



Benchmarks from 5E

Flow of Matter and Energy

5E Flow of Matter and Energy (K-2)#1

Plants and animals both need to take in water, and animals need to take in food. In addition, plants need light.

5E Flow of Matter and Energy (K-2)#2

Many materials can be recycled and used again, sometimes in different forms.

5E Flow of Matter and Energy (3-5)#1

Almost all kinds of animals' food can be traced back to plants.

5E Flow of Matter and Energy (3-5)#2

Some source of "energy" is needed for all organisms to stay alive and grow.

5E Flow of Matter and Energy (3-5)#3

Over the whole earth, organisms are growing, dying, and decaying, and new organisms are being produced by the old ones.

5E Flow of Matter and Energy (6-8)#1

Food provides molecules that serve as fuel and building material for all organisms. Plants use the energy from light to make sugars from carbon dioxide and water. This food can be used immediately or stored for later use. Organisms that eat plants break down the plant structures to produce the materials and energy they need to survive. Then they are consumed by other organisms.

5E Flow of Matter and Energy (6-8)#2

Over a long time, matter is transferred from one organism to another repeatedly and between organisms and their physical environment. As in all material systems, the total amount of matter remains constant, even though its form and location change.

5E Flow of Matter and Energy (6-8)#3

Energy can change from one form to another in living things. Animals get energy from oxidizing their food, releasing some of its energy as heat. Almost all food energy comes originally from sunlight.

5E Flow of Matter and Energy (9-12)#1

At times, environmental conditions are such that plants and marine organisms grow faster than decomposers can recycle them back to the environment. Layers of energy-rich organic material have been gradually turned into great coal beds and oil pools by the pressure of the overlying earth. By burning these fossil fuels, people are passing most of the stored energy back into the environment as heat and releasing large amounts of carbon dioxide.

5E Flow of Matter and Energy (9-12)#2

The amount of life any environment can support is limited by the available energy, water, oxygen, and minerals, and by the ability of ecosystems to recycle the residue of dead organic materials. Human activities and technology can change the flow and reduce the fertility of the land.

5E Flow of Matter and Energy (9-12)#3

The chemical elements that make up the molecules of living things pass through food webs and are combined and recombined in different ways. At each link in a food web, some energy is stored in newly made structures but much is dissipated into the environment as heat. Continual input of energy from sunlight keeps the process going.