Quantum Mechanics
Physics 237

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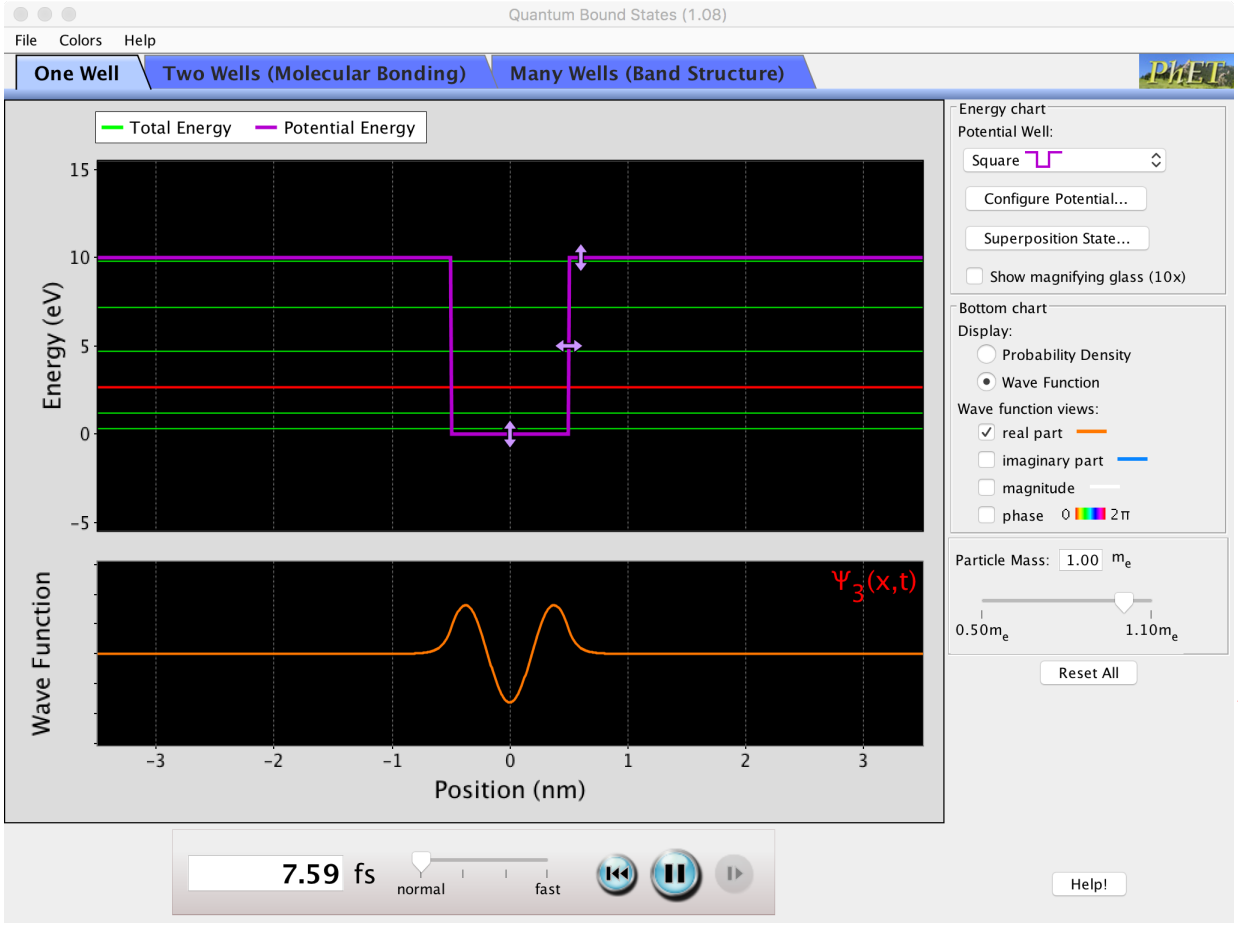
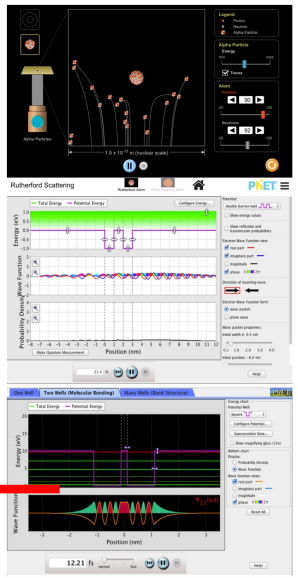
Explore properties of wavefunctions.



