

CL21\_Q1. How are the energy values of a quantum mechanical oscillator fundamentally different from the energy values of a classical oscillator?

CL21\_Q2. The energy of a linear harmonic oscillator in the third excited state is 0.1 eV. Find the frequency of the oscillator.

CL21\_Q3. Sketch the wave functions and probability densities for the first two quantum states of quantum harmonic oscillators.

CL21\_Q4. A lithium atom, mass  $1.17 \times 10^{-26}$  kg, is vibrating with simple harmonic motion in a crystal lattice, where the force constant  $k$  is 64.0 N/m. (a) what is the ground state energy of this system in eV? (b) What would be the wavelength of the photon that could excite this system to the  $n = 1$  level?

CL21\_Q4. Establish Schrodinger's equation of a linear harmonic oscillator and write its solution.