



Ethnomathematic Numeralia Calculation System Dwar Subdialek Language North Biak As A Learning Media

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ABSTRACT

Numeralia is a term for counting the number of forms (individuals, animals, or objects) and ideas. In the vicinity of Dwar Village, the use of Biak regional language numerals has evolved with the passage of time. Young generation Z (1990-2000) communicates only in Indonesian (B2). At contrast, generation Y (1980-1990) did not teach or practice the Biak regional language to generation Z in Dwar Village. The generation born between 1950 and 1970 still utilizes the Biak regional language in talks with their parents. The current state of Biak language use in Kampung Aman is in flux. When communicating in the Biak language, Generation Z frequently has trouble pronouncing words pertaining to numeralia or numbers. The objective of this project is to produce written documentation of the Biak regional language's numerals for the numbers 1-1000 in Biak. By providing the formula code for the number calculation system in the Biak dialect Dwar, the number will be written. Through its documentation and calculating system, generation Z and later generations can acquire Biak numerals, comprehend and use them in spoken and written language, and serve as alternative learning medium. This study employed the synchronous approach by examining the use of the Biak Subdialek Dwar regional language by generation Z over a period of 1-2 years. The study's results include documents. This study's Biak numeral data consists of five sections: (1) fundamental numbers, (2) intermediate numbers, (3) tens numbers, (4) hundreds numbers, (5) thousands numbers, and (6) a number computation system with formula codes.

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1. INTRODUCTION

The progress of the times in the era of digitalization causes everyone to be easily influenced and imitate foreign cultures and leave their culture. The original culture of every tribe in the world is a wealth that the next generation must preserve. Culture is a habit or custom that has existed for thousands of years and was applied by ancestors. This is emphasized by (Muller, 2008). They, in general, the ancestors of the Papuan people, generally speak to their loved ones through customs or stories passed down from one generation to another.

One of the essential parts of culture is the local language. Regional language is the language used by ethnic groups in the area of origin of each tribe that shows the identity of the place of origin in uniting tribes (Sanjoko & Marawuri, 2018). A person is considered part of a tribe if he can speak the local language well. For people who cannot speak the local language, their identity is still in doubt as part of a specific tribe (Fautngil & Rumbrawer, 2002).

There are 428 regional languages in Papua (Bloomfield, 1995)(Syarfina et al., 2022). There are 746 regional languages in Indonesia (Eti, 2008) . There are 13 regional languages that are classified as safe because there are still many speakers, have letters, have grammar, have dictionaries, have been documented, and are still taught in schools and used in the family environment and the wider community (Sawaki, 2018)(Arsai, 2010). The thirteen regional languages are Acehnese, Batak, Malay, Minangkabau, Rejang, Lampung, Sundanese, Javanese, Madurese, Balinese, Sasak, Bugis, and Makassarese.

Following reality, generation Z of the Biak tribe rarely uses the Biak language in communicating in contextual situations. Generation Z is the younger generation born between the 1990s-2000s (Indonesia, 2018) (Badan Pengembangan dan Pembinaan Bahasa, 2022). The Biak tribe is one of the tribes in Papua Province. The Biak tribe consists of North Biak, East Biak, Padaido Islands, South Biak, West Biak, Supiori, and Numfor Island, using one language and each dialect per region.

The Biak language began to experience a shift, and this happened because Generation Z (the 1990s-2000s) always used Indonesian. Furthermore, Generation Y in the 1980s-1990s and Generation X in the 1960s-1970s did not provide learning and practice on the use of the Biak regional language to Generation Z. This situation has become a problem for the condition of the language and the younger generation who own the Biak regional language (Arwam & Sawaki, 2020) (Dalrymple & Mofu, 2013).

In particular, the problem of using the Biak language occurred in North Biak Dwar Village. Kampung Dwar is the name of a large village in the administrative areas of Kampung Diano, Wir Insos, Sawai, Aman and Biawer. Generation Z in Dwar Village cannot mention and know the numeralia calculation system in the Biak sub-dialect Dwar language. According to the observations, it was found that there was a generation Z who was able to pronounce the numerals 1-10, but most of them could not say the numbers 1-10 and so on in the Biak sub-dialect Dwar language. This problem can cause a language shift and cause a crisis in understanding the Biak regional language by Generation Z in Dwar Village.

