



## Secret-Text by e-Abacus Diagram II

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### Abstract

In this work, there will be upgraded on the work of (Mahmood and Mahmood , 2018) by finding a general rule of the code for any text made from any number of words by using James e-Abacus Diagram in partition theory

**Keywords:** Partition Number, Abacus James Diagram.

## الجملة السرية بـأستخدام مخطط اباكس جيمس e

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### الخلاصة

في هذا العمل، سيكون هناك تحديث على أعمال محمود و محمود في عام ٢٠١٨ من خلال إيجاد قاعدة عامة لتشغير أي نص مصنوع من أي عدد من الكلمات باستخدام مخطط جيمس آباكس في نظرية التقسيم.

### 1. Introduction

Let  $n$  be a positive integer. A composition of  $n$  is a sequence  $\mu = (\mu_1, \mu_2, \dots)$  of non-negative integers such that  $|\mu| = \sum_i \mu_i = n$ . The integers  $\mu_i$  for  $i \geq 1$  are the parts of  $\mu$  if  $\mu_i = 0$  for  $i > r$ , we identify  $\mu$  with  $(\mu_1, \mu_2, \dots, \mu_r)$ . A composition  $\mu$  is a partition if  $\mu_j \geq \mu_{j+1}$ , for all  $j \geq 1$ . We write  $\mu \models n$  and  $\mu \vdash n$  if  $\mu$  is a composition and  $\mu$  is a partition of  $n$  respectively, [1]. Let  $\sigma$  be the number of redundant part of the partition  $\mu$  of  $n$  , then we have  $\mu = (\mu_1, \mu_2, \mu_3, \dots, \mu_r) = (\lambda_1^{\sigma_1}, \lambda_2^{\sigma_2}, \dots, \lambda_m^{\sigma_m})$  such that  $|\mu| = n = \sum_{i=1}^r \mu_i = \sum_{k=1}^m \lambda_k^{\sigma_k}$ , [2]. An e-Abacus is a Chinese abacus with vertical runners, labeled  $0, 1, 2, 3, \dots, e-1$  from left to right. We label the positions on the abacus  $0, 1, 2, \dots$  from left to right, top to bottom.

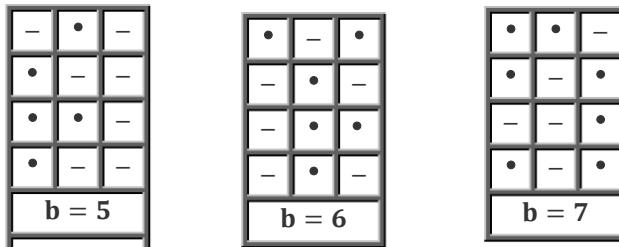
run.1	run.2	run.3	...	run.e
0	1	2	...	e - 1
e	e + 1	e + 2	...	2e - 1
2e	2e + 1	2e + 2	...	3e - 1
.	.	.	...	.

James in [3], defined  $\beta$ -numbers by fix  $\mu$  as a partition of  $n$ , choose an integer  $b$  greater than or

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equal to the number of parts  $r$  of  $\mu$  and define  $\beta_i = \mu_i + b - i$ ,  $1 \leq i \leq b$ . The set  $\beta_1, \beta_2, \dots, \beta_b$  is said to be a set of  $\beta$ -numbers for  $\mu$ . He will represent  $\beta$ -numbers by  $\square$  and any number does not appear by  $-$  in each any runners depending on  $e$ .

**Example:** if  $\mu = (5, 4, 4, 2, 1)$ , then  $n = 16$ ,  $r = 5$  and we can take  $b \geq 5$ . If  $b = 5, 6$  and  $7$ , then  $\beta$ -numbers are  $\{9, 7, 6, 3, 1\}$ ,  $\{10, 8, 7, 4, 2, 0\}$  and  $\{11, 9, 8, 5, 3, 1, 0\}$  respectively. If  $e = 3$  then we have:



Mahmood in [4] defined the following: For any Abacus James diagram and  $\beta$ -numbers, the values of  $b = r, r+1, \dots, r+(e-1)$ , are called the "guides" where  $r$  is the number of parts of the partition  $\mu$  of  $n$ . We will define any Abacus James diagram that corresponds to any  $b$  guide, as a "Main diagram" or "Guide diagram".

