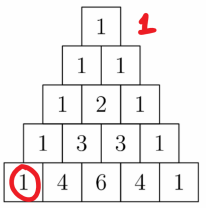
PASCAL'S TRIANGLE - PATTERNS

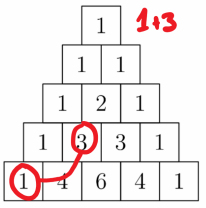
Patterns sometimes appear in unexpected places. Sometimes a wild thing has some strange rules that govern it. Pascal's triangle is full of these little patterns. For example, we have already seen that the numbers $1, 2, 3, 4, \ldots$ appear as a diagonal in Pascal's triangle.

As another example, did you know that the **Fibonacci** numbers, $1, 1, 2, 3, 5, 8, 13, \ldots$ appear in Pascal's triangle? Here's how!

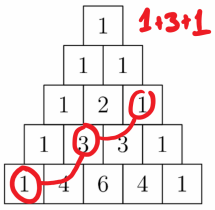
Start at a 1 on the left



Move one square to the right, and one square up, and add it to what you have



Repeat this until you leave the triangle. Which Fibonacci number did you get?



Now you try!

Can you find these sequences of numbers hidden inside Pascal's triangle?

(1) $1, 2, 4, 8, 16, \ldots$
(2) The **triangular numbers**, $1, 3, 6, 10, \ldots$. How do these numbers relate to the size of the pyramid at each row?
(3) $11, 11^2, 11^3, 11^4$. Does this pattern continue?

What other patterns can you spot? If you have time, you should go talk to the students working on changing the rules to see if you can spot patterns in their triangles.