

For the following four topics include a sketch the potential and the wavefunctions with your description in words
The transmission and reflection coefficients for a potential step up
The transmission and reflection coefficients for a potential step down
The transmission and reflection coefficients for a potential well (down)
The transmission and reflection coefficients for a potential barrier (up)
Why study the square well?
Sketch the first four energy eigenfunctions for the square well in x-space
Sketch the corresponding first four probability densities for the square well in x-space
Sketch the first four energy eigenfunctions for the square well in p-space
Sketch the first four energy eigenfunctions for the square well in E-space
Obtaining the eigenfunctions for the square well
Obtaining the eigenenergies for the square well
The past, present, and future time evolution of a 1d free-particle Gaussian wave packet
The spreading of a Gaussian wave packet and the dispersion of empty space for matter waves
The eigenstates of momentum for the one-dimensional free particle
The phase velocity and the group velocity for the one-dimensional free particle
The minimum uncertainty state for the free particle
Why study the harmonic oscillator?
Sketch the first four energy eigenfunctions for the harmonic oscillator in x-space
Sketch the corresponding first four probability densities for the harmonic oscillator in x-space
Sketch the first four energy eigenfunctions for the harmonic oscillator in p-space
Sketch the first four energy eigenfunctions for the harmonic oscillator in E-space
Obtaining the eigenenergies for the harmonic oscillator via the separation of variables
Obtaining the eigenfunctions for the harmonic oscillator via the separation of variables
Charles Hermite, the Hermite equation, and the Hermite polynomials
Factoring the Hamiltonian for the harmonic oscillator
The ladder operators for the harmonic oscillator in Hilbert space
The ladder operators for the harmonic oscillator in position space
Obtaining the eigenenergies for the simple harmonic oscillator using the ladder operators
Obtaining the eigenfunctions for the simple harmonic oscillator using the ladder operators
The minimum uncertainty state for the harmonic oscillator
The zero-point energy and the zero-point motion of the harmonic oscillator