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Syriac Letters and James Diagram (A)

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ABSTRACT

Will be dealt with the letters of Syriac language as it is natural numbers, to enter the diagram of James (A) to the theory of partition, this process will have uses in our daily lives and in confidential correspondence.

Keywords: Partition theory, Beta numbers, Syriac Letters.

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1. INTRODUCTION

The aim of the study is how to use the Syriac language as a secret message between two people or more.Syriac language is a Semitic language derived from the Aramaic language which appeared in the first millennium BC, and in the sixth century BC Syriac language has become the only language of communication in the (fertile crescent) region, till after the birth of Christ this language gained its new name (Syriac) in the fourth century [5,7].

This language like other Semitic languages has multiple letters which is 22 letters, three of this letters are vowels, but the rest of the letters are silent, this letters are as follows:

ܐ* ، ܒ ، ܓ ، ܕ ، ܗ ، ܘ* ، ܙ ، ܚ ، ܛ ، ܝ* ، ܟ ، ܠ ، ܡ ، ܢ ، ܣ ، ܥ

The letters do not appear but replace it with meaningless numbers if this message read by a stranger person, from here the idea started where we saw that James' diagram (A) could help us. First of all, we will explain what James's diagram is and then begin the process of linking with Syriac characters. Let r be a non-negative integer, a composition μ of r is a sequence $\mu = (\mu_1, \mu_2, \cdots \mu_n)$of non-negative integers suchthat $|\mu| = \sum_{j=1}^{n} \mu_j = r$, [4]. For example, if $r = 4$, the following sequences are compositions:

$$(4), (3,1), (2,2), (1,3), (2,1,1), (1,2,1), (1,1,2), (1,1,1,1).$$

The composition μ is said to be a partition of r if $\mu_j \geq \mu_{j+1}$, $j \geq 1$. By using the previous example in the case of $r = 4$, the following sequences satisfy the condition of partition:

$$(4), (3,1), (2,2), (2,1,1), (1,1,1,1).$$

Let τ be a number of redundant part of the partition $\mu$of r, then we have $\mu = (\mu_1, \mu_2, \cdots, \mu_n) = (\lambda_1^{\tau_1}, \lambda_2^{\tau_2}, \cdots, \lambda_f^{\tau_f})$such that: $|\mu| = \sum_{j=1}^{n} \mu_j = \sum_{l=1}^{f} \lambda_l^{\tau_l}$, [2].

β - numbers was defined by; see James in [1]: "Fix μ is a partition of r, choose an integer b greater than or equal to the number of parts of μ and define$\beta_i = \mu_i + b - i$, $1 \leq i \leq b$. The set $\{\beta_1, \beta_2, \cdots, \beta_b\}$is said to be the set of β - numbers for μ. For example if we have the partition $\mu = (6,5,2,2,1)$ and $b = 5$ b=5 then β - numbers for partition μ will be:

$\beta_i = \mu_i + b - i$ for $1 \leq i \leq 5$
$\beta_1 = 6 + 5 - 1 = 10$
$\beta_2 = 5 + 5 - 2 = 8$
$\beta_3 = 2 + 5 - 3 = 4$
$\beta_4 = 2 + 5 - 4 = 3$
$\beta_5 = 1 + 5 - 5 = 1$

Then the set of β – numbers are$\{10,8,4,3,1\}$.

Now, let (e) be a positive integer number greater than or equal to 2, we can represent β - numbers by a diagram called diagram (A).

runner -1	runner -2	...	runner – e
0	1	...	e – 1
e	e + 1	...	2e -1
2e	2e + 1	...	3e -1
.	.	...	.
.	.	...	.

Where every β – numbers will be represented by a bead (●) which takes its location in diagram (A) and in case of nonexistence of β - numbers, then the value in diagram (A) will be represented by a blank (-). Returning to the previous example in the case of $\mu = (6,5,2,2,1)$and b = 5, then the set of β – numbers are {10,8,4,3,1} and diagram (A) where e = 2 will be:

