

# First International Olympiad in Theoretical, Mathematical and Applied Linguistics

8–12 September 2003, Borovetz, Bulgaria

Individual Contest

## Problem 1 (20 marks)

In 1916 the Russian scholar Jacob Linzbach invented a universal writing system, which he thought should be understandable to all people, regardless of their native tongue. Linzbach called his new language ‘Transcendental Algebra’.

Several sentences have been written in Linzbach’s language and translated into English:

1.  $(\frac{\dot{\Delta}\dot{\Delta}i\dot{\Delta}}{\Delta i\dot{\Delta}} + \frac{i\dot{\Delta}}{\dot{\Delta}}) \llcorner$  The father and the brother are talking.
2.  $n(> \dot{I})^{\square} - t$  The giants are working without haste.
3.  $(\frac{i\dot{\Delta}(-\dot{\Delta}\dot{\Delta})}{(-\dot{\Delta}\dot{\Delta})}) \swarrow = \boxtimes$  The orphans are writing a letter.
4.  $(-n\dot{I}_1) \swarrow - t = \dot{I}_2$  It wasn’t us who wrote about you (sg.).
5.  $\boxtimes \sqrt{\swarrow} - t = -\dot{\Delta}_3$  It was not by her that the letter was written.
6.  $(\frac{\dot{\Delta}\dot{\Delta}i\dot{\Delta}}{\Delta i\dot{\Delta}})^{-\heartsuit} = \ulcorner$  The father doesn’t like the work.
7.  $((> \dot{I}) - \heartsuit)^{\ominus} - t = \frac{\dot{\Delta}\dot{\Delta}i\dot{\Delta}}{i\dot{\Delta}}$  The wicked giant ate the parents.
8.  $\dot{\Delta}_3^{-t}$  She is not in a hurry.

**Assignment 1.** Translate into English:

9.  $i_3^{\heartsuit} - \sqrt{\heartsuit}$
10.  $(\frac{\dot{\Delta}\dot{\Delta}i\dot{\Delta}}{\dot{\Delta}\dot{\Delta}i} - \llcorner) \swarrow + t = \frac{\dot{\Delta}\dot{\Delta}i\dot{\Delta}}{\Delta i\dot{\Delta}} + \frac{\dot{\Delta}\dot{\Delta}i\dot{\Delta}}{\dot{\Delta}i\dot{\Delta}}$
11.  $\dot{\Delta}_2^{\square} + t - \llcorner - t$
12.  $\boxtimes \sqrt{\heartsuit} - t = \frac{i\dot{\Delta}}{i} - \heartsuit$

**Assignment 2.** Write in ‘Transcendental Algebra’:

13. It wasn’t about them that my husband and I (*say*: I and the husband) talked.
14. The people are working reluctantly.
15. The good widow loves the unemployed dwarf.
16. You (pl.) will be talked about.

Explain your solution.

(Ksenia Guiliarova)

## Problem 2 (25 marks)

Below you see arithmetic equalities written in Egyptian Arabic<sup>1</sup>. All summands, as well as all sums except the last one, are represented as fractions in which neither the numerators nor the denominators are greater than 10, nor is any denominator equal to 1:

$$tumn + tumn\bar{e}n = talatt itm\bar{a}n \quad (1)$$

$$saba\varsigma t itl\bar{a}t + suds = \varsigma a\check{s}art irb\bar{a}\varsigma \quad (2)$$

$$tus\varsigma\bar{e}n + tus\varsigma = suds\bar{e}n \quad (3)$$

$$xamast ixm\bar{a}s + sub\varsigma = tamant isb\bar{a}\varsigma \quad (4)$$

$$sub\varsigma\bar{e}n + xums\bar{e}n = \frac{24}{35} \quad (5)$$

**Assignment 1.** Write these equalities in figures.

**Assignment 2.** The equality  $rub\varsigma + \varsigma a\check{s}art its\bar{a}\varsigma = sabast isd\bar{a}s$  is missing a sign. Which one?