In particular, the problem of using the Biak language occurred in North Biak Dwar Village. Kampung Dwar is the name of a large village in the administrative areas of Kampung Diano, Wir Insos, Sawai, Aman and Biawer. Generation Z in Dwar Village cannot mention and know the numeralia calculation system in the Biak sub-dialect Dwar language (Manurung & Manurung, 2019). According to the observations, it was found that there was a generation Z who was able to pronounce the numerals 1-10, but most of them could not say the numbers 1-10 and so on in the Biak sub-dialect Dwar language. This problem can cause a language shift and cause a crisis in understanding the Biak regional language by Generation Z in Dwar Village.

2. RESEARCH METHOD

The method used in data acquisition is the synchronous method. According to (Mahsun, 2017) in the book "Language Research Methods", the synchronous research method is carried out by observing the phenomenon of a language at a specific time and is descriptive (Raco, 2018). The synchronous method has forms and techniques used in providing and obtaining data. The forms and techniques in the synchronic method consist of (1) the listening method, (2) the speaking method and technique, and (3) the introspection method.

This study uses the synchronous method with the form of speaking and introspection. The conversant method is the method used in data collection through conversation. The introspection method provides data by utilizing the intuition of the language that one has mastered (mother tongue) to provide the data needed for analysis following the purpose of the research. The mother tongue or first language referred to is the regional language of Biak, the Dwar sub-dialect of North Biak. Mother tongue is the first common language we use as a communication activity in the surrounding environment (Widodo, 2021).

3. RESULTS AND DISCUSSIONS

This study aims to create written documentation and descriptions of the Biak Subdialek Dwar (BBSD) numeral calculation system. The results of this study can help Generation Z learn and practice the mention and calculation of BBSD numerals.

3.1. Biak Numerical 1-9000

The writing and mention of numerals 1-9000 are intended as a written document in defence of the Biak sub-dialect Dwar language in Dwar Village. The highest number in the Biak language is "syaran", or thousands (Fautngil & Rumbrawer, 2002).

In the Biak language, the number of numerals can reach 9999. 1-1000 is written and pronounced with a system combining formula codes. The following is the formula code for the number calculation system in the Biak sub-dialect of the North Biak Dwar language.

- 1) Di/Ri means, '**the th**' with the multiplication system (x) or 'there' with the addition system (+)
- 2) Sesor means, '**excess**' with the addition system (+)
- 3) Base numbers 1–9 (*oser/ eser – siw*)
- 4) Numbers Between 11–19 (*samfur seser oser – samfur seser di siw*)
- 5) Tens numbers 10–90 (*samfur – samfur in siw*)
- 6) Hundreds of numbers 100–900 (*usin oser – usin in siw*)
- 7) Thousands of 1000–9000 (*syaran oser – syaran di siw*)

In table 1, writing numbers represents other numbers because writing is the same as repeating the formula code

Table 1. Numerical Biak Sub-dialect Dwar

Number	Language	
	Biak Dwar Sub-Dialect	Indonesian
1	<i>Eser/Oser</i>	One
2	<i>Suru</i>	Two
3	<i>Kyor</i>	Three
4	<i>Fyak</i>	Four
5	<i>Rim</i>	Five
6	<i>Wonem</i>	Six
7	<i>Fik</i>	Seven
8	<i>War</i>	Eight
9	<i>Siw</i>	Nine
10	<i>Samfur</i>	Ten
11	<i>Samfur Sesor Oser</i>	Eleven
12	<i>Samfur Sesor Ri Suru</i>	Twelve
13	<i>Samfur Sesor Ri Kyor</i>	Thirteen
14	<i>Samfur Sesor Ri Fyak</i>	Fourteen
15	<i>Samfur Sesor Ri Rim</i>	Fifteen
16	<i>Samfur Sesor Ri Wonem</i>	Sixteen
17	<i>Samfur Sesor Ri Fik</i>	Seventeen
18	<i>Samfur Sesor Ri War</i>	Eighteen
19	<i>Samfur Sesor Ri Siw</i>	Nineteen

