The classical problem in the theory of dynamical systems is to take a rational map $f(z) = F(z)/G(z)$ and to describe the behavior of points under iteration

$$f^n(z) = f \circ f \circ \ldots \circ f(z).$$

The $f$-orbit of a point $b$ is the set of images of $b$ under the iterates of $f$,

$$\text{Orbit of } b = \{ b, f(b), f^2(b), f^3(b), \ldots \}.$$ 

The points with finite orbit are called \textit{preperiodic points}. They play a particularly important role in the dynamics of $f$. For a number theorist, it is natural to take $F(z)$ and $G(z)$ to be polynomials with integer coefficients and to study the orbits of rational numbers $b$. In this talk I will survey some of the known results and some of the outstanding conjectures related to this number-theoretic view of dynamics. Typical problems include:

1. How many rational numbers can be preperiodic points?
2. For which rational maps $f$ can the orbit of a rational number $b$ contain infinitely many integers?

\textbf{Abstract:}