An object falling in air satisfies the ordinary differential equation gotten from N2:

$$m\frac{dv}{dt} = -mg - bv$$

The equation has three dimensioned parameters (*m, g,* and *b*) and one dimensioned variable (*v*).

(a) Use the fixed dimensioned parameters in this equation to create "natural" scales of mass, length, and time, M_0, L_0, and T_0.

(b) Using these scales, create a natural scale for the velocity, V_0.

(c) Define a dimensionless velocity V by the equation $V=v/V_0$.

(d) Rewrite the original equation for *v* as an equation for *V*. This equation should contain no parameters that have any dimensions (or perhaps only combinations of parameters that have no dimensions).