Number	Language	
	Biak Dwar Sub-Dialect	Indonesian
20	<i>Samfur Ri Suru</i>	Twenty
21	<i>Samfur Ri Suru Sesor Oser</i>	Twenty one
22	<i>Samfur Ri Suru Sesor Ri Suru</i>	Twenty two
23	<i>Samfur Ri Suru Sesor Ri Kyor</i>	Twenty three
24	<i>Samfur Ri Suru Sesor Ri Fyak</i>	Twenty-four
25	<i>Samfur Ri Suru Sesor Ri Rim</i>	Twenty five
26	<i>Samfur Ri Suru Sesor Ri Wonem</i>	Twenty-six
27	<i>Samfur Ri Suru Sesor Ri Fik</i>	Twenty-seven
28	<i>Samfur Ri Suru Sesor Ri War</i>	Twenty-eight
29	<i>Samfur Ri Suru Sesor Ri Siw</i>	Twenty-nine
30	<i>Samfur Ri Kyor</i>	Thirty
31	<i>Samfur Ri Kyor Sesor Oser/Eser</i>	Thirty one
32	<i>Samfur Ri Kyor Sesor Ri Suru</i>	Thirty-two
33	<i>Samfur Ri Kyor Sesor Ri Kyor</i>	Thirty-three
34	<i>Samfur Ri Kyor Sesor Ri Fyak</i>	Thirty-four
35	<i>Samfur Ri Kyor Sesor Ri Rim</i>	Thirty-five
36	<i>Samfur Ri Kyor Sesor Ri Wonem</i>	Thirty-six
37	<i>Samfur Ri Kyor Sesor Ri Fik</i>	Thirty-seven
38	<i>Samfur Ri Kyor Sesor Ri War</i>	Thirty-eight
39	<i>Samfur Ri Kyor Sesor Ri Siw</i>	Thirty-nine
40	<i>Samfur Ri Fyak</i>	Forty
41	<i>Samfur Ri Fyak Sesor Oser/Eser</i>	Forty-one
42	<i>Samfur Ri Fyak Sesor Disuru</i>	Forty-two
43	<i>Samfur Ri Fyak Sesor Ri Kyor</i>	Forty-three
44	<i>Samfur Ri Fyak Sesor Ri Fyak</i>	Forty-four
45	<i>Samfur Ri Fyak Sesor Ri Rim</i>	Forty-five
46	<i>Samfur Ri Fyak Sesor Ri Wonem</i>	Forty-six
47	<i>Samfur Ri Fyak Sesor Ri Fik</i>	Forty-seven
48	<i>Samfur Ri Fyak Sesor Ri War</i>	Forty-eight
49	<i>Samfur Ri Fyak Sesor Ri Siw</i>	Forty-nine
50	<i>Samfur Ri Rim</i>	Fifty
51	<i>Samfur Ri Rim Sesor Oser/Eser</i>	Fifty-one
52	<i>Samfur Ri Rim Sesor Ri Suru</i>	Fifty-two
53	<i>Samfur Ri Rim Sesor Ri Kyor</i>	Fifty-three
54	<i>Samfur Ri Rim Sesor Ri Fyak</i>	Fifty-four
55	<i>Samfur Ri Im Sesor Ri Rim</i>	Fifty-five
56	<i>Samfur Ri Rim Sesor Ri Wonem</i>	Fifty-six
57	<i>Samfur Ri Rim Sesor Ri Fik</i>	Fifty-seven
58	<i>Samfur Ri Rim Sesor Ri War</i>	Fifty-eight
59	<i>Samfur Ri Rim Sesor Ri Siw</i>	Fifty-nine
60	<i>Samfur Ri Wonem</i>	Sixty
61	<i>Samfur Ri Wonem Sesor Oser/Eser</i>	Sixty-one
62	<i>Samfur Ri Wonem Sesor Ri Suru</i>	Sixty two
63	<i>Samfur Ri Wonem Sesor Ri Kyor</i>	Sixty-three
64	<i>Samfur Ri Wonem Sesor Ri Fyak</i>	Sixty-four
65	<i>Samfur Ri Wonem Sesor Ri Rim</i>	Sixty-five
66	<i>Samfur Ri Wonem Sesor Ri Wonem</i>	Sixty-six
67	<i>Samfur Ri Wonem Sesor Ri Fik</i>	Sixty seven
68	<i>Samfur Ri Wonem Sesor Ri War</i>	Sixty-eight
69	<i>Samfur Ri Wonem Sesor Ri Siw</i>	Sixty-nine
70	<i>Samfur Ri Fik</i>	Seventy
71	<i>Samfur Ri Fik Sesor Oser/Eser</i>	Seventy-one
72	<i>Samfur Ri Fik Sesor Ri Suru</i>	Seventy-two
73	<i>Samfur Ri Fik Sesor Ri Kyor</i>	Seventy-three
74	<i>Samfur Ri Fik Sesor Ri Fyak</i>	Seventy-four
75	<i>Samfur Ri Fik Sesor Ri Rim</i>	Seventy-five
76	<i>Samfur Ri Fik Sesor Ri Wonem</i>	Seventy-six

