

## Thirteenth International Olympiad in Linguistics

Blagoevgrad (Bulgaria), 20–24 July 2015

### Individual Contest Solutions

#### Problem 1. Nahuatl:

- 1: *cē*, 2: *ōme*, 3: *ēyi*, 4: *nāhui*;
- 5: *mācuilli*, 10: *mahtlactli*, 15: *catōlli*;

$$\bullet \alpha \times 20^\beta, 1 \leq \alpha \leq 5, 1 \leq \beta \leq 3:$$

$\alpha$	
1: <i>ceM</i>	$20^\beta$ 20: <i>pōhualli</i> 400: <i>tzontli</i> 8000: <i>xiquipilli</i>
2: <i>ōm</i>	
3: <i>yē</i>	
4: <i>nāuh</i>	
5: <i>mācuil</i>	

- 7: *chicōme*;

$$\bullet \gamma + \delta, \left\{ \begin{array}{l} \gamma \in \{10, 15\}, 1 \leq \delta \leq 4 \\ \gamma = \alpha \times 20^\beta, 1 \leq \delta < 20^\beta \end{array} \right\}: \boxed{\gamma}\text{-}oM\text{-}\boxed{\delta},$$

$$M = \begin{cases} m & \text{before } m, p, \text{ or a vowel;} \\ n & \text{otherwise.} \end{cases}$$

#### Arammba:

- 1: *ngámbi*, 2: *yànpa*ro, 3: *yenówe*, 4: *asàr*, 5: *tambaroy*, 6: *nimbo*;
- $\alpha \times 6, 2 \leq \alpha \leq 5$ :  $\boxed{\alpha}$  *tàxwo*;
- $6^2 = 36$ : *fete*,  $6^3 = 216$ : *tarumba*,  $6^4 = 1296$ : *ndamno*,  $6^5 = 7776$ : *weremeke*;
- $\alpha \times 6^\beta, 2 \leq \beta$ :  $\boxed{\alpha} \boxed{6^\beta}$ ;
- $\alpha \times 6^\beta + \delta, 0 < \delta < 6^\beta$ :  $\boxed{\alpha \times 6^\beta} \boxed{\delta}$ .

<div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> <math display="block">\begin{array}{rcl} &amp; 10+1 &amp; \\ 11 &amp; \times 10 &amp; = \\ &amp; 1 \times 20 &amp; \\ 20 &amp; \times 2 &amp; = \end{array}</math> </div> <div style="text-align: center;"> <math display="block">\begin{array}{rcl} &amp; 5 \times 20 + 10 &amp; \\ 110 &amp; &amp; \end{array}</math> </div> </div> <div style="text-align: right;">(1)</div> <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> <math display="block">\begin{array}{rcl} &amp; 10+4 &amp; \\ 67 &amp; + 14 &amp; = \end{array}</math> </div> <div style="text-align: center;"> <math display="block">\begin{array}{rcl} &amp; 4 \times 20 + 1 &amp; \\ 81 &amp; &amp; \end{array}</math> </div> </div> <div style="text-align: right;">(3)</div> <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> <math display="block">\begin{array}{rcl} &amp; 10+3 &amp; \\ 13 &amp; \times 3 &amp; = \end{array}</math> </div> <div style="text-align: center;"> <math display="block">\begin{array}{rcl} &amp; 1 \times 20 + (15+4) &amp; \\ 39 &amp; &amp; \end{array}</math> </div> </div> <div style="text-align: right;">(5)</div> <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> <math display="block">\begin{array}{rcl} &amp; 5+2 &amp; = \\ 7 &amp; &amp; \end{array}</math> </div> <div style="text-align: center;"> <math display="block">\begin{array}{rcl} &amp; 5 \times 3 &amp; = \\ 15 &amp; &amp; \end{array}</math> </div> </div> <div style="text-align: right;">(4), (6)</div>	<div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> <math display="block">\begin{array}{rcl} 1+1 &amp; = &amp; 1 \times 2 \\ 1+4 &amp; = &amp; 5 \end{array}</math> </div> <div style="text-align: center;"> <math display="block">\begin{array}{rcl} 2 \times 6 &amp; 36+4 \times 6 &amp; 2 \times 36 \\ 12+60 &amp; = &amp; 72 \end{array}</math> </div> </div> <div style="text-align: right;">(7), (8), (9)</div> <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> <math display="block">\begin{array}{rcl} &amp; 3 \times 6 &amp; 36+3 \times 6 \\ 3 \times 18 &amp; = &amp; 54 \end{array}</math> </div> <div style="text-align: center;"> <math display="block">\begin{array}{rcl} &amp; 6 \times 36 &amp; = \\ 216 &amp; &amp; \end{array}</math> </div> </div> <div style="text-align: right;">(10), (11)</div> <div style="display: flex; justify-content: space-between;"> <div style="text-align: center;"> <math display="block">\begin{array}{rcl} &amp; 2 \times 6 &amp; 3 \times 6 \\ 6+12 &amp; = &amp; 18 \end{array}</math> </div> </div> <div style="text-align: right;">(12)</div>
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$$\begin{array}{rcl} 3 \times 400 + 4 \times 20 + (15 + 1) & & \\ 1296 & = & 1296 \end{array} \quad (13)$$