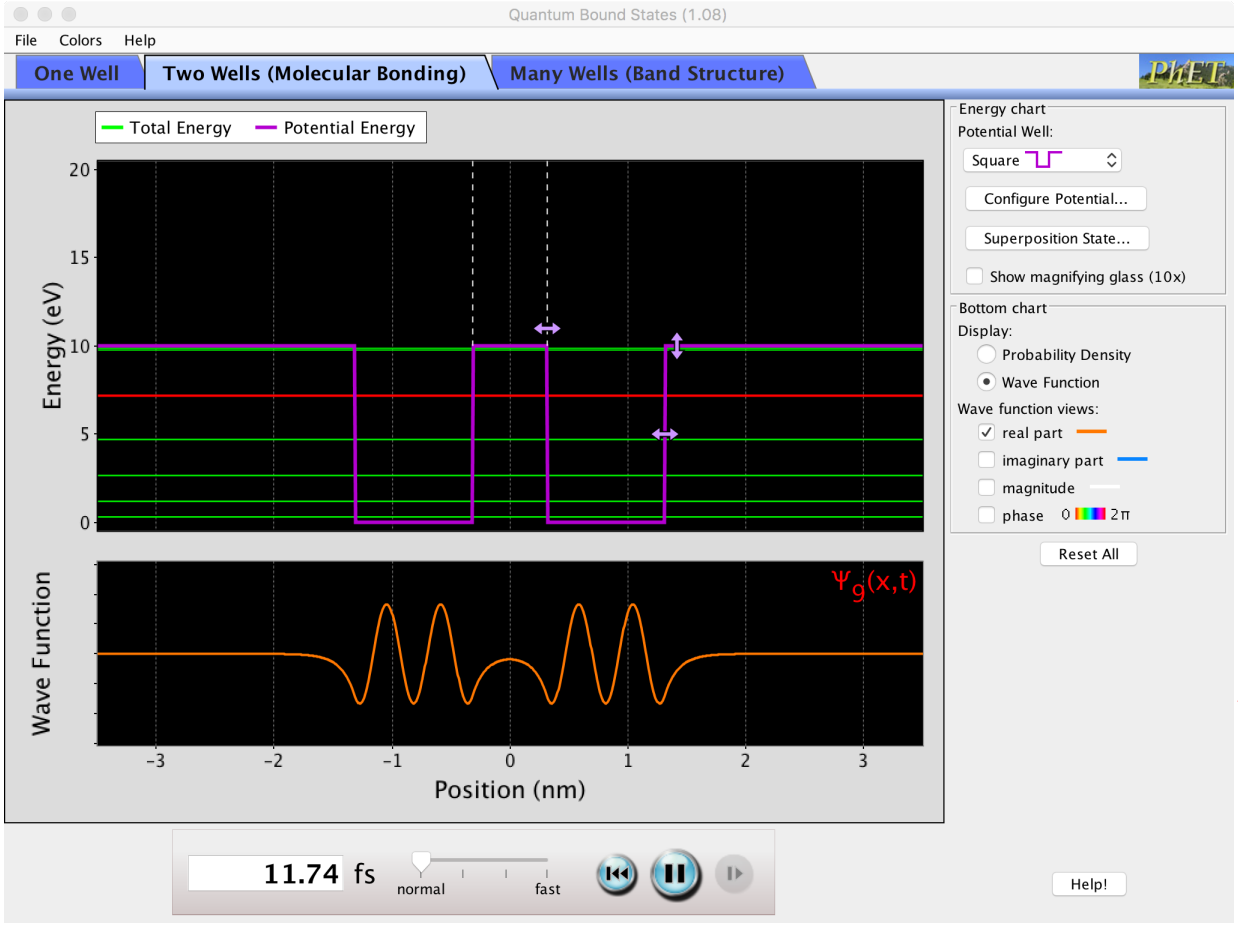


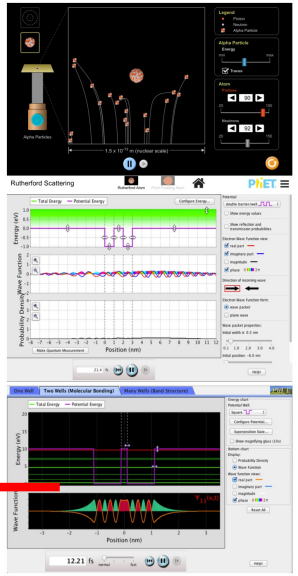
How did Rutherford figure out the structure of the atomic nucleus without looking at it? Simulate the famous experiment in which he disproved the Plum Pudding model of the atom by observing alpha particles bouncing off atoms and determining that they must have a small core.

Watch quantum "particles" tunnel through barriers. Explore the properties of the wave functions that describe these particles.

Explore the properties of quantum "particles" bound in potential wells. See how the wave functions and probability densities that describe them evolve (or don't) over time.

Explore properties of wavefunctions.





