5. Matter and Energy in Organisms and Ecosystems

Science and Engineering Practices

Developing and Using Models
Modeling in 3-5 builds on K-2 experiences and progresses to building and revising simple models and using models to represent events and design solutions:
- Use models to describe phenomena. (5-PS3-1)
- Develop a model to describe phenomena. (5-LS2-1)

Engaging in Argument from Evidence
Engaging in argument from evidence in 3-5 builds on K-2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s):
- Support an argument with evidence, data, or a model. (5-LS1-1)

Disciplinary Core Ideas

PS3.D: Energy in Chemical Processes and Everyday Life
- The energy released from food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water). (5-PS3-1)

- Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion. (secondary to 5-PS3-1)
- Plants acquire their material for growth chiefly from air and water. (5-LS1-1)

LS2.A: Interdependent Relationships in Ecosystems
- The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as “decomposers.” Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. (5-LS2-1)

LS2.B: Cycles of Matter and Energy Transfer in Ecosystems
- Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment. (5-LS2-1)

Crosscutting Concepts

Systems and System Models
- A system can be described in terms of its components and their interactions. (5-LS2-1)

Energy and Matter
- Matter is transported into, out of, and within systems. (5-LS1-1)
- Energy can be transferred in various ways and between objects. (5-PS3-1)

Connections to Nature of Science

Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena
- Science explanations describe the mechanisms for natural events. (5-LS1-1)

Connections to other DCIs in fifth grade:
- K.LS1.A (5-PS1-1), (5-LS1-1), (5-LS2-1)
- 5.ESS2.A (5-LS2-1)
- 5-PS1.1 (5-PS3-1), (5-LS1-1), (5-LS2-1), (5-PS3-1)
- 2.PS1.A (5-LS2-1), (5-LS1-1), (5-PS1-1)
- 2.LS2.A (5-LS3-1), (5-LS1-1), (5-PS4-1), (5-LS2-1), (5-LS2-1), (5-PS3-1)
- 4.PS3.A (5-PS3-1), (5-PS3-1)
- 4.ESS2.A (5-LS2-1), (5-LS1-1), (5-PS3-1)
- MS.PS3.D (5-PS3-1), (5-LS1-1), (5-PS1-1), (5-LS2-1), (5-PS3-1)
- MS.PS4.B (5-PS3-1), (5-LS2-1), (5-LS1-1), (5-PS1-1), (5-PS3-1)
- MS.LS1.C (5-PS3-1), (5-LS1-1), (5-LS2-1), (5-LS1-1), (5-PS1-1), (5-LS2-1)
- MS.LS2.A (5-LS1-1), (5-LS2-1), (5-LS2-1), (5-LS2-1)
- MS.LS2.B (5-PS3-1), (5-LS2-1)

Common Core State Standards Connections:
- ELA: Literacy:
  - RI.5.1 Quote or paraphrase a text when explaining what the text says explicitly and when drawing inferences from the text. (5-LS1-1)
  - RL.1.5 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (5-PS3-1), (5-LS2-1)
  - RL.1.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (5-LS1-1)
  - W.1.5 Write opinion pieces on topics or texts, supporting a point of view with reasons and evidence. (5-LS1-1)
  - SL.5.5 Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes. (5-PS3-1), (5-LS2-1)
- Mathematics:
  - MP.2 Reason abstractly and quantitatively. (5-LS1-1), (5-LS2-1)
  - MP.4 Model with mathematics. (5-LS1-1), (5-LS2-1)
  - MP.5 Use appropriate tools strategically. (5-LS1-1)
  - 5.MD.A.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real-world problems. (5-LS1-1)

*The performance expectations marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea.

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