**Note:** The letter  $\check{s}$  is pronounced as English *sh*,  $x$  as the *ch* in *loch*;  $\varsigma$  is a specific Arabic consonant. A bar above a vowel indicates length. (Ivan Derzhanski)

## Problem 3 (15 marks)

Consider the following expressions in Basque<sup>2</sup> and their unordered English translations (some words have been left out):

<i>urtarrilaren hogeita hirugarrena, larunbata;</i>	<i>abenduaren azken astea;</i>
<i>otsailaren lehenengo osteguna;</i>	<i>ekainaren bederatzigarrena, igandea;</i>
<i>abenduaren lehena, _____;</i>	<i>irailaren azken asteazkena;</i>
<i>azaroaren hirugarren ostirala;</i>	<i>urriaren azken larunbata;</i>
<i>irailaren lehena, astelehena;</i>	<i>_____ bigarrena, ostirala.</i>

*the first Thursday of February; the last Wednesday of \_\_\_\_\_; the first of December, Wednesday; the last \_\_\_\_\_ of December; the ninth of June, Sunday; the twenty-third of January, \_\_\_\_\_; the last Saturday of October; the third Friday of November; \_\_\_\_\_ of September, Monday; the second of January, Friday.*

**Assignment 1.** Match up the expressions with their translations and fill in the gaps.

**Assignment 2.** Translate into Basque:

*the first Monday of December; the twenty-ninth of November, Saturday; the second week of January; the third of February, Monday.*

**Assignment 3.** How do you think the Basque names of days of the week *astelehena*, *asteazkena*, *asteartea* might be translated literally? (Alexandre Arkhipov)

<sup>1</sup>The Egyptian dialect of the Arabic language is spoken by about 45 million people. Thanks to Egypt's considerable economic, political and cultural influence and most of all to the great quantity and popularity of its radio and television programmes, this dialect is also widely understood by speakers of other Arabic dialects.

<sup>2</sup>Basque is spoken by more than 500 thousand people in Basque Country (an autonomous province of Spain) and in France. It has not been proven to be related to any other language.

## Problem 4 (20 marks)

Several sentences in Adyghe<sup>3</sup> are written in a simplified romanisation and accompanied by their English translations:

1. *śanyćyr hakum devəuco.* He puts the kettle into the stove.
2. *syda lavəm tyrižərər?* What does he throw onto the plate?
3. *aχśər pχwantym tyrevafə.* He drops the money onto the chest.
4. *śywanyr ρanym tyrevəuco.* He puts the cauldron onto the table.
5. *syda pχəntəkum ćivafərər?* What does he drop under the stool?
6. *lavər tyda zyćivəucorər?* Where does he put the plate?
7. *lavər tyda zytyrižərər?* Where does he throw the plate?

**Assignment 1.** Offer more precise translations of sentences 6 and 7 (even if they don't sound quite so natural in English).

**Assignment 2.** Translate into English:

8. *pχəntəkur hakum dežə.*
9. *aχśər tyda zydivafərər?*

**Assignment 3.** Translate into Adyghe:

10. He puts the plate under the kettle.
11. What does he throw under the chest?
12. What does he drop into the cauldron?

**Assignment 4.** Translate into Adyghe in all possible ways:

13. Where does he put the table?

**Note:** *ć, ć, k, v, ś, t, χ, ž, ρ* are specific consonants, *ə* and *y* are vowels of the Adyghe language.  
(Yakov Testelelets)

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<sup>3</sup>The Adyghe language is of the Abkhaz-Adyghean (North West Caucasian) language family. It is spoken by over 300 thousand people, mostly in the Republic of Adyghea (Russian Federation).

## Problem 5 (20 marks)

The table below contains French verbs with prefixes and the corresponding verbs without prefixes, along with the English translations of all. The shaded cells mean that there is a prefixed verb there with no prefixless counterpart. In some verbs the prefixes have been left out.

