Panini Linguistics Olympiad 2017

Juniors (Class VI to VIII)
Round 1, 22ⁿᵈ January 2017

Question Booklet

Maximum Marks: 100   **Total Time: 4 hours**

Instructions:

1. There are 7 printed pages in this question booklet, including this page. If your booklet has less than 7 printed pages, report to the invigilator immediately.
2. There are 5 problems of 20 marks each. The problems have many sub-parts, all of which must be answered to receive full credit.
3. The Answer Booklet provided to you has specific space for writing down the objective solutions of each problem. **You MUST write down the precise answers or solutions to the problems in the space provided.** The assignments for which at least a part of the answer needs to be written down in the answer booklet have been specifically indicated.
4. The details and explanations of your answers and the rules of the language should be written in separate sheets.
5. While explaining your answers in separate sheets, you need not rewrite the solutions that you have already provided in the Answer Booklet.
6. Write down your explanations to each problem on a new sheet or sheets of paper. On each sheet, indicate the **number of the problem**, your **roll number**, and your **name**. Otherwise, your work may be mislaid or misattributed.
7. Do not copy the statements of the problem.
8. **All answers must be well-argued. Even a perfectly correct answer will receive a low score unless accompanied by an explanation.**
9. Each problem has been thoroughly checked by linguists as well as students like you for clarity, accuracy and solvability. Some problems are more difficult than others, but all can be solved using ordinary reasoning and some basic analytical skills. You don't need to have prior knowledge of linguistics or these languages in order to solve them.
10. The question paper has been designed to ensure that very few people will solve all these problems completely in the time allotted. Don't be discouraged if you don't finish everything.
11. Use of calculators, mobile phones and any other electronic devices is strictly prohibited. No books, notebooks or other printed materials can be consulted during the contest.

Good luck!

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1. Akamu's Table (20 marks)

Adapted from "Compilation of Russian Olympiad problems between 1965 and 1975" by Vladimir Belikov, Elena Muravenko, Alekseev Mikhail Egorovic

"Did you know that the Hawaiian language and the Maori language spoken by the Maori people of your country are related?" said Akamu, the tourist guide, to Tia, the tourist from New Zealand, who was visiting Hawaii for the first time. "That's impossible!" exclaimed Tia. "The two archipelagos are separated by 7500 km of water. How could two languages spoken in islands so far apart could be similar?" Akamu smiled. "Well, it is not only these two languages. There are at least 30 other languages spread across the islands of the Pacific Ocean that evolved from the same common ancestor. Linguists call this the *Polynesian family of languages*". He took out a piece of paper and wrote down the words for the cardinal numbers (first, second, third etc.) in 5 Polynesian languages that he could recall. He handed it over to Tia and said "You don't have to believe me; see it for yourself. How would a set of unrelated languages have so similar words for the cardinal numbers?"

Tia looked at Akamu's table with utmost surprise (' and wh are specific consonants):

Language	1	2	3	4	5	6	7	8	9
Hawaiian	*kahi*	*lua*	*(a)*	*ha*	*lima*	*ono*	*hiku*	*walu*	*(b)*
Maori	*tahi*	*rua*	*toru*	*wha*	*(c)*	*ono*	*whitu*	*waru*	*iwa*
Nuku Hiva	*tahi*	*(d)*	*to'u*	*ha*	*(e)*	*ono*	*(f)*	*va'u*	*(g)*
Rarotonga	*ta'i*	*(h)*	*(i)*	*'a*	*rima*	*ono*	*'itu*	*varu*	*iva*
Samoa	*tasi*	*lua*	*(j)*	*(k)*	*lima*	*ono*	*fitu*	*(l)*	*iva*

It was not hard to see the pattern. Akamu had forgotten some of the words – the gray cells in the table. Tia could fill in the gaps simply by studying the pattern. She showed Akamu her guesses, and Akamu exclaimed "Woah! You got everything right. When did you learn all these languages?" "It's actually simple", said Tia.

Assignment 1 [Answer Booklet]: Guess the 12 missing words.

Assignment 2: Explain the rules that you used to convert words from one language to another. Here is one example rule (as well as a hint) for you: 'the consonant *l* in Hawaiian is transformed to *r* in Maori'.

