Solution

3. Compare the energy $E_{1,finite}$ of the lowest state of a finite well with the energy $E_{1,infinite}$ of the lowest state of an infinite well of the same width L.

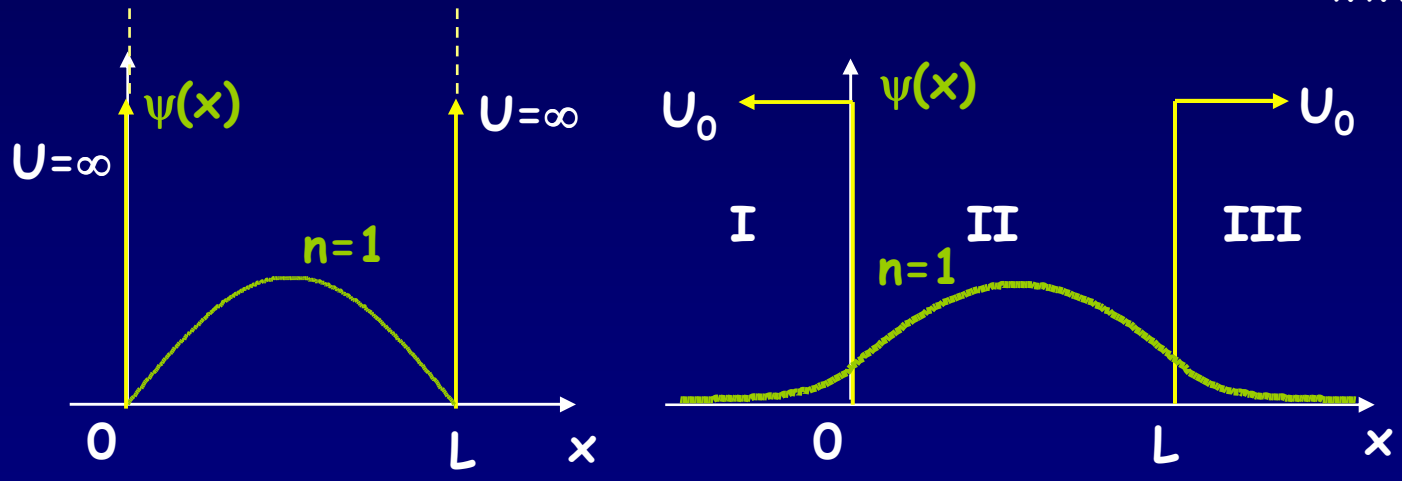
a. $E_{1,finite} < E_{1,infinite}$

b. $E_{1,finite} > E_{1,infinite}$

c. $E_{1,finite} = E_{1,infinite}$

Look at the wavefunctions for the two situations:

www.falstad.com/qm1d



The wavelength in the finite well is longer, because it is not required to go to zero at x = 0 and x = L (it "leaks" out a little). Thus, the momentum $p = h/\lambda$ is smaller, and so is the energy. That's true in general; the less one confines an object, the lower its energy can be - a consequence of the Heisenberg Uncertainty Principle.

Kruse Demo (wvfn)