

# 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

(a)

ሃሳብገሳ፣	<b>bàlákàwúli</b>	unexpectedness; sandgrouse (a kind of bird)
ሠጥኤ	<b>játùrú</b>	hyena
ሃፕሃፕ	<b>kòlijí</b>	washing water
ፂ፯	<b>wàlá</b>	slate
ዙሃፍገሳ	<b>kúmayira</b>	advertising
ሃገሥቲ	<b>tùbabumóri</b>	Christian priest
ጋፕገሳ	?	uncircumcised boy
ፂ፯	?	match-seller
?	<b>kòrikóri</b>	rust
?	<b>báwò</b>	because

(b)

Ἰἶλῑᾱ	márajàba	hail!
ἰἵλῑᾱ	jílasama	hippopotamus
Υἱῑῑῑῑῑ	kòrəkaraśí	gerontocracy
ἴἷἡ	kàna	may it be that
ἈΔΒῖṽἱἶἶ	bàsitéme	wide-meshed sieve
ἡἷῑῑῑἵἵἵἵἵ	nàmátòrokó	hyena
ῒῒῒῒῒ	?	rainbow
Ἀἶἶἶ	?	light (of a lamp)
ἡῒῒῒῒῒ	?	a kind of midges; honey from such midges
?	jàmanaké	the joys, pleasures of youth
?	létεε	letter, missive
?	bìlakóro	uncircumcised boy

⚠ The N’Ko script was invented in 1949 by the Guinean enlightener Souleymayne Kante.

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
kaun mya?	06/01/2009	paŋ we	06/04/2009
zeiya cɔ	06/09/2009	thouŋ uŋ	06/06/2009
pyesouŋ auŋ	06/18/2009	khin le nwɛ	06/08/2009
ne liŋ	06/20/2009	win i muŋ	06/10/2009
lwin koko	06/24/2009	mimi khain	06/18/2009
phouŋ nain thun	06/25/2009	su mya? so	06/30/2009
myo khin win	07/02/2009	susu win	07/07/2009
tin mauŋ la?	07/04/2009	yadana u	07/08/2009
khain min thun	07/06/2009	tin za mɔ	07/11/2009
win cɔ auŋ	07/08/2009	yinyin myin	07/15/2009
the? auŋ	07/11/2009	kepi thun	07/20/2009
shan thun	07/21/2009	shu man 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 nain
- girls: daliya, e tin, phyuphyu win

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*, **ɲ** indicates that the preceding vowel is nasal, **ɔ** ≈ *a* in *hall*, **p** ≈ English *th* in *with*, **y** = *y* in *yay!*, **?** 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>pṛ́r-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>kŕ̥ṣ-í-</i>	tillage
<i>puṣ́-ti-</i>	prosperity	<i>ghṛ́-ṇi-</i>	heat	<i>stó-ma-</i>	hymn
<i>sik-tí-</i>	effusion	<i>ghṛ́-ṇá-</i>	heat	<i>dar-má-</i>	demolisher
<i>pī-tí-</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>nimitztlazohitla</i>	I love you
2. <i>tikmaka in āmoxtli</i>	you give the book to him
3. <i>nitlahtoā</i>	I say something
4. <i>kātlitla in kuauhxīnki in pochtekatl</i>	the merchant makes the carpenter drink; 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 tiztli</i>	the healer sleeps
10. <i>niknekiltia in kuauhxīnki in āmoxtli</i>	I make the carpenter want the book
11. <i>mitztēhuitekilia</i>	he beats you for somebody; he beats somebody for you
12. <i>kēhua in kikatl</i>	sings the song
13. <i>niktlalhūia 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>tlachihua in pochtekatl</i>	the merchant prepares something
17. <i>tēhuetzitia in zihuātl</i>	the woman makes somebody fall

(a) Translate into English in all possible ways:

18. *tiktlazohitlaltia in zihuātl in kuauhxīnki*
19. *nēchtzāhtzitia*
20. *tikhuiteki*
21. *nikēhuilia in kikatl in tiztli*
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 ˉ denotes vowel length.

Atole is a cornstarch-based hot drink.

—Bozhidar Bozhanov, Todor Tchervenkov

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Good luck!