<i>réagir</i>	react		
<i>__assortir</i>	pick again	<i>assortir</i>	pick
<i>recommencer</i>	recommence	<i>commencer</i>	begin
<i>recomposer</i>	compose anew	<i>composer</i>	compose
<i>réconcilier</i>	reconcile	<i>concilier</i>	reconcile
<i>réconforter</i>	comfort	<i>conforter</i>	comfort
<i>recréer</i>	recreate	<i>créer</i>	create
<i>récréer</i>	amuse		
<i>__curer</i>	clean	<i>curer</i>	clean
<i>redire</i>	say again	<i>dire</i>	say
<i>réduire</i>	reduce		
<i>rééditer</i>	publish again	<i>éditer</i>	publish
<i>refaire</i>	redo, remake	<i>faire</i>	do, make
<i>__former</i>	reform		
<i>__former</i>	form again	<i>former</i>	form
<i>__futer</i>	refute		
<i>réincarner</i>	reincarnate	<i>incarner</i>	incarnate
<i>rejouer</i>	resume playing	<i>jouer</i>	play
<i>__lancer</i>	throw again	<i>lancer</i>	throw
<i>__munérer</i>	remunerate		
<i>renover</i>	renovate		
<i>réopérer</i>	operate again	<i>opérer</i>	operate
<i>repartir</i>	depart once more	<i>partir</i>	depart
<i>__partir</i>	distribute		
<i>répéter</i>	repeat		
<i>résonner</i>	sound	<i>sonner</i>	sound
<i>révéler</i>	reveal		

**Assignment.** Fill in the gaps using information from the table. Explain your solution.

(Boris Iomdin)

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Team Contest

## Problem 1 (35 marks)

In the first millennium CE there were in Chinese Turkestan two closely related languages, Tocharian A and Tocharian B, which had descended from a common ancestor, Proto-Tocharian. Here are some Proto-Tocharian words as they have been reconstructed by scholars:

<i>ākänatsa</i>	‘unreasonable’	<i>päratsako</i>	‘chest (breast)’	<i>stāṅkā</i>	‘palace’
<i>āsare</i>	‘dry’	<i>räsäkäre</i>	‘sharp’	<i>tsāṅkär</i>	‘top’
<i>āstäre</i>	‘pure’	<i>samä</i>	‘same’	<i>wälo</i>	‘king’
<i>kärāmärtse</i>	‘black’	<i>säkäre</i>	‘happy’	<i>yäsär</i>	‘blood’

And here are Tocharian A and Tocharian B words which are descendants of the Proto-Tocharian words listed above (in no particular order):

*štāṅk, walo, räskäre, āsar, astare, āstär, āstre, asäre, stāṅk, wäl, wlo, pratsäko, pratsak, āknats, aknātsa, tsāṅkär, tsäṅkär, kramartse, krāmärts, räskär, sam, sām, ysär, säkär, yasar, säkre, ysär.*

**Assignment 1.** Determine which word belongs to which language, knowing that:

- in one of the languages some words have two variants;
- the first word is Tocharian A.

**Assignment 2.** Allocate the following words to languages and reconstruct the Proto-Tocharian form of each pair:

- (a) *stām, ṣtām* ‘tree’;
- (b) *rtär, ratre* ‘red’;
- (c) *pärs, parso* ‘letter’.

**Assignment 3.** It is thought that Tocharian B had stress (as in English more or less). Upon what might this hypothesis be based?

