Quiz 7: Misc

1. Two objects, A and B, are submersed in a liquid of density ρ_s at depths of h_A and h_B, respectively. The pressure above the liquid's surface is P_0. What is the difference in pressure experienced by the two objects?

- $\rho_s g(h_A - h_B) + \frac{1}{2}P_0$
- $\rho_s g(h_A - h_B) + 2P_0$
- $\rho_s g(h_A - h_B)$
- $P_0 + \rho_s g(h_A - h_B)$

2. Estimate the pressure exerted on your eardrum due to the water above when you are swimming at the bottom of a pool that is $5.0\,\text{m}$ deep. (Note $\rho_{\text{water}} = 1000\,\text{kg/m}^3$).

- $4.9 \times 10^4\,\text{Pa}$
- $1.88 \times 10^5\,\text{Pa}$
- $2.73 \times 10^6\,\text{Pa}$
- $3.76 \times 10^5\,\text{Pa}$

3. Simple molecules can be modeled reasonably well as mass-spring systems. For a CO molecule, one would deduce experimentally $k \approx 1800\,\text{N/m}$. If a CO molecule vibrates with an amplitude of $8.3 \times 10^{-12}\,\text{m}$, what is its maximal kinetic energy?

- $6.2 \times 10^{-20}\,\text{J}$
- $1.7 \times 10^{-16}\,\text{J}$
- $6.2 \times 10^{-14}\,\text{J}$
- $1.7 \times 10^{-31}\,\text{J}$

4. Two cylinders A and B have the same volume and contain the same number of moles of a monatomic ideal gas. It is found that the pressure in vessel A is twice the pressure in vessel B. What is the relation between the temperatures of the vessels?

- $T_A = 2T_B$
- $T_A = T_B$
- $T_A = 0.5T_B$
- $T_A = 4T_B$