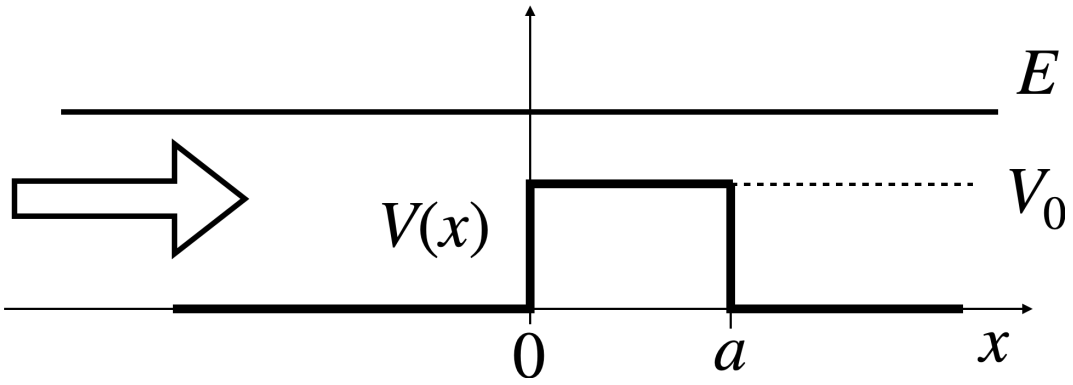
PHYS2063 Wave Physics Homework #21 Due Tuesday 15 Nov 2022

This homework assignment is due at the start of class on the date shown. You may submit a PDF of your solutions to the Canvas page for the course, or bring a paper copy to class.

In class we analyzed quantum mechanical penetration through a square barrier, that is, for the energy E less than the barrier height V_0. Now analyze the same problem, but for $E > V_0$:

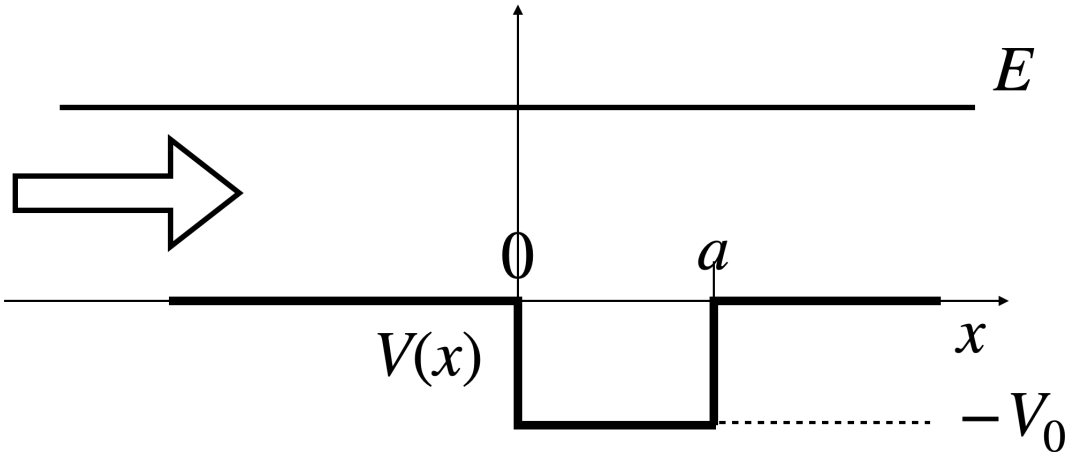


Find the transmission coefficient T and plot it as a function of E/V_0. I showed you how to make the plot for barrier penetration using

$$V_0 = g\,\frac{\hbar^2}{2ma^2} \qquad \text{where} \qquad g = 16$$

but you can use a different value for g if you want. In any case, also plot the result for $E < V_0$ and show that the two curves "connect."

Also analyze the case of transmission past a "quantum well" of the form



and plot the transmission coefficient as a function of energy $E > 0$.

In both cases, there are values of the energy for which there is perfect transmission, that is, $T = 1$. What is the physical significance of these energies? That is, what is the property of the particle wave that leads to perfect transmission?