**Note:**  $\bar{a}$  is a prolonged  $a$ ,  $\mathring{s}$  sounds as  $sh$ ,  $\eta$  as  $ng$ ; the sequence  $ts$  is pronounced as a single consonant,  $\ddot{a}$  is a specific Tocharian vowel. (Svetlana Burlak)

## Problem 2 (30 marks)

When describing how personal and reflexive pronouns work in various languages, linguists make use of the so-called subscripts—Roman letters (typically  $i, j, k, \dots$ ) which mark pronouns and some other words in sentences. The character  $*$  (asterisk) is also used. Here are some English examples:

1. John <sub>$i$</sub>  saw himself <sub>$i$</sub>  in the mirror.
2. John <sub>$i$</sub>  says that he <sub>$i/j/*k$</sub>  doesn't know Peter <sub>$k$</sub> .
3. The boy <sub>$i$</sub>  is playing with his <sub>$i/j$</sub>  gun.
4. His <sub>$i$</sub>  teacher <sub>$j$</sub> 's influence is easily seen in his <sub>$i/*j/k$</sub>  work.
5. The girl <sub>$i$</sub>  saw her <sub>$*i/j$</sub> .

**Assignment 1.** Explain the meaning of the subscripts and the asterisk.

**Assignment 2.** Add subscripts (and asterisks where appropriate) in the following sentences:

- (a) She doesn't like this trait in herself.
- (b) The father took his son to his room.
- (c) John knows that Peter has given his book to his son.

(Maria Rubinstein)

## Problem 3 (35 marks)

Consider the following pairs of verbs with closely related meanings:

<i>accuse</i>	<i>rebuke</i>
<i>denounce</i>	<i>reprehend</i>
<i>command</i>	<i>instruct</i>
<i>advise</i>	<i>guide</i>
<i>assure</i>	<i>convince</i>

It is known that all verbs in the left-hand column have a certain ability that the verbs in the right-hand column lack.

**Assignment 1.** Identify the ability in question.

**Assignment 2.** Find the verbs that also have this ability among the following: *extort, threaten, forbid, swear, shout, approve, refuse, rob, dedicate, lose, scold, give up, demand*.

**Assignment 3.** Try to find two more verbs with the same ability.

(Boris Iomdin)

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Solutions to the Problems of the Individual Contest

## Solution of Problem 1

1. Nouns:

- $\dot{\Lambda}$  'man',  $\dot{\Delta}$  'woman',  $i$  'boy',  $\dot{\Delta}$  'girl',  $\boxtimes$  'letter',  $\boxminus$  'work'.
  - Combinations:  $\dot{\Lambda}\dot{\Delta}$  'man + woman = husband + wife',  $i\dot{\Delta}$  'boy + girl = brother + sister',  $\dot{\Lambda}\dot{\Delta}i\dot{\Delta}$  'man + woman + boy + girl = family'.
  - Family members are singled out by division and cancellation:  $\frac{\dot{\Lambda}\dot{\Delta}i\dot{\Delta}}{\dot{\Delta}i\dot{\Delta}}$  'family/(woman + kids) = father',  $\frac{i\dot{\Delta}}{\dot{\Delta}}$  'kids/girl = brother',  $\frac{\dot{\Lambda}\dot{\Delta}i\dot{\Delta}}{i\dot{\Delta}}$  'family/kids = parents'.
  - Missing (deceased) family members are preceded by a minus sign:  $\frac{i\dot{\Delta}(-\dot{\Lambda}\dot{\Delta})}{(-\dot{\Lambda}\dot{\Delta})}$  'kids (-parents)/(-parents) = orphans' (apparently orphaned children of one and the same family).
- $\dot{I}$  'person',  $(> \dot{I})$  'giant'.

2. Pronouns are composed of the character  $\dot{I}$  or  $\dot{\Delta}$  (for feminine gender) and the subscripts 1 to 3, which indicate the person.

3. The plural of nouns and pronouns is expressed by the coefficient  $n$ . The plus sign plays the part of the conjunction 'and'.

4. Verbs:  $\leq$  'talk',  $\boxminus$  'work',  $t$  'hurry',  $\diagup$  'write',  $\heartsuit$  'like, love',  $\bigodot$  'eat'. If what the verb denotes is absent or uncharacteristic, a minus sign expresses that:  $-\heartsuit$  'not inclined to affection = wicked'. (We can assume that a characteristic property is expressed by a plus sign, hence  $+\heartsuit$  'good', a concept we need.)

