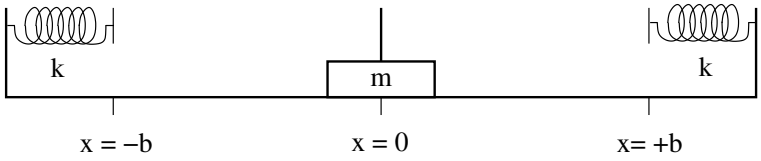
## [mex270] Anharmonic oscillator of sorts

A block of mass $m$ with a thin but sturdy mast is bouncing back and forth between two springs of stiffness $k$ mounted at the ends of an airtrack. Contact between block and springs begins and ends at positions $x = \pm b$.
(a) Neglect friction and dissipation during contact with springs. The block then undergoes periodic motion at constant energy $E$. Find the period $\tau$ of the motion as a function of $E$.
(b) Assume the presence of a constant kinetic frictional force $f_k$ on the stretch between $-b$ and $+b$ of the track. Now the block, launched at $x = 0$ to the right with initial velocity $v_i$, comes to rest at some point on the track. Plot the final position $x_f$ versus initial velocity $v_i$ in a graph. Use scales in natural units of your choice along both axes.




**Solution:**