



The Energy of Life

AN INTRODUCTION TO METABOLISM

Learning Target



- ▶ **I can demonstrate my understanding of the key concepts related to metabolism, energy, and enzymes by teaching my classmates and asking them challenging questions as they teach me.**

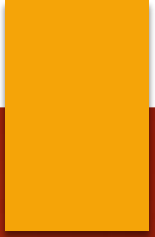
You ALL must know:

- ▶ Examples of endergonic and exergonic reactions
- ▶ The key role of ATP in energy coupling
- ▶ That enzymes work by lowering the energy of activation
- ▶ The catalytic cycle of an enzyme that results in the production of a final product
- ▶ Factors that change enzyme shape and how they influence enzyme activity
- ▶ How the shape of enzymes, their active sites, and interaction with specific molecules affect their function
- ▶ How feedback inhibition is used to maintain appropriate levels of enzymes in a pathway

Your Group Task:

- ▶ Find the slide that corresponds to your group number
- ▶ Read the concept in the red header on that slide
- ▶ Work together to create a handwritten document that:
 - ▶ Defines the listed terms (may be a list, flashcards, or a paragraph)
 - ▶ Explains how the terms support the concept in a paragraph with complete sentences
 - ▶ Contains a hand-drawn illustration (you may use diagrams from Campbell as a guide) that supports your explanation of how the terms support the concept

Each of you will become an expert on the concept assigned to your group so that you can teach the other groups about the concept. The goal is for everyone to master the ideas on the “You ALL must know” slide. Think about the role your group will play in that mastery!



An organism's metabolism transforms matter and energy, subject to the laws of thermodynamics

- ▶ Metabolism
- ▶ Catabolic Pathway
- ▶ Anabolic pathways
- ▶ Energy
- ▶ Thermodynamics
- ▶ Entropy

Grp 1

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

ATP powers cellular work by coupling exergonic reactions to endergonic reactions

- ▶ Free energy
- ▶ ΔG
- ▶ Exergonic reaction
- ▶ Endergonic reaction
- ▶ Energy Coupling
- ▶ ATP
- ▶ ADP

Grp 2

Enzymes speed up metabolic reactions by lowering energy barriers

- ▶ Catalysts
- ▶ Enzymes
- ▶ Activation energy
- ▶ Substrate
- ▶ Active site
- ▶ Enzyme-substrate complex
- ▶ Products
- ▶ Cofactors
- ▶ Coenzymes
- ▶ Competitive inhibitors
- ▶ Noncompetitive inhibitors

Grp 3

Grp 4

Regulation of enzymes helps control metabolism

- ▶ Allosteric
- ▶ Feedback inhibition

Grp 5