$$\begin{array}{rcl} 1 \times 400 + 1 \times 20 + (10 + 2) & & 2 \times 216 \\ 432 & = & 432 \end{array} \quad (14)$$

$$\begin{array}{rcl} 1 \times 400 & & 216 + 5 \times 36 + 4 \\ 400 & = & 400 \end{array} \quad (15)$$

$$\begin{array}{rcl} 1 \times 8000 & & 7776 + 216 + 6 + 2 \\ 8000 & = & 8000 \end{array} \quad (16)$$

- (b) •  $42 = 2 \times 20 + 2$ : *öm-pöhualli-om-öme*;  
•  $494 = 1 \times 400 + 4 \times 20 + 10 + 4$ : *cen-tzontli-on-nāuh-pöhualli-om-mahtlactli-on-nāhui*.
- (c) •  $43 = 36 + 6 + 1$ : *fete nimbo ngámbi*;  
•  $569 = 2 \times 216 + 3 \times 36 + 4 \times 6 + 5$ : *yànpa-ro tarumba yenówe fete asàr tàxwo tambaroy*.

**Problem 2.** Structure of the verb form:

- I.
- **me-**: affirmative form, present, indicative mood,
  - ROOT,
  - **-pe** ‘really’, **-fe** ‘pretend to’, **-f** ‘be able to’, **-n** — infinitive.

In this part of the word:

1.  $C + -C > C\bar{a}C$  (**de** + **-f** + **-n** > **de-f-ä-n**, **me-** + **bäb** + **-pe** > **me-bäb-ä-pe**).
2. The last syllable receives the stress if it is closed, otherwise the penultimate is stressed (**defän** > **defän**, **mešxepe** > **mešxépe**).
3.  $CéC(C)e > CáC(C)e$  (**méšxe** > **mášxe**, **mešxépe** > **mešxápe**).

- II. **-xe** — plural, **-t** — past, **-me** — conditional mood, **-qäm** — negative form.

Answers:

- (a) **zeqén** *to bite*  
**medéf** *(he/she) is able to sew*  
**medáfe** *(he/she) is pretending to sew*  
**səfän** *to be able to burn*  
**meg<sup>w</sup>əš’ə?e** *(he/she) is speaking*  
**mebáb** *(he/she) is flying*
- (b) **çentχ<sup>w</sup>éfme** *if (he/she) is able to slide*  
**šxáfexeqäm** *(they) aren’t pretending to eat*  
**bäbäft** *(he/she) was able to fly*  
**šxet** *(he/she) was eating*  
**ṭəg<sup>w</sup>ərəg<sup>w</sup>épeme** *if (he/she) really is trembling*

- (c) **mádexe** (they) are sewing  
**mebəbáfexe** (they) are pretending to fly  
**sópet** (he/she) really was burning  
**šxéfqəm** (he/she) isn't able to eat  
**gʷəš'əʔexeme** if (they) are speaking  
**mezáqexe** (they) are biting