0	1
2	3
4	5
6	7
8	9
10	11

$\longrightarrow$

-	•
-	•
•	-
-	-
•	-
•	-

and if e = 3

0	1	2
3	4	5
6	7	8
9	10	11

$\longrightarrow$

-	•	-
•	•	-
-	-	•
-	•	-

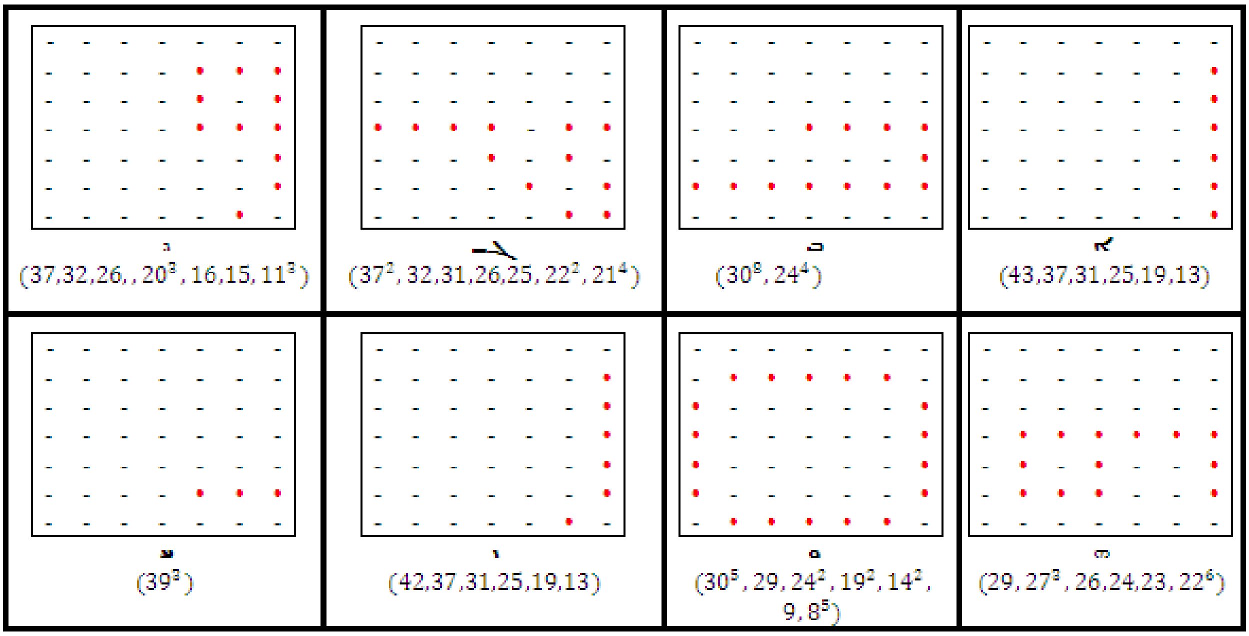
It is possible from diagram (A) we can know the partition that belong to it , by numbering the blanks which precedes the beads In ascending order from left to right, where the number of blanks preceding any bead is represented by one of the elements μ, for example, the number of blanks preceding the first bead will represent the value of μ_n, and the number of blanks preceding the second bead represents μ_{n-1}, thus, until the last bead in diagram (A), all the blanks in the diagram preceding this bead will be represented by μ_1. For example, we have the following diagram (A) we will find its own partition as shown below:

$-^{1}$	•	$-^{2}$	$-^{3}$
$-^{4}$	•	•	$-^{5}$
•	$-^{6}$	$-^{7}$	•
$-^{8}$	•	$-^{9}$	$-^{10}$
$-^{11}$	$-^{12}$	•	-

$\mu = (12,8,7,5,4^2,1)$. Many papers that talk about specific types of movements, see [3,6].

2. THE RELATION BETWEEN SYRIAC WORDS AND JAMES DIAGRAM (A)

In this part we will try to find a suitable way to write each letter of the Syriac language according to diagram (A). The focus was on choosing a fixed (e) and an equal number of rows for each letter, after the study it was found that e = 7 and 7 of the rows is the best choice as follows:



