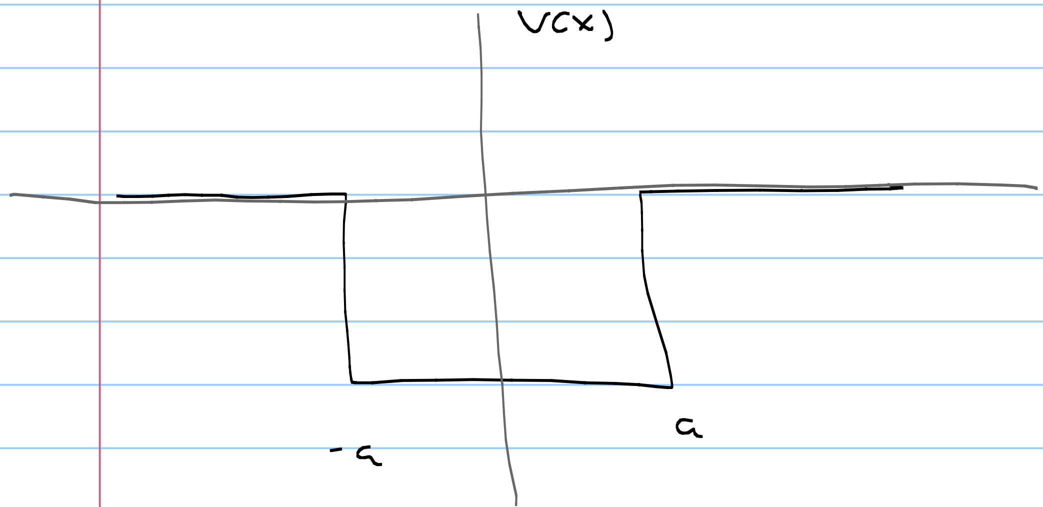
2_20_08

Note Title 2/20/2008



$x < -a$

$$\psi(x) = Ae^{ikx} + Be^{-ikx}$$

where $\boxed{k = \sqrt{2mE}/\hbar}$

$-a < x < a$ $\quad V(x) = -V_0$

$$\psi(x) = C\cos(\ell x) + D\sin(\ell x)$$

where $\boxed{\ell = \sqrt{2m(E+V_0)}/\hbar}$

$x > a$ (No incoming wave from $+\infty$)

$$\psi(x) = Fe^{ikx}$$

4 BC

1 $$A e^{-ika} + B e^{ika} = -C \sin(la) + D \cos(la)$$

2 $$ik\left[A e^{-ika} - B e^{ika}\right] = l\left[C \cos(la) + D \sin(la)\right]$$

3 $$C \sin(la) + D \cos(la) = F e^{ika}$$

4 $$l\left[C \cos(la) - D \sin(la)\right] = ik F e^{ika}$$

After lots of Algebra

$$B = \frac{i \sin(2la)}{2kl} (l^2 - k^2) F$$

$$F = \frac{e^{-2ika} A}{\cos(2la) - i \, (k^2 + l^2)/2kl \, \sin(2la)}$$

$$\Rightarrow T^{-1} = 1 + \frac{V_0}{4E(E+V_0)} \sin^2\left(\frac{2a}{\hbar}\sqrt{2m(E+V_0)}\right)$$