Mathematical investigation (2)

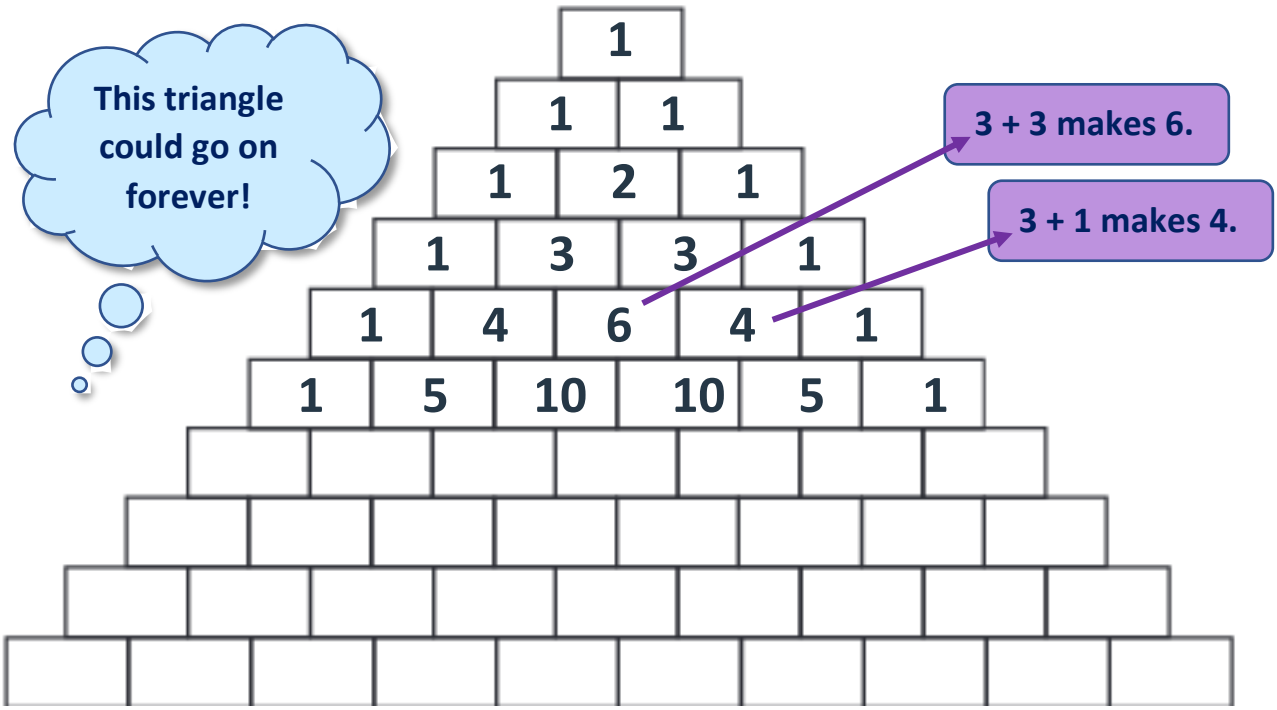
Investigating is a great way to learn to think mathematically, apply logic, spot patterns and improve our perseverance.

Pascal's triangle

Patterns have intrigued mathematicians for centuries.
Blaise Pascal (1623–1662) discovered new patterns in what is now known as Pascal's triangle.

How is it made?

- The triangle starts at the top with **1** in the top block and **1** in the two blocks underneath.
- Then, each number is made by adding the numbers in the two blocks above. So, **2** is made from 1 and 1. **1** is made from 1 and nothing!
- Look at the row **1, 3, 3, 1.** Can you see why **3** is written in two blocks?

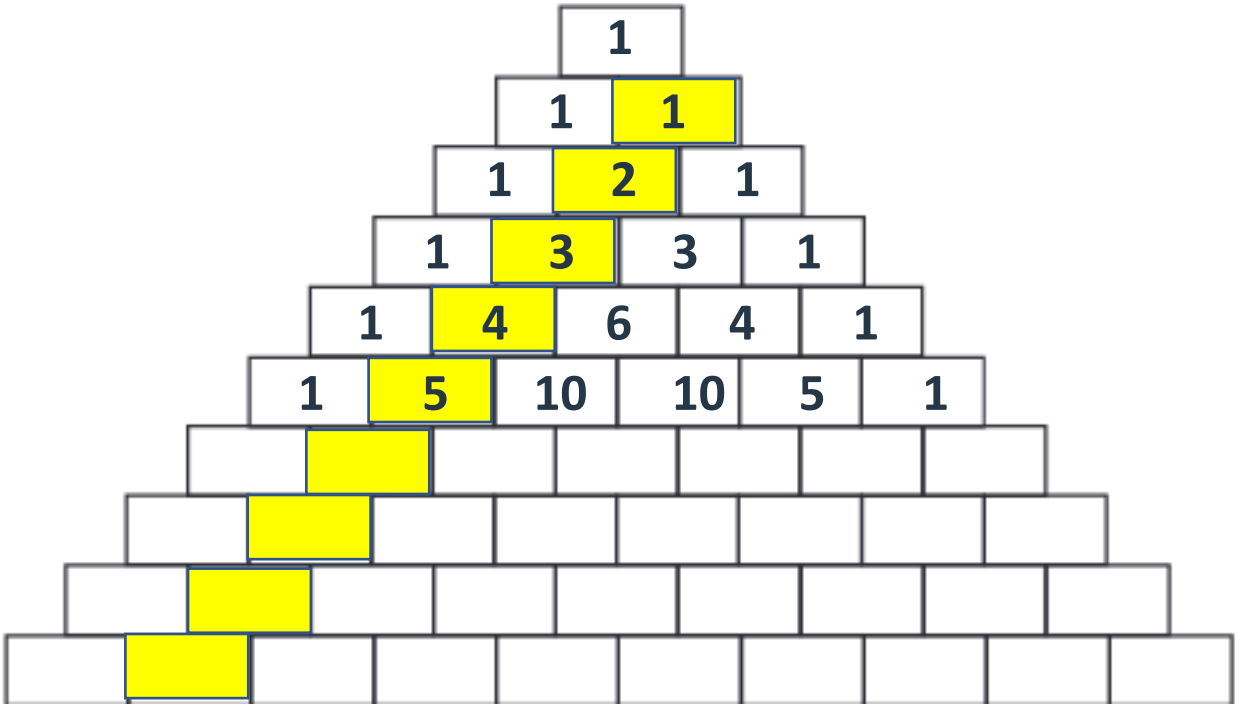


- Can you fill in the next three rows? When the numbers get really big, use a calculator!

Tip: You can use symmetry to help!

Patterns

- Now let's hunt for some patterns…
- There's definitely some symmetry, which helped us to fill in the triangle.
- But have a look at some of the diagonal lines…



- The next diagonal line has a pattern too: **1, 3, 6, 10, 15…**
- What's the difference between the first two numbers in this sequence?
  And the next two numbers?
  And the next two numbers?
- Predict the next five terms in the sequence.

There are some hidden patterns too…

- Add the numbers in each row and write them.
  Use a calculator to help once you are past the first few rows.
  What do you notice?
- Now colour in all the odd numbers to find yet another pattern!