2. Chamorro Months (20 marks)

Problem designed by Monojit Choudhury

After finishing her undergraduate degree in mathematics, Ms. Vibhashini wanted to explore the world. She took up a job of teaching English in a primary school in the island of Guam located in the Pacific Ocean. One day, in the class, she asked her students to write down the names of the months in English. However, she was surprised to see that 10 year old Tasi, who is a native of the island and speaks Chamorro at home, came up with a list of 23 months:

Abrit	*Hulio*	*Maimu'*	*Oktubri*	*Umagahaf*
Agosto	*Huño*	*Makmamao*	*Semu*	*Umatalaf*
Disembre	*Ineru*	*Måtsu*	*Sumongsong*	*Umayanggan*
Fananaf	*Lumamlam*	*Måyu*	*Tenhos*	
Fangualu	*Lumuhu*	*Nubembre*	*Tumaiguini*	

Vibhashini asked Tasi what were these. None of them were the names of the months she was expecting. Tasi told her that his grandmother tells him that there are 13 months and he learnt the names of those months. But then his parents use some other month names, some of which he remembers as well. Tasi was confused as to which month names his teacher wanted. Therefore, he wrote all the 13 names that his grandmother taught him, as well as 10 more month names that he could remember that his parents use. But he'd mixed all of them up.

Vibhashini looked at the names again, and smiled at Tasi. She knew what he was talking about and which months he missed out. She helped Tasi remember those missing names, even though she did not know Chamorro. Can you separate out the 13 month names used by Tasi's grandmother from the 10 that his parents use?

Assignment 1 [Answer-Booklet]: Identify the 10 months that Tasi has heard from his parents and write their English equivalents?

Assignment 2 [Answer-Booklet]: What are the two missing month names in Chamorro? What are their English equivalents? [No explanations needed for parts 1 and 2]

Assignment 3: Why do you think Tasi's grandmother and his parents use a different set of names for the months?

Note: Chamorro is an Austronesian language spoken by about 47,000 people who are the indigenous people of Guam and the Northern Mariana Islands, US territories. u' and $å$ are vowels, $ñ$ is a consonant.

3. Yash in Rwanda (20 marks)

Problem designed by Yash Sinha

Yash, who is studying linguistics in the University of Chicago, went to Rwanda on a field trip. His task was to analyze the Kinyarwanda language, which is one of the three official languages of Rwanda along with French and English. What flummoxed him though is while some English sentences had only one translation in Kinyarwanda, some had two and some even more. To crack the mystery, Yash collected the Kinyarwanda translations of a few English sentences from the locals, though he could not make his subjects speak out all the possible translations (after all they were not linguists and said whatever came to their mind). Yash prepared the following table of Kinyarwanda sentences and their English sentences

and also made some notes of how many translations he thought the English sentence actually had for cases where he did not get all possible translations.

1.	*Umugabo arakora*	The man is working.
2.	*Abogore baragenda*	The women are going.
3.	*Umugabo arabona umugore*	The man is seeing the woman.
4.	*Umugore arabonwa numugabo*	
5.	*Umuhungu arabonwa nabogore*	The women are seeing the boy.
6.	*Abogore barabona umuhungu*	
7.	*Abogabo baraandika ibaruwa nikarumu*	The men are writing the letter with the pen. [There are 2 more possible translations in Kinyarwanda]
8.	*Abogabo baraandikiisha ikarumu ibaruwa*	
9.	*Umuhungu arabona abogore nijisho*	The boy is seeing the women with the eye. [there are 2 more possible translations in Kinyarwanda]
10.	*Ijisho araboniishwa abogore numuhungu*	
11.	*Umualimu araandikera umuhungu igitabo*	The teacher is writing the book for the boy. [there are 2 more possible translations in Kinyarwanda]
12.	*Umualimu araandika igitabo kuumuhungu.*	

Yash realized that for every pair of Kinyarwanda sentences that mean the same thing, the two forms mean the same thing. *However, they do not necessarily have the same structure.*

Assignment 1: Explain how the same meaning can be expressed in multiple ways.