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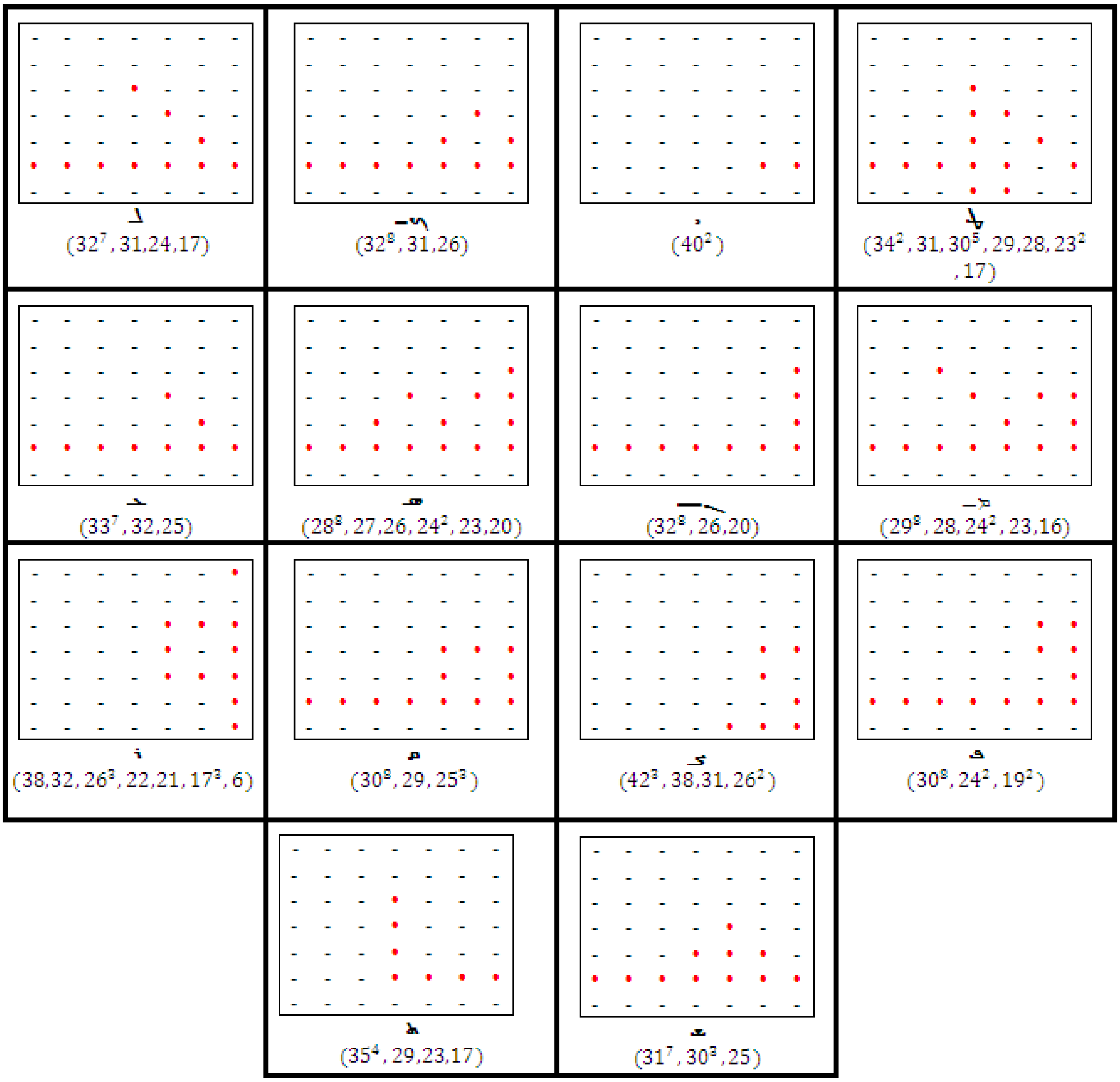
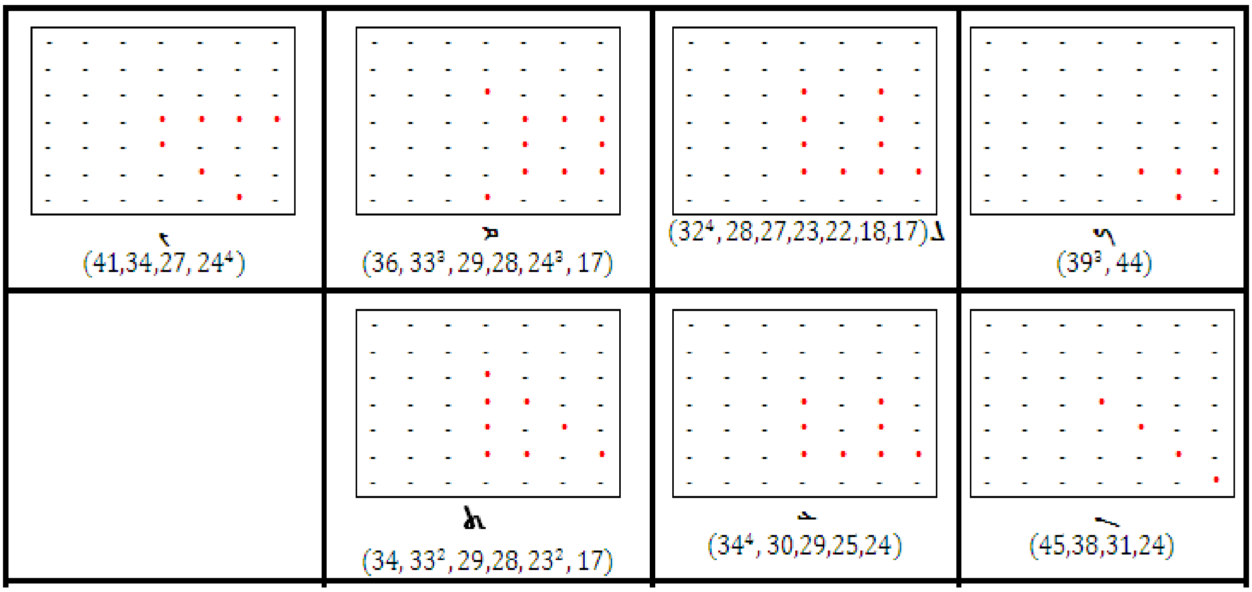
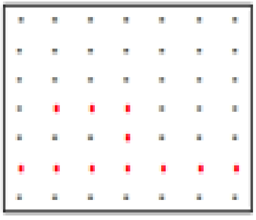
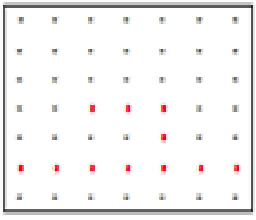
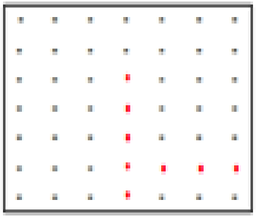
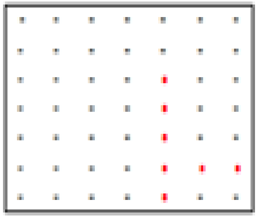
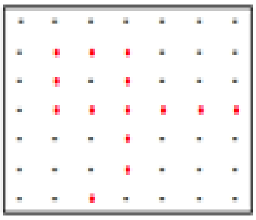
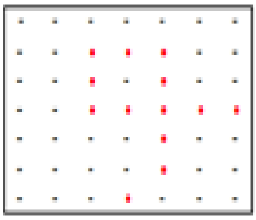
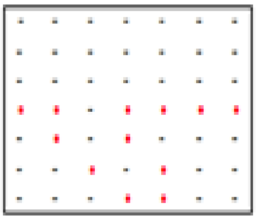
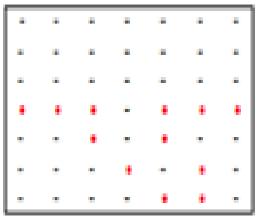
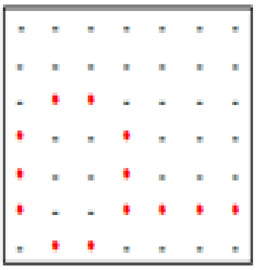
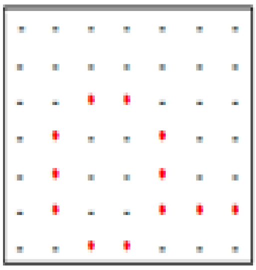
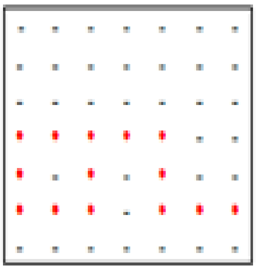
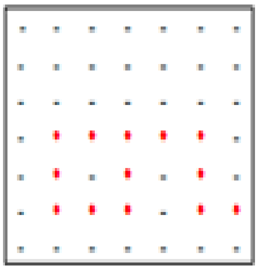
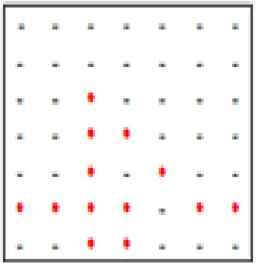
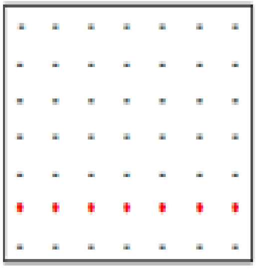
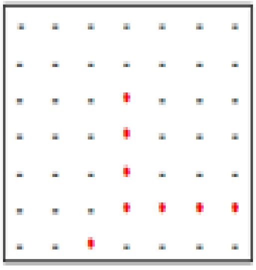
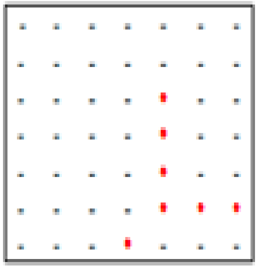
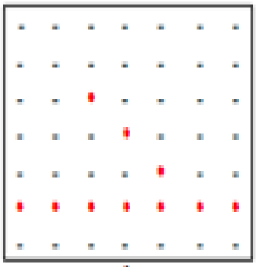
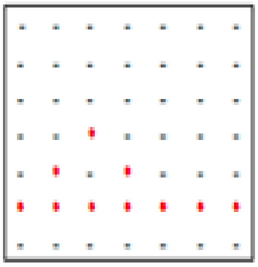
