Problem 101B

The pressure and density of the atmosphere at the surface of the planet Venus are respectively $9.26 \times 10^6\ kg/m\ s^2$ $(91.4\ atm)$ and $63\ kg/m^3$ and we shall denote these values by p_s and ρ_s. Up to an altitude of $40\ km$ the atmosphere behaves adiabatically; that is to say $p = C\rho^\gamma$ where p, ρ denote pressure and density, γ is the ratio of specific heats ($\gamma = 1.2$ approximately for the Venetian atmosphere) and C is a constant. Assuming the acceleration due to gravity, g, has a constant value of $8.7\ m/s^2$ find

1. An expression for the pressure, p, as a function of the altitude, y, and the constants p_s, ρ_s, γ and g.

2. The pressure at an altitude of $30\ km$.