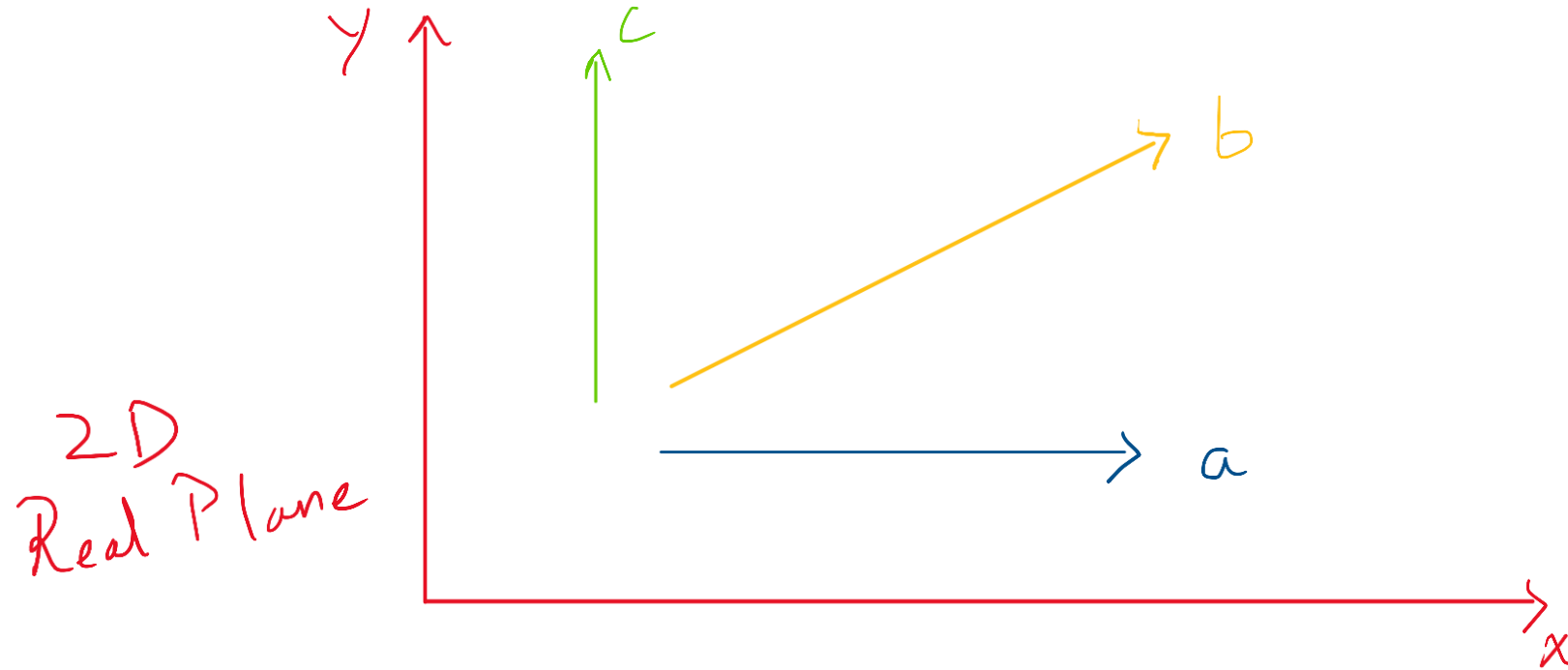


# Vectors and Quantum Mechanics

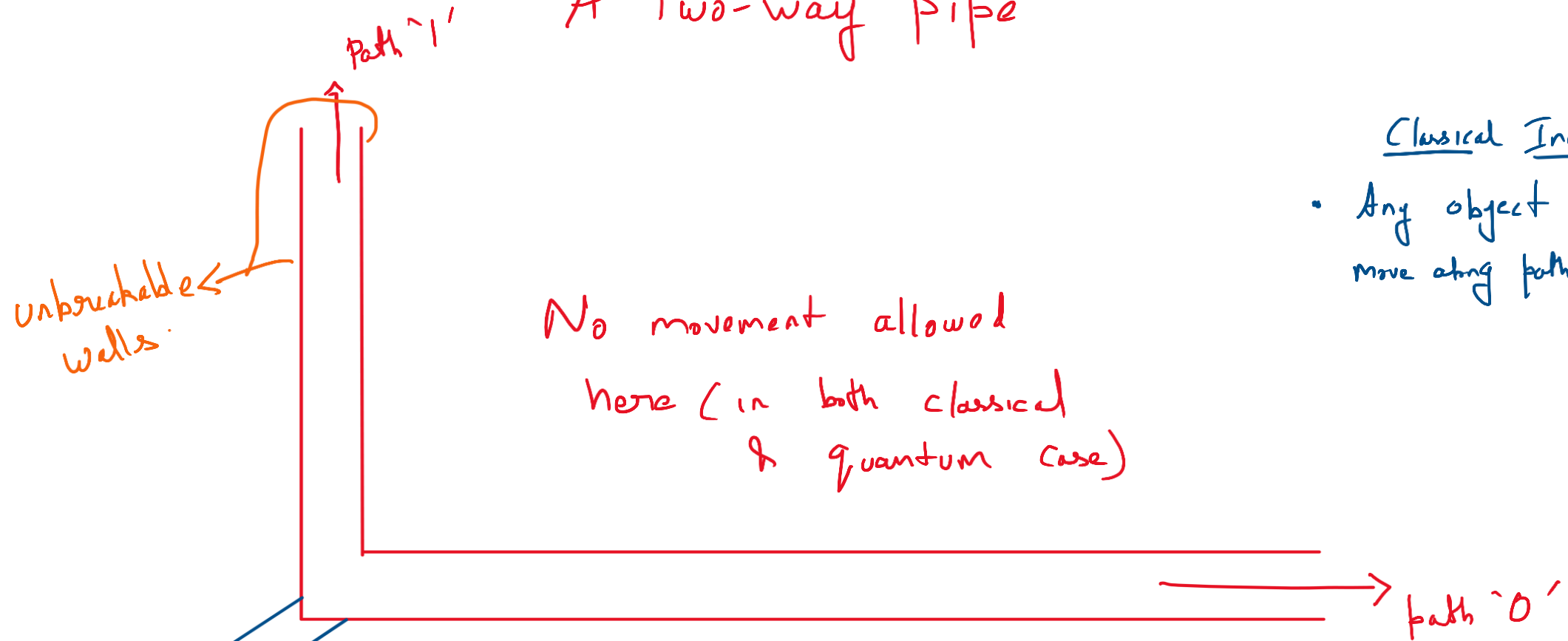


Three paths:

- a) Motion along x-axis
- b) Motion along x & y axis
- c) Motion along y-axis

Any motion along the 2D plane can be resolved into two orthogonal directions.

# A Two-way pipe



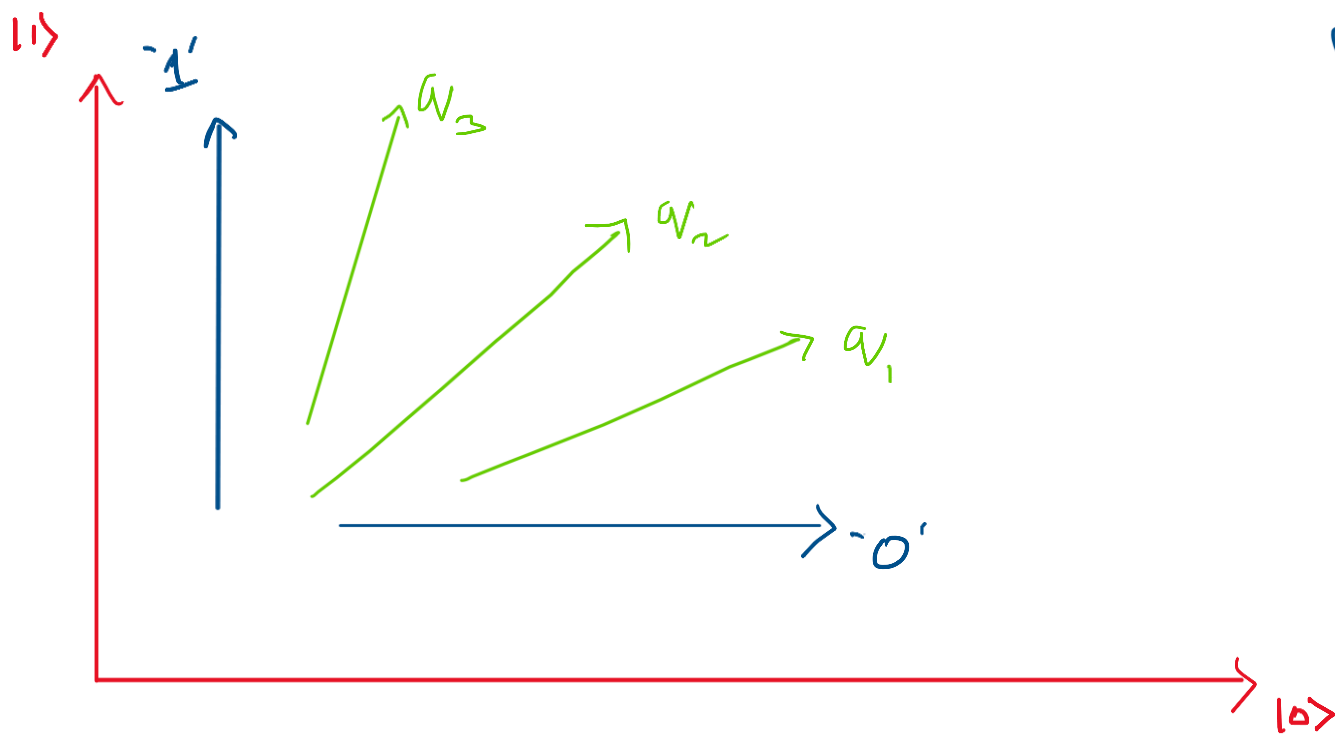
## Classical Interpretation

- Any object can only move along path '0' or '1'

## Quantum Observation

- It is possible to simultaneously move along '0' & '1'

2D  
Complex Plane



There only two allowed  
classical paths

$q_1, q_2, q_3$  are distinct modes of movement allowed in quantum mechanics

Since movement is possible along  $|0\rangle$  &  $|1\rangle$ ,

any general state of motion is given as

$$\underbrace{|\psi\rangle}_{\downarrow} = a|0\rangle + b|1\rangle \quad ; \quad a, b \in \mathbb{C}$$

A valid Physical  
observable State

$$|a|^2 + |b|^2 = 1$$

$$|a| = (a\bar{a})^{1/2}$$

$$a = p + iq \quad p, q \in \mathbb{R}$$

$$\bar{a} = p - iq$$

Vectors in Quantum Mechanics represent  
some physical state of some System.