In this paper, we should find partition number for a text depended on partition number for the design of each letter that fit the standard of the main Diagram found before and based on the table we previously found. After the results of Mahmood and Mahmood [2] we have the following partition for any letter:

Letters	Partition	Letters	Partition
A	(11,8 <sup>2</sup> ,5 <sup>7</sup> ,2,1 <sup>3</sup> )	B	(11 <sup>3</sup> ,10,8,6 <sup>3</sup> ,5,3,1 <sup>3</sup> )
C	(13 <sup>3</sup> ,12,9,5 <sup>2</sup> ,2,1 <sup>3</sup> )	D	(12 <sup>3</sup> ,11,9,8,6,5,3,1 <sup>3</sup> )
E	(11 <sup>5</sup> ,7,5 <sup>3</sup> ,1 <sup>5</sup> )	F	(6,10,6,5 <sup>4</sup> ,1 <sup>5</sup> )
G	(11 <sup>3</sup> ,10,7 <sup>4</sup> ,6,2,1 <sup>3</sup> )	H	(13,11,10,8,7 <sup>4</sup> ,6,4,3,1)
I	(15 <sup>3</sup> ,12,8,4,1 <sup>3</sup> )	J	(14,11,10,8,4,1 <sup>3</sup> )
K	(15,13,11,10,7 <sup>2</sup> ,5,4,3,1)	L	(17 <sup>4</sup> ,13,9,5,1)
M	(12,9 <sup>2</sup> ,8,7 <sup>2</sup> ,6,5 <sup>2</sup> ,4,3,2,1)	N	(11,9,8 <sup>2</sup> ,7,6 <sup>4</sup> ,5,4 <sup>2</sup> ,3,1)
O	(12 <sup>3</sup> ,11,8 <sup>2</sup> ,5 <sup>2</sup> ,2,1 <sup>3</sup> )	P	(11 <sup>3</sup> ,8,6 <sup>3</sup> ,5,3,1 <sup>3</sup> )
Q	(11 <sup>4</sup> ,10 <sup>2</sup> ,8 <sup>2</sup> ,5 <sup>2</sup> ,2,1 <sup>3</sup> )	R	(13,11,10,8,6 <sup>3</sup> ,5,3,1 <sup>3</sup> )
S	(13 <sup>3</sup> ,12,7 <sup>2</sup> ,2,1 <sup>3</sup> )	T	(14,10,6,2,1 <sup>5</sup> )
U	(14 <sup>2</sup> ,12,10,9,7,6,4,3,1)	V	(16,13,12,11,8 <sup>2</sup> ,5)
W	(14,13,12,11,10 <sup>2</sup> ,9,8 <sup>2</sup> ,5)	X	(13,10,9,8,5,2,1)
Y	(16,12,9 <sup>3</sup> ,8,5)	Z	(13 <sup>5</sup> ,10,7,4,1 <sup>4</sup> )

