**ENZYMES**

**What are enzymes?**

**The living cell is a miniature \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ where MILLIONS of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

**Metabolism:**

Metabolic Pathway:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ pathways release energy.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ pathway consume energy.

**Bioenergetics:**

Laws of Thermodynamics (a review):

* + 1st law – Energy cannot be created or destroyed it only be transferred or transformed
	+ 2nd law – Every energy transfer increases the entropy of the universe

**Energy flows INTO and ecosystem as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and exists as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

* The free-energy change of a reaction tells us whether or not the reaction occurs spontaneously.

** Free energy =**

**Endergonic Reactions and Exergonic Reactions:**

***Exergonic:***

***Endergonic:***



**Energy Coupling Reactions**

In the cell, the energy from the exergonic reaction of ATP hydrolysis can be used to drive an endergonic reaction. It’s driven by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Why do we need enzymes?**

* What do enzymes do to the activation energy of a reaction? They \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**What are the parts/players in an enzymatic reaction?**



**Enzymes are SPECIFIC**

**Induced Fit Model**



**Activation Energy**

**DIFFERENT FACTORS CAN INFLUENCE AN ENZYMATIC REACTION**

1. **Cofactors**

examples: Vitamin C

 Folic Acid

 Vitamin D

**ENZYME INHIBITORS**

Two types: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Competitive Inhibitors Non-competitive Inhibitors**





**Allosteric Regulation – (Non-competitive inhibition)**



* **FEEDBACK INHIBITION!!!** (why is it important?)



1. **Temperature**



1. **pH**
2. **Substrate/Enzyme Concentrations**



1. **Time**

****