**HS-LS1 From Molecules to Organisms: Structures and Processes**

**HS-LS1-1 Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.**

Further explanation: Emphasis is on protein synthesis from DNA to codon to amino acid sequence.

Constructing Explanations and Designing Solutions, Structure and Function, Structure and Function

**HS-LS1-2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.**

Further explanation: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to neural stimuli. An example of an interacting system could be an artery depending on the proper function of elastic tissue and smooth muscle to regulate and deliver the proper amount of blood within the circulatory system. Another example could be the water and nutrient intake in soft shell clams.

Developing and Using Models, Structure and Function, Systems and System Models

**HS-LS1-3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.**

Further explanation: Examples of investigations could include heart rate response to exercise, stomate response to moisture and temperature, and root development in response to water levels. Another example is commonly observed in the daphnia heart rate response to changes in temperature, caffeine, alcohol, or nicotine.

Planning and Carrying out Investigations, Structure and Function, Stability and Change

**HS-LS1-4 Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.**

Developing and Using Models, Growth and Development of Organisms, Systems and System Models

**HS-LS1-5 Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.**

Further explanation: Emphasis is on illustrating inputs and outputs of matter and the transfer and transformation of energy in photosynthesis by plants and other photosynthesizing organisms. Examples of models could include diagrams, chemical equations, and conceptual models. Models may focus on Maine based economy of photosynthetic organisms such as seaweeds, potatoes and pine trees.

Developing and Using Models, Organization for Matter and Energy flow in Organisms, Energy and Matter

**HS-LS1-6 Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.**

Further explanation: Emphasis is on using evidence from models and simulations to support explanations.

Constructing Explanations and Designing Solutions, Organization for Matter and energy Flow in Organisms, Energy and Matter

**HS-LS1-7 Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.**

Further explanation: Emphasis is on the conceptual understanding of the inputs and outputs of the process of cellular respiration. An example could be a moose eating a lily pad, the lily pad producing energy for the moose and the breathing of oxygen by the moose to enable the process of cellular respiration.

Developing and Using Models, Organization for Matter and Energy Flow in Organisms, Energy and Matter