Elements of Life

Energy has a one way flow through an ecosystem. It generally enters as a high quality form of energy, sunlight. This energy eventually leaves the ecosystem in a low quality form, heat.

Matter is used over and over. It is recycled through biogeochemical cycles. In this activity you will explore the movement of matter between organisms and the environment. Make a background poster with a plant and animal in the environment, then use the element tiles to build and model molecules moving through plants, animals and the environment. Some molecules are too complicated to build in this activity. For these you have been provided with a base tile.

The right side of your paper should be folded over and hidden from you. If you are stuck, unfold the strip once for a little help, and twice to reveal more detail about how to proceed.

Task	**A little help**	**A lot of help (These may be example of a pathway)**
Make or find a representative macromolecule for each of the four classes.	There are four macromolecule classes	There are four macromolecule classes, carbohydrates, lipids, proteins and nucleic acids. Try making your own glucose: $C_6H_{12}O_6$
For each macromolecule type, add a representative of each type of element it contains	Look up the composition of these macromolecules.	• Carbohydrates: Carbon, Hydrogen