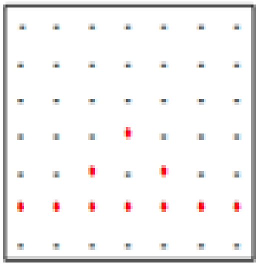
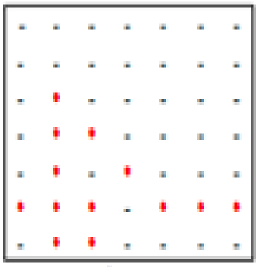
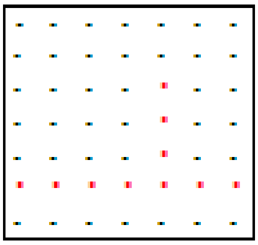
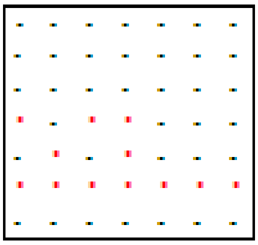
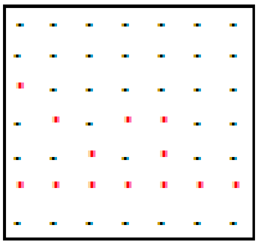
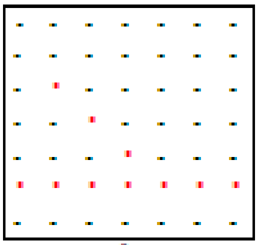
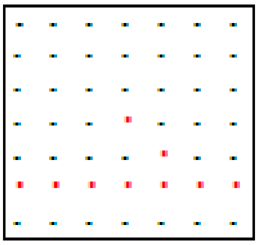
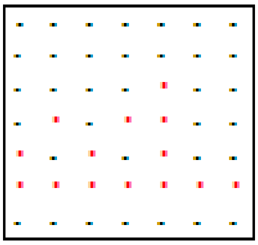
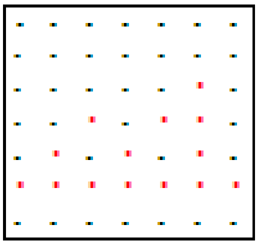
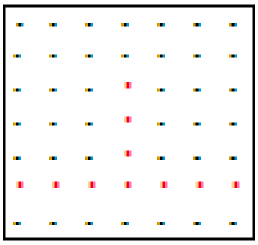
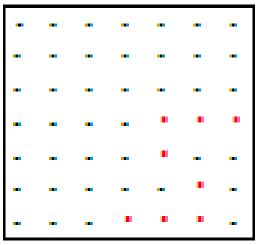
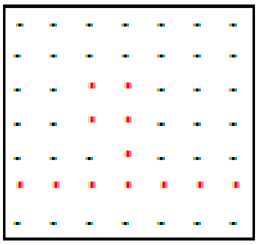
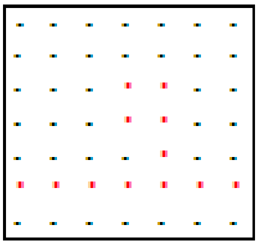
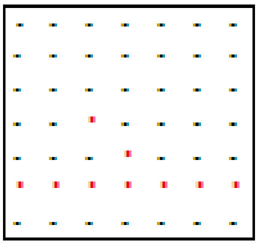
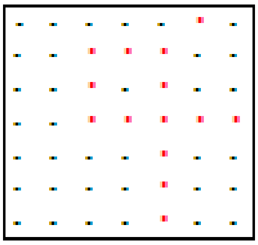
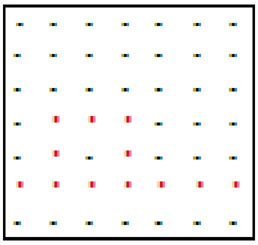
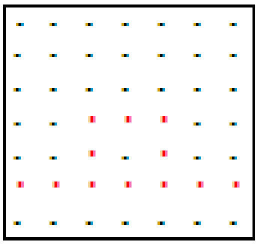
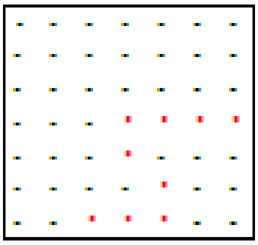
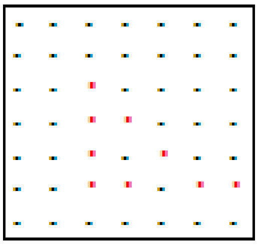
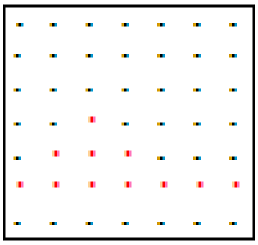
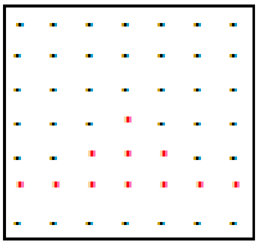
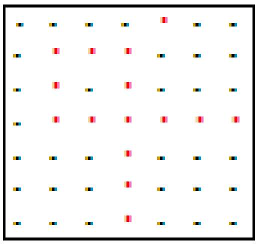