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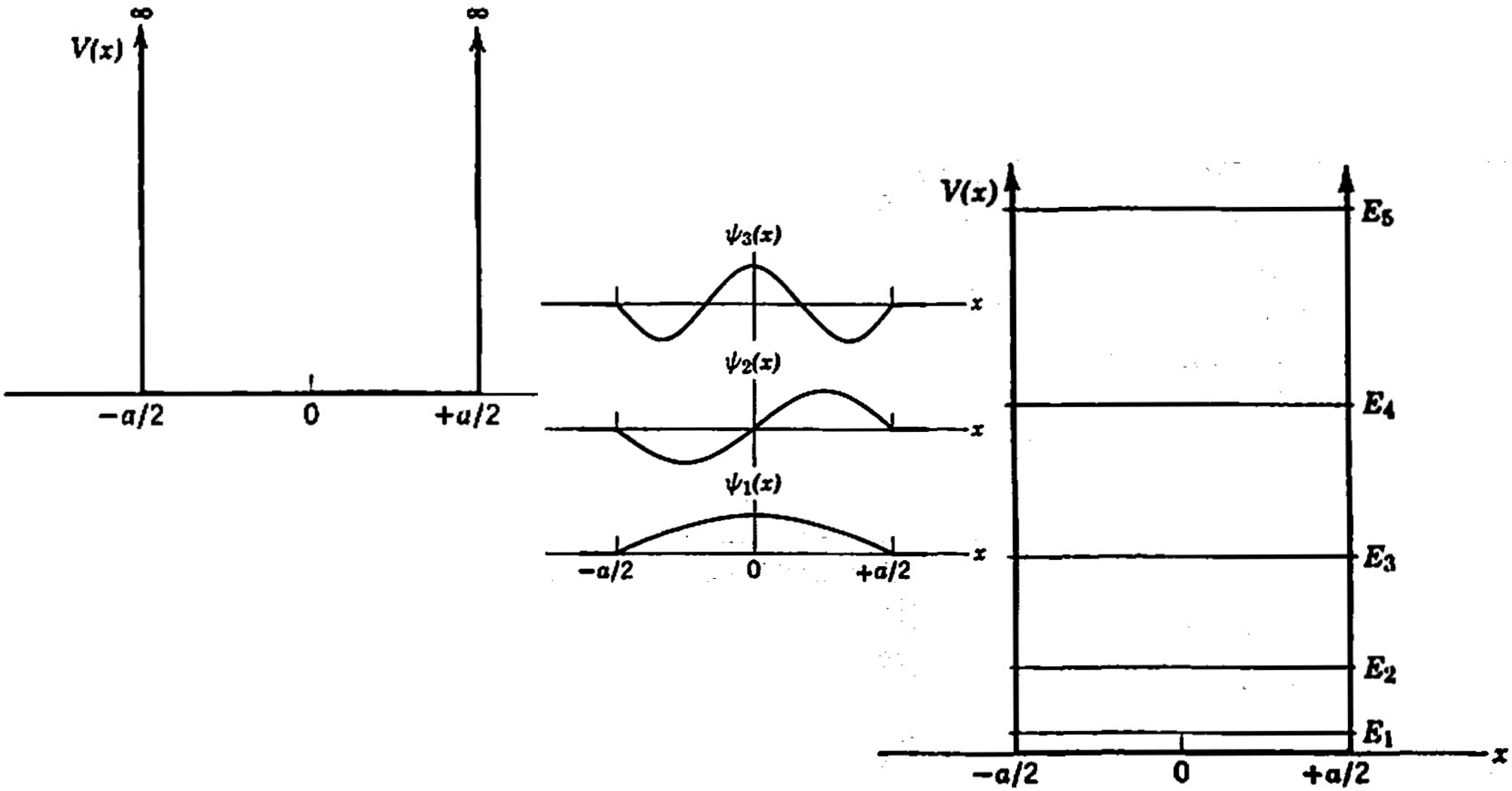
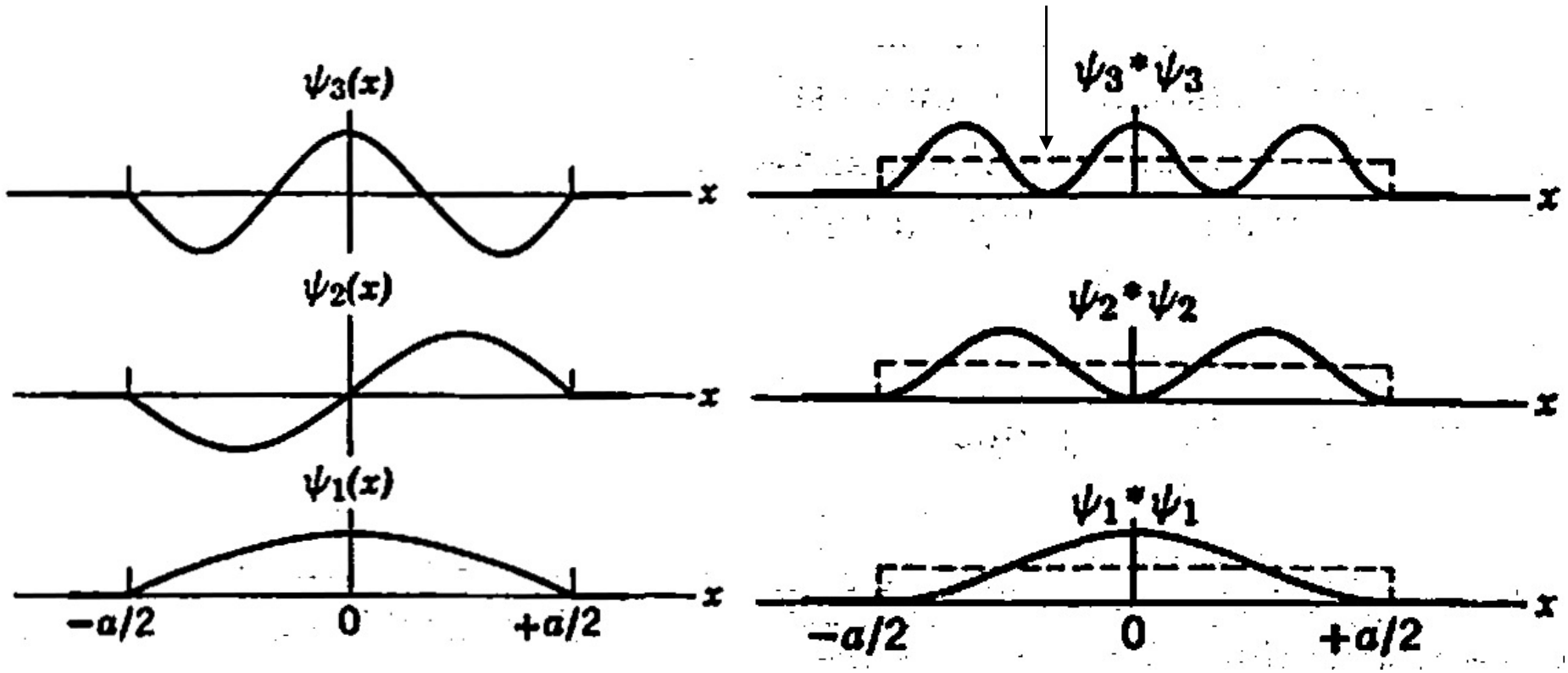
The infinite well.



