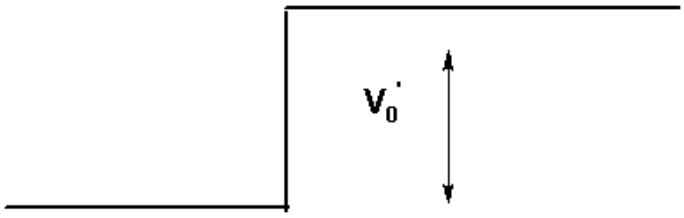
European Master on Nuclear Fusion Science and Engineering Physics
Introductory Atomic and Molecular Physics. Problems (2).

1. A particle of mass m and energy E' is moving in the one-dimension barrier potential shown in the figure



For $E' > V_0'$ find:

(a) The reflection probability

(b) The probability of finding the particle at $x > 0$.

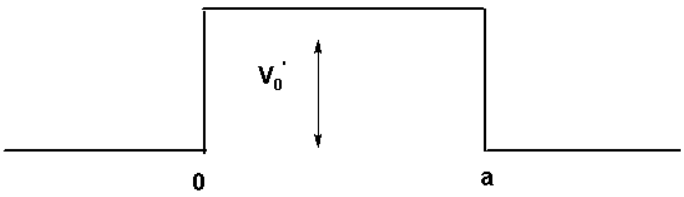
For $E' < V_0'$ derive equations for:

(a) The transmission probability T.

(b) The reflection probability of R.

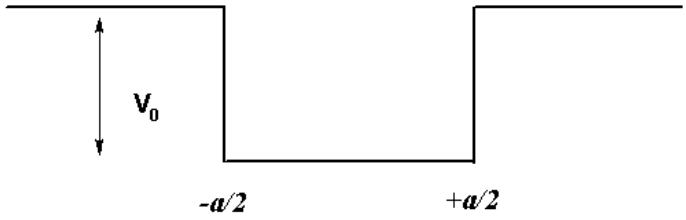
(c) $T + R$

2. Consider the repulsive barrier of the figure



Obtain an equation for the transmission probability of a free particle of mass m and energy E'.

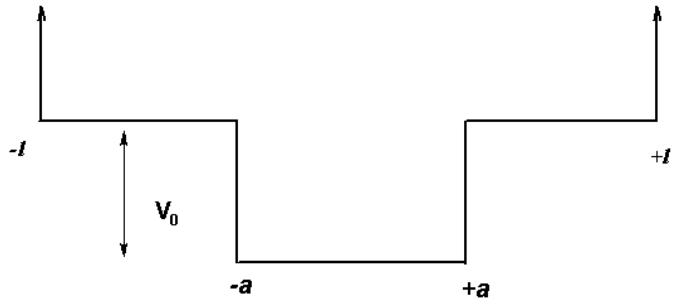
3. A particle of mass m is confined in the potential well of the figure



   (a) Determine the energy levels for the bound states of this system ($E < V_0$).

   (b) Write the normalized wave function for the ground state when $V_0 = 5h^2/8ma^2$.

4. Find the solutions of the time independent Sshrödinger for the potential of the figure



5. A particle of mass m is confined in a 1-D potential box with a infinite barrier at $x = 0$ and a finite barrier at $x = b$. Determine the energies of the bound states of this system.