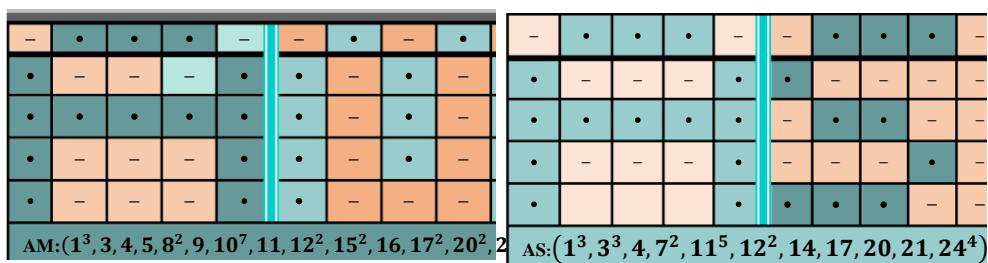
Figure 1.1

## 2. Creation a Text Consists of at Least Two Words

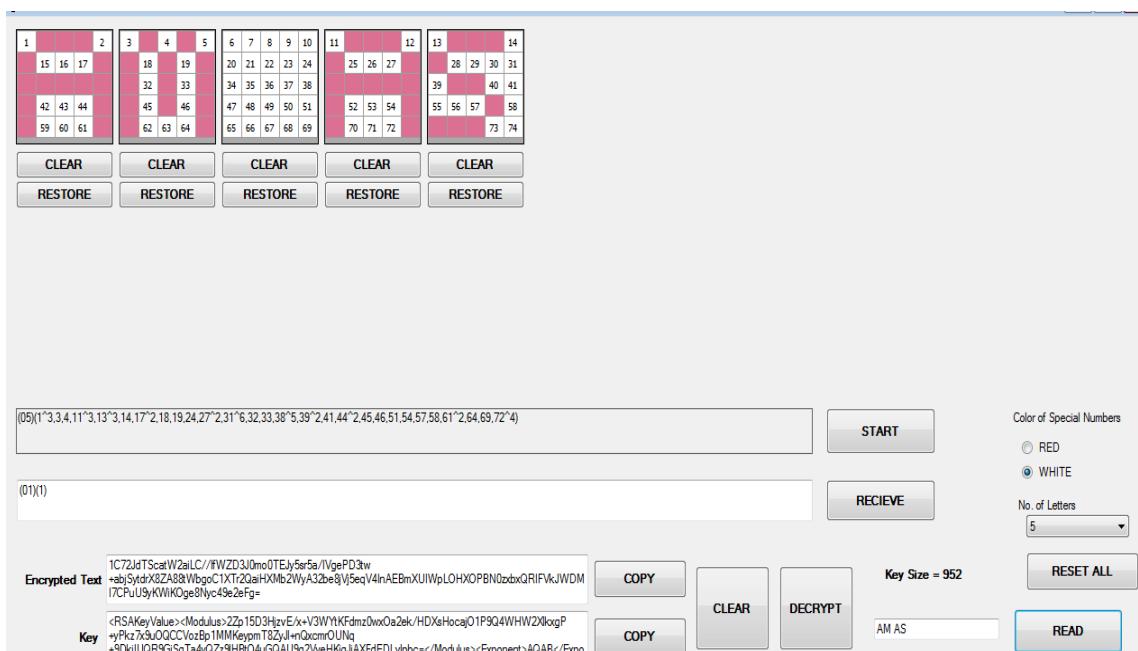
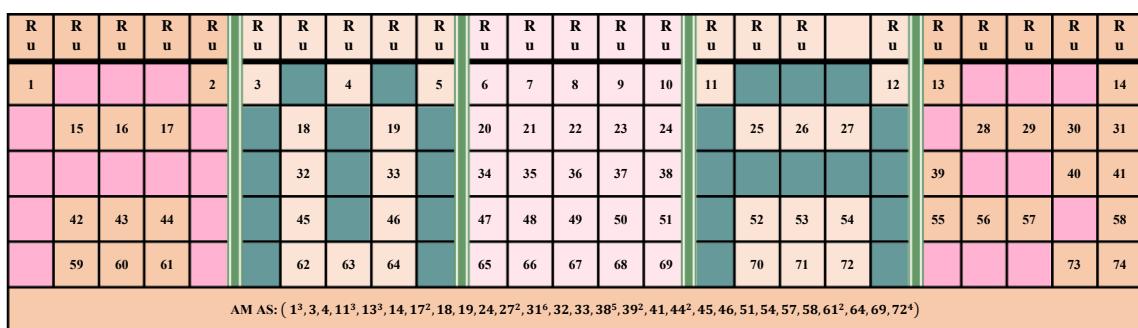
In this section, we take the partition of any text made from any number of words. That shown in the table above. The only difference between this paper and the one before it is the presence of space between each word in the same text, so what is the size of this space? For that, we will suggest the space as the same chart, which has five rows and columns without any bead. As this diagram:

-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-

Take the text: **AM AS**



Then the secret –text of AM AS is:



Let  $PW^*(w)_k$  be a partition of word  $w$  to with respect (\*) the condition of five positions in each row  $k$ , also  $b^\#$  is the sum of all beads that come before it unless it's the same column and  $i = 0, 1, 2, \dots$  if  $w = 2, 3, 4, \dots$  respectively.

