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PARITY TRIANGLES OF PASCAL'S TRIANGLE

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In the Pascal's triangle of binomial coefficients, $\binom{n}{r}$, let every odd number be represented by an asterisk, "*," and every even number by a cross, "†." Then we discover another diagram which is quite interesting.

Every nine (odd) numbers form a triangle having exactly one (odd) even number in its interior (odd!). Thus we shall designate it as an Odd-triangle.

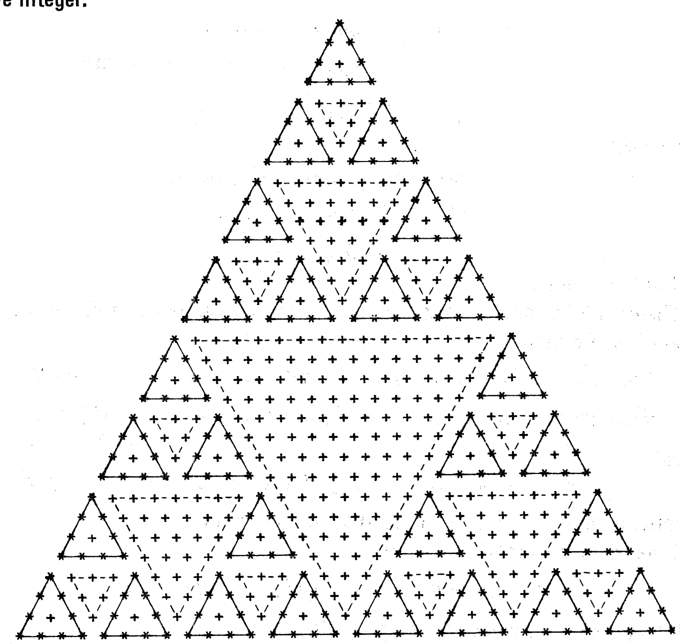
The even numbers also form triangles whose sizes vary but each of these triangles contains an even number of crosses. This set of triangles is called Even-triangles.

The present diagram $(n = 31)$ can be easily extended along the outermost apex of Pascal's triangle. Some partial observations are:

(a) If $n = 2^i - 1$ and $0 \leqslant r \leqslant 2^i - 1$, then $\binom{n}{r}$ is odd,

(b) If $n = 2^i$ and $1 \leqslant r \leqslant 2^i - 1$, then $\binom{n}{r}$ is even,

where i is a nonnegative integer.



Parity Triangles of $\binom{n}{r}$

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