**CBA 1 Review 2015**

**Unit 2 Flow of Energy**

**Student Expectation**

**7.5A** The student is expected to recognize that radiant energy from the Sun is transformed into chemical energy through the process of photosynthesis.

**Key Concepts**

* Interactions occur between matter and energy during photosynthesis. The Sun emits radiant energy in all directions, including towards Earth’s surface. Some of this radiant energy is in the form of light and is transformed to chemical energy and stored as sugar (glucose) which sustains life on Earth.
* Photosynthesis is a chemical reaction that occurs in plants, using radiant energy from sunlight. In this chemical reaction, carbon dioxide from the atmosphere and water from the soil are combined to produce sugar (glucose) that contains stored chemical energy. The left over oxygen is released to the atmosphere.

**Fundamental Questions**

* What role does the Sun play in the interaction of matter and energy during photosynthesis?
* What forms of energy conversions occur during the process of photosynthesis?
* What is photosynthesis?

**Student Expectation**

**7.5C The** student is expected to diagram the flow of energy through living systems, including food chains, food webs, and energy pyramids.

**Key Concepts**

* Interactions that occur between matter and energy can be examined by using a variety of models. The flow of energy through living systems can be modeled as food chains, food webs or energy pyramids.
* Food chains diagram the transformation of energy as it flows from the Sun to producers (plants) to primary consumers (herbivores), to secondary consumers (carnivores that eat herbivores) to tertiary consumers (carnivores that eat carnivores).
* Food webs diagram the complex relationships of energy flow in an ecosystem containing a variety of producers and consumers.
* Energy pyramids diagram the decreasing amount of available energy as it flows from one trophic level to the next moving from producers at the bottom of the food pyramid to tertiary consumers at the top of the food pyramid. Energy transfer from one trophic level to the next is not efficient because some energy transforms into heat and is therefore unavailable to the next level on the pyramid.

**Fundamental Questions**

* How do matter and energy interact in a food web or energy pyramid model?
* Why is energy flow a key component in a food web or energy pyramid model?
* Why is the energy flow in a food web diagram more complex than in a food chain?
* What is a trophic level in a food pyramid diagram?
* Why is the amount of energy available in a trophic level different from the levels that precede and follow it?

**Student Expectation**

**7.5B** The student is expected to demonstrate and explain the cycling of matter within living systems such as in the decay of biomass in a compost bin.

**Key Concepts**

* Interactions occur between matter and energy during the carbon, nitrogen and water cycles. Soil is a natural composting environment containing decomposers, such as bacteria and fungi, which break down or decay biomass. This process produces thermal energy, releasing gases (such as carbon dioxide and nitrogen), and simple molecules (such as water). This matter is released back into the soil and atmosphere to be reused by producers to make food and to grow.
* Carbon Cycle: Carbon is essential to life and cycles in many forms within living systems. Carbon dioxide in the atmosphere enters the leaves of plants and is used in the process of photosynthesis to make glucose. Some animals eat plants and thus carbon is cycled through the food web.
* Nitrogen Cycle: Nitrogen is an element essential to life. It is cycled from the atmosphere to living things and back into the atmosphere. Nitrogen in the atmosphere enters soil and is broken down by bacteria into a usable form that is absorbed by the roots of plants and enters the food web.
* Water Cycle: Water is a simple molecule that is cycled throughout living systems and the atmosphere.

**Fundamental Questions**

* How can the decay of biomass be explained and related to the carbon, nitrogen and water cycles?

* How can you use a food web example to demonstrate and explain the cycling of carbon within living systems?
* How can you use the decay of biomass in a compost bin to demonstrate and explain the cycling of nitrogen within living systems?
* Why is the water cycle a key component in the cycling of matter within living systems?

**Unit 3 Organisms and the Environment**

**Student Expectation**

**7.10ABC** The student is expected to observe and describe how different environments, including microhabitats in schoolyards and biomes, support different varieties of organisms, describe how biodiversity contributes to the sustainability of an ecosystem, AND observe, record, and describe the role of ecological succession such as in a microhabitat of a garden with weeds.

**Key Concepts**

* Organisms exhibit interdependency in ecosystems, whether small microhabitats or large complex biomes. The greater the biodiversity in an ecosystem, the greater the sustainability; however, all ecosystems change over time as their populations transition through a natural ecological succession toward a climax community.
* A microhabitat is a small-scaled environment with all biotic and abiotic factors needed to support the limited variety of organisms occupying an area. Examples of a microhabitat include a garden, a schoolyard, or the space between two rocks.
* Earth’s environments can be classified into a variety of biomes including freshwater, marine, desert, forest, grassland, and tundra. Each biome is characterized by a combination of abiotic factors such as climate, geology, soil type, and water resources. These unique biomes support different varieties of organisms.
* A healthy ecosystem exhibits biological diversity within and between trophic levels. As biodiversity of an ecosystem increases, the ability to withstand environmental stress due to the loss of a single species or group also increases, improving the sustainability of the ecosystem.
* Ecological succession is the transition of organisms over time in community, such as the changes that occur in a garden with weeds or regrowth of an area after a forest fire.

