

Ke Ana 'Ana O Nā Hawewe: Electromagnetic A i 'ole Mechanical?

'Ōwehe Laulā:

'O ke kukui ka hawewe electromagnetic. Akā, 'o ke kani ka hawewe mechanical. Hiki ke lohe i nā kani i nā alapine (frequencies) like 'ole, mai ka infrasonic (ma lalo o ka lohe 'ana o kōnaka) a i ka ultrasonic (ma luna o ka lohe 'ana o kōnaka). Ke noi 'i nei nā kōnaka 'epekema i nā lauana o ke kani infrasonic e ho'okumu 'ia e nā lua pele a pehea kēia lauana o ke kani ke wanana i nā lua 'i 'ana o ka lua pele. Ma kēia ha'awina, e noi 'i ana nā haumāna i ka 'ike o nā hawewe kani (sound waves).

Nā Pahuhopu:

E a'ō ana ka haumana:

- e wehewehe i ka 'oko'a o ka hawewe electromagnetic a me ka hawewe mechanical;
- e noi 'i i ka pilina ma waena o ke alapine (frequency) a me ke kuekueni (vibration); a me
- e ho'omaulia i ka mamao o kekahi mea hypothetical me ka 'ike o ke kani.

Nā Pono Ha'awina:

- Tuning fork
- Mallet
- Ka pola nui (ma kahi o 12 'īniha ke anawaena)
- Nā lula ea
- Ka Māliko: "Nā Hawewe Kani"
- Ka Pepa Ha'awina Haumana: "Ke Kani A Me Ke Kuekueni"

Nā Pane I Ka Pepa Ha'awina Haumana:

1. Ha'aha'a
2. Emi ha'aha'a loa
3. Emi ha'aha'a loa
4. 'A'ole pono ka hawewe electromagnetic i kekahi mea no ka holo pono 'ana; akā pono ka hawewe mechanical e holo pono i kekahi kinopa'a (solid), kinowai (liquid), a i 'ole kinoea (gas).
5. Ana ke alapine (Frequency) i ka māmā holo o ke kuekueni, a i 'ole ka helu o nā hawewe e ka'alo i ke kekona pākahi ma kekahi wahi kiko'ī. Ana ka māmā holo i ka mamao ke holo ka hawewe i kekahi manawa kiko'ī.
6. 240.8 mau mika
7. 'A'ole; 'a'ole pili ka māmā holo me ke alapine (frequency).

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Ke Ka'ina Hana Ha'awina:

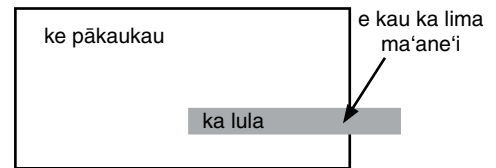
1. E noi i nā haumāna e kau i ko lākou manamana lima ma ko lākou pu'u a hana ka (hum). He aha lā ho'i ka mea e hāhā ai? He aha ka hana, no ke aha mai? Inā pono, e wehewehe 'o ke kueleka ka mea i ho'okumu 'ia e ke kani 'ā'i (larynx) a 'o ia nō ke kumu no ka ho'okumu 'ana o nā hawewe kani.
2. E wehewehe pono i ka mana'o o hawewe (he disturbance e ho'oili i ka ikehu mai kekahi wahi a i kekahi wahi 'ē a'e, akā na'e 'a'ole pili kēia i ka meakino). E ho'omaopopo i nā haumāna i nā hawewe 'elua: electromagnetic a me mechanical. 'A'ole pono nā hawewe electromagnetic i kekahi meakino no ka holo 'ana: hiki kēia 'ano hawewe ke holo i kahi hakahaka. Akā na'e no nā hawewe mechanical, pono kēia 'ano hawewe e holo i kekahi meakino. E kākau i kēia mau mana'o ma ka papa ke'oke'o.
3. E nīnau i nā haumāna inā electromagnetic a i 'ole mechanical nā hawewe kani a pane i ka nīnau, no ke aha mai ('o electromagnetic ka pane pololei, akā ho'ohana ka hawewe kani i kekahi meakino: ea! Hiki i ka hawewe kani ke holo i loko o ke kinowai, kinopa'a, a me ke kinoea kekahi).
4. E ku'i i ka tuning fork me kekahi mallet, a laila komo ke 'ō ho'okani (tuning fork) i loko o ka pola me ka wai. Pono nā haumāna e nānā pono i ke 'ano o nā 'ale e ho'omaka mai ke 'ō ho'okani (tuning fork). E wehewehe holo pū nā hawewe kani i ke ea, 'a'ole hiki ke 'ike i nā hawewe. E wehewehe i nā haumāna holo ka ikehu i ka wai---'a'ole holo ka wai. 'O ka ikehu ka mea e holo ai.
5. E hō'ike i ka Māliko: "Nā Hawewe Kani." Wehewehe nā hawewe kani i kekahi mau alapine (frequencies). 'Ike nā pepeiao o kōnaka i ka hawewe kani alapine (frequency) ma ke 'ano he ki'ileo (pitch). 'O nā alapine ha'aha'a (Low-frequency) ke ki'eleo ha'aha'a (low-pitched), a 'o nā alapine ki'eki'e (high-frequency) ke ki'eleo ki'eki'e (high-pitched). 'O ka alapine (frequency) ka helu o nā hawewe e ka'alo i kekahi wahi pa'a i 1 kekona ('o Hertz nā anakahi alapine). 'O kēia kekahi la'ana, inā loa'a ke kani i ke alapine (frequency) o 10 Hertz, ka'alo i 10 mau hawewe i kekahi wahi pa'a i 1 kekona. E kākau i kēia 'ike ma ke papa ke'oke'o i maopopo nā haumāna.
6. E wehewehe, ha'aha'a a i 'ole ki'eki'e kekahi o nā hawewe kani i hiki i ka pepeiao o kōnaka ke lohe. Hana ka lua pele i mau kani i ka laulā o "infrasonic": ma lalo o 20 Hertz. Ke a'o nei nā kōnaka 'epekema i kēia mau kani e wanana i ka lua'i 'ana o ka lua pele.
7. E wehewehe, 'o nā kani ultrasonic nā kani ki'eki'e i hiki i nā pepeiao o kōnaka ke lohe, ho'ohana nā holoholona i echolocation. Ma muli o ka holo 'ana o ka hawewe, hiki i ka hawewe ke kūpī (reflect) mai nā mea like 'ole, e like me ka hawewe kukui. 'O kekahi kūpina'i (echo) ke kūpī (reflection) mai ke kani. Hana nā holoholona i kekahi kani i maopopo iā lākou ka mamao o kekahi mea a maopopo ka mamao o ia mea ma muli o ka ho'i koke a i 'ole ho'i lohi o ke kani.
8. E maopopo ka 'oko'a o ke "alapine" (frequency) mai ka "māmā holo" (speed) o ka hawewe: Ana ke alapine (frequency) i nā manawa o nā mea huna (particles) e kueleka puni o ka hawewe, a ana ka māmā holo i ka mamao o ka holo 'ana i ka hawewe i kekahi manawa kiko'i. 'A'ole pili ka māmā holo o ka hawewe kani a me ke alapine: holo ka hawewe kani o ka hekili a me nā kani o nā 'ūhini (cricket) ma kahi o 344 mika /kekona (750 mile i ka hola pākahi) i ke ea ma ke ana wela (temperature) ma'amau.

Ka Mana'o Hou A'e: E nānā i ka punaewehe ma lalo nei e hō'ike i nā haumāna i nā kani infrasonic o ka lua pele: Ke kani o ka lua pele 'o Mt. Etna ma Italy ma ke 'ano mele (melody) (<http://grid.ct.infn.it/etnasound/page4/page8/etna.aif>). Ke kani o ka lua pele 'o Tungurahua ma Ecuadorma ke 'ano mele (melody) (<http://grid.ct.infn.it/tungurahuasound/TunguScore.mid>).

Ke Kani A Me Ke Kuekueni

Ka 'Ike Hou A'e:

Hiki ke ho'ohana i ke ki'eleo (pitch) o ke kani e koho ke alapine (frequency) o kekahi hawewe kani. 'O nā alapine ki'eki'e (high-frequency) ke ki'eleo ki'eki'e (high-pitched) a 'o nā alapine ha'aha'a (Low-frequency) ke ki'eleo ha'aha'a (low-pitched). 'Oko'a ke "alapine" (frequency) mai ka "māmā holo" (speed) o ka hawewe: Ana ke alapine (frequency) i nā manawa o nā mea huna (particles) e kuekueni puni o ka hawewe, a ana ka māmā holo i ka mamao o ka holo 'ana i ka hawewe i kekahi manawa kiko'i.