The following diagrams are for the letters that come at the end of the word, as well as we have made clips for the letters (ر) and (د) with the rest of the letters for easy connectivity when writing the word.



 $(31^7, 28, 22^2)$	 $(31^7, 29, 23^2)$	 $(38, 35^4, 29, 23, 17)$	 $(40, 36^2, 30, 24, 18)$
 $(31, 26, 20, 17^5, 13, 12, 8^2)$	 $(33, 28, 22, 18^5, 14, 13, 9^2)$	 $(35^2, 30, 29, 24, 23, 22^4, 21^2)$	 $(36^2, 31, 30, 25, 24, 22^2, 21^2)$
 $(33^2, 31^4, 29, 26, 254, 21, 19, 15^2)$	 $(34^2, 32^2, 30, 27, 25, 22, 20, 16^2)$	 $(28^2, 27^2, 25, 24, 23, 21^5)$	 $(29^2, 28^2, 26, 25, 24, 22^5)$
 $(33^2, 31^2, 30^4, 28, 27, 22^2, 16)$	 (35^7)	 $(37, 35^4, 29, 23, 17)$	 $(39, 36^2, 30, 24, 18)$
 $(32^7, 30, 23, 16)$	 $(32^7, 29, 28, 23)$	 $(32^7, 30, 29, 24)$	 $(32^2, 31^2, 30^2, 27, 26, 21^2, 15)$

 $(32^7, 30, 24, 18)$	 $(30^7, 27, 26, 22^2)$	 $(29^7, 27, 26, 22^2, 21, 14)$	 $(32', 29, 22, 15)$
 $(33', 31, 24)$	 $(28^7, 26, 25, 24, 22^2, 21, 18)$	 $(28^7, 27, 26, 25, 23^2, 22, 19)$	 $(32^7, 29, 23, 17)$
 $(40^2, 36, 29, 25^2)$	 $(30^7, 27, 21^2, 16^2)$	 $(30^7, 28, 22^2, 17^2)$	 $(33', 30, 23)$
 $(33, 27, 21, 17^5, 13, 12, 8^2, 5)$	 $(30^7, 27, 26, 22^2)$	 $(30^7, 28, 27, 23^2)$	 $(38^2, 34, 27, 24^4)$
 $(33^2, 32^2, 28, 27, 22^2, 16)$	 $(31^7, 28^3, 23)$	 $(31^7, 29^2, 24)$	 $(31, 25, 19, 16^8, 12, 11, 7^4, 4)$

