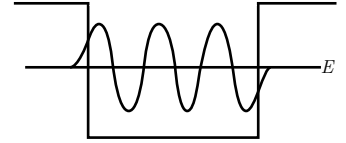


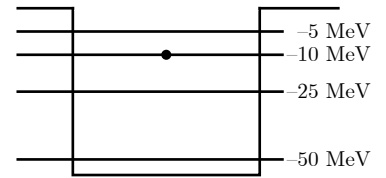
Finite Potential Wells

1. A particle in a potential well is in the $n = 3$ quantum state. How many peaks are there in the probability density $P(x) = |\psi(x)|^2$?

2. What is the quantum number for this particle in a finite potential well? How can you tell?



3. The diagram shows a neutron occupying one energy level in a nucleus.
 - a. How many possibilities are there for the emission of a gamma-ray photon?



- b. What is the energy, in MeV, of each gamma-ray photon that could be emitted?

4. Quantum mechanical effects for electrons become significant at the size of a few nanometers. The size of a nucleus is on the order of femtometers. How do you expect the spacing between the energy levels of an electron in a quantum well device to compare to the spacing of the energy levels of a neutron in a nucleus? Explain.

5. Rank in order, from largest to smallest, the penetration distances η_1 to η_2 of the electron wave functions corresponding to these three energy levels. Explain.

