# Fibonacci Numbers

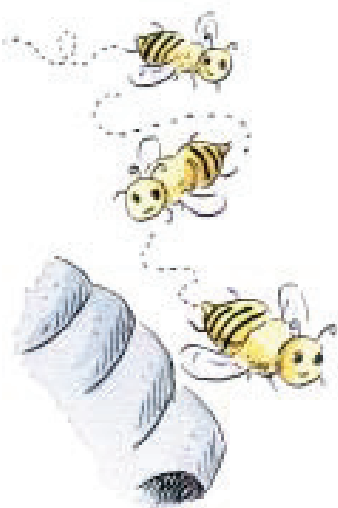One of greatest mathematicians of the Middle Ages was an Italian, Leonardo Fibonacci.

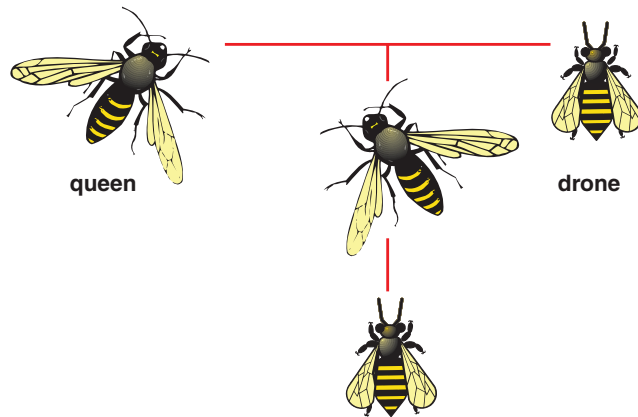Fibonacci is remembered for this problem:

A pair of rabbits is placed in a large pen.
When the rabbits are two months old, they produce another pair of rabbits.
Every month after that, they produce another pair of rabbits.
Each new pair of rabbits does the same.
None of the rabbits dies.
How many rabbits are there at the beginning of each month?

This table shows the rabbits at the beginning of the first 5 months.

| Beginning of Month | Number of Pairs | Number of Rabbits |
|:---:|:---:|:---|
| 1 | 1 | |
| 2 | 1 | |
| 3 | 2 | |
| 4 | 3 | |
| 5 | 5 | |

**1. a)** Continue the pattern for two more months.
Use different colours to show the new rabbits.
**b)** Write the number of pairs of rabbits at the beginning of each month, for the first 7 months.
These are the Fibonacci numbers.
What pattern do you see?
Explain how to find the next number in the pattern.

**2.** The Fibonacci sequence appears in the family tree of the drone, or male bee.
The drone has a mother, but no father.
Female bees are worker bees or queens.
They have a mother and a father.
The family tree of a male bee back to its grandparents is shown on the next page.

queen        drone

a) Copy the diagram. Trace the male bee's ancestors back 5 more generations.
b) Explain how you can use this pattern to find the Fibonacci numbers.

There are many patterns you can find in the Fibonacci sequence.

**3.** Write the first 15 Fibonacci numbers.
   a) What type of number is every third number?
   b) Which number is a factor of every fourth number?
   c) Which number is a factor of every fifth number?

**4.** Add the squares of the:
   2nd and 3rd terms
   3rd and 4th terms
   4th and 5th terms
   What do you notice?
   Write the next two lines of this pattern.

**5.** Research Fibonacci numbers. Make a poster to show your work.

**Reflect on the Unit**

What have you learned about whole numbers?
What have you learned about number patterns?
Write about some of the things you have learned.