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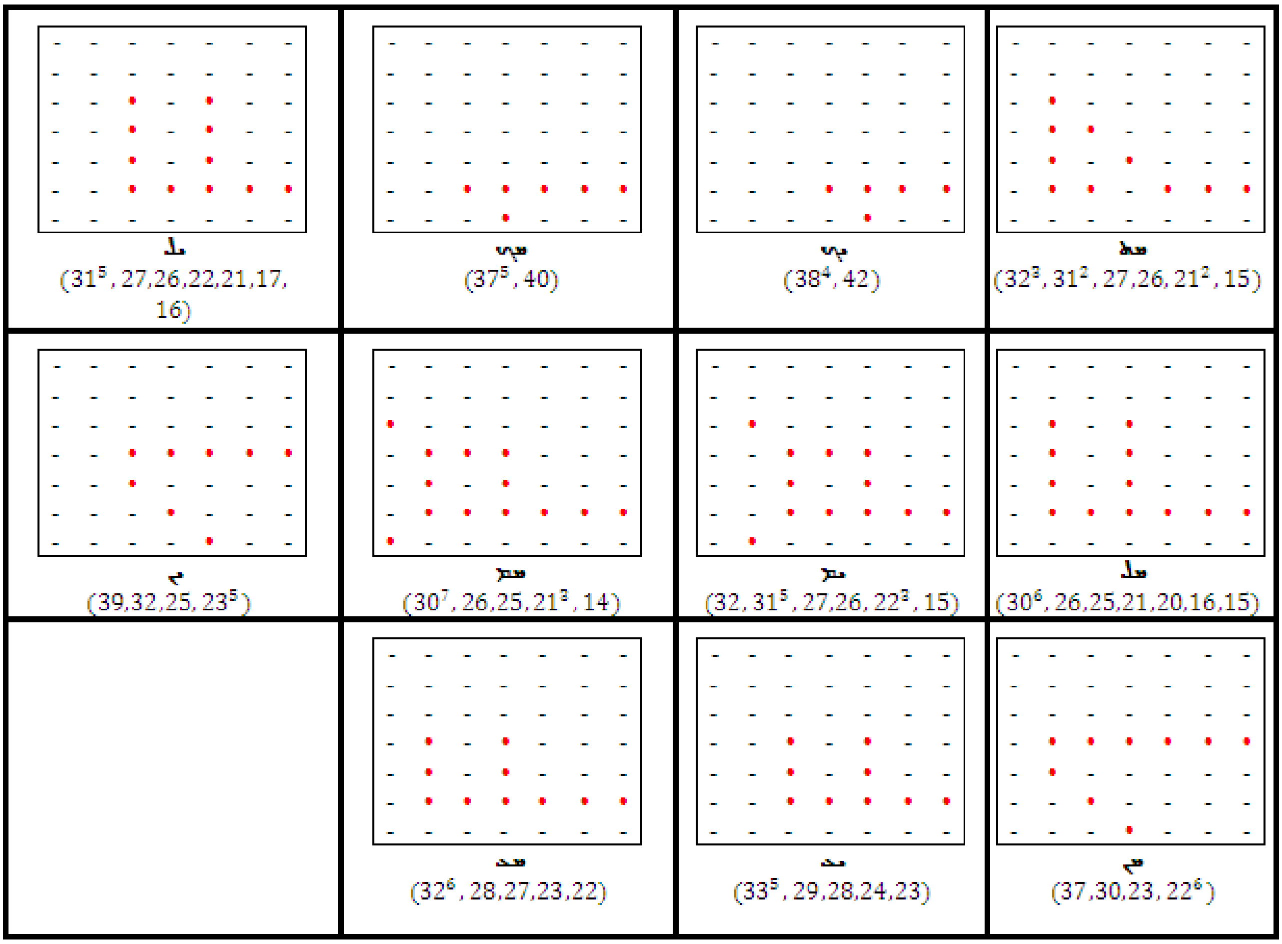
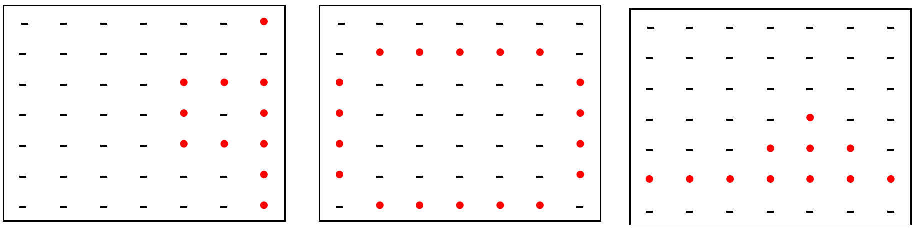


