Eight Unifying Themes Reflection

Major Themes	Chapter 1	Chapter 2	Chapter 3	Chapter 4	Chapter 5
Science as a Process					***X-ray crystallography*** helps scientist determine the 3-dimensional structure of proteins (p. 85)
Evolution	Darwin proposed ***natural selection*** as the mechanism for evolutionary adaptation of populations (p. 16)				
Energy Transfer			Evaporative cooling is due to H2O's high heat of vaporization. H2O molecules must have a high ***kinetic energy*** to break H bonds (p. 49)	When a phosphate group splits off from ***ATP*** , energy is released that can be used by the cell (p. 66)	
Continuity & Change					***DNA and RNA*** are molecules that enable living organisms to reproduce and pass genes to next generation (p. 86)

Unit One Themes Reflection/ AP Biology Name_____

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Structure vs. Function				***Functional groups*** are chemically reactive groups of atoms within an organic molecule that give it specific properties (p. 63)	
Regulation	The most common form of regulation is ***negative feedback***, when a buildup of an end product of a process will slow that process (p. 11)				
Interdependence in Nature	***Prokaryotes*** play essential roles in chemical cycling for plants and animals (p. 8)				
Science, Tech & Society					New ***DNA and protein sequencing*** technology enables us to infer how closely related two species may be based on the similarities in DNA sequences (p. 89)

A Brief Explanation of the Major Unifying Themes

I. ***Science as a Process*** – Science is a way of knowing. It can involve a discovery process using inductive reasoning, or it can be a process of hypothesis testing. ***Example: The theory of evolution was developed based on observation and experimentation.***

II. ***Evolution*** – Evolution is the biological change of organisms that occurs over time and is driven by the process of natural selection. Evolution accounts for the diversity of life on Earth. ***Example: Widespread use of antibiotics has selected for antibiotic resistance in disease-causing bacteria.***

III. ***Energy Transfer*** – Energy is the capacity to do work. All living organisms are active (living) because of their abilities to link energy reactions to the biochemical reactions that take place within their cells. ***Example: The energy of sunlight, along with carbon dioxide and water, allows plant cells to make organic materials, synthesize chemical energy molecules, and ultimately release oxygen to the environment.***

IV. ***Continuity and Change***- All species tend to maintain themselves from generation to generation using the same genetic code. However, there are genetic mechanisms that lead to change over time, or evolution. ***Example: Mitosis consistently replicates cells in an organism; meiosis (and hence sexual reproduction) results in genetic variability.***

V. ***Relationship of Structure vs. Function***- The structural levels from molecules to organisms ensure successful functioning in all living organisms and living systems. ***Example: Aerodynamics of a bird's wing permits flight.***

VI. ***Regulation*** – Everything from cells to organisms to ecosystems is in a state of dynamic balance that must be controlled by positive or negative feedback mechanisms. ***Example: Body temperature is regulated by the brain via feedback mechanisms.***

VII. ***Interdependence in Nature*** – Living organisms rarely exist alone in nature. ***Example: Microscopic organisms can live in a symbiotic relationship in the intestinal tract of another organism; the host provides shelter and nutrients, and the microorganism digests the food.***

VIII. ***Science, Technology, and Society*** – Scientific research often leads to technological advances that can have positive and/or negative impacts upon society as a whole. ***Example: Biotechnology has allowed the development of genetically modified plants.***