Solutions in the infinite well.

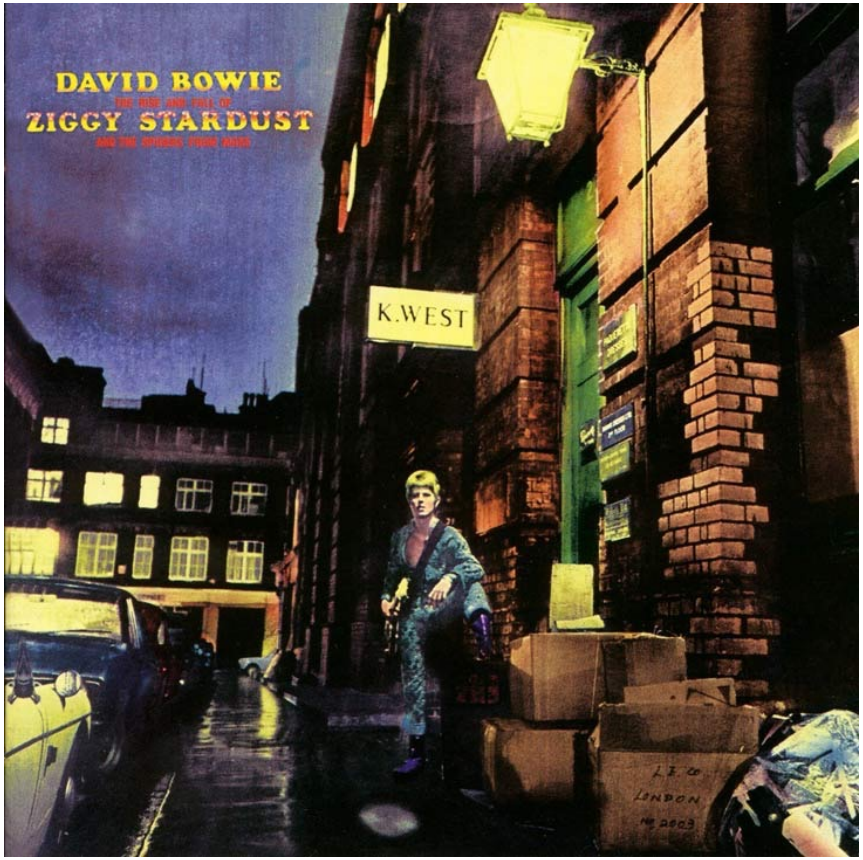
Classical predictions.



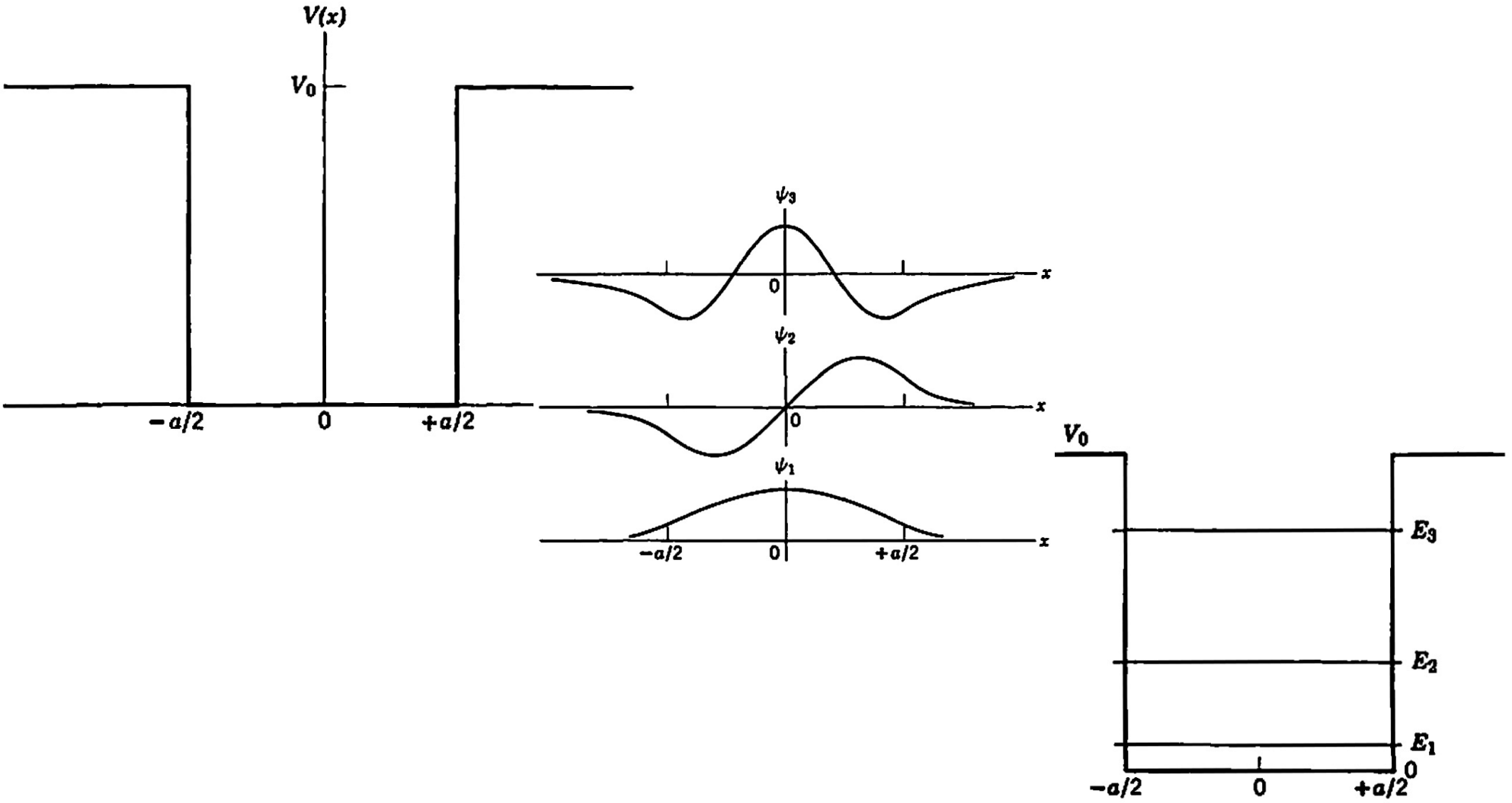
4 Minute 42 Second Intermission.