**Rule (2.1):** The general rule of the secret -text with two words is defined by:

	Word(1) with $\tau_1$ letters	Word(2) with $\tau_2$ letters
(1)	$PW^*(1)_1 \Rightarrow [PW^*(\tau_1)_1 + (5(\tau_1 - 1) - b^\#)]$	$[PW^*(2)_1 + (5(\tau_1 + 1) - b^\#)] \Rightarrow [PW^*(\tau_2)_1 + (5(\tau_1 + \tau_2) - b^\#)]$
(2)	$[PW^*(1)_2 + (5(\tau_1 + \tau_2) - b^\#)] \Rightarrow [PW^*(\tau_1)_2 + (5((2\tau_1 + \tau_2) - 1) - b^\#)]$	$[PW^*(2)_2 + (5((2\tau_1 + \tau_2) + 1) - b^\#)] \Rightarrow [PW^*(\tau_2)_2 + (5(2\tau_1 + 2\tau_2) - b^\#)]$
(3)	$[PW^*(1)_3 + (5(\sum_{t=1}^2 2\tau_t) - b^\#)] \Rightarrow [PW^*(\tau_1)_3 + (5((3\tau_1 + 2\tau_2) - 1) - b^\#)]$	$[PW^*(2)_3 + (5((3\tau_1 + 2\tau_2) + 1) - b^\#)] \Rightarrow [PW^*(\tau_2)_3 + (5(\sum_{t=1}^2 3\tau_t) - b^\#)]$
(4)	$[PW^*(1)_4 + (5(\sum_{t=1}^2 3\tau_t) - b^\#)] \Rightarrow [PW^*(\tau_1)_4 + (5((4\tau_1 + 3\tau_2) - 1) - b^\#)]$	$[PW^*(2)_4 + (5((4\tau_1 + 3\tau_2) + 1) - b^\#)] \Rightarrow [PW^*(\tau_2)_4 + (5(\sum_{t=1}^2 4\tau_t) - b^\#)]$
(5)	$[PW^*(1)_5 + (5(\sum_{t=1}^2 4\tau_t) - b^\#)] \Rightarrow [PW^*(\tau_1)_5 + (5((5\tau_1 + 4\tau_2) - 1) - b^\#)]$	$[PW^*(2)_5 + (5((5\tau_1 + 4\tau_2) + 1) - b^\#)] \Rightarrow [PW^*(\tau_2)_5 + (5(\sum_{t=1}^2 5\tau_t) - b^\#)]$

Figure 2.2

**Proof:**

By using the same system in Rule (2.1) and the idea of (space) in (the introduction of this section), we have the result in each (rectangular) between each row and any letters. In fact, (Arrow $\Rightarrow$ ) refer to (the start of operation for the 1<sup>st</sup> Letter in each word and the end of the operation for the last letter in the same word).

