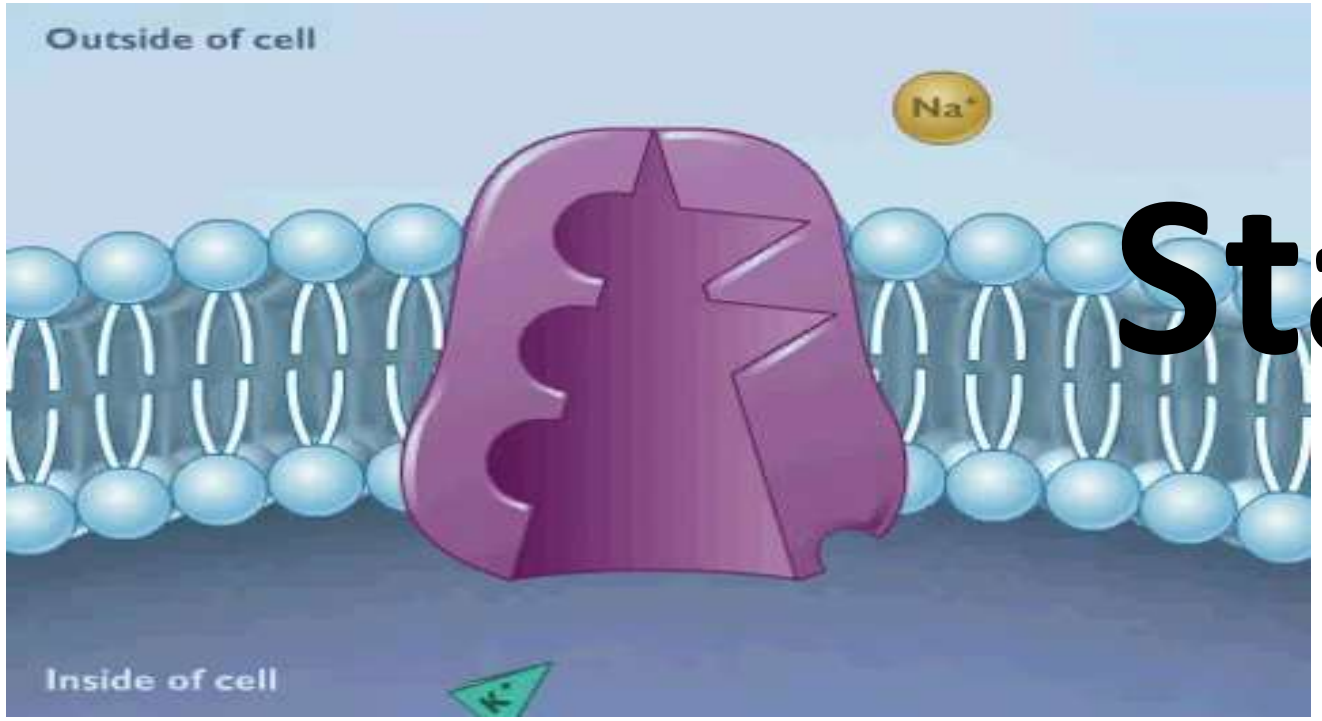
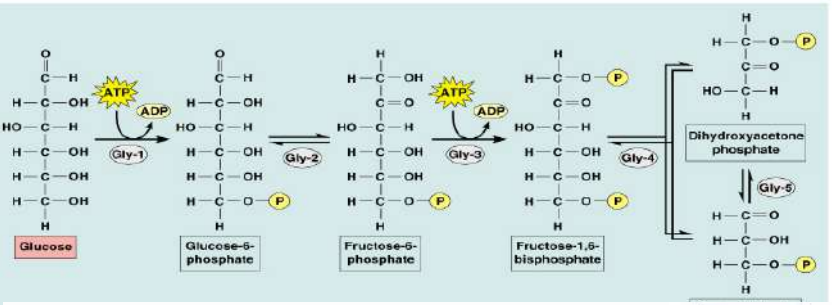
ENERGY AND THE CELL
BIOENERGETICS

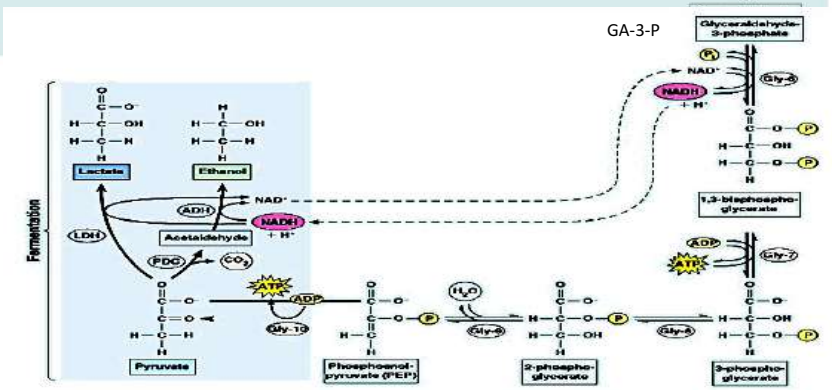


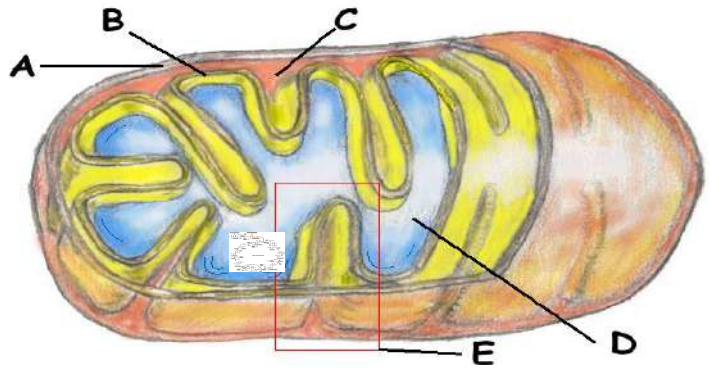
Staying Alive

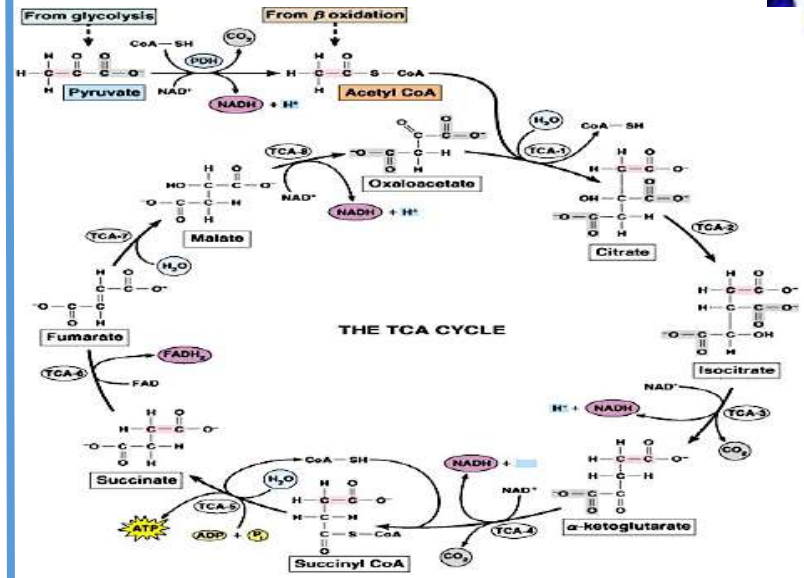
- **Principles:**

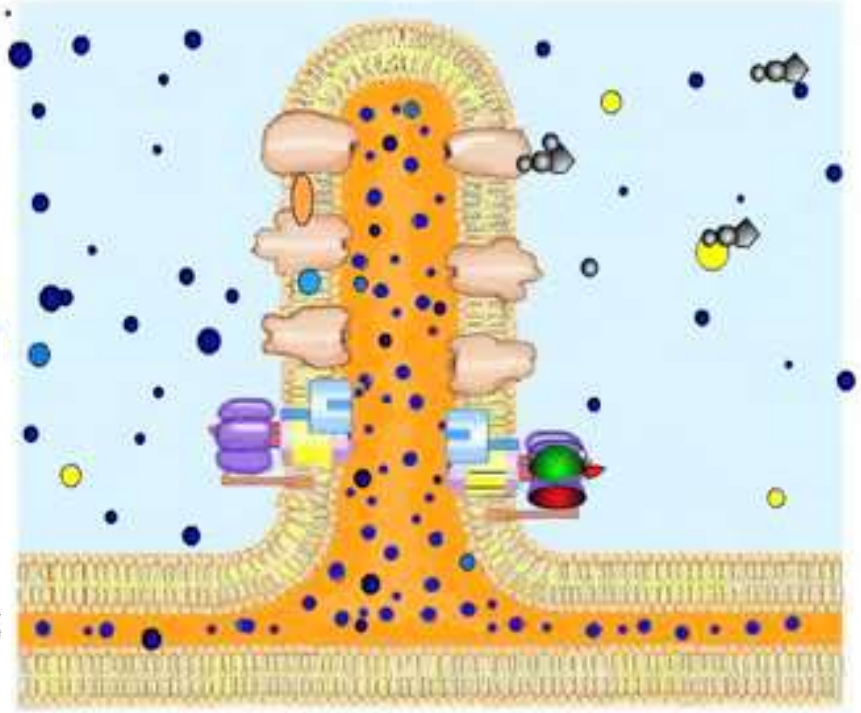
1. **Energy in living organisms is contained within the bonds of its chemical Structure**
2. Energy is transferred and converted from one chemical bond to another
3. Obeys Laws of Thermodynamics
4. Need adequate controls

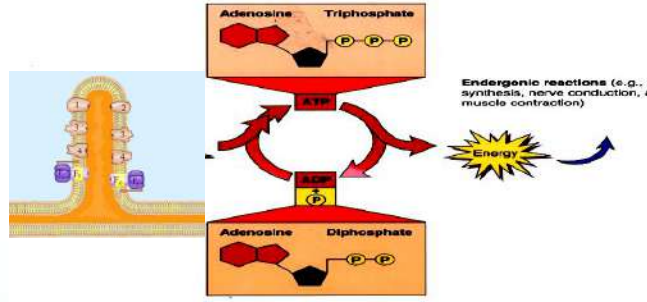






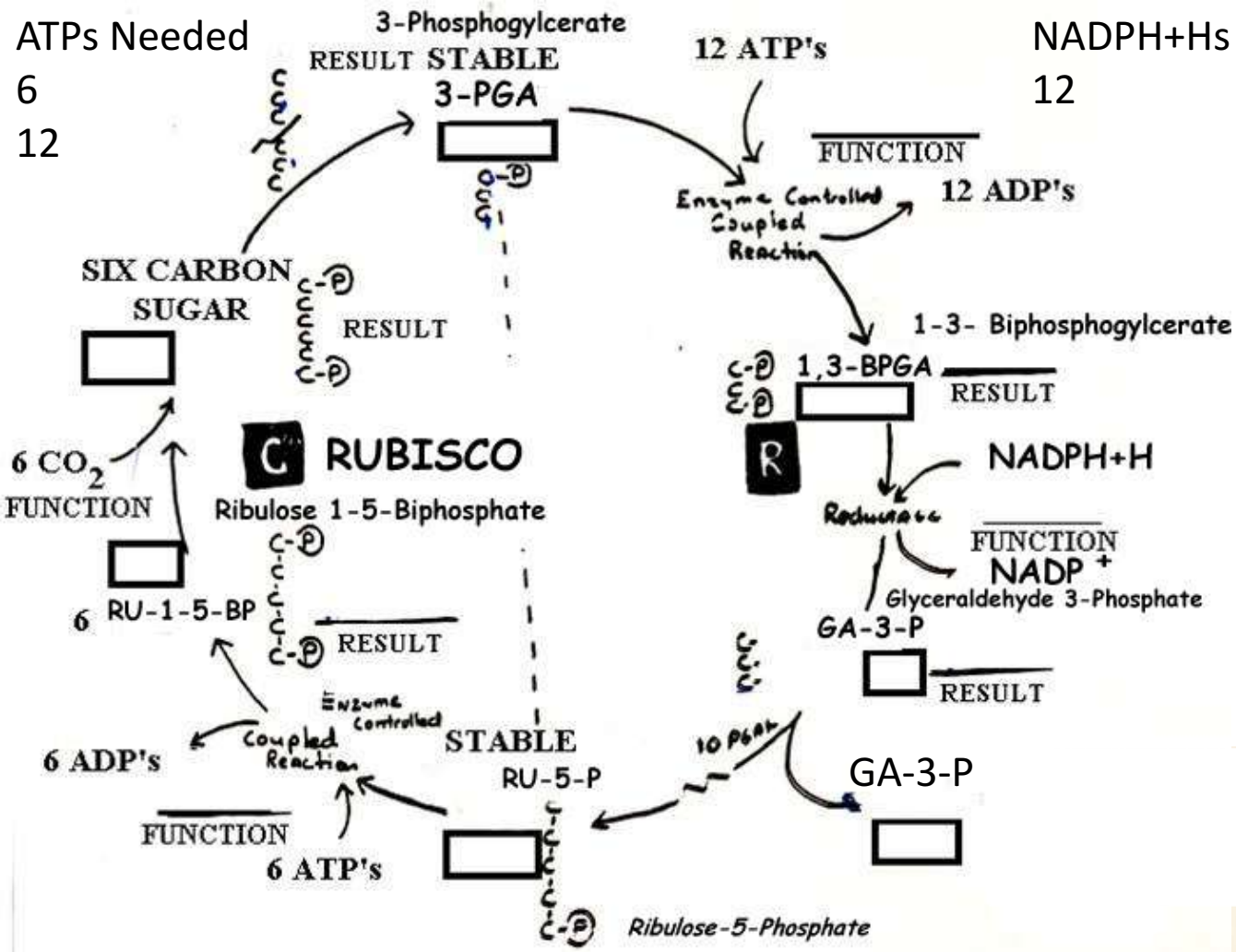


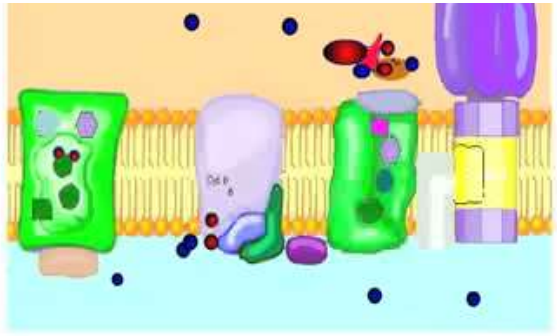


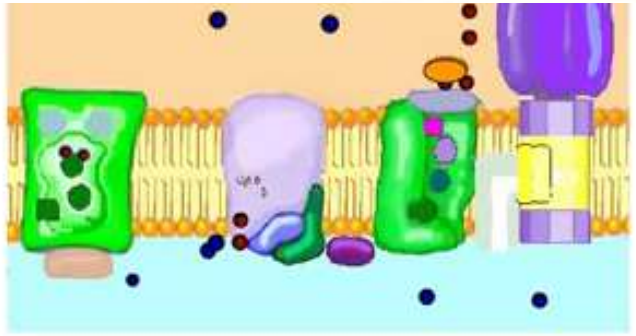


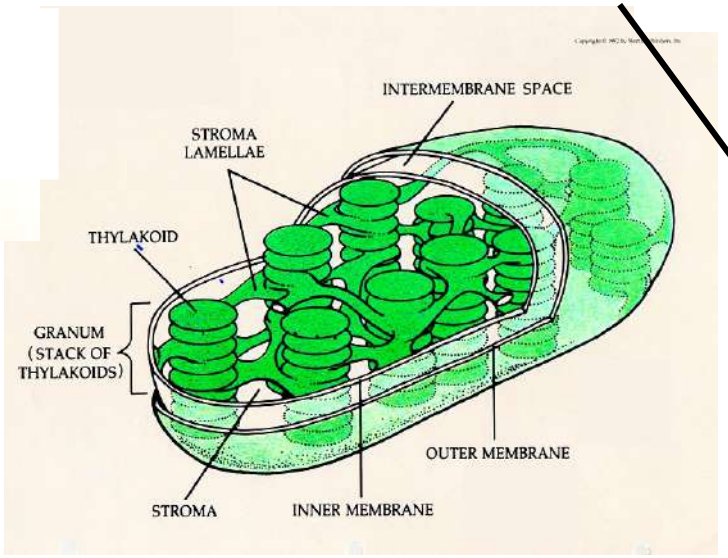
ATPs Needed
6
12

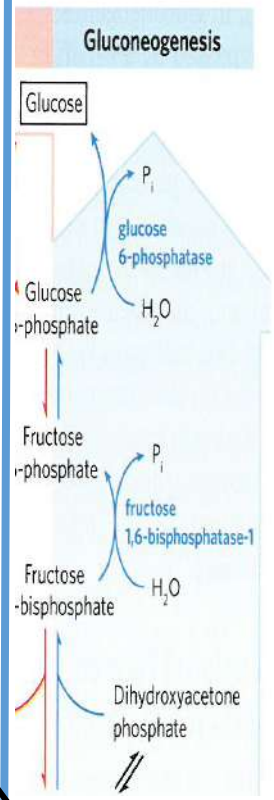
NADPH+Hs Needed
12









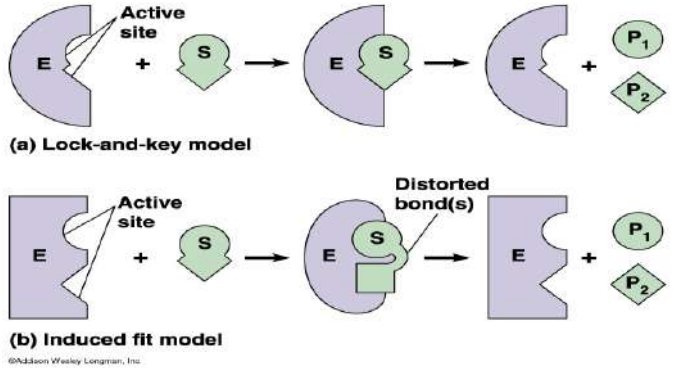


GA-3-P

- **Synthetic Work**
  - **(Changes in Chemical Bonds)**
  - **[Chemical bond energy is of greatest concern in biology]**
- Mechanical Work
  - (Changes in location or orientation)
- Concentration Work
  - (Changes in Concentration Across Membranes)
- Electro-magnetic Work
  - Heat Energy (Warm the organism)
- Electrical Work
  - (Developing Electrochemical gradients)
- Bioluminescent Work
  - (Production of Light)

- **Principles:**

1. **Energy in living organisms is contained within the bonds of its chemical Structure**
   e.g., Starch, Triglycerides, DNA
2. Energy is transferred and converted from one chemical bond t- -nother
3. Obeys Laws of Thermodynamics
4. Need adequate controls



Energy of Activation (E_a)