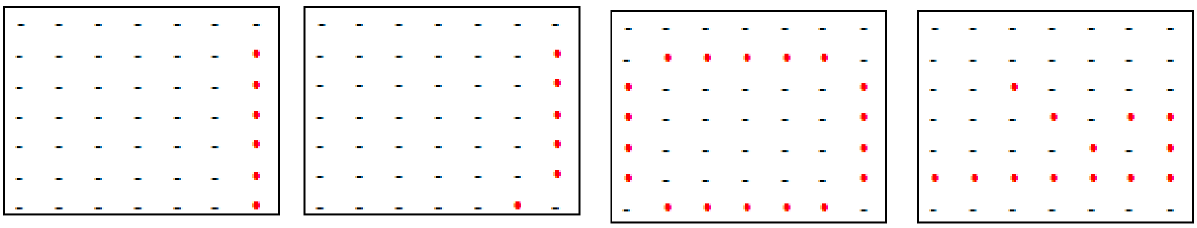
Here we will have the following question: If we want to write a word, it is likely to consist of a number of letters, thus what is the partition that denotes that word?

For example, we have the words (ܢܘܪ) and (ܦܘܪܐ) , the partition and James diagram are as follows:



ܢܘܪ

$\mu = (99^5, 98, 92^8, 87^2, 80^3, 77, 72^4, 66, 62, 57^2, 56, 45, 40^4, 28^5, 6)$



ܦܘܪܐ

$\mu = (146^5, 144, 139, 133^8, 128^2, 122, 116, 115, 111, 106^2, 99, 93^2, 92, 89, 84^2, 78, 68, 66, 61^2, 55, 41^5, 40, 34)$

	Letter (1)	Letter (2)	...	Letter (τ)
Row (1)	$PL^*(1)_1$	$PL^*(2)_1 + (7 - b_{11})$	...	$PL^*(\tau)_1 + (7(\tau-2) - \sum b_{ks})$ $k = 1$ $s = 1,2,\dots,\tau-1$
Row (2)	$PL^*(1)_2 + (7(\tau-1) - \sum b_{ks})$ $k = 1$ $s = 2,3,\dots,\tau$	$PL^*(2)_2 + (7(\tau) - \sum b_{ks})$ $\begin{cases} k = 1, & s = 1,3,4,\dots,\tau \\ k = 2, & s = 1 \end{cases}$	...	$PL^*(\tau)_2 + (7((\tau-2)+\tau) - \sum b_{ks})$ $k = 1,2$ $s = 1,2,\dots,\tau-1$
Row (3)	$PL^*(1)_3 + (7((\tau-2)+\tau) - \sum b_{ks})$ $k = 1,2$ $s = 2,3,\dots,\tau$	$PL^*(2)_3 + (7((\tau-1)+\tau) - \sum b_{ks})$ $\begin{cases} k = 1,2, & s = 1,3,4,\dots,\tau \\ k = 3, & s = 1 \end{cases}$	...	$PL^*(\tau)_3 + (7((\tau-3)+2\tau) - \sum b_{ks})$ $k = 1,2,3$ $s = 1,2,\dots,\tau-1$
Row (4)	$PL^*(1)_4 + (7((\tau-3)+2\tau - \sum b_{ks})$ $k = 1,2,3$ $s = 2,3,\dots,\tau$	$PL^*(2)_4 + (7((\tau-2)+2\tau) - \sum b_{ks})$ $\begin{cases} k = 1,2,3, & s = 1,3,4,\dots,\tau \\ k = 4, & s = 1 \end{cases}$	...	$PL^*(\tau)_4 + (7((\tau-4)+3\tau) - \sum b_{ks})$ $k = 1,2,3,4$ $s = 1,2,\dots,\tau-1$
⋮	⋮	⋮	⋮	⋮
Row (7)	$PL^*(1)_7 + (7((\tau-6)+5\tau) - \sum b_{ks})$ $k = 1,2,3,4$ $s = 2,3,\dots,\tau$	$PL^*(2)_7 + (7((\tau-5)+5\tau) - \sum b_{ks})$ $\begin{cases} k = 1,2,3,4,5,6, & s = 1,3,4,\dots,\tau \\ k = 7, & s = 1 \end{cases}$	...	$PL^*(\tau)_7 + (7((\tau-7)+6\tau) - \sum b_{ks})$ $k = 1,2,3,4,5,6$ $s = 1,2,\dots,\tau-1$

Remark:

1) $PL^*(i)_j$ the partition of letter L with respect (*) the condition of 7 positions by i (letter number) and j (row number).
2) b_{ks} : Number of beads in k of (rows) and s of (Columns).