5. Sentence structure:

- the subject is the base of the power;
- the predicate is the exponent, whereby negation is expressed by a minus sign ( $-\heartsuit$  'not like') and passive voice by a radical sign ( $\sqrt{\diagup}$  'be written'); additional activities can be added or subtracted ( $i_3^{0-t}$  'he is working and doesn't hurry = he is working without haste');
- past tense is marked by  $-t$  ( $i_3^{0-t}$  'he worked'), future tense by  $+t$ ;
- the direct object, if there is one, follows an equals sign.

- Assignment 1.**
9. He loves with an unrequited love (*i. e.* loves without being loved).
  10. The taciturn (*or* mute) daughter will write about the father and the mother.
  11. You (sg. fem.) worked quickly (*or* hastily) and silently.
  12. The letter was eaten by the hungry sister.

- Assignment 2.**
13.  $(\dot{\Delta}_1 + \frac{\dot{\Delta}\dot{\Delta}}{\dot{\Delta}}) \leq -t = -n\dot{I}_3$
  14.  $(n\dot{I})^{0-\heartsuit}$
  15.  $(\frac{\dot{\Delta}(-\dot{\Lambda})}{(-\dot{\Lambda})} + \heartsuit)^{\heartsuit} = (< \dot{I}) - \boxminus$
  16.  $(n\dot{I}_2)^{\sqrt{\leq}} + t$

## Solution of Problem 2

All Arabic words in the problem are made according to one of the patterns  $1a2a3t$ ,  $i12\bar{a}3$ ,  $1u23$  and  $1u23\bar{e}n$  (whereby words using the first and the second pattern always come together in this order and words using the other two patterns occur on their own). In these patterns  $1-2-3$  is one of the triples of consonants  $r-b-\varsigma$ ,  $s-b-\varsigma$ ,  $s-d-s$ ,  $t-l-t$ ,  $t-m-n$ ,  $t-s-\varsigma$ ,  $x-m-s$ ,  $\varsigma-\check{s}-r$ . Let us assume that the consonant triples correspond to numbers between 1 and 10 and the arrangements of the vowels indicate certain functions, in particular,  $1a2a3t$   $i1'2'\bar{a}3'$  is either  $\frac{n}{n'}$  or  $\frac{n}{n}$  (and in either case  $xamast$   $ixm\bar{a}s = \frac{n}{n} = 1$ ), and  $1u23 = \frac{i}{n}$  and  $1u23\bar{e}n = \frac{j}{n}$ , for some as yet unknown  $i$  and  $j$ .

From equality (5) we see that  $s-b-\varsigma$  and  $x-m-s$  are 5 and 7 (in one order or the other), and from  $\frac{j}{5} + \frac{j}{7} = \frac{(7+5)j}{35} = \frac{24}{35}$  it follows that  $j = 2$ , that is,  $1u23\bar{e}n = \frac{2}{n}$ . Since  $1u23$  is shorter than  $1u23\bar{e}n$ , we can assume that this pattern corresponds to a more basic function, and the only candidate for such a one is  $\frac{1}{n}$ .

From(1) it follows that  $t-l-t$  is 3 (and that the numerator precedes the denominator in the Arabic fractions). From (4) we see that  $t-m-n$  is greater than  $s-b-\varsigma$  by one. From (3) it follows that  $3s-d-s = 2t-s-\varsigma$ . Thus  $t-s-\varsigma$  is divisible by three. Since the value 3 is already taken,  $t-s-\varsigma$  and  $s-d-s$  are either 6 and 4 or 9 and 6, respectively, and  $t-m-n$ ,  $s-b-\varsigma$  and  $x-m-s$  are respectively 8, 7 and 5.

