**Comment on reflection/transmission at a potential barrier:**

For the case of a particle moving from a region with potential equal to 0, with energy E> U across a single barrier of height U into a region where the potential = U, it is NOT TRUE
that

R + T = 1

What IS true is that *particle flux* is conserved. Particle flux is measured by the group velocity ( h-bar k/m) times the modulus squared of the wavefunction, i.e. apart from the same constants it is $k_1 * |A|^2$ for the incident beam and ( $- k_1 * |B|^2$ ) for the reflected beam (if flux is measured to the right i.e. towards x > 0) , but $k_2 * |C|^2$ for the transmitted beam.

Thus the condition is $k_1 * |A|^2 = k_1 * |B|^2 + k_2 * |C|^2$

Dividing through by this becomes

R + T* $k_2/k_1$ = 1

Remember that $k_1{}^2$ = [ 2m/(h-bar)2* E ] and $k_2{}^2$ = [ 2m/(h-bar)2 * (E – U ) ]

Note if the particle tunneled through and came back out into a region U =0 as in the finite potential well problem, then $k_2 = k_1$
and R + T = 1