Assignment 2 [Answer-booklet]: Translate the following sentences into English

- a) *Ibaruwa araandikwa nabogabo*
- b) *Ibaruwa araandikwa numugore kuabogabo*
- c) *Abogabo barabonera umugore abohungu*

Assignment 3 [Answer-booklet]: Now translate the two sentences below. Consider the verb form carefully.
- d) *Ikarumu araandiishwa ibaruwa numagabo*
- e) *Abogore barabonerwa abohungu numugabo*

Assignment 4 [Answer-booklet]: Provide Kinyarwanda translations for these two English sentences. See instructions besides each sentence for the number of translations you are expected to provide.
- f) The boys are writing the book. (Give **two** Kinyarwanda equivalents)
- g) The boy is writing the book for the women. (Give **four** Kinyarwanda equivalents)

4. A Dozen Miskito Birthdays (20 marks)

Problem designed by Shinjini Ghosh

Sumu has 12 friends; let's denote them by the letters from A to L. One day Sumu's friends decided to play a prank on her. They swapped their names, photographs and all other information on their Facebook profiles randomly among themselves. Sumu had no way to recognize who was who. However, her friends did not change one information – their birthdays. It was a clue that Sumu could use to identify her friends, if she remembered all of their birthdays. Fortunately, Sumu did remember her friends' birthdays. But to her surprise, her friends had listed their birthdays not in English, but in an unknown language called *Miskito*. Sumu listed down the birthdays of her 12 friends, A to L, and the Miskito dates mentioned in her friends profiles (in random order):

Dates in English	Miskito Dates
A. 10th December	1. Matawalsip pura kumi, Kuswa Kati
B. 6th March	2. Yumhpa, Siakwa Kati
C. 2nd October	3. Matawalsip pura wal, Wis Kati
D. 11th February	4. Matlal kahbi pura wal, Yahbra Kati
E. 7th May	5. Matlal kahbi, Kakamuk Kati
F. 12th September	6. Walwal, Lih wainhka Kati
G. 3rd January	7. Wal, Waupasa Kati
H. 9th August	8. Matawalsip, Trisu Kati
I. 8th November	9. Matlal kahbi pura yumhpa, Sikla Kati
J. 5th July	10. Kumi, Li Kati
K. 4th April	11. Matlal kahbi pura kumi, Lih Mairin Kati
L. 1st June	12. Matsip, Pastara Kati

Can you help Sumu to find out who is who by matching the Miskito dates to the English ones?

Assignment 1 [Answer-Booklet]**:** Match the Miskito dates with their English translations.

Assignment 2 [Answer-Booklet]: What do you think 'Kati' means literally?

Assignment 3 [Answer Booklet]**:** Sumu then decides to write her teachers' birthdays in Miskito. Help her to write the following dates in Miskito:

(a) 6th July, (b) 9th April, (c) 10th January, (d) 5th May, (e) 7th September

Note: Miskito is spoken by the Miskito people who live in Northeastern Nicaragua. There are approximately 150000 Miskito speakers.

5. A Rose by another Name (20 marks)

Problem designed by Abhishek Dedhe

You must have heard about chemical formulas, but did you know that there are also *floral formulas* for representing the structure of flowers? For example, the floral formula of *China Rose* is:

$$\text{Br. Brl. } \Phi \text{ K(5) C5 A(} \infty \text{) G(5)}$$

Don't worry if that looks bizarre. Not all flowers have such complicated formulas. In fact, there is a systematic way in which the structure of a flower (for example, whether it is symmetrical, how many petals does it have, how are the petals connected to each other, and so on) can be represented in terms of a *floral diagram*. Since drawing a detailed diagram can take time, botanists have invented a clever way of representing the diagrams in terms of floral formulas.

Given below are some floral diagrams and their corresponding floral formulas.

$$K_4 C_4 A_4 G_1 \qquad K_0 C_5 A_{10} G_1 \qquad K_{(4)+1} C_5 A_{4+1} G_5 \qquad K_4 C_{(2+2)} A_{4+2+2} G_4$$
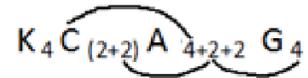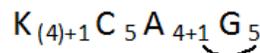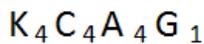
Assignment 1: Explain the rules of obtaining the *floral formula* from a *floral diagram*.

Assignment 2 [Answer-booklet]: Given below are three floral diagrams. Write their corresponding floral formulae.

(a) (b) (c)

Assignment 3: Explain the problem(s) which would arise when trying to draw the floral diagram of this floral formula: $K_{(6)}C_{(2+2)}A_4G_2$ How might you resolve this issue?

Note: The data presented in this problem has been slightly simplified.

--END OF QUESTION BOOKLET--