Number	Language	
	Biak Dwar Sub-Dialect	Indonesian
77	<i>Samfur Ri Fik Seser Ri Fik</i>	Seventy-seven
78	<i>Samfur Ri Fik Seser Ri War</i>	Seventy-eight
79	<i>Samfur Ri Fik Seser Ri Siw</i>	Seventy-nine
80	<i>Samfur Ri War</i>	Eighty
81	<i>Samfur Ri War Seser Oser/Eser</i>	Eighty-one
82	<i>Samfur Ri War Seser Ri Suru</i>	Eighty two
83	<i>Samfur Ri War Seser Ri Kyor</i>	Eighty-three
84	<i>Samfur Ri War Seser Ri Fyak</i>	Eighty-four
85	<i>Samfur Ri War Seser Ri Rim</i>	Eighty-five
86	<i>Samfur Ri War Seser Ri Wonem</i>	Eighty-six
87	<i>Samfur Ri War Seser Ri Fik</i>	Eighty-seven
88	<i>Samfur Ri War Seser Ri War</i>	Eighty-eight
89	<i>Samfur Ri War Seser Ri Siw</i>	Eighty-nine
90	<i>Samfur Ri Siw</i>	Ninety
91	<i>Samfur Ri Siw Seser Oser/Eser</i>	Ninety-one
92	<i>Samfur Ri Siw Seser Ri Suru</i>	Ninety-two
93	<i>Samfur Ri Siw Seser Ri Kyor</i>	Ninety-three
94	<i>Samfur Ri Siw Seser Ri Fyak</i>	Ninety-four
95	<i>Samfur Ri Siw Seser Ri Rim</i>	Ninety-five
96	<i>Samfur Ri Siw Seser Ri Wonem</i>	Ninety-six
97	<i>Samfur Ri Siw Seser Ri Ri Fik</i>	Ninety-seven
98	<i>Samfur Ri Siw Seser Ri War</i>	Ninety-eight
99	<i>Samfur Ri Siw Seser Ri Siw</i>	Ninety-nine
100	<i>Usin Oser</i>	One hundred
101	<i>Usin Oser Seser Oser/Eser</i>	One hundred and One
102	<i>Usin Oser Seser Ri Suru</i>	One hundred two
103	<i>Usin Oser Seser Ri Kyor</i>	One hundred and three
104	<i>Usin Oser Seser Ri Fyak</i>	One hundred and four
105	<i>Usin Oser Seser Ri Rim</i>	One hundred and five
106	<i>Usin Oser Seser Ri Wonem</i>	One hundred and six
107	<i>Usin Oser Seser Ri Fik</i>	Hundred Seven
108	<i>Usin Oser Seser Ri War</i>	Hundred and Eight
109	<i>Usin Oser Seser Ri Siw</i>	One hundred and nine
110	<i>Usin Oser Seser Ri Samfur</i>	One hundred and ten
111	<i>Usin Oser Samfur Seser Oser</i>	Hundred Eleven
112	<i>Usin Oser Samfur Seser Ri Suru</i>	One hundred and twelve
113	<i>Usin Oser Samfur Seser Ri Kyor</i>	One hundred and thirteen
114	<i>Usin Oser Samfur Seser Ri Fyak</i>	One hundred and fourteen
115	<i>Usin Oser Samfur Seser Ri Rim</i>	One hundred and fifteen
116	<i>Usin Oser Samfur Seser Ri Wonem</i>	One Hundred Sixteen
117	<i>Usin Oser Samfur Seser Ri Fik</i>	One hundred seventeen
118	<i>Usin Oser Samfur Seser Ri War</i>	One Hundred and Eighteen
119	<i>Usin Oser Samfur Seser Ri Siw</i>	Nineteen
120	<i>Usin Oser Samfur Ri Suru</i>	One hundred twenty
200	<i>Usin Ri Suru</i>	Two hundred
300	<i>Usin Ri Kyor</i>	Three hundred
400	<i>Usin Ri Fyak</i>	Four hundred
500	<i>Usin Ri Rim</i>	Five hundred
600	<i>Usin Ri Wonem</i>	Six hundred
700	<i>Usin Ri Fik</i>	Seven hundred
800	<i>Usin Ri War</i>	Eight hundred
900	<i>Usin Ri Siw</i>	Nine hundred
1000	<i>Syaran Oser</i>	One thousand
1001	<i>Syaran Oser Seser Ri Oser</i>	One thousand and One
1010	<i>Syaran Oser Seser Ri Samfur</i>	one thousand ten
1011	<i>Syaran Oser Samfur Seser Ri Oser</i>	One Thousand Eleven
2000	<i>Syaran Ri Suru</i>	Two thousand

