Pascal triangle for kids

When children train addition, they might as well train with Pascal triangle. They can construct theirselves the first 9 rows (where all numbers are less than 100) or the first 13 rows (where all numbers are less than 1000).

They might find funny that the sides of the triangles are long sequences of 1's.

They can also detect that, next to these external sides, there are two arithmetic progressions "+1": they can understand the reason for it well, because the procedure to build the triangle lets them add 1 at each step.

They can appreciate the left-right symmetry of the Pascal triangle, understanding that the construction is symmetric. And they can exploit this symmetry to identify computation mistakes.

One can show them the even/odd colouring of a large Pascal triangle (with 32 rows) and they are fascinated by seeing all the triangles (the Sierpinski triangle). Moreover, some of the kids see this colouring and understand the colouring rule according to the parity of the numbers.

The triangle also displays procedures (e.g. the constructions of the triangle) and patterns (e.g. the arithmetic sequence, the Sierpinski triangle) that go to infinity, and maybe one could discuss how large a triangle is feasible for today's computer (noticing that large numbers, written in a readable font, are longer than the distance from the earth to the moon…)

Children can also understand that the largest numbers are in the middle. They can also understand with the construction that for example below two odd numbers there is an even number.

As soon as children get to know multiplication, they should be presented with binomial coefficients and compute the Pascal triangle in this way (which means for example that they write a row without knowing the previous ones).

While preparing the material for kids one should go through all widely known properties of the Pascal triangle and see which ones are accessible to children, possibly only visually.

To build the Pascal triangle, it is fun if the children cut a paper triangle first and they fill it. It helps (even the more talented kids) to have underscore lines as placeholders where the numbers have to be filled. The numbers 1's on the sides can be written first, so that the triangle can progressively be filled by doing additions. As mistakes propagate, it is meaningful to check that the first lines are correct before proceeding further. To have more effect, the children should build the triangle theirselves first, and then only later be presented with the large triangle.
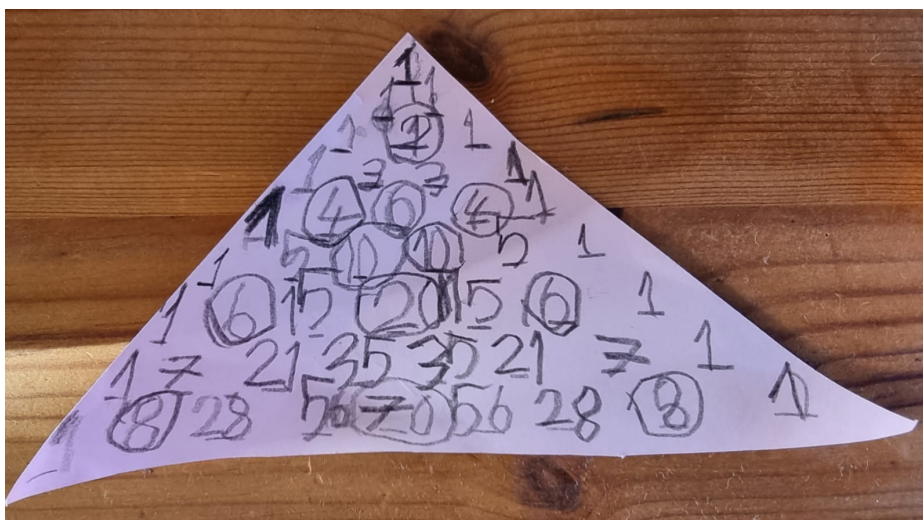
Commenting on the triangle exercise, a talented six-years old said "Diese ist eine reine Rechenaufgabe" (this is a pure computation exercise), and that's precisely it. It is also a win-win situation: children train addition, and so much more. And one has the beauty of mathematics (symmetries, hidden paths, mathematical mysteries) all in one place. Having a triangle for an arithmetic exercise is also funny, and in fact understanding the directions of the lines inside the triangle is more an exercise in geometry.

We recommend to write numbers in circles, as done in the picture below, referenced
https://commons.wikimedia.org/wiki/File:Sierpinski_Pascal_triangle.svg