Kā Pono Ha'awina:

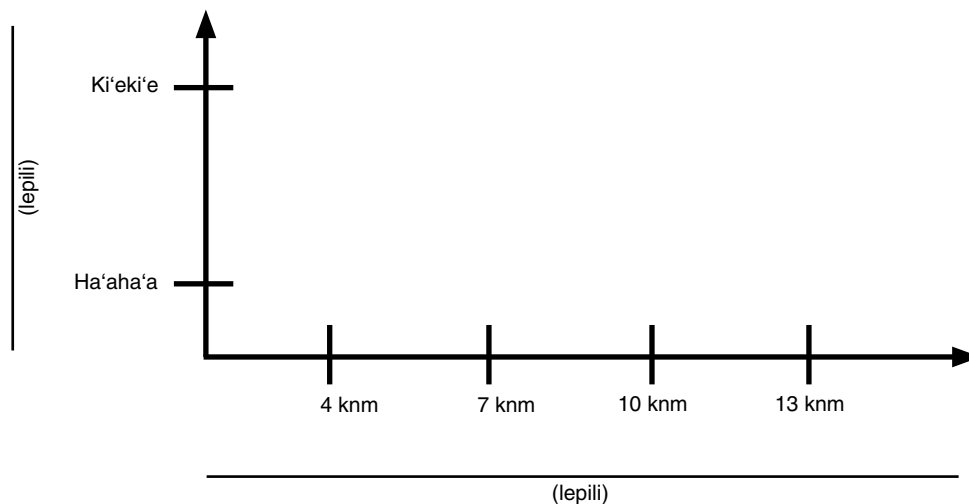
Ka lula ea

Ke Ka'ina Hana Ha'awina:

1. E kau ka lula ea ma ke pākaukau ma kahi o 4 kenimika ma 'ō ka lihi o ke pākaukau.
2. E kaomi a pa'a ka lula me ka lima. E kau ka lima kokoke i ka lihi o ke pākaukau i hō'ike 'ia e ke ki'ikuhi.
3. Me ka manamana lima o ka lima 'ē a'e, e kaomi a pa'a i ka lula a laila ho'oku'u ka lima i mea e kuekueni. E ho'olohe i ke alapine (frequency) o ke kani i hana 'ia e ke kuekueni a nānā pono i nā kuekueni.
4. E ho'onohonoho pono ka lula a e kau nā kenimika 7 ma ka lihi o ke pākaukau. E kaomi a pa'a ka lula a laila ho'olohe a nānā pono i nā kuekueni.
5. E hana hou i ke ka'ina hana me 10 mau kenimika a me 13 mau kenimika ma 'ō ka lihi o ke pākaukau.

Ka 'Ikepili:

'O ka y-axis ma ka pakuhi ke alapine (frequency). E kākuhi i nā alapine o nā kani a me ka 'oko'a o ia mau kani ke kau ka lula ma o ke pākaukau. (E lepili i ka Y-Axis "Alapine" (Frequency) a me ka X-Axis "Ke Ana O Ka Lula Ma O Ke Pākaukau")



<h2 style="margin: 0;">Ke Kani A Me Ke Kuekueni</h2>
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Nā Nīnau:

1. I ke kau 'ana o ka lula ma 'ō ke pākaukau ki'eki'e a i 'ole ha'aha'a ke alapine (frequency)?

2. I ke kau 'ana o ka lula ma 'ō ke pākaukau ki'eki'e a i 'ole ha'aha'a nā kuekueni?

3. Ki'eki'e a i 'ole ha'aha'a ke alapine ke hō'emi ka nui o nā kuekueni?

4. E wehewehe i kou mana'o i ka 'oko'a o ka hawewe electromagnetic, e like me ke kukui visible, a me ka hawewe mechanical, e like me ke kani.

5. He aha ka 'oko'a o ke alapine o ka hawewe a me ka māmā holo o ka hawewe?

6. Hiki ke ho'ohana i ka manawa e lohe i ke kūpina'i no ka ho'omaulia 'ana i ka mamao o kekahi mea:

$$\text{Mamao} = \text{ka māmā holo o ke kani} \times 1/2 \text{ ka manawa no ka ho'i 'ana o ke kūpina'i}$$

Ke kū nei kekahi kanaka i ka mamao i 'ike 'ole 'ia mai ke paia. Makemake e 'ike i ka mamao o kēia kanaka mai ka paia. 'O 344 mau mika kekona pākahi ka māmā holo o ke kani. Uwā ke kanaka, a ho'i mai ke kūpina'i i 1.4 mau kekona. He aha ka mamao o ka paia i mau mika? E hō'ike i kou ho'omaulia.

7. Inā ho'ololi ke alapine o ke kani ho'ololi pū ka māmā holo o ka holo 'ana? 'Ae a i 'ole 'A'ole, no ke aha mai?