Number	Language	
	Biak Dwar Sub-Dialect	Indonesian
3000	<i>Syaran Ri Kyor</i>	Three thousand
4000	<i>Syaran Ri Fyak</i>	Four thousand
5000	<i>Syaran Ri Rim</i>	Five thousand
6000	<i>Syaran Ri Wonem</i>	Six thousand
7000	<i>Syaran Ri Fik</i>	Seven thousand
8000	<i>Syaran Ri War</i>	Eight thousand
9000	<i>Syaran Ri Siw</i>	Nine thousand

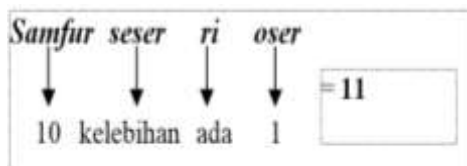
3.2. Numerical Calculation System for the Biak Language Sub-dialect of North Biak

DwarThe basic numerals 1-9 are written and pronounced normally, namely: eser 'one', suru 'two', kyor 'three', fyak 'four', rim 'lima', wonem 'six', fik 'seven', war 'eight', and siw 'nine'.

The mention of the **number between** 11-19 is written and pronounced by adding the numerical formula code: 10 '**samfur**' + **seser** + **ri** + the basic number in question.

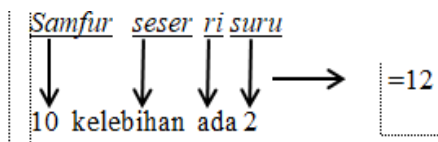
Example:

1) Number 11 is written and pronounced



The same calculation system refers to numbers between 12-19 by substituting the base number at the end (see tabulation of mentioning base numbers 1-9).

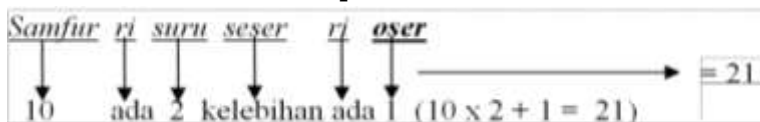
2) The number 12 is written and pronounced



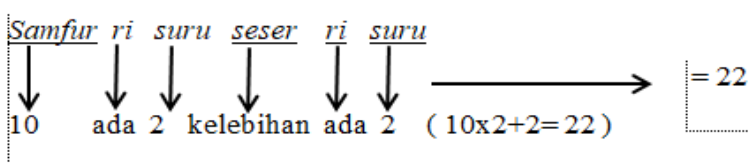
The mention of the tens and units numbers which includes the numbers 21-29, 31-39, 41-49, 51-59, 61-69, 71-79, 81-89, and 91-99 are written and pronounced using a numeric formula code system: 10 '*samfur*' + *ri* + the base number in question + *seser* + *ri* + the base number.

