lattice and look at the pictures.

II. DEFINITIONS, NOTATIONS, THE VERY BASICS

The q-binomial coefficient

$$\begin{bmatrix} n \\ k \end{bmatrix}_q = \prod_{i=1}^{k} \frac{1 - q^{n-i+1}}{1 - q^i}, \quad q \neq 1,\, 0 \leq k \leq n \tag{1}$$

is a natural extension of the standard binomial coefficient

$$\binom{n}{k} = \frac{n!}{k!\,(n-k)!}, \quad 0 \leq k \leq n \tag{2}$$

The Pochhammer symbol (or shifted factorial) is defined as

$$(a)_n = \prod_{i=0}^{n-1} (a + i) \tag{3}$$

so that $(1)_n = n!$. Its q-deformed relative, the q-Pochhammer symbol, is defined as

$$(a;\, q)_n = \prod_{i=0}^{n-1} \left(1 - a\, q^i\right), \quad n \geq 0 \tag{4}$$

The q-binomial coefficient can then be expressed as

$$\begin{bmatrix} n \\ k \end{bmatrix}_q = \frac{(q;\, q)_n}{(q;\, q)_k\ (q;\, q)_{n-k}} = \frac{\left(q^{n-k+1};\, q\right)_k}{(q;\, q)_k} \tag{5}$$

The q-numbers are defined for any real number a as

$$[a]_q = \frac{1 - q^a}{1 - q}, \quad q \neq 1 \tag{6}$$

and it is easy to show that

$$\lim_{q \to 1} [a]_q = a \tag{7}$$

Note that for integers $n \geq 1$ we have

$$[n]_q = \frac{1 - q^n}{1 - q} = 1 + q + \cdots + q^{n-1}, \quad q \neq 1 \tag{8}$$

so that $[n]_q \to n$ when $q \to 1$. To continue, the q-number factorials are defined as

$$[n]_q! = \prod_{k=1}^{n} [k]_q \tag{9}$$