**Rule (2.2):** The general rule of the secret –text with three words is defined by:

	Word(1) with $\tau_1$	Word(2) with $\tau_2$	Word(3) with $\tau_3$
(1)	$PW'(1)_1 = [PW(\tau_1)_1 + (3(\tau_1 - 1) - b^*)]$	$[PW(2)_1 + (3(\tau_1 - 1) - b^*)] \Rightarrow [PW(\tau_2)_1 + (3(\tau_1 - \tau_2) - b^*)]$	$[PW(3)_1 + (3(\tau_1 - \tau_2 + 2) - b^*)] \Rightarrow [PW(\tau_3)_1 + (3(\tau_1 - \tau_2 + \tau_3 + 1) - b^*)]$
(2)	$[PW(1)_2 + (3(\sum_{i=1}^{t-1} \tau_i - 1) - b^*)] \Rightarrow [PW(\tau_1)_2 + (3(2\tau_1 + \sum_{i=2}^{t-1} \tau_i) - b^*)]$	$[PW(2)_2 + (3((2\tau_1 + \sum_{i=2}^{t-1} \tau_i) + 2) - b^*)] \Rightarrow [PW(\tau_2)_2 + (3((2\tau_1 + \sum_{i=2}^{t-1} \tau_i) + 1) - b^*)]$	$[PW'(3)_2 + (3((\sum_{i=1}^{t-1} 2\tau_i - \tau_3) + 2) - b^*)] \Rightarrow [PW'(\tau_3)_2 + (3((\sum_{i=1}^{t-1} 2\tau_i) + 2) - b^*)]$
(3)	$[PW(1)_3 + (3((\sum_{i=1}^{t-1} 2\tau_i) - 2) - b^*)] \Rightarrow [PW(\tau_1)_3 + (3((3\tau_1 - \sum_{i=1}^{t-1} 2\tau_i) + 1) - b^*)]$	$[PW(2)_3 + (3((3\tau_1 + \sum_{i=2}^{t-1} \tau_i) + 3) - b^*)] \Rightarrow [PW(\tau_2)_3 + (3((\sum_{i=1}^{t-1} 3\tau_i - 2\tau_3) + 2) - b^*)]$	$[PW'(3)_3 + (3((\sum_{i=1}^{t-1} 3\tau_i - 2\tau_2) + 3) - b^*)] \Rightarrow [PW'(\tau_3)_3 + (3((\sum_{i=1}^{t-1} 3\tau_i) + 3) - b^*)]$
(4)	$[PW(1)_4 + (3((\sum_{i=1}^{t-1} 3\tau_i) - 3) - b^*)] \Rightarrow [PW(\tau_1)_4 + (3((4\tau_1 - \sum_{i=1}^{t-1} 2\tau_i) + 2) - b^*)]$	$[PW(2)_4 + (3((4\tau_1 + \sum_{i=2}^{t-1} 3\tau_i) - 4) - b^*)] \Rightarrow [PW(\tau_2)_4 + (3((\sum_{i=1}^{t-1} 4\tau_i - 3\tau_3) + 3) - b^*)]$	$[PW'(3)_4 + (3((\sum_{i=1}^{t-1} 4\tau_i - 3\tau_2) + 4) - b^*)] \Rightarrow [PW'(\tau_3)_4 + (3((\sum_{i=1}^{t-1} 4\tau_i) + 4) - b^*)]$
(5)	$[PW(1)_5 + (3((\sum_{i=1}^{t-1} 4\tau_i) - 4) - b^*)] \Rightarrow [PW(\tau_1)_5 + (3((3\tau_1 - \sum_{i=1}^{t-1} 4\tau_i) + 3) - b^*)]$	$[PW(2)_5 + (3((3\tau_1 + \sum_{i=2}^{t-1} 4\tau_i) - 3) - b^*)] \Rightarrow [PW(\tau_2)_5 + (3((\sum_{i=1}^{t-1} 5\tau_i - 4\tau_3) + 4) - b^*)]$	$[PW'(3)_5 + (3((\sum_{i=1}^{t-1} 5\tau_i - 4\tau_2) + 5) - b^*)] \Rightarrow [PW'(\tau_3)_5 + (3((\sum_{i=1}^{t-1} 5\tau_i) + 5) - b^*)]$

Figure 2.3

**Proof:**

By using the same system in Rule (2. 2) and the idea of (space) in (the introduction of this section), we have the results in each (rectangular) between each row and any letters.

For example, (HE DRINKS TEA)

1		2	3		4				
5		6	7		8		9	10	11
12					13				14
15		16	17		18		19	20	21
22		23	24		25				
HE: {1,3,4 <sup>4</sup> ,5,7,8,12 <sup>4</sup> ,13 <sup>3</sup> ,15,17,18,22,24,25 <sup>4</sup> }									

1				2	3		4	5			6	7		8	9		1		1	2		1	3		1	4
1		1	1	1	8	1	2	2	2	2	2	2	2	2	2	2	1	1	2	2	2	3	3	3	3	
3		3	3	3	7	9	0	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
4		5	6	7	8	9	0	9	1	2	3	2	3	4	5	6	6	7	6	6	6	7	8	8	9	
5		5	5	5	4	5	5	5	5	5	5	5	5	5	5	6	6	7	8	8	8	8	8	8	8	
0		1	2	3	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	
6				7	7	2	3	4	7	7	5	6	7	7	7	8	7	8	9	8	8	8	2	3	9	
9				0	1	2	3	4	7	7	5	6	7	7	8	7	8	9	8	8	8	2	3	9	0	

$$P_{DRINKS} = \{1^3, 3^3, 5^3, 7, 9, 10, 12, 13^3, 15, 17, 18, 20, 22, 25^2, 26, 27, 28, 29, 34, 36, 37^3, 40, 43^4, 44^2, 47^2, 50, 52, 53, 55, 57, 60, 61^2, 62, 63, 67, 69^3, 71, 73, 74^3, 76, 78, 79, 81^3\}$$