Example:

3) Number 21 is written and pronounced



4) Number 22 is written and pronounced

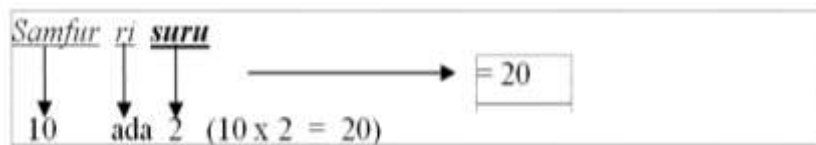


The calculation system for the number 23-99 is written and pronounced according to the formula code in examples number 3 and 4. The formula code that needs to be replaced is the primary number code in the middle and end positions (see table 1 for the mention of the number 21-99).

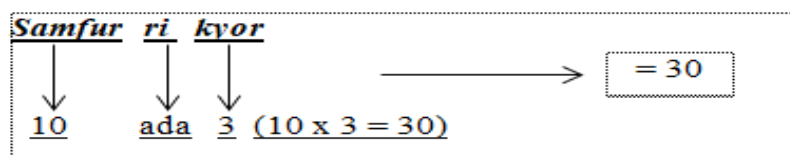
The mention of the tens number consisting of the digits 10, 20, 30, 40, 50, 60, 70, 80, and 90 is written and pronounced with a numerical formula code system: 10 'samfur + ri + the base number in question'. Writing the number 10 'samfur' does not get an additional formula code, writing the number 20_90 follows the formula code by replacing the base number at the end of the word according to the number in question.

Example:

5) Number 20 is written and pronounced



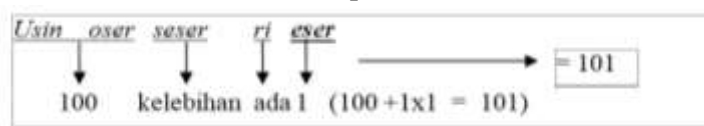
6) Number 30 is written and pronounced



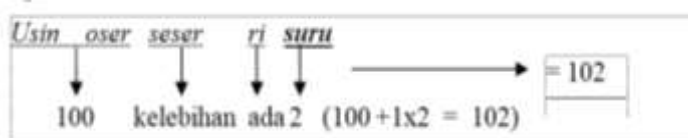
Writing hundreds of units of 101-110 using the formula code: *usin oser + seser + ri + base number* (adjustable). The writing of other numbers uses the same formula, this can be seen in table 1 of the writing and pronunciation of numbers.

Example:

7) Number 101 is written and pronounced



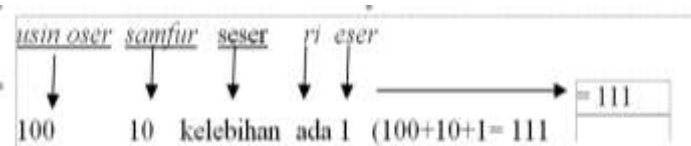
8) Number 102 is written and pronounced



Writing hundreds of numbers between 111-119 using the formula code: *usin oser + samfur + seser + ri + base number* (adjustable). The writing of other numbers uses the same formula, this can be seen in table 1 of the writing and pronunciation of numbers.

Example:

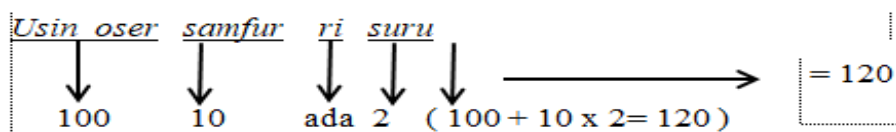
9) Number 111 is written and pronounced



The hundreds of tens of 120, 130, 140, 150, 160, 170, 180, and 190 are written and pronounced with the formula: *usin oser + samfur + ri + base number* (adjustable). The writing of other numbers uses the same formula, this can be seen in table 1 of the writing and pronunciation of numbers.

