

# Seventh International Olympiad in Theoretical, Mathematical and Applied Linguistics

Wrocław (Poland), 26–31 July 2009

Individual Contest Problems

## Rules for writing out the solutions

1. Do not copy the statements of the problems. Write down your solution to each problem on a separate sheet or sheets. On each sheet indicate the number of the problem, the number of your seat and your surname. Otherwise your work may be mislaid or misattributed.
2. Your answers must be well-argued. Even a perfectly correct answer will be given a low score unless accompanied by an explanation.

**Problem #1 (20 points).** The following are phrases in English and their translations into the Sulka language:

1 betel nut	<i>a vhoi a tgiang</i>
1 yam	<i>a tu a tgiang</i>
2 betel nuts	<i>a lo vhoi a lomin</i>
2 coconuts	<i>a lo ksie a lomin</i>
3 betel nuts	<i>o vuo a korlotge</i>
3 breadfruits	<i>a moulang hori orom a tgiang</i>
4 yams	<i>o sngu a korlolo</i>
6 yams	<i>o sngu a ktiëk hori orom a tgiang</i>
7 betel nuts	<i>o vuo a ktiëk hori orom a lomin</i>
10 breadfruits	<i>a lo ngaitegaap hori orom a moulang</i>
10 coconuts	<i>a lo ngausmia hori orom a lomin</i>
10 yams	<i>o sngu a lo ktiëk</i>
15 coconuts	<i>o ngausmia a korlotge hori orom a korlotge</i>
16 coconuts	<i>o ngausmia a korlolo</i>
18 breadfruits	<i>o ngaitegaap a korlolo hori orom a moulang</i>
18 yams	<i>o sngu a lo ktiëk hori orom a ktiëk hori orom a korlotge</i>
19 betel nuts	<i>o vuo a lo ktiëk hori orom a ktiëk hori orom a korlolo</i>
20 yams	<i>o sngu a mhelom</i>

(a) Translate into English:

*a ksie a tgiang*  
*o ngaitegaap a korlotge*  
*o ngausmia a ktiëk*  
*o vuo a lo ktiëk hori orom a tgiang*

(b) Translate into Sulka:

2 yams  
14 yams  
15 breadfruits  
20 betel nuts

△ Sulka belongs to the East Papuan language family. It is spoken by approx. 3500 people in East New Britain Province in Papua New Guinea.

Betel nuts are actually seeds of a certain kind of palm. Yam is the edible tuber of the tropical plant of the same name.

—Evgenia Korovina, Ivan Derzhanski

**Problem #2 (20 points).** The following are words of the Maninka and Bamana languages written in the N'Ko and the Roman script and their English translations:

(a)

Yɔ̣ɔ̣ɔ̣ɔ̣ɔ̣ɔ̣ɔ̣	<b>bàlákàwúli</b>	unexpectedness; sandgrouse (a kind of bird)
ɔ̣ṭɔ̣ɔ̣ɔ̣ɔ̣	<b>játùrú</b>	hyena
Yɔ̣Yɔ̣ɔ̣ɔ̣ɔ̣	<b>kòlijí</b>	washing water
ɔ̣ɔ̣ɔ̣	<b>wàlá</b>	slate
ɔ̣ṭYɔ̣ɔ̣ɔ̣ɔ̣	<b>kúmayira</b>	advertising
Yɔ̣ṭɔ̣ɔ̣ɔ̣ɔ̣ɔ̣ɔ̣	<b>tùbabumóri</b>	Christian priest
ɔ̣ṭɔ̣ɔ̣ɔ̣ɔ̣ɔ̣	?	uncircumcised boy
ɔ̣ɔ̣ɔ̣ɔ̣	?	match-seller
?	<b>kòrikóri</b>	rust
?	<b>báwò</b>	because

(b)

