Let $R$ be the region bounded by the $y$-axis, the line $y = 1$, and $y = \sin x$, with $0 \leq x \leq \pi/2$. Suppose that $R$ is rotated around the $y$-axis to form a solid. The $x$- and $y$-axes are measured in feet and the solid is filled with water (62.5 lbs/ft$^3$). Determine the total potential energy released if all the water drains down to the origin.

You may leave your final answer in the form of an integral, provided it is expressed entirely in terms of the integration variable and physical constants. Otherwise, you must show work for all the usual steps.