We have yet to use equality (2). Letting  $s-d-s$  be equal to 4 gets us nowhere ( $\frac{7}{3} + \frac{1}{4} = \frac{31}{12}$  can't be reduced to a fraction with a numerator and denominator between 1 and 10), consequently  $s-d-s = 6$ , and  $\frac{7}{3} + \frac{1}{6} = \frac{15}{6} = \frac{5}{2} = \frac{10}{4} = \varsigma-\check{s}-r/r-b-\varsigma$ . (The root  $r-b-\varsigma$  '4' is the source of the word *ruba'i* 'quatrain', used also in English.)

**Assignment 1.** (1)  $\frac{1}{8} + \frac{2}{8} = \frac{3}{8}$ , (2)  $\frac{7}{3} + \frac{1}{6} = \frac{10}{4}$ , (3)  $\frac{2}{9} + \frac{1}{9} = \frac{2}{6}$ , (4)  $\frac{5}{5} + \frac{1}{7} = \frac{8}{7}$ , (5)  $\frac{2}{7} + \frac{2}{5} = \frac{24}{35}$ .

**Assignment 2.**  $rub\varsigma + \varsigma a\check{s}art\ its\bar{a}\varsigma = \frac{1}{4} + \frac{10}{9} = \frac{49}{36}$  and  $saba\varsigma t\ isd\bar{a}s = \frac{7}{6}$ . Thus either  $\sqrt{rub\varsigma + \varsigma a\check{s}art\ its\bar{a}\varsigma} = saba\varsigma t\ isd\bar{a}s$  or, perhaps,  $rub\varsigma + \varsigma a\check{s}art\ its\bar{a}\varsigma = (saba\varsigma t\ isd\bar{a}s)^2$  (if we don't consider brackets to be a sign).



### Solution of Problem 3

There are two types of English expressions in the problem: some (I) consist of a date, a month and a day of the week, others (II) name the number of the day of the week within the month instead of the date. The word order in the Basque expressions of type (I) is ⟨month⟩ ⟨date⟩, ⟨day of the week⟩, whilst in type (II) it is ⟨month⟩ ⟨number of the day⟩ ⟨day of the week⟩. The last word ends in *-a*, whereas the preceding words have no final *-a* (except for the word *hogeita*, which means ‘20’ in compound numerals). The element *-garren* forms ordinal numbers. The word *astea* is not a name of a day of the week (six of those we have seen in examples 1–10, the seventh occurs in Assignment 3). Since Assignment 2 features the word ‘week’, we can guess that this is the meaning of the word *astea*.

<b>Assignment 1.</b>	<i>urtarrilaren hogeita hirugarrena, larunbata</i>	<i>the 23rd of January, Saturday</i>
	<i>abenduaren azken astea</i>	<i>the last <u>week</u> of December</i>
	<i>otsailaren lehenengo osteguna</i>	<i>the first Thursday of February</i>
	<i>ekainaren bederatzigarrena, igandea</i>	<i>the ninth of June, Sunday</i>
	<i>abenduaren lehena, <u>asteazkena</u></i>	<i>the first of December, Wednesday</i>
	<i>irailaren azken asteazkena</i>	<i>the last Wednesday of <u>September</u></i>
	<i>azaroaren hirugarren ostirala</i>	<i>the third Friday of November</i>
	<i>urriaren azken larunbata</i>	<i>the last Saturday of October</i>
	<i>irailaren lehena, astelehena</i>	<i><u>the first of September, Monday</u></i>
	<i><u>urtarrilaren</u> bigarrena, ostirala</i>	<i>the second of January, Friday</i>

<b>Assignment 2.</b>	<i>the first Monday of December</i>	<i>abenduaren lehenengo astelehena</i>
	<i>the 29th of November, Saturday</i>	<i>azaroaren hogeita bederatzigarrena, larunbata</i>
	<i>the second week of January</i>	<i>urtarrilaren bigarren astea</i>
	<i>the third of February, Monday</i>	<i>otsailaren hirugarrena, astelehena</i>

**Assignment 3.** *Astelehena* ‘Monday’, *asteazkena* ‘Wednesday’; *asteartea*, the only day of the week not found in in Assignment 1, is ‘Tuesday’. All three names are formed from the word *aste* ‘week’. *Astelehena* means literally ‘first (day) of the week’, *asteazkena* ‘last (day) of the week’. Tuesday’s Basque name can be translated more or less as ‘day in the middle of the week’.