- Since paying attention for 1 hour and 15 minutes is hard when the topic is physics, let's take a 4 minute 42 second intermission.

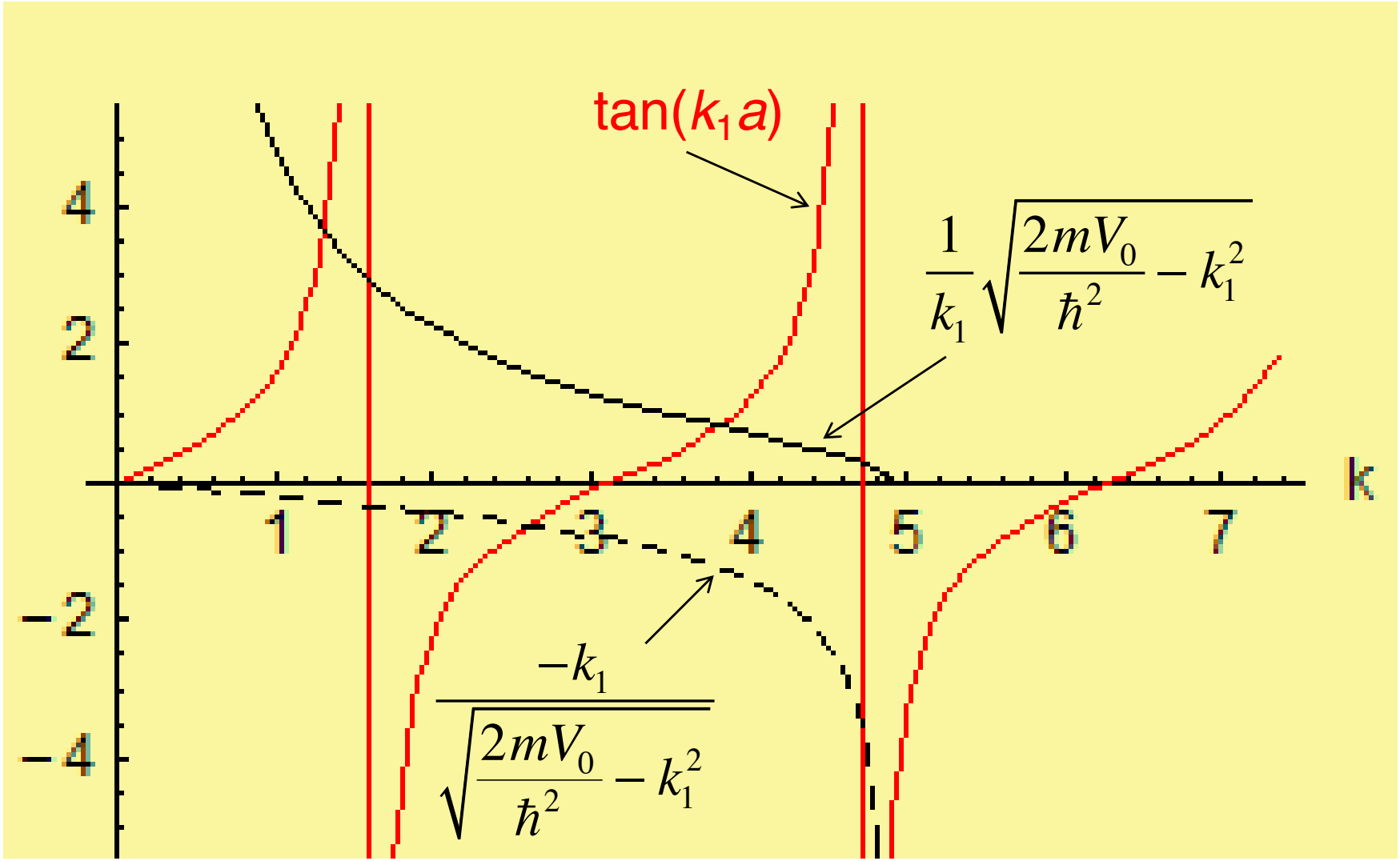
- You can:
  - Stretch out.
  - Talk to your neighbors.
  - Ask me a quick question.
  - Enjoy the fantastic music.



Finite well.



