

Problem

An equilateral triangle with side l is filled with plus and minus signs as follow:

- *The first row contains a sequence of n plus and minus signs;*
- *the second row contains a sequence of $n-1$ signs obtained by applying the following rule: under each pair of consecutive signs, we place the product sign;*
- *and so on for the subsequent rows.*

A triangle is balanced if and only if it contains as many + signs as - signs.

Warm-up

1. *Can we construct a balanced triangle of side 3? And one of side 4?*
2. *For what values of n , being n the triangle's size, can we construct balanced triangles?*

Solution

1. *Proved by finding direct examples;*
2. *Proved by Gauss' formula.*

Challenge

How can we construct balanced triangles, if they exist?

Solution

We are still trying to solve this part of the problem, but we think that recursion can be a good method.