
The Four Color Problem

WHO AM I?:

- ▶ Katherine's Dad (Michael Filaseta)
- ▶ Professor (or teacher) at the University of South Carolina
- ▶ Mathematician

PRELIMINARIES:

- ▶ Describe what they are to do on the board (define regions).
- ▶ Give the students simple handout.
- ▶ Have them color the regions.
- ▶ Give the students not-so-simple handout.
- ▶ Have them color the regions.
- ▶ "What if I gave you something even more complicated?"

HISTORY:

- ▶ Francis Guthrie (1852) notices that he can color maps with 4 colors.
- ▶ Francis Guthrie asks his brother Frederick if this can always be done.
- ▶ Frederick Guthrie mentions the problem to his teacher, Augustus De Morgan.
- ▶ Augustus De Morgan writes to Sir William Rowan Hamilton about the problem.
- ▶ The problem continues to spread around the world.
- ▶ Alfred Kempe (1879) twenty-seven years later publishes a solution to the problem.
- ▶ Percy Heawood (1890) eleven years later finds a mistake in the solution.
- ▶ Kenneth Appel and Wolfgang Haken (1976), more than a hundred years after the problem first was considered, find a solution to the problem. Four colors suffice.
- ▶ The proof made use of computers (taking over 1000 hours on the computer).
- ▶ Computers can make mistakes too. The result has been checked and the computer programs repeated.

IF TIME PERMITS:

- ▶ Have students recall what a prime is. Make a list (2, 3, 5, ...).
- ▶ Mention the twin prime conjecture and that it is an "open" problem.
- ▶ It is known that there are infinitely many primes that are two away from a number which is either a prime or the product of two primes.

SUMMARY:

- ▶ I try to answer questions in mathematics that haven't been answered yet.
- ▶ When I do, I travel, give talks (about the answers), and write a paper.
- ▶ I send it to a journal.
- ▶ The paper appears in a journal (or book) so others can learn the answers too.
- ▶ I read what answers to questions others have done in the journals (books).