Finding eigen values.
$V_0 = 12, a = 2.$



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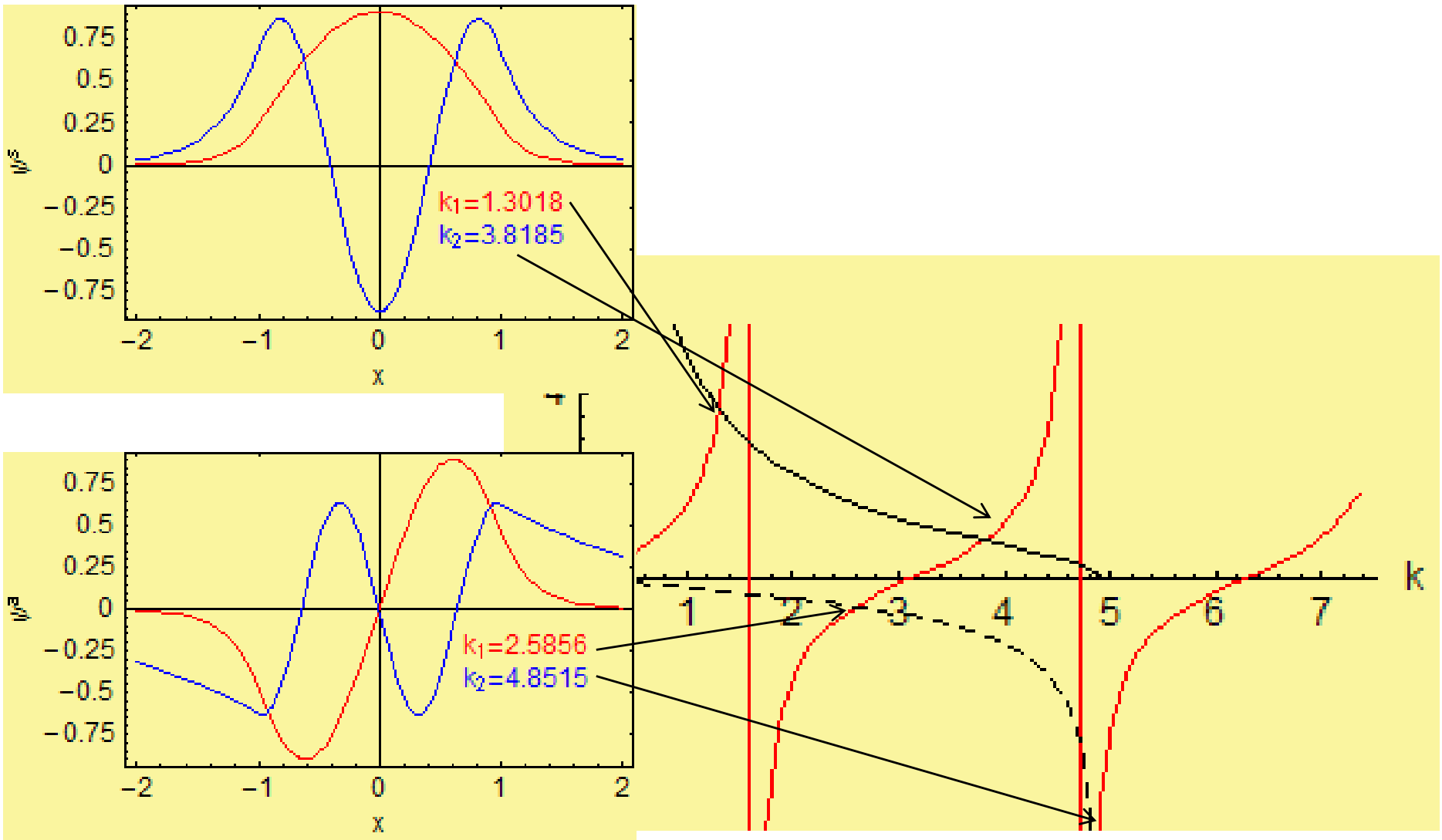
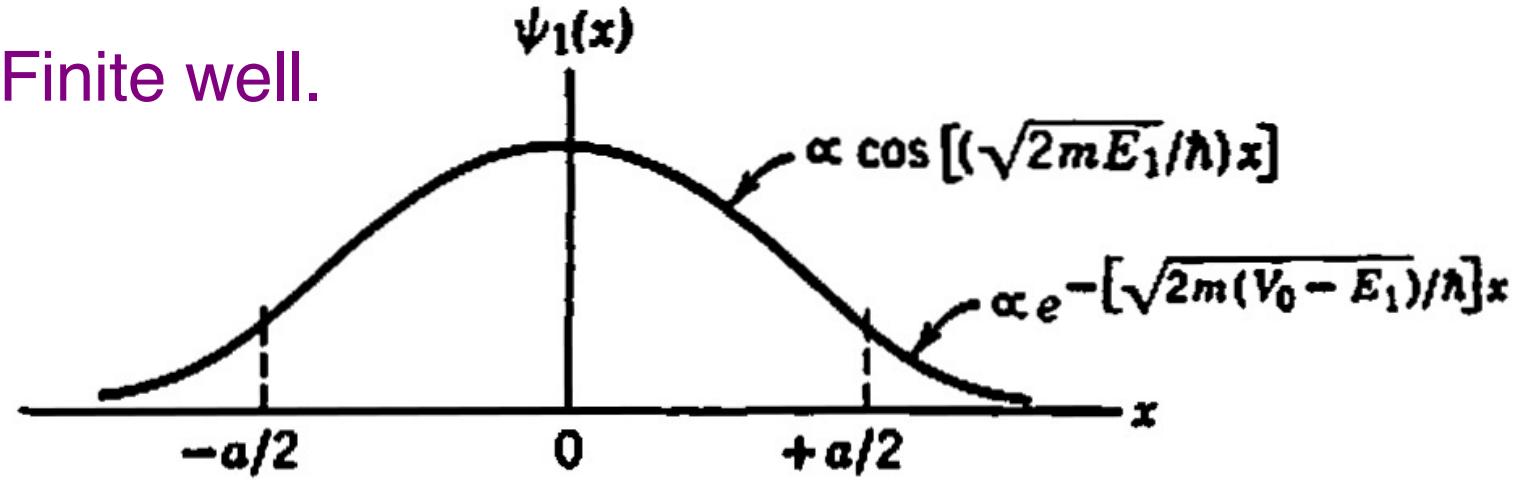
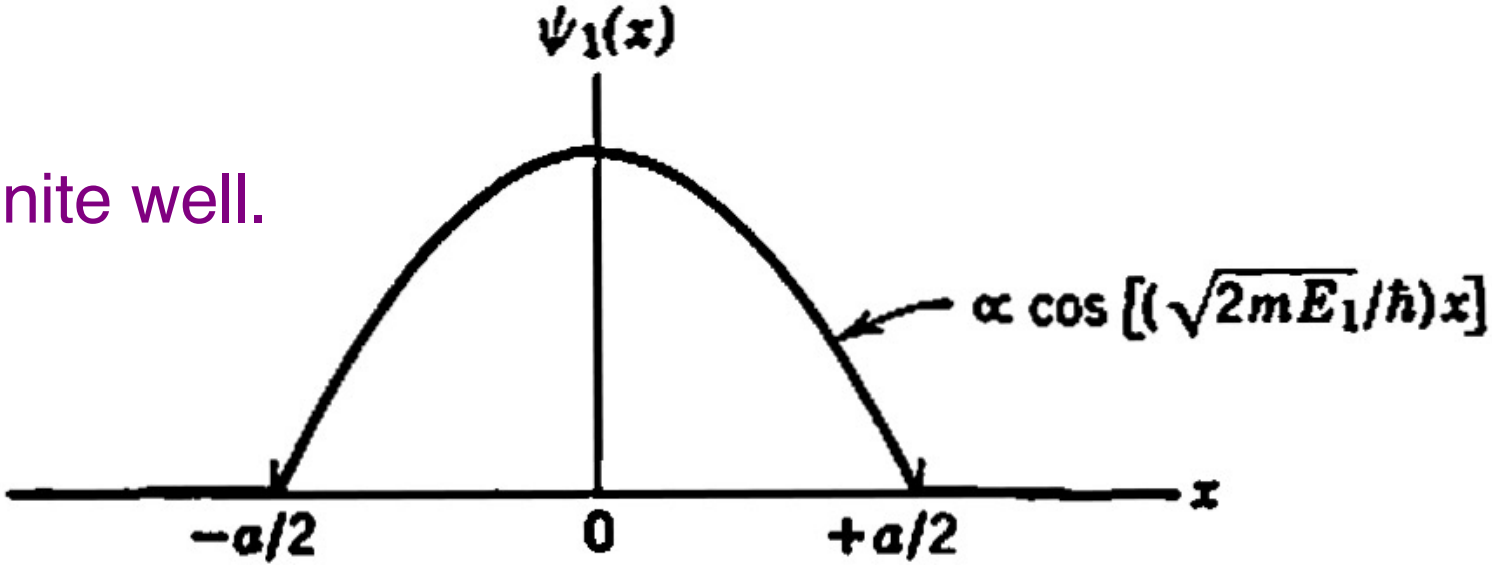


Differences between finite and infinite wells.

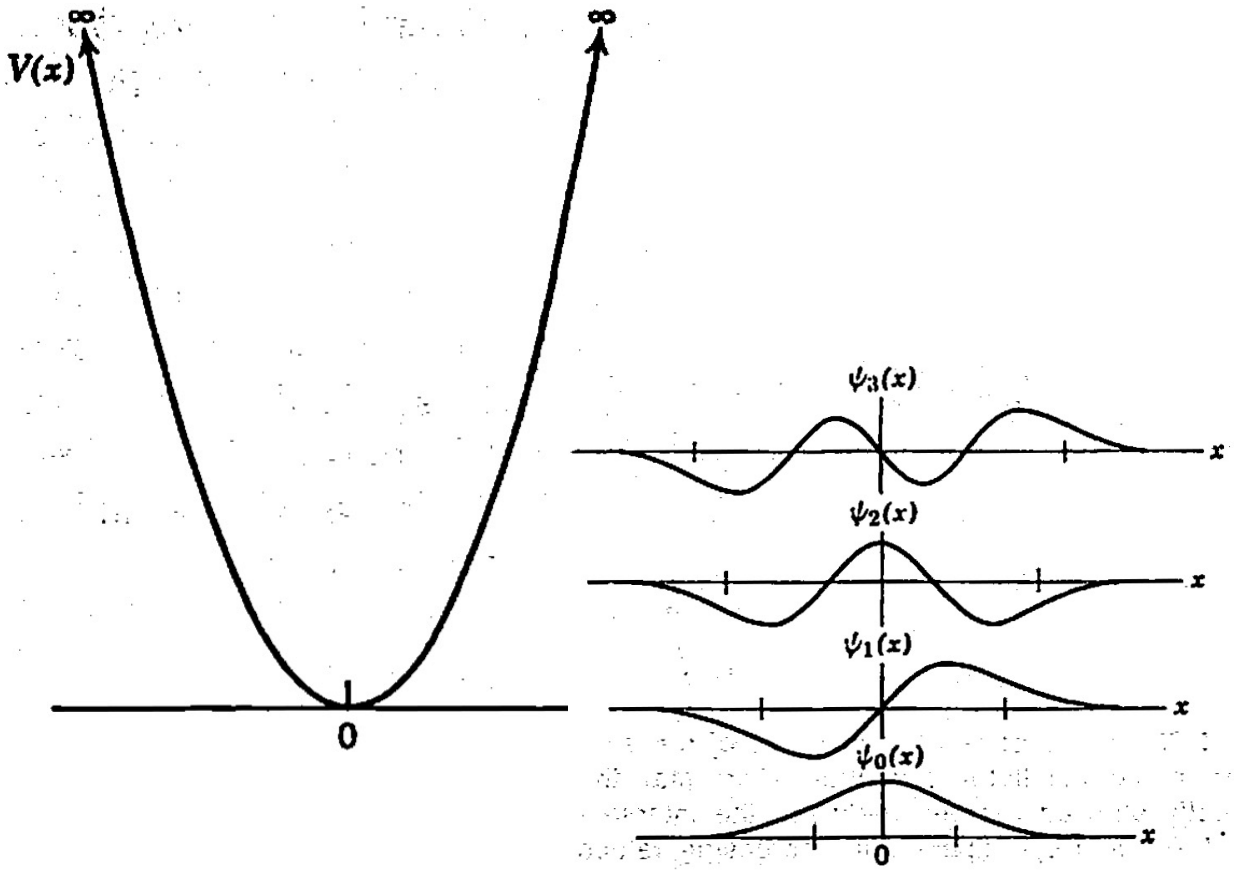
Finite well.

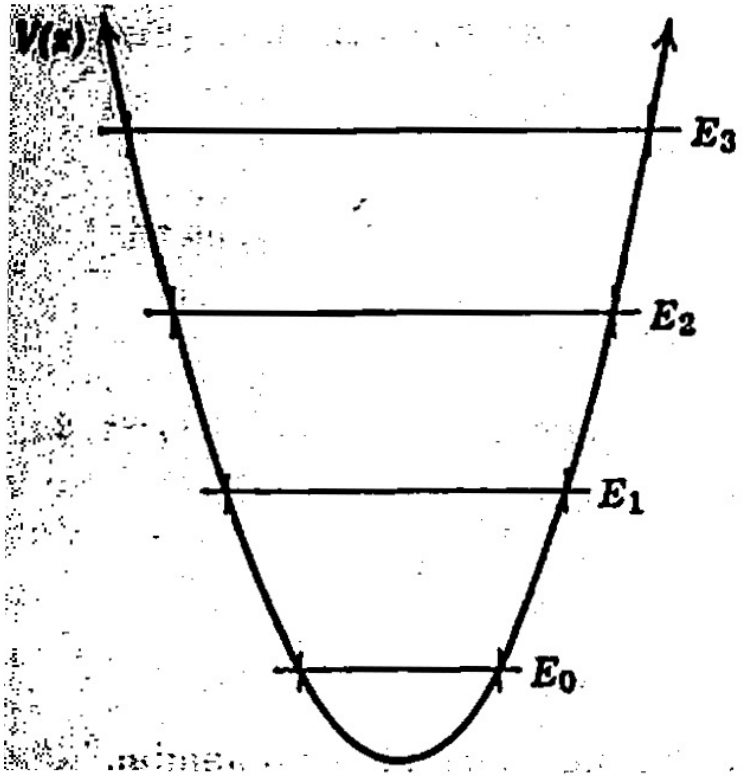


Infinite well.



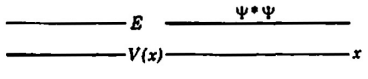
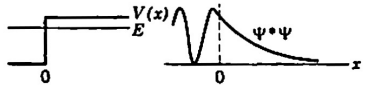
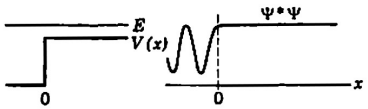
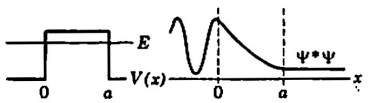
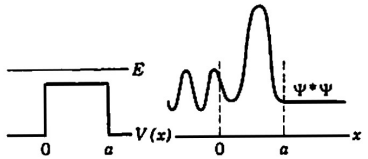
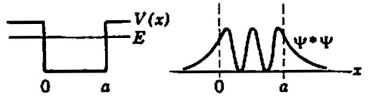
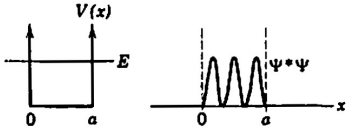
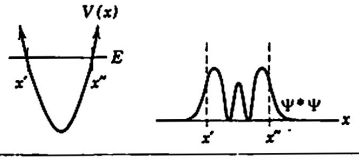
Simple harmonic oscillator.





Summary of systems studied in chapter 6.

Table 6-2. A Summary of the Systems Studied in Chapter 6

Name of System	Physical Example	Potential and Total Energies	Probability Density	Significant Feature
Zero potential	Proton in beam from cyclotron			Results used for other systems
Step potential (energy below top)	Conduction electron near surface of metal			Penetration of excluded region
Step potential (energy above top)	Neutron trying to escape nucleus			Partial reflection at potential discontinuity
Barrier potential (energy below top)	α particle trying to escape Coloumb barrier			Tunneling
Barrier potential (energy above top)	Electron scattering from negatively ionized atom			No reflection at certain energies
Finite square well potential	Neutron bound in nucleus			Energy quantization
Infinite square well potential	Molecule strictly confined to box			Approximation to finite square well
Simple harmonic oscillator potential	Atom of vibrating diatomic molecule			Zero-point energy

ENOUGH FOR TODAY?