### Problem 3.

- (a) 1. Leave the first letter in place.  
 2. Delete *h* and *w*.  
 3. Replace all consonant letters with digits (letters whose most common sounds are similar are grouped together):
- |                         |                             |           |          |           |          |
|-------------------------|-----------------------------|-----------|----------|-----------|----------|
| <i>bpv</i> ( <i>f</i> ) | <i>cgjkqs</i> ( <i>xz</i> ) | <i>dt</i> | <i>l</i> | <i>mn</i> | <i>r</i> |
| 1                       | 2                           | 3         | 4        | 5         | 6        |
4. Reduce any sequence of two or more identical digits to a single digit.  
 5. Delete all vowels (*a*, *e*, *i*, *o*, *u*, *y*).  
 6. Leave only the first three digits or add zeroes on the right to make the code one letter and three digits long.
- (b) *Allaway*: A400, *Anderson*: A536, *Ashcombe*: A251, *Buckingham*: B252, *Chapman*: C155, *Colquhoun*: C425, *Evans*: E152, *Fairwright*: F623, *Kingscott*: K523, *Lewis*: L200, *Littlejohns*: L342, *Stanmore*: S356, *Stubbs*: S312, *Tocher*: T260, *Tonks*: T520, *Whytehead*: W330.
- (c) *Ferguson*: F622, *Fitzgerald*: F326, *Hamnett*: H530, *Keefe*: K100, *Maxwell*: M240, *Razey*: R200, *Shaw*: S000, *Upfield*: U143.

### Problem 4. Rules:

- Word order: V P (S/O); S/O P V Poss, V P Poss; S Poss.
- V = verb (past → future: **-bi** → **-ba**, ∅ → **-jba**).
- S = subject (noun). The subject of a transitive verb gets the ending **-ni**.
- O = object (noun).
- P = pronouns (subject + object) + tense:
  - subject:
    - \* 1st **ngV-**,
    - \* 2nd **nyV-**,
    - \* 3rd  $\left\{ \begin{array}{l} \text{intransitive verb: } gV- \\ \text{transitive verb: } \left\{ \begin{array}{ll} \text{masculine} & gVnV- \\ \text{feminine} & ngVyV-; \end{array} \right. \end{array} \right.$
  - object: 1st **-ngV**, 2nd **-nyV**, 3rd **-∅**;

–  $V$  are vowels (past:  $i$ , ...,  $i$ ,  $a$ ; future:  $u$ , ...,  $u$ ).

$$\bullet \text{ Poss} = \text{possessed: } \left\{ \begin{array}{l} \text{'+' : } -ngu \\ \text{'-' : } -wa \end{array} \right\} \left\{ \begin{array}{l} \text{possessor} \\ \text{masculine: } -ji \\ \text{feminine: } -nya \end{array} \right\}$$

- (a) 1. *Alayulujba nguyunyu bungmanyani.* The old woman will find you (sg.).  
 2. *Yagu gininya.* He left you (sg.).  
 3. *Janji darrangguwaji.* The dog doesn't have a stick.  
 4. *Ngirra nya alanga.* You (sg.) stole the girl.  
 5. *Daguma nyinga.* You (sg.) struck me.  
 6. *Dirragbi ga balamurrungunya.* She jumped with the spear.
- (b) 7. You (sg.) will leave me. *Yagujba nyungu.*  
 8. The doctor slept. *Gulugbi ga ngunybulugi.*  
 9. The man will run (away) with the money. *Juwa gu bardba gijilulunguji.*  
 10. He will steal the dog. *Ngirrajba gunu janji.*  
 11. The girl saw you (sg.). *Ngajbi ngiyinya alangani.*

**Problem 5.**

$$(a) \quad (\circ) \frac{\circ\circ}{\varpi} \frac{\circ\circ}{\varpi} \circ \frac{\circ\circ}{\varpi} \frac{\circ\circ}{\varpi}, \quad \left| \begin{array}{l} \circ = V (a, e, i, o, u) \\ \varpi = VV (aa, ee, ii, oo, uu) \end{array} \right.$$

(b)	36.	war	is—maa—ciil		daa-	rood	×	
	37.	dir mi-	yaad	wa-	daag-	taan	√	
	38.	laba-	daad	ka	duu-	diye	√	
	39.	ka jan-	na-daad		daa-	hiye	×	
	40.	adi-	ga i-	yo	deris-	kaa	√	
	41.	diga-	xaar-	ka	mari-	yoo	√	
	42.	ciid i-	yo doo-		lo di-	raac	×	
	43.	noo-	ma kee-		neen	darka	×	
	44.	ka-	la de-	yaa-	yaa mi-	yaan	×	
	45.	wu-	xuun	kaa	dan-	qaa-	baan	√