1 33 34 35	2 4 37 38 39	3 5 6 7 8 9 40 41 42 43 44	10 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 59 60 61 62 63 64 65 66 67 68 69 70 71	11 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111	12 121 122 123 124 125 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153	13 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193	14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 59 60 61 62 63 64 65 66 67 68 69 70 71																		
CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR	CLEAR
RESTORE	RESTORE	RESTORE	RESTORE	RESTORE	RESTORE	RESTORE	RESTORE	RESTORE	RESTORE	RESTORE	RESTORE	RESTORE	RESTORE	RESTORE	RESTORE	RESTORE	RESTORE	RESTORE	RESTORE	RESTORE	RESTORE	RESTORE	RESTORE	RESTORE	RESTORE
(13) (1,3,4,10,12,3,14,3,16,18,19,21,22,3,29,4,30,4,31,3,33,35,36,45,47,48,50,52,55,2,56,57,58,59,60,69,72,75,78,79,4,80,3,87,89,90,3,93,96,4,97,2,100,2,109,112,3,113,5,14,116,117,126,128,129,131,133,135,137,2,138,139,143,151,154,157,160,161,163,164,4,170,3,172,174,175,3,177,179,180,182,4,191,194,5,197	START	Color of Special Numbers <input checked="" type="radio"/> RED <input type="radio"/> WHITE																							
(0)(1)	RECEIVE	No. of Letters 13																							
Encrypted Text Encrypted Text Key	Ep1oeDmPRoz6ZY+efmOSi7zunBxFebXwhxVNx630aZQyAoKneBBelk6f0K+04gQgRo8R/rmtKhs <2FC0bvNnXZYnAMCr8pAn0d361FvyfoDXg7SvG5aDdCejU14vdw <L03uNmH15mRlfTAgRyAn0DJ71zGPhQ+Vg7+ensHCgU/wTH5vO4G28kWKEG9PRjuL0A <RSAKeyValue><Modulus>3BdT5bUEoDT2b904vPkDETROB4eryH4x25cr23ScI6+QSRAMsLEiKarBMQkLo <CbxPPMWWXmrNUTofJ0KNGSR32ewYYS0DZkU/lpsVGW189lU0U0dBY <obj7RWaV5QhwtWhybB3LRbZa8N8tA3HCvVTDkgDGBcgTlHR<dKV2EWjdb	COPY	CLEAR	DECRYPT	Key Size = 2552	RESET ALL																			
COPY	HE DRINKS TEA	READ																							

1					2												3								4
	5			6	7		8		9		10		11					12	13	14					
15	16			17	18		19						20					29	30	31					
21	22			23	24		25		26		27		28					37	38	39					
32	33			34	35		36																		

$$P_{TEA} = \{1^4, 2^4, 3^3, 4, 5, 8, 11, 14, 16, 19^3, 20^5, 22, 25, 28, 31, 33, 36^5, 39\}$$

Now, after the **Rule (2. 1)** and **Rule (2.2)**, we can find the general rule of the partition of text for any number the words, as follows:

	Word(1) with $\tau_1$	Word(2) with $\tau_2$	...	Word( $\omega$ ) with $\tau_\omega$
(1)	$PW^*(1)_1 \Rightarrow [PW^*(\tau_1)_1 + (5(\tau_1 - 1) - b^\#)]$	$[PW^*(2)_1 + (5(\tau_1 + 1) - b^\#)] \Rightarrow [PW^*(\tau_2)_1 + (5(\sum_{t=1}^{\omega-1} \tau_t) - b^\#)]$		$[PW^*(\omega)_1 + (5(\sum_{t=1}^{\omega-1} \tau_t + (i + 1)) - b^\#)] \Rightarrow [PW^*(\tau_\omega)_1 + (5 \sum_{t=1}^{\omega} (\tau_t + i) - b^\#)]$
(2)	$[PW^*(1)_2 + (5(\sum_{t=1}^{\omega} \tau_t + i) - b^\#)] \Rightarrow [PW^*(\tau_1)_2 + (5((2\tau_1 + \sum_{t=2}^{\omega} \tau_t) + (i - 1)) - b^\#)]$	$[PW^*(2)_2 + (5((2\tau_1 + \sum_{t=2}^{\omega} 2\tau_t) + (i + 1)) - b^\#)] \Rightarrow [PW^*(\tau_2)_2 + (5((\sum_{t=1}^2 2\tau_t + \sum_{t=3}^{\omega} \tau_t) + (i)) - b^\#)]$		$[PW^*(\omega)_2 + (5((\sum_{t=1}^{\omega-1} 2\tau_t + \tau_\omega) + (2i + 1)) - b^\#)] \Rightarrow [PW^*(\tau_\omega)_2 + (5((\sum_{t=1}^{\omega} 3\tau_t) + 3i) - b^\#)]$
(3)	$[PW^*(1)_3 + (5((\sum_{t=1}^{\omega} 2\tau_t) + 2i) - b^\#)] \Rightarrow [PW^*(\tau_1)_3 + (5((3\tau_1 + \sum_{t=2}^{\omega} 2\tau_t) + (2i - 1)) - b^\#)]$	$[PW^*(2)_3 + (5((3\tau_1 + \sum_{t=2}^{\omega} 2\tau_t) + (2i + 1)) - b^\#)] \Rightarrow [PW^*(\tau_2)_3 + (5((\sum_{t=1}^2 3\tau_t + \sum_{t=3}^{\omega} 2\tau_t) + (2i)) - b^\#)]$		$[PW^*(\omega)_3 + (5((\sum_{t=1}^{\omega-1} 3\tau_t + 2\tau_\omega) + (3i + 1)) - b^\#)] \Rightarrow [PW^*(\tau_\omega)_3 + (5((\sum_{t=1}^{\omega} 3\tau_t) + 3i) - b^\#)]$
(4)	$[PW^*(1)_4 + (5((\sum_{t=1}^{\omega} 3\tau_t) + 3i) - b^\#)] \Rightarrow [PW^*(\tau_1)_4 + (5((4\tau_1 + \sum_{t=2}^{\omega} 3\tau_t) + (3i - 1)) - b^\#)]$	$[PW^*(2)_4 + (5((4\tau_1 + \sum_{t=2}^{\omega} 3\tau_t) + (3i + 1)) - b^\#)] \Rightarrow [PW^*(\tau_2)_4 + (5((\sum_{t=1}^2 4\tau_t + \sum_{t=3}^{\omega} 3\tau_t) + (3i)) - b^\#)]$		$[PW^*(\omega)_4 + (5((\sum_{t=1}^{\omega-1} 4\tau_t + 3\tau_\omega) + (4i + 1)) - b^\#)] \Rightarrow [PW^*(\tau_\omega)_4 + (5((\sum_{t=1}^{\omega} 4\tau_t) + 4i) - b^\#)]$
(5)	$[PW^*(1)_5 + (5((\sum_{t=1}^{\omega} 4\tau_t) + 4i) - b^\#)] \Rightarrow [PW^*(\tau_1)_5 + (5((5\tau_1 + \sum_{t=2}^{\omega} 4\tau_t) + (4i - 1)) - b^\#)]$	$[PW^*(2)_4 + (5((5\tau_1 + \sum_{t=2}^{\omega} 4\tau_t) + (4i + 1)) - b^\#)] \Rightarrow [PW^*(\tau_2)_4 + (5((\sum_{t=1}^2 5\tau_t + \sum_{t=3}^{\omega} 4\tau_t) + (4i)) - b^\#)]$		$[PW^*(\omega)_5 + (5((\sum_{t=1}^{\omega-1} 5\tau_t + 4\tau_\omega) + (5i + 1)) - b^\#)] \Rightarrow [PW^*(\tau_\omega)_5 + (5((\sum_{t=1}^{\omega} 5\tau_t) + 5i) - b^\#)]$

## References

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