Through what has been explained, the process of writing a partition by the numbering of the blank in each row of the word from left to right will be arranged in ascending order, thus the first row of the first letter from the left it will be according to the known rule for finding a partition. As for the first row of the second letter, the value (e) will have a large role and then the number of beads located in the first row of the first letter to the left, if we move to the third letter in the first row, the value of (2e) will have the largest role deleted from it number of beads located in the first row of the first and second letters to the left. Thus, we get to the first row of the last letter it will be as much as (e (the number of letters - 1)) subtracted from it the number of beads in the first row of letters which preceded the last letter. Now, if we move to the second row of the first letter to the left, it will be (e (number of letters - 1)) subtracted from it the number of the beads that preceded it in the first row of all letters except the same letter considering that the partition was basically calculated previously. This process will be repeated with the rest of the rows and cases, where we will always subtract the number of beads located before the same site except for the same letter, so through the above, the rule of this will be:

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	Word (1) with τ_1 letters	Word (2) with τ_2 letters	…	Word (w)with τ_w letters
Row (1)	$FW^*(1)_1 \longrightarrow [FW^*(\tau_1)_1 + (7(\tau_1 - 1) - b^*)]$	$[FW^*(1)_1 + (7(\tau_1 + 1) - b^*)] \longrightarrow [FW^*(\tau_2)_1 + (7(\tau_1 + \tau_2) - b^*)]$	…	$[FW^*(1)_1 + (7(\sum_{i=1}^{w-1}\tau_i + (i+1)) - b^*)] \longrightarrow \left[FW^*(w)_1 + \left(7\sum_{i=1}^{w}\tau_i + i) - b^*\right)\right]$
Row (2)	$[FW^*(1)_2 + (7(\sum_{i=1}^{w}\tau_i + i) - b^*)] \longrightarrow \left[FW^*(\tau_1)_2 + \left(7\left(2\tau_1 + \sum_{i=2}^{w}\tau_i\right) + (i-1)\right) - b^*\right]$	$[FW^*(1)_2 + (7((2\tau_1 + \sum_{i=2}^{w}\tau_i) + (i+1)) - b^*)] \longrightarrow \left[FW^*(\tau_2)_2 + \left(7\left(\sum_{i=1}^{2}2\tau_i + \sum_{i=3}^{w}\tau_i\right) + (i)\right) - b^*\right]$	…	$[FW^*(1)_2 + (7(\sum_{i=1}^{w-1}2\tau_i + \tau_w) + (2i+1)) - b^*)] \longrightarrow \left[FW^*(w)_2 + \left(7\left(\sum_{i=1}^{w}2\tau_i + 2i\right) - b^*\right)\right]$
Row (3)	$[FW^*(1)_3 + (7(\sum_{i=1}^{w}2\tau_i + 2i) - b^*)] \longrightarrow \left[FW^*(\tau_1)_3 + \left(7\left(3\tau_1 + \sum_{i=2}^{w}2\tau_i\right) + (2i-1)\right) - b^*\right]$	$[FW^*(1)_3 + (7(3\tau_1 + \sum_{i=2}^{w}2\tau_i) + (2i+1)) - b^*)] \longrightarrow \left[FW^*(\tau_2)_3 + \left(7\left(\sum_{i=1}^{2}3\tau_i + \sum_{i=3}^{w}2\tau_i\right) + (2i)\right) - b^*\right]$	…	$[FW^*(1)_3 + (7(\sum_{i=1}^{w-1}3\tau_i + 2\tau_w) + (3i+1)) - b^*)] \longrightarrow \left[FW^*(w)_3 + \left(7\left(\sum_{i=1}^{w}3\tau_i + 3i\right) - b^*\right)\right]$
⋮	⋮	⋮	⋮	⋮
Row (7)	$[FW^*(1)_7 + (7(\sum_{i=1}^{w}6\tau_i + 6i) - b^*)] \longrightarrow \left[FW^*(\tau_1)_7 + \left(7\left(7\tau_1 + \sum_{i=2}^{w}6\tau_i\right) + (6i-1)\right) - b^*\right]$	$[FW^*(1)_7 + (7((7\tau_1 + \sum_{i=2}^{w}6\tau_i) + (6i+1)) - b^*)] \longrightarrow \left[FW^*(\tau_2)_7 + \left(7\left(\sum_{i=1}^{2}7\tau_i + \sum_{i=3}^{w}6\tau_i\right) + (6i)\right) - b^*\right]$		$[FW^*(1)_7 + (7(\sum_{i=1}^{w-1}7\tau_i + 6\tau_w) + (7i+1)) - b^*)] \longrightarrow \left[FW^*(w)_7 + \left(7\left(\sum_{i=1}^{w}7\tau_i + 7i\right) - b^*\right)\right]$

Remarks:

1) $i = 0, 1, 2, \ldots$ if $w = 2, 3, 4, \ldots$ respectively
2) b^* The sum of all beads that come before it unless it s the same column.
3) $FW^*(w)_k$ the partition of word w with respect (*) the condition of 7 positions in each row k.

Here, must be attention before everything on the form of the letters such as ...، ي، ح when used it with the rest of the letters for the purpose of forming the word here we must shift the letters to the top and in this case we will delete (14) blanks of each $\mu_1, \mu_2, \ldots, \mu_n$ of each letter. For example, when connecting the two letters ح and ـه to form the section ـهـح, here we need to make the letter ـه in parallel with the letter ح, in this case we will re-write the partition of the letter ـه which is $(30^8, 24^4)$ so that after deleting (14) blanks of each μ are $(16^8, 10^4)$ and thus this will be the new partition of the letter ـه, and in the same way with the rest of the letters. In the same way we will try to find the general rule to write a sentence, and for that the rule is:

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