Postulates of Quantum Mechanics

1. The state of a quantum mechanical system is described mathematically by a normalized ket $|\psi\rangle$ that contains all the information we can know about the system.
2. A physical observable is described mathematically by an operator A that acts on kets.
3. The only possible result of a measurement of an observable is one of the eigenvalues a_n of the corresponding operator A.
4. The probability of obtaining the eigenvalue a_n in a measurement of the observable A on the system in the state $|\psi\rangle$ is

$$\mathcal{P}(a_n) = \left|\langle a_n|\psi\rangle\right|^2,$$

where $|a_n\rangle$ is the normalized eigenvector of A corresponding to the eigenvalue a_n.

5. After a measurement of A that yields the result a_n, the quantum system is in a new state that is the normalized projection of the original system ket onto the ket (or kets) corresponding to the result of the measurement:

$$|\psi'\rangle = \frac{P_n|\psi\rangle}{\sqrt{\langle\psi|P_n|\psi\rangle}}.$$

6. The time evolution of a quantum system is determined by the Hamiltonian or total energy operator $H(t)$ through the Schrödinger equation

$$i\hbar\frac{d}{dt}|\psi(t)\rangle = H(t)|\psi(t)\rangle.$$