The Finite Square Well

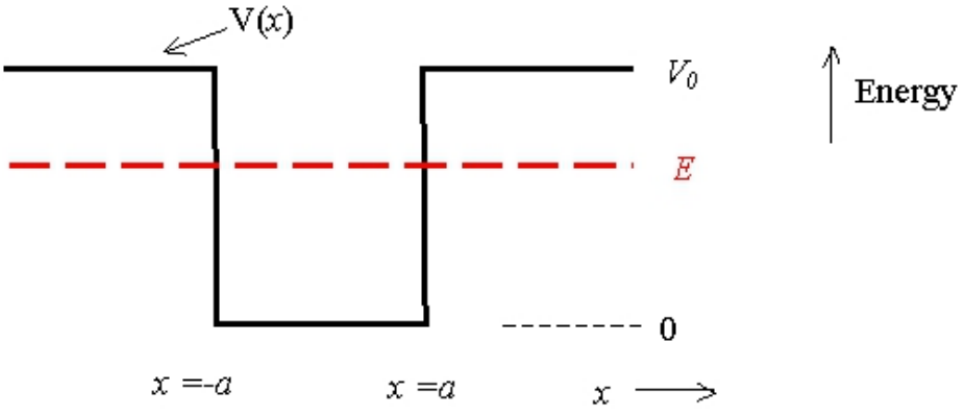
This graph (solid black line) represents the potential energy of a particle at any position. This is known as the "finite square well" problem, and the potential function is a piecewise function

$$V(x) = \begin{cases} V_0 & x < -a \\ 0 & -a < x < a \\ V_0 & x > a \end{cases}$$

The dashed line represents the total energy E of the particle. We don't know the value(s) of E yet; we have to find them. We also don't yet know the form of the wave function $\phi(x)$. We have to find the correct form. For this piecewise potential function, the wave function has a different form in each of the regions. Solve the eigenvalue equation $\hat{H}\phi(x) = E\phi(x)$ in the region assigned to your group. Afterwards, we will have a group discussion to decide how to make sure that the total wave function over the entire space is appropriately continuous and otherwise well-behaved.

1. Region 1: $x < -a$
2. Region 2: $-a < x < a$
3. Region 3: $x > a$

Your group will discuss one of the regions: if you finish early, move on to another, swapping roles of taskmaster, cynic, & recorder. Consider whether or not your answer would be different if $E > V_0$.



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