Problem 9. Central Pamerican sums

Northern and Central Pame are distinct but related languages spoken in the state of San Luis Potosí in Mexico by approximately 5,000 people each.

In the following examples, you may like to know the following pronunciation facts.

- ɲ - palatal nasal, like *ni* in *onion*.
- ʃ'- postalveolar fricative, like *sh* in *shell*, but ejective ('spat out')
- k' – velar stop like *k* in *kiss*, but ejective.
- i̱ - ee sound as in *fee*, but with 'creaky' voice.
- ʔ - glottal stop, like the *t* in London *butter* (often written *bu'er*).
- ũ – oo sound as in *zoo*, but nasalised like *on* in French *bonjour*.

First, here are some numbers in **Northern Pame**:

(1) 9 = kara tenhiuɲ sante
(2) 13 = kara tenhiuɲ gitʃ'ai̱
(3) 17 = kanuje tenhiuɲ sante
(4) 20 = kanuje tenhiuɲ giriui̱
(5) 26 = karnuʔ tenhiuɲ nuji
(6) 30 = karnuʔ tenhiuɲ tiria
(7) 35 = giriui̱ tenhiuɲ rnuʔ

And now some arithmetic equalities in **Central Pame** (where * means 'multiplied by'):

(8) nda ntsawʔ + seskaʔai nda ntsawʔ nda = nda lien tiliɲũhũɲ
(9) kiɲui + nda ntsawʔ = seskaʔai nui
(10) nda lien nda * nui = nui lien nui
(11) tiliɲũhũɲ + kik'ai = tilija * nui
(12) seskaʔai ranhũʔ * ranhũʔ = nda lien seskaʔai nda ntsawʔ nda
(13) seskaʔai kik'ai + kik'ai = nui * seskaʔai
(14) kik'ai + ranhũʔ = nda ntsawʔ
(15) nda + nui = ranhũʔ

And finally an equality in both languages:

(16) Northern Pame: teriuhiɲ * kara tenhiuɲ nuji = Central Pame: ranhũʔ lien seskaʔai,

Q.9.1. On the answer sheet, write out the following numbers in **Northern Pame**: **2, 31**.

Q.9.2. Write out the following numbers in **Central Pame**: **9, 56, 60**.

Q.9.3. Explain clearly and succinctly how the number systems of Northern Pame and Central Pame work and how they differ. [NB This question will only be marked as a tie-breaker.]

Answer sheet

9.1. Northern Pame
2: **31:**
9.2. Central Pame
9:
56:
60:

Q.9.3. Explanation

Solution and marking.

Scoring: max 18

- Q.9.1,2. 1 for each correct Pame word (max 13)
  - Ignore spelling errors (one letter wrong per word)
  - Require correct position, but only relative to preceding correct words.
    - e.g. for 56 = lien nui seskaʔai tilija, accept all words except *nui*
    - for 56 = lien nda ntsawʔ nda, accept *lien*
- Q.9.3. **DON'T MARK THIS QUESTION!**

9.1. Northern Pame
2: nuji **31:** karnuʔ tenhiuɲ teriuhiɲ
9.2. Central Pame
9: nda ntsawʔ nda
56: nui lien seskaʔai tilija
60: ranhũʔ lien

Commentary

Northern Pame:

- **base:** tenhiuɲ = 8;
- **order:** multiplier_base_addend, i.e. the numbers have the following form: α **tenhiuɲ** β = 8*α + β, where 1 ≤ α, β ≤ 7;
- numbers between 1 and 3 have two different names which are used as multipliers and addends, respectively.

	1	2	3	4	5	6	7
α	kara	kanuje	karnuʔ	giriuį			
β	sante	nuji	rnuʔ	giriuį	gitʃʾaį	tiria	teriuhiɲ

Your name:

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Central Pame:

Since the two languages are cognate, it can be expected that at least some words with identical meanings are going to turn out to be more or less similar.

1	nda	5	kik'ai	9	nda ntsawʔ nda
2	nui	6	tilija	10	seskaʔai
3	ranhũʔ	7	tiliɲũhũɲ	20	nda lien
4	kiɲui	8	nda ntsawʔ	β*20	β lien

- **base:** 20, subbase 10 (**seskaʔai**);
- **order:** multiplier_base_addend, i.e. the numbers have the following form:
  seskaʔai $\beta = 10 + \beta$, $\beta \geq 1$;
  α **lien** $\beta = \alpha*20 + \beta$, $\alpha \geq 1$, $\beta \geq 1$.