

(20 points)

(C) Letters for Cuzco (1/4)

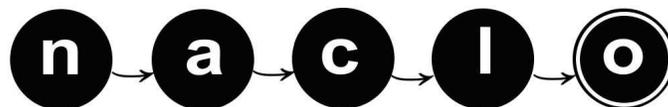
Orthography design is the process of developing an alphabet and spelling rules for a language. A good orthography has several features:

- * Given a spoken word, there's no question of how to spell it.
- * Given a written word, there's no question of how to pronounce it.
- * In the modern world, it's increasingly important that it be reasonably easy to type!

Quechua is spoken today by millions of people in Peru, Ecuador, and Bolivia, the descendants of the citizens of the Incan Empire. Quechua speakers are rapidly joining the Information Age, and both Google and Microsoft Windows now come in Quechua!

Like in English, there are more sounds in Quechua than there are letters on a keyboard, but there are ways around that. For example, we can assign one letter to multiple sounds so long as a reader can always predict, from its position in the word or from other letters in the word, which sound is meant. So if the sound [b] only ever occurs right after [m], and [p] never occurs right after [m], we can just write "p" for both, since you'll be able to predict from the previous letter whether "p" means [b] or [p].

This "phonemic principle" is the central principle of most orthographies, not just because it reduces letters but also because our minds categorize sounds in the same way.

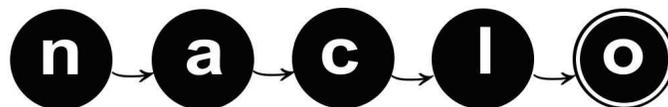


(C) Letters for Cuzco (2/4)

Here are 33 words in Cuzco Quechua, as they are pronounced but not necessarily as they are written. [q] and [χ] represent special sounds that don't occur in English.

awtu	car	qasi	free	seqay	to climb
kanka	roasted	qatoχ	merchant	sikasika	caterpillar
karu	far	qatuy	to barter	sipeχ	murderer
kiru	teeth	qatisaχ	I will follow	sipiy	to kill
kisa	nettle	qelqax	writer	soχtaral	sixty cents
kisu	cheese	qelqay	to write	sunka	beard
kunka	neck	qolqe	silver	toχra	ball of ash
kusa	great	qosa	husband	uyariy	to listen
layqa	witch	qosqo	Cuzco	uywaχ	caretaker
oqe	spotted	saqey	to abandon	waleχ	a lot
qasa	frost	saχsa	striped	weqaw	waist

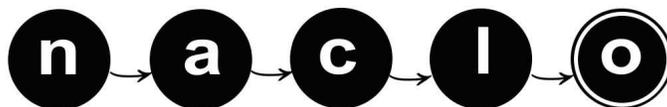
C1. Show that we don't need separate letters for [q] and [χ].



(C) Letters for Cuzco (3/4)

C2. Show that we can't represent [a] and [i] by the same letter.

C3. Show that we can't represent [a] and [e] by the same letter.



(C) Letters for Cuzco (4/4)

C4. Most modern Quechua orthographies get by with only *three* of the five vowels [a], [e], [i], [o], and [u]. Show how this is possible.

