If I could teach the world just *one* thing
by Marcus du Sautoy

I would like to excite another kid like my teacher excited me about mathematics. If I was going to choose one thing that I'd like to teach the world about mathematics, I think it'd be the proof that there are infinitely many prime numbers.

I think this is really the beginnning of mathematics -this analytic subject- the amazing ability to be up to prove beyond any doubt that the primes -indivisible numbers like 17, 19, which can't be divided by any other numbers- that they never run out, that there are infinitely many of these numbers.

Prime numbers, I think, are the most interesting numbers in the whole of mathematics. Take a number like 15 -that's not a prime number because I can divide it by 3 and 5- but once I get down to 3 and 5 I can't divide these any further.

Any number can be divided and divided until you get to these indivisible numbers so you can't divide any further. They're so important because using the primes by multiplying together you get all numbers. Out of numbers you have the whole of mathematics; from mathematics you move to the whole of science. So in a sense there are right down there at the foundation of the whole of the world of science.

The beautiful thing about Euclid's proof that they are infinitely many prime numbers is that it's surprising, yet when you see it it's actually quite a simple argument. I mean, suppose for example I want to show that the numbers in my football team -we had 2 up to 43-, suppose those are all the prime numbers there are. Perhaps you can build all other numbers by multiplying the primes in our football team together.

Euclid came out with this clever idea to show why there must be a number which cannot be built out of those primes from 2 to 43. What he did was to take all our football shirts, multiply them together so he did 2 times 3 times 5 times 7 all the way up to 43.

Then it was his act of genius. What he did was to add one to this number. Now can this new number that Euclid built be built out of any of the primes in our football team? No, because if you divide that number of Euclid's by any of the numbers in our football team you always get a remainder 1. So Euclid found a number which isn't built out of any of the primes in our football team. So there must be another football shirt with a different prime number which is helping you to built that number that Euclid built.

I think there is a real problem in school so as the way mathematics is taught because there aren't enough teachers showing you how much wonderful mathematical music there is out there. There are moments when I score a goal –well, you know the elation that breaks through hours of toiling away- and suddenly there it goes in. And it's the same with mathematics: you work a way out of this thing and suddenly you see how to do it and that is the biggest buzz-out.