**Fundamental Questions**

* How might the interdependency of organisms in a specific habitat be helped or harmed as a result of changes in the ecosystem over time?
* How might the biodiversity of the populations in a habitat affect organism interdependency?
* What is a microhabitat?
* What is a biome and what abiotic factors characterize each biome?
* How might biodiversity within and between trophic levels in a habitat affect sustainability of an ecosystem?
* How does the concept of ecological succession explain changes in an ecosystem?

**Unit 4 Factors Impacting Earth Systems**

**7.8B Student Expectation** The student is expected to analyze the effects of weathering, erosion, and deposition on the environment in eco-regions of Texas.

**Key Concepts**

* The natural events of weathering, erosion and deposition effect the unique ecoregions of Texas depending upon the characteristic soil and rock type, vegetation, climate, and topography of the area. Human activities such as deforestation or urbanization can increase the impact of weathering, erosion and deposition on an ecosystem.
* Weathering is the gradual chemical and physical changes made to rocks due to the presence of weathering agents such as water, temperature changes and the actions of plant roots that pry rocks apart.
* Erosion occurs when the rock or soil of Earth’s surface is moved to another location by erosional agents such as the flow of water, ice or wind, as well as the constant pull of gravity.
* Deposition occurs as sediment or fine rock fragments, resulting from the actions of weathering and erosional agents, settles (or is deposited) in a different location.

**Fundamental Questions**

* How do the unique topography and other characteristics in different Texas ecoregions reflect the natural forces of weathering, erosion, and deposition?
* What are the primary weathering agents?
* What evidence indicates that weathering processes have affected the Texas ecoregions?
* What are the primary erosional agents?
* What evidence indicates that erosional processes have affected the Texas ecoregions?
* What are the primary deposition agents?
* What evidence indicates that deposition processes have affected the Texas ecoregions?

**Student Expectation**

**7.8A** The student is expected to predict and describe how different types of catastrophic events impact ecosystems such as floods, hurricanes, or tornadoes.

**Key Concepts**

* Natural events such as floods, hurricanes, and tornadoes can cause catastrophic impacts on ecosystems. By analyzing the characteristics and patterns of these events, the impact on the ecosystem can be described and predicted.
* Floods result when rainfall exceeds the holding capacity of a drainage system. The energy of the moving water and the layers of sediment carried by the water can uproot or bury plants, reshape the topography, and destroy roads and buildings.
* Hurricanes develop over warm ocean waters as an area of low pressure in the atmosphere. As more ocean water evaporates, air pressure decreases and wind intensity increases. Hurricanes impact the ecosystem as a storm surge along the coast, as well as intense wind damage and excess flooding all along the path of the storm.
* Tornadoes are violent, rotating columns of air extending from the base of intense storm clouds. Although affecting an area much smaller in width and distance than that covered by a hurricane, tornadoes have much stronger wind speeds. Objects in the path of a tornado are totally destroyed, leaving a scar of devastation to the ecosystem.

**Fundamental Questions**

* How can natural events such as floods, hurricanes, and tornadoes be predicted?
* What are some catastrophic impacts on the ecosystem caused by floods?
* What are some catastrophic impacts on the ecosystem caused by hurricanes?
* What are some catastrophic impacts on the ecosystem caused by tornadoes?

**Student Expectation**

**7.8C** The student is expected to model the effects of human activity on groundwater and surface water in a watershed.

**Key Concepts**

* Natural events and human activity can impact Earth systems such as those found in a watershed. A watershed is an area of surface and subsurface land from which water flows into a larger body of water such as a river, lake, stream, ocean, or aquifer.
* Groundwater in a watershed is water found underground in porous rock layers called aquifers.
* Excessive pumping of groundwater from aquifers for agricultural, industrial or residential use results in subsidence, or sinking of the Earth’s surface. Groundwater can be effected by human activity when pollutants seep through porous material and contaminate groundwater resources.
* Surface water in a watershed flows into small gullies and streams which in turn flow into larger bodies of water such as rivers, lakes and oceans.
* Human activity contaminating surface water is often   
  classified into two types: point source and non-point source. Improper disposal of industrial waste can pollute surface water, making it uninhabitable for all living organisms. Nutrients found in fertilizers and human waste can flow into surface water leading to algal blooms and dead zones.

**Fundamental Questions**

* What is a watershed?
* What is groundwater and how does it relate to a watershed?
* How can you use aquifers and subsidence issues to model the effects of human activity on groundwater resources?
* How can you diagram or model the flow of water through a watershed from a field or mountain top to a lake or ocean?
* How can you explain and model human impact on the ecosystem using examples of point source and non-point source pollution of surface water?