No one knows for sure why Basque calls Wednesday ‘last day of the week’. In Basque dialects other variants of the names of the days of the week are also found, including loans from Romance languages.

## Solution of Problem 4

The Adyghe sentences have the following structure:

(1, 3, 4)	X- <i>r</i>	Y- <i>m</i>	P- <i>e</i> -V.	‘He V X P Y.’
(2, 5)	<i>syda</i>	Y- <i>m</i>	P- <i>i</i> -V- <i>rər</i> ?	‘What does he V P Y?’
(6, 7)	X- <i>r</i>	<i>tyda</i>	<i>zy</i> -P- <i>i</i> -V- <i>rər</i> ?	‘Where does he V X?’

where X and Y are nouns, V is a verb (or its stem) and P is, in English, one of the prepositions *into*, *onto* or *under* and in Adyghe it is one of the prefixes *d-*, *tyr-* or *č-*. As the third schema shows, the Adyghe locative prefix may not correspond to anything in the natural (but imprecise) English translation.

**Assignment 1.** We specify (at the expense of naturalness):

- 6. Under what does he put the plate?
- 7. Onto what does he throw the plate?

**Assignment 2.** 8. He throws the stool into the stove.  
9. Where (into what) does he drop the money?

**Assignment 3.** 10. *lavər śanyčym čevəuco.*  
11. *syda pχwantym čizərər?*  
12. *syda śywanym divafərər?*

**Assignment 4.** 13. *ʔanyr tyda zydivəucorər?* Into what does he put the table?  
13'. *ʔanyr tyda zytyrivəucorər?* Onto what does he put the table?  
13". *ʔanyr tyda zyčivəucorər?* Under what does he put the table?

## Solution of Problem 5

<i>réassortir</i>	pick again	<i>assortir</i>	pick
<i>récurer</i>	clean	<i>curer</i>	clean
<i>réformer</i>	reform		
<i>reformer</i>	form again	<i>former</i>	form
<i>réfuter</i>	refute		
<i>relancer</i>	throw again	<i>lancer</i>	throw
<i>rémunérer</i>	remunerate		
<i>répartir</i>	distribute		

The table features verbs with two different prefixes: *re-* and *ré-*. All verbs with *re-* indicate a repetition or a renewal of the action named by the verb without a prefix. Contrariwise, if the prefix is *ré-*, then the corresponding prefixless verb either doesn't exist or means the same thing as the prefixed one does. The verbs whose stems begin with vowels are an exception: the prefix they take is *ré-* regardless of the existence and the meaning of a corresponding prefixless verb. There are other exceptions from this rule in French, but on the whole it is fairly reliable.

**Note:** The vowel in the prefix *ré-* is not unlike the first vowel in *raider*, whereas the one in the prefix *re-* bears a certain similarity to the second, and needs to be fortified when it finds itself next to another vowel.

# First International Olympiad in Theoretical, Mathematical and Applied Linguistics

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Solutions to the Problems of the Team Contest

## Solution of Problem 1

Assignment 1.	A	B	A	B	A	B
	<i>štāṅk</i>	<i>stāṅk</i>	<i>āknats</i>	<i>aknātsa</i>	<i>pratsak</i>	<i>pratsāko</i>
	<i>āštār</i>	<i>astare, āstre</i>	<i>krāmārts</i>	<i>kramartse</i>	<i>rāškār</i>	<i>rāškare</i>
	<i>wāl</i>	<i>walo, wlo</i>	<i>sākār</i>	<i>sākre</i>	<i>sam</i>	<i>sām</i>
	<i>āsar</i>	<i>asāre</i>	<i>tsāṅkār</i>	<i>tsaṅkār</i>	<i>ysār</i>	<i>ysār, yasar</i>

