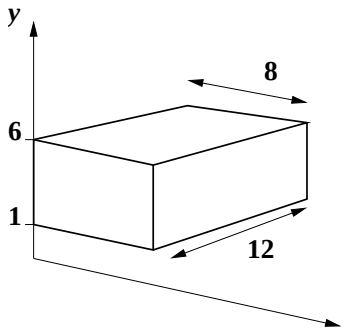
**MATH 116-023 QUIZ 7** / 9 Mar 2006 Name:_____

**1.** A somewhat questionable model for the mass distribution of a truck or SUV is the following: the SUV is a rectangular solid 8 ft wide by 5 ft tall by 12 ft long, 1 ft above the ground (because of its wheels, of course—note that this essentially says that the SUV extends from the ground to a height of 6 ft, but has zero mass for the lowest 1 ft). This is shown in the figure to the right. Suppose that the density of the truck is approximately $\delta(y) = \frac{20}{3}(6-y)$ lbs/ft$^3$, where $y$ is the distance up from the ground. If the weight of the truck is 8000 lbs, find its $y$-center of mass. (4 points)




**2.** Find the work required to empty a cylindrical tank, standing on one of its circular ends, with radius $r = 2$ m and height $h = 4$ m if it is initially half full of water (mass 1000 kg/m$^3$; use $g = 9.8$ m/s$^2$). (4 points)

**3.** True or false (explain in one sentence): If $f(t)$ is a density function such that $f(t)\Delta t$ gives the fraction of the U.S. population having taken between $t$ and $t+\Delta t$ years of math classes, then $\int_{13}^{\infty} f(t)\,dt \geq 0.50$. (2 points)