Example:

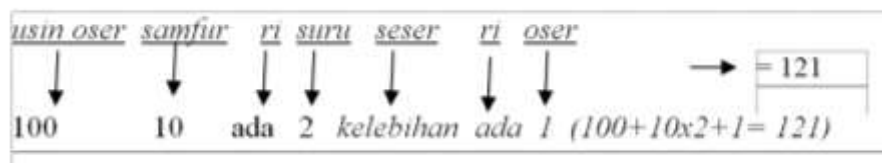
10) Number 120 is written and pronounced



Hundreds of tens of units 121-129, 131-139, 141-149, 151-159, 161-169, 171-179, 181-189, and 191-199 are written and pronounced with the formula: *usin oser + samfur + ri + base number + seser + ri + base number* (adjustable). The calculation system for the number 121-199 is written and pronounced according to the formula code in example number 11. The formula code that needs to be changed is the basic number code in the middle and end positions (see table 1 for the mention of the number 121-199).

Example:

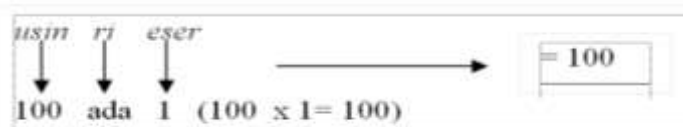
11) Number 121 is written and pronounced



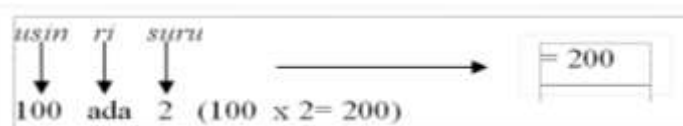
The hundreds of digits 100, 200, 300, 400, 500, 600, 700, 800, and 900 are written and pronounced with the formula: *usin + ri + base number* (adjustable). The calculation system for the hundreds of numbers 100-900 is written and pronounced according to the formula code in examples number 12 and 13. The formula code that needs to be replaced is the base number code at the end position (see table 1 for the mention of the number 100-900).

Example:

12) Number 100 is written and pronounced



13) Number 200 is written and pronounced

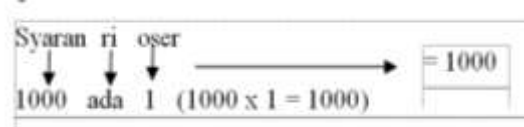


The thousands of 1000, 2000, 3000, 4000, 5000, 6000, 7000, 8000, and 9000 numbers are written and pronounced with the formula: *syaran + ri + base number* (adjusted). The calculation system for the 1000-9000 thousand numbers is written and pronounced according to the formula code in examples 14 and 15. The formula code that needs to be

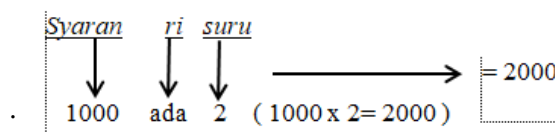
replaced is the base number code at the end position (see table 1 for the 1000-9000 number).

Example :

14) Number 1000 is written and pronounced



15) Number 2000 is written and pronounced



4. CONCLUSION

Based on the research results that have been stated, it can be concluded that: (1) Generation Z in Kampung Dwar need to learn and use the Biak sub-dialect Dwar language in communicating in contextual situations; (2) Generations X and Y need to motivate and invite generation Z to preserve the Biak Dwar dialect; (3) Generations X, Y, and Z need to work together in using Biak Subdielek Dwar numerals; (4) Numerical language Biak Subdielek Dwar that needs to be mastered consists of basic numerals, intermediate numbers, tens numbers, hundreds and thousands; and (5) The process of writing numbers in the Biak sub-dialect Dwar language follows a system containing the formula code: di/ri which means, 'the th' with the multiplication system (x) or 'there' with the addition system (+); then seser code which means, 'excess' with the addition system (+).

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