The first pair gives the correspondence *št*—*st*. This determines unambiguously the second pair (or triple, rather), whence we learn that Tocharian B has kept the final vowels (except for the ‘specific’ one) and Tocharian A has lost them. Consequently all words with retained final vowels are Tocharian B and their counterparts with lost final vowels are Tocharian A. This allows the following conclusions to be made: In Tocharian A the ‘specific’ vowel falls out before a vowel that is retained and is retained before one that is lost; *a*, long or short, is preserved without change. In Tocharian B the ‘specific’ vowel can become *a*, *ä* or nothing and both *as* can become either *a* or *ä*. This determines the remaining pairs.

**Assignment 2.** (a) A *štām*, B *stām* ‘tree’ < \**stāmä*; (b) A *rtār*, B *ratre* ‘red’ < \**rätäre*; (c) A *pārs*, B *parso* ‘letter’ < \**pārso*. In the reconstruction the ‘specific’ vowel is not inserted in clusters of the type ‘sonant + obstruent’ and the cluster *št*, nor is it added after final *r*.

**Assignment 3.** It is assumed that under stress \**ä* > *a*, \**a/ā* > long *ā*, whereas without stress \**ä* > nothing or *ä* (as in Tocharian A), \**a/ā* > short *a*.

## Solution of Problem 2

**Assignment 1.** The subscripts mark the participants in the situation (the persons mentioned in the sentence). Identical letters mean identical individuals, different letters mean different individuals. In this way it is shown which pronoun can refer to which noun. If a pronoun can refer to more than one noun, all possible subscripts are given, separated by slashes. If a pronoun can refer to an individual not mentioned in the sentence, a letter is used that doesn’t mark any other word in the same sentence (e. g., *he* in (2) may be someone other than John or Peter, let’s say Bill, if he exists at all). An asterisk next to a letter indicates that the pronoun can’t refer to the noun with this subscript.

**Assignment 2.**

- She<sub>i</sub> doesn’t like this trait in herself<sub>i</sub>.
- The father<sub>i</sub> took his<sub>i/\*j/k</sub> son<sub>j</sub> to his<sub>i/j/k/l</sub> room.
- John<sub>i</sub> knows that Peter<sub>j</sub> has given his<sub>i/j/l</sub> book to his<sub>i/j/k/l/m</sub> son<sub>k</sub>.

### Solution of Problem 3

**Assignment 1.** The left column contains what are technically known as performative verbs. (The concept of performativity was introduced in 1965 by the English philosopher John Austin.) They are different from other verbs in that the action they name can be performed by their use, rather than simply described. So the words '*I accuse you of murder*' all by themselves constitute an accusation; the words '*I denounce you as an impostor*', a denunciation; '*I command you to report to the headquarters at once*', a command; '*I advise you not to go there*', advice; '*I assure you that this problem is not so hard*', assurance. Performativity is a rather peculiar property; as the statement of the problem shows, even verbs with very similar meanings can differ in its presence or absence (one can't very well say '*I hereby reprehend your cowardice*' of '*I convince you that this is the correct solution*').

**Assignment 2.** These are the verbs *forbid* ('*I forbid leaving the room before the class is over*'), *swear* ('*I swear to cheat no more*'), *approve* ('*I approve of your decision*'), *refuse* ('*I refuse to try to solve this problem*'), *dedicate* ('*I dedicate this book to my parents*'), *give up* ('*I can't do this problem, I give up*'), *demand* ('*I demand to be told how this problem is to be solved*').

**Assignment 3.** For example, *thank* ('*I thank you for the clarification*'), *congratulate* ('*I congratulate you on your success*').