The selection problem receives $n$ distinct numbers and an integer $i$, and returns the element of rank $i$. Suppose instead you receive $i_1, i_2, ..., i_k$. You could apply linear time selection $k$ times, for a total time of $\Theta(nk)$.

Design an algorithm that is more efficient on average, when the indices are randomly distributed. The target is $\Theta(n \lg k)$, but any algorithm that is $o(nk)$ is good. Analyse the time of your algorithm.