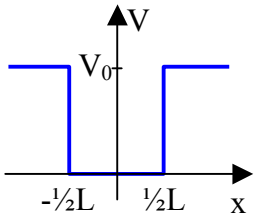
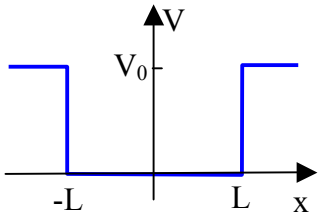
1. The diagram below shows two finite square wells. How would you expect the energy levels in (b) compare to the levels in (a)?

(a)

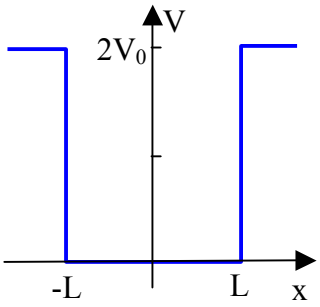


(b)

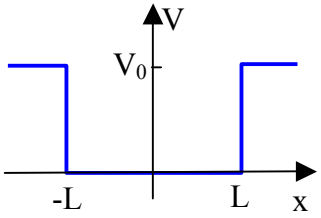


2. Consider the two finite square wells below. How would you expect the energy levels in (b) compare to the levels in (a)? Which will be larger?

(a)

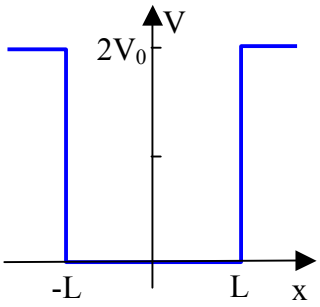


(b)

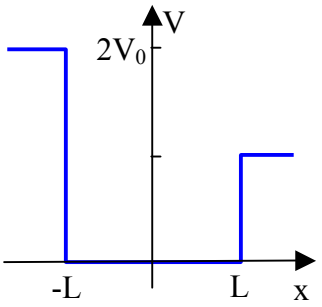


3. Consider the two finite square wells below. How would you expect the energy levels in (b) compare to the levels in (a)? Which will be larger? Sketch ψ(x) for the first three levels in (b).

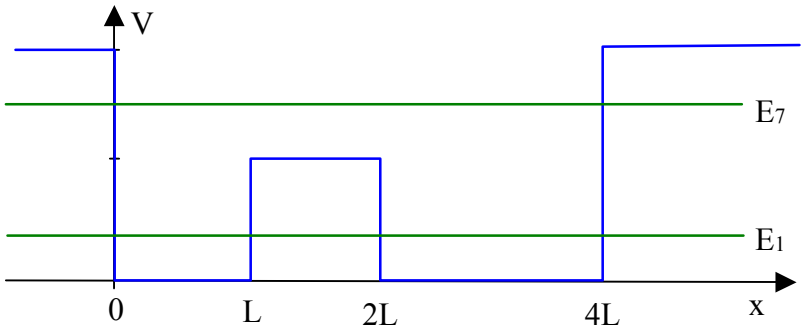
(a)



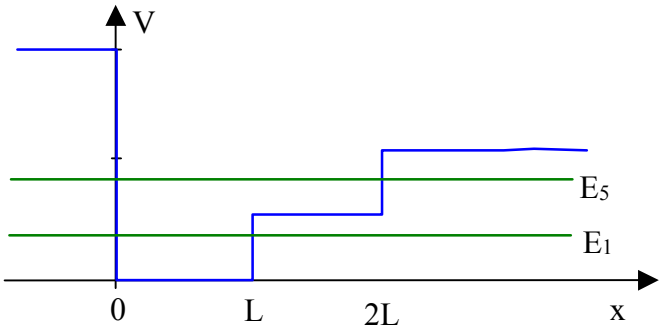
(b)



4. Sketch ψ(x) for the following potential well at the indicated energy levels.

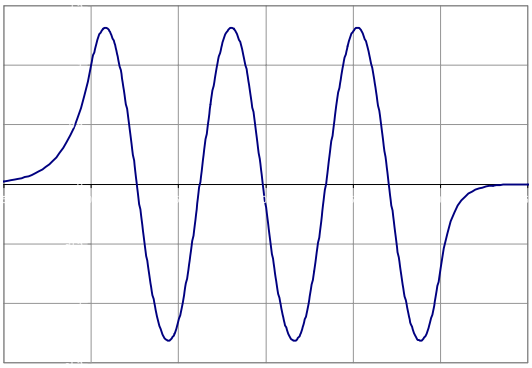


5. Sketch ψ(x) for the following potential well at the indicated energy levels.

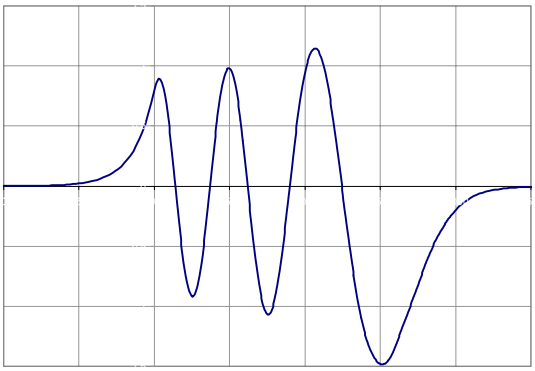


6. Sketch the V(x) for the following ψ(x). Identify n, the energy level.

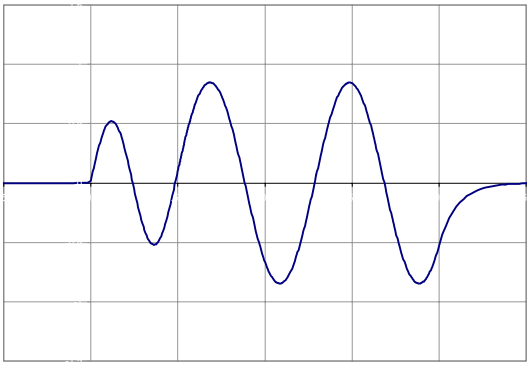
(a)



(b)



(c)



7. For $\psi_3(x)$ in the infinite square well potential, determine $\langle x \rangle$, $\langle x^2 \rangle$, and σ_x. Use MAPLE if you wish.

8. For $\psi_3(x)$ in the infinite square well potential, determine $\langle p \rangle$, $\langle p^2 \rangle$, and σ_p. Use MAPLE if you wish.

9. For $\psi_3(x)$ in the finite square well potential, determine $\langle x \rangle$, $\langle x^2 \rangle$, and σ_x. Use MAPLE if you wish. Take $V_0 = 8$ eV, L = 1 nm, $m_e = 0.511$ MeV, and E = 2.573490 eV.

10. For $\psi_3(x)$ in the finite square well potential, determine $\langle p \rangle$, $\langle p^2 \rangle$, and σ_p. Use MAPLE if you wish. Take $V_0 = 8$ eV, L = 1 nm, $m_e = 0.511$ MeV, and E = 2.573490 eV.

11. For $\psi_2(x)$ in the simple harmonic oscillator potential, determine $\langle x \rangle$, $\langle x^2 \rangle$, and σ_x. Use MAPLE if you wish.

12. For $\psi_2(x)$ in the simple harmonic oscillator potential, determine $\langle p \rangle$, $\langle p^2 \rangle$, and σ_p. Use MAPLE if you wish.

13. Consider the step potential as shown below. Imagine that a beam of particles comes from the right instead of from the left as considered. Find expressions for R and T in this case.