

Start with two numbers, say 8 and 2.

Let's generate a sequence where the next number is the mean of the previous two numbers.

So the next number is half of $(8 + 2)$, and the sequence continues: 8, 2, 5

The next number is half of $(2 + 5)$, and the sequence continues: 8, 2, 5, 3.5

What would happen if you continued this process indefinitely?

Choose a few pairs of starting numbers and repeat the process.

Each time, your sequence should get closer and closer to a value which we call the *limit*.

Can you find a relationship between your starting numbers and the limit of the sequence they generate?

Can you explain why this happens?

Now start with three numbers.

This time, we can generate a sequence where the next number is the mean of the last three numbers.

Check you agree that if we start with 4, 1, 10, the next number is 5, and the number after that is $\frac{16}{3}$.

What would happen if you continued this process indefinitely?

Choose some more sets of three starting numbers.

Can you find a relationship between your starting numbers and the limit of the sequence they generate?

Can you explain why this happens?

Extension

Explore what happens when you have n starting numbers and you generate a sequence where the next number is the mean of the last n numbers.