



Stage 3 ★ Mixed Selection 3 – Solutions

1. Starting Fibonacci

Let the first term be x , then the sequence is

$$x, 4, x + 4, x + 8, 2x + 12$$

So $2x + 12 = 22$ and hence $x = 5$.

2. Many Matildas

The pattern repeats every seven letters, so the name ends on the 7th, 14th, 21st, ... letters, i.e. on every multiple of 7.

Since $1000 \div 7 = 142$ remainder 6, there are 142 complete copies of the name, and then the 1000th letter is the sixth letter of the next name. Therefore the 1000th letter is d .

3. Night watchmen

The two watches will next agree when Granny's watch has gained twelve hours relative to Grandpa's watch. Each hour, Granny's watch gains one hour relative to Grandpa's watch, so it will take 12 hours for this to happen. At this time, both watches will show a time of 6 o'clock.

4. Suit sequence

The block of six symbols ♡ ♣ ♠ ♦ ♠ ♣ repeats every six symbols. $100 \div 6 = 16$ remainder 4. This means a block will end on the 96th symbol, so a new one will start on the 97th.

The 100th symbol will therefore be the same as the 4th and the 101st will be the same as the 5th.

Therefore, these will be ♦ ♠.

These problems are adapted from UKMT Mathematical Challenge problems (ukmt.org.uk).