina wāwae ‘awelika. I kēia la‘ana, 1.6 mau mika ka mamao o ke ka‘ina wāwae pākahi,  $(100 \text{ mau mika} \div 62 \text{ ka‘ina wāwae} = 1.6 \text{ mika/ka‘ina wāwae})$ . E ho‘ohana i ka ha‘ilula ma lalo nei e huli i ka mamao o kou ka‘ina wāwae pākahi, a laila e palapala i kēia helu ma ka Pepa Ha‘awina Haumana: “Māhele 2: E Huli No Nā Wahi Huli.”

E ho‘ohana i kēia ‘ike e ho‘okumu i kekahi palapala ‘āina.

**Ke kuhikuhina no ke ka‘ina wāwae pākahi:**

$100 \div \frac{\text{_____}}{\text{(ka ‘awelike no 100 mau mika pākahi)}} = \frac{\text{_____}}{\text{(ka mamao o ke ka‘ina wāwae)}}$

## Māhele 2: E Huli No Nā Wahi Huli

E kākau i ke ka'ina wāwae: \_\_\_\_\_ 100 mika pākahi

1. 'O ke ki'ina hana ka'ina wāwae a me ke pānānā a me ka GIS (Geographic Information System) nā ki'ina hana 'elua i ho'ohana 'ia no ka ho'okumu 'ana i kekahi \_\_\_\_\_.
2. E ho'opiha i ka pakuhi ma lalo nei (ua hā'awi 'ia nā kuhikuhina pānānā e ke kumu).

Ka Inoa & Ka Helu Wahi Huli	Kuhikuhina Pānānā	Ka'ina Wāwae		Nā Mika I Ke Ka'ina Pākahi		Ka Mamao (Nā Mika)
	-----	-----	x	-----	=	-----
			x		=	
			x		=	
			x		=	
			x		=	

3. I ka pakuhi ma lalo nei, e kahaki'i i kekahi palapala 'āina e hō'ike i kēia mau mea:
  - a) ka wahi ho'omaka;
  - b) nā wahi o nā wahi huli pākahi;
  - c) ke ka'ina wāwae i nā wahi huli pākahi (ka mamao);
  - d) ke kuhikuhina pānānā i nā wahi huli pākahi (ka 'ao'ao); a me
  - e) kekahi pālākiō.