ɔ̣ɔ̣ɔ̣ɔ̣ɔ̣	<b>márajàba</b>	hail!
ɔ̣ɔ̣ɔ̣ɔ̣ɔ̣	<b>jílasama</b>	hippopotamus
Yɔ̣ɔ̣ɔ̣ɔ̣ɔ̣ɔ̣	<b>kòrɔkarasí</b>	gerontocracy
ɔ̣ɔ̣ɔ̣	<b>kàna</b>	may it be that
ɔ̣ɔ̣ɔ̣ɔ̣ɔ̣ɔ̣	<b>bàsitéme</b>	wide-meshed sieve
ɔ̣ɔ̣ɔ̣ɔ̣ɔ̣ɔ̣	<b>nàmátòrokó</b>	hyena
ɔ̣ɔ̣ɔ̣ɔ̣	?	rainbow
ɔ̣ɔ̣ɔ̣ɔ̣	?	light (of a lamp)
ɔ̣ɔ̣ɔ̣ɔ̣ɔ̣	?	a kind of midges; honey from such midges
?	<b>jàmanaké</b>	the joys, pleasures of youth
?	<b>létere</b>	letter, missive
?	<b>bìlakóro</b>	uncircumcised boy

Fill in the gaps.

△ The N'Ko script was invented in 1949 by the Guinean enlightener Soulemanyne Kante.

In the Roman script **j** = *j* in *judge*, **y** = *y* in *yay!*, **ɛ** ≈ *a* in *hat*, **ɔ** ≈ *a* in *hall*. The marks ̣ and ̤ indicate high and low tone (level of voice when pronouncing the syllable), respectively; if neither is present, the syllable has middle tone.

The Bamana and Maninka languages belong to the Manding group of the Mande language family. They are spoken in Mali, Guinea and other countries in West Africa. These languages are very close to one another; the distinction between them is of no consequence to the problem.

—Ivan Derzhanski

**Problem #3 (20 points).** Here are the names of 24 Burmese children and their dates of birth:

boys		girls	
name	date of birth	name	date of birth
kaʊŋ myaʔ	06/01/2009	paŋ we	06/04/2009
zeiya cɔ	06/09/2009	thouŋ uŋ	06/06/2009
pyesouŋ auŋ	06/18/2009	khiŋ le nwɛ	06/08/2009
ne liŋ	06/20/2009	wiŋ i muŋ	06/10/2009
lwiŋ koko	06/24/2009	mimi khaiŋ	06/18/2009
phouŋ naiŋ thuŋ	06/25/2009	su myaʔ so	06/30/2009
myo khiŋ wiŋ	07/02/2009	susu wiŋ	07/07/2009
tiŋ mauŋ laʔ	07/04/2009	yadana u	07/08/2009
khaiŋ miŋ thuŋ	07/06/2009	tiŋ za mɔ	07/11/2009
wiŋ cɔ auŋ	07/08/2009	yiŋyiŋ myiŋ	07/15/2009
thɛʔ auŋ	07/11/2009	keʔi thuŋ	07/20/2009
shaŋ thuŋ	07/21/2009	shu maŋ cɔ	07/21/2009

On 06/14/2009, 06/16/2009, 06/24/2009, 07/09/2009, 07/13/2009, and 07/18/2009 six other Burmese children were born. Here are their names:

- boys: **ŋwe siŋpu, so mo cɔ, ye auŋ naiŋ**
- girls: **daliya, e tiŋ, phyuphyu wiŋ**

Who was born when?

△ The Burmese names are given in a simplified Roman transcription. **c** = *ch* in *church*, **ɛ** ≈ *a* in *hat*, **h** indicates that the preceding consonant is aspirated (pronounced with a puff of air), **ŋ** = *ng* in *hang*, **ŋ** indicates that the preceding vowel is nasal, **ɔ** ≈ *a* in *hall*, **ɸ** ≈ English *th* in *with*, **y** = *y* in *yay!*, **ʔ** is a consonant (the so-called glottal stop).

—Ivan Derzhanski, Maria Cydzik

**Problem #4 (20 points).** Given are Old Indic word stems which are thought to preserve the most ancient (Indo-European) position of the stress. They are divided into root and suffix by a hyphen. The stressed vowel bears the mark ́.

