

Educational Resources from *Phenomenon Science Education*
Student Proficiency Goals for **NGSS MS-LS1-7**



Information about MS-LS1-7

NGSS Performance Expectation MS-LS1-7.

Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.

Clarification Statement.

Emphasis is on describing that molecules are broken apart and put back together and that in this process, energy is released.

Assessment Limits.

Assessment does not include details of the chemical reactions for photosynthesis or respiration.

Science and Engineering Practice (Developing and Using Models)

- Develop a model to describe unobservable mechanisms.

Disciplinary Core Idea (LS1.C: Organization for Matter and Energy Flow in Organisms)

- Within individual organisms, food moves through a series of chemical reactions in which it is broken down and rearranged to form new molecules, to support growth, or to release energy.

Disciplinary Core Idea (PS3.D: Energy in Chemical Processes and Everyday Life)

- Cellular respiration in plants and animals involves chemical reactions with oxygen that release stored energy. In these processes, complex molecules containing carbon react with oxygen to produce carbon dioxide and other materials. (secondary).

Crosscutting Concept (Energy and Matter)

- Matter is conserved because atoms are conserved in physical and chemical processes.

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Student Proficiency Goals

SEP (Developing and Using Models):

- Students identify and describe components needed in a model that can describe how atoms in food are rearranged to release energy and produce molecules that support growth.
- Students develop a model capable of describing the unobservable mechanisms of atoms in food being rearranged, including carbon-containing molecules of food, oxygen, energy that is absorbed, energy that is released, and the new types of molecules produced.
- Students use their model to describe the conservation of atoms (i.e., all atoms going in must come out) when food is rearranged to form new molecules that support growth.
- Students use their model to describe the unobservable mechanisms of cellular respiration in plants and animals.

DCI (LS1.C Organization for Matter and Energy Flow in Organisms):

- Students know that food moves through a series of chemical reactions in organisms.
- Students know that chemical reactions in organisms break food molecules into smaller molecules and atoms.
- Students know that organisms use small molecules and atoms to form new molecules that support growth.
- Students know that breaking molecules requires an energy input and that making new molecules results in a release of energy that an organism can use.

CCC (Energy and Matter):

- Students consider the movement of atoms through both physical and chemical processes as matter moves through an organism.
- Students consider that atoms are conserved in physical and chemical processes.
- Students consider that matter is conserved what plants and animals use food for energy and growth.

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DCI (PS3.D Energy in Chemical Processes and Everyday Life):

- Students know that cellular respiration happens in both plants and animals.
- Students know that carbon-based organic molecules react with oxygen to release energy and produce carbon dioxide, water, and other materials.