Sudoku, Anyone?

I once knew a fellow teacher who was completely convinced of two things; firstly, that he hated mathematics, and secondly, that he enjoyed sudokus. The only possible conclusion was that sudukos and maths did not overlap at all. I remember him telling me earnestly one day, ‘You see, Jonny, you could replace the numbers with colours, and sudokus would work just as well.’ I was struck speechless by the narrow view of mathematics this revealed.

To be fair to my colleague, there is a national paper that advises sudoku tacklers that ‘no mathematics is required.’ What the paper means is that ‘no arithmetic is required’. Yes, the numbers can be replaced with colours, but is the logical thinking that then ensues not at least partly mathematical in nature? Mathematics is about pattern and structure and reasoned argument as well as arithmetic, and these areas are tested well by a sudoku. As with any good puzzle, sudokus have spawned a myriad variations, and I must confess to loving the Killer Sudoku - a deeper logic is needed to approach these, that feels much more like real maths to me. We can argue about how profound the mathematics required to solve a sudoku is. Many mathematicians I have spoken to say they enjoyed the first few puzzles they tried, but the pleasure became superficial in the long run. Compare the thrill gained from polishing off a routine Sudoku with the thrill that follows from doing real maths, from coming up with a fresh conjecture and finding a proof for it that may not be straightforward, and there is not much competition.

I do use the occasional Sudoku with my students. It is a good way to demonstrate, for example, proof by contradiction. A particular square could be, let’s say, a 5 or a 1. Suppose that the right choice is the 5. But then this square here must be a 4, and this a 3, and this must be a 7, but then – we

have two 7s in the same row. So our initial choice of 5 must be the wrong one, and we must therefore choose the 1 instead. If anyone knows of a simpler demonstration of proof by contradiction, I would like to hear it. When one starts out on a suduko, there is a step of faith, that the compiler has produced something consistent. The compiler writes ’Gentle, or ‘Fiendish’ at the top (I sometimes wonder how many hours across the nation would be wasted if *The Times* in error one day published a suduko containing an internal contradiction, or one with two or more possible answers, that is, one that could never be completed). When one begins work on a mathematical proof, however, there is no telling how easy it will be, or even whether a proof exists. The easiest thing to state may be a devil to get anywhere with; the twin prime conjecture, for example. And if you do get somewhere with that? Ah, then you will be remembered, not for solving the same suduko as millions of others, but for doing something unique.

Jonny Griffiths, jonny.griffiths@ntlworld.com