Many problems in number theory are equivalent to determining all of the rational points on some curve or family of curves. In general, finding all the rational points on any given curve is a challenging (even unsolved!) problem.

The focus of this talk is rational points on so-called Erdős-Selfridge curves. A deep conjecture of Sander, still unproven in many cases, predicts all of the rational points on these curves.

I will describe work-in-progress proving new cases of Sander's conjecture, and sketch some ideas in the proof. The core of the proof is a 'mass increment argument,' which is loosely inspired by various increment arguments in additive combinatorics. The main ingredients are a mixture of combinatorial ideas and quantitative estimates in Diophantine geometry.