<i>vṛ́k-a-</i>	wolf	<i>vádh-ri-</i>	castrated	<i>púr-va-</i>	first
<i>vadh-á-</i>	deadly weapon	<i>dhū-má-</i>	smoke	<i>bhṛ́m-i-</i>	mobile
<i>sād-á-</i>	sitting on horseback	<i>dṛ́-ti-</i>	leather bag	<i>kr̥ṣ́-i-</i>	tillage
<i>puṣ́-ti-</i>	prosperity	<i>ghṛ́-ṇi-</i>	heat	<i>stó-ma-</i>	hymn
<i>sik-ti-</i>	effusion	<i>ghṛ́-ṇá-</i>	heat	<i>dar-má-</i>	demolisher
<i>pī-ti-</i>	drinking, draught	<i>kā́-ma-</i>	desire	<i>nag-ná-</i>	naked
<i>gá-ti-</i>	walk			<i>vák-va-</i>	rolling

(a) Explain why it is not possible to use these data to determine the placement of the stress of the following stems: *bhā́g-a-* ‘share’, *pad-a-* ‘step’, *pat-i-* ‘lord’, *us-ri-* ‘morning light’.

(b) Indicate the stress of the word stems given below:

<i>mṛ́dh-ra-</i>	foe	<i>tan-ti-</i>	cord	<i>svap-na-</i>	sleep	<i>abh-ra-</i>	cloud
<i>phe-na-</i>	foam	<i>bhār-a-</i>	burden	<i>bhū-mi-</i>	earth, soil	<i>ghan-a-</i>	killing
<i>stu-ti-</i>	praise	<i>dū-ta-</i>	messenger	<i>ghar-ma-</i>	heat	<i>ghṛ́ṣ-vi-</i>	exuberant

△ **h** indicates that the preceding consonant is aspirated (pronounced with a puff of air); **ṇ**, **ṣ** and **ṭ** ≈ *n*, *sh* and *t* in *barn*, *marsh* and *art*, uttered with the tip of the tongue turned back; **ṛ** is a vowel similar to the middle sound in American English *bird*. The mark ́ denotes vowel length.

—Alexander Piperski

**Problem #5 (20 points).** The following are sentences in Nahuatl and their English translations:

- |  |   |
|--|---|
| 1. <i>nimitztlazoh<sub>tl</sub>a</i>                       | I love you  |
| 2. <i>tikmaka in āmoxtli</i>                               | you give the book to him  |
| 3. <i>nītlah<sub>to</sub>a</i>                             | I say something   |
| 4. <i>kātlītia in kuauh<sub>xī</sub>nki in pochtekatl</i>  | the merchant makes the carpenter drink;<br>the carpenter makes the merchant drink |
| 5. <i>titzāhtzi</i>  | you shout   |
| 6. <i>niki in ātōlli</i>                                   | I drink the atole   |
| 7. <i>tikuika</i>  | you sing  |
| 8. <i>tinēchtlakāhuilia</i>                                | you leave something for me  |
| 9. <i>kochi in tīzītl</i>                                  | the healer sleeps   |
| 10. <i>niknekiltia in kuauh<sub>xī</sub>nki in āmoxtli</i> | I make the carpenter want the book  |
| 11. <i>mitztēhuitekilia</i>                                | he beats you for somebody;<br>he beats somebody for you                           |
| 12. <i>kēhua in kikatl</i>                                 | sings the song  |
| 13. <i>niktlalhuia in zihuātl</i>                          | I say something to the woman  |
| 14. <i>tiktēkāhualtia in oktli</i>                         | you make somebody leave the wine  |
| 15. <i>ātli</i>  | he drinks   |
| 16. <i>tlachīhua in pochtekatl</i>                         | the merchant prepares something   |
| 17. <i>tēhuetzītia in zihuātl</i>                          | the woman makes somebody fall   |

(a) Translate into English in all possible ways:

18. *tiktlazoh<sub>tl</sub>altia in zihuātl in kuauh<sub>xī</sub>nki*
19. *nēchtzāhtzītia*
20. *tikhuiteki*
21. *nikēhuilia in kikatl in tīzītl*
22. *nikneki in ātōlli*
23. *mitztlakāhualtia*

(b) Translate into Nahuatl:

24. he makes me prepare the atole
25. you prepare the wine for somebody
26. the healer makes you sleep
27. I sing something
28. I fall

⚠ Classical Nahuatl was the language of the Aztec Empire in Mexico.

The Nahuatl sentences are given in a simplified orthography. *ch*, *hu*, *ku*, *tl*, *tz*, *uh* are consonants. The mark  $\bar{\quad}$  denotes vowel length.

Atole is a cornstarch-based hot drink.

—Bozhidar Bozhanov, Todor Tchervenkov

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Good luck!