CONCEPT: INTRODUCTION TO QUANTUM MECHANICS

- **Quantum Mechanics** is the mathematical and theoretical description of matter and its electrons on the atomic scale.
  - □ **Mathematical Behavior of Electrons**: Schrodinger's Wave Equation

Schrodinger Wave Equation

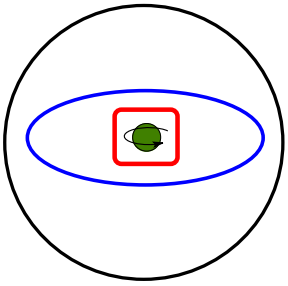
$$\frac{\partial^2\psi}{\partial x^2}+\frac{\partial^2\psi}{\partial y^2}+\frac{\partial^2\psi}{\partial x^2}+\frac{8\pi^2 m}{h^2}(E-V)\psi=0$$

  - □ **Theoretical Behavior of Electrons**: Quantum Numbers

The Quantum Numbers

- A set of values that describe the energy levels and ultimately the location of a specific electron.
  - □ **Shell**: The orbit that electrons take as they travel around the nucleus.
  - □ **Subshell**: The region where a group of electrons in an atom are located within the same *shell*.
    - □ Subshells use the variables of _____, _____, _____, and _____.
  - □ **Orbital**: The region within a *subshell* where specific electrons can be found.

Quantum Numbers



Quantum Number	Description	Variable
Principal	_____ and _____ of a shell	
Angular Momentum (Azimuthal)	_____ of an orbital within a subshell	
Magnetic	_____ of electrons in a set of orbitals	
Spin	_____ of electron in an orbital	

- **Breakdown:** The Atom ⟶ _____ ⟶ _____ ⟶ _____ ⟶ _____

EXAMPLE: If the path of an electron within an orbital can be seen as an ellipses, which quantum number would best describe this image?

a) Principal b) Azimuthal c) Magnetic d) Spin e) None of the above