

DISCUSSION FOR FIRST TUTORIAL

DATE: SEPTEMBER 20, 2010

From Thinking Mathematically (2nd edition p. 84, revised edition p. 91)

Male bees hatch from unfertilized egg and so have a mother but no father. Female bees hatch from fertilized eggs. How many ancestors does a male bee have in the twelfth generation back? How many of these are male?

When you attack this problem draw a diagram. Try to determine the answer without drawing all 12 generations. Start with determining how many ancestors there are in the previous two, three, and four generations (more if you don't quite see a pattern). You may see a connection with the sequence of the Fibonacci numbers. Once you identify the pattern it is important that you explain why you are observing this pattern happening.

Once you have answered this problem try to **Extend** a bit to make sure that you understand it. The real question is, not for just 12 generations, but can you go 100 generations back? How many ancestors does a male bee have in *all* of the last 12 generations (and not just in the 12th generation)? How many male ancestors are in all of the last 12 generations? How does your answer change if you are looking at the bee genealogy of another type of bee (e.g. where the female bee has a father but no mother)?