



**Stage 3 ★**  
**Mixed Selection 3**

**1. Starting Fibonacci**

The standard Fibonacci sequence 1, 1, 2, 3, 5, 8, 13,... begins with two 1s and each later number in the sequence is the sum of the previous two numbers.

Other Fibonacci-like sequences can be constructed by starting with any two numbers  $a$  and  $b$  (not necessarily 1 and 1) and using the same rule for creating the other numbers in the sequence.

What is the first term of the Fibonacci-like sequence whose second term is 4 and whose fifth term is 22?

**2. Many Matildas**

The name Matilda is written repetitively like this

MatildaMatildaMatilda.....

What is the 1000<sup>th</sup> letter?

**3. Night watchmen**

Granny's watch gains 30 minutes every hour, whilst Grandpa's watch loses 30 minutes every hour. At midnight, they both set their watches to the correct time of 12 o'clock.

What is the correct time when their two watches next agree?

**4. Suit sequence**

A pattern that repeats every six symbols starts as shown below:



What are the 100<sup>th</sup> and 101<sup>st</sup> symbols in the pattern?

*These problems are adapted from UKMT Mathematical Challenge problems ([ukmt.org.uk](http://ukmt.org.uk)).*