Key Concept 6: Photosynthesis

Learning Objectives *Students will be able to ...*	Essential Knowledge *Students need to know that ...*
Properties of Water	
CELLS 6.1(a) Explain how the unique properties and phase changes of water enable and regulate biological reactions and/or processes.	**CELLS 6.1.1 The polarity of water molecules results in properties on which biological reactions depend.** **a.** The properties of cohesion, adhesion, and surface tension result in the capillary action of water. **b.** The solvent properties of water dissolve organic and inorganic nutrients.
Photosynthesis	
CELLS 6.2(a) Explain why the products of photosynthesis are ecologically important. **CELLS 6.2(b)** Create and/or use models to explain the process of converting solar energy into chemical energy through photosynthesis. **CELLS 6.2(c)** Describe how chemical energy produced in photosynthesis is stored in photosynthetic organisms. **CELLS 6.2(d)** Use data to describe what factors affect rates of photosynthesis.	**CELLS 6.2.1 Photosynthetic organisms have the cellular structures to convert solar radiation into chemical energy.** **a.** Photosynthetically active radiation wavelengths occur in the visible light spectrum. **b.** Photosynthetic organisms have specialized pigments, membranes, and/or organelles that enable solar radiation to be converted into chemical energy. **c.** Photosynthesis is divided into two stages, light-dependent and light-independent reactions. **1.** Light-dependent reactions require sunlight energy and H_2O to transfer energy to ATP and NADPH. A byproduct of this process is oxygen. **2.** Light-independent reactions use CO_2, ATP, and NADPH to produce sugars.

Content Boundary: The intent is not for students to memorize details of chemical reactions that occur during photosynthesis. Instead the *focus* here is on understanding the role of the main reactants and byproducts (as defined in the essential knowledge) at each stage of energy transfer. A deep understanding of photosystems I and II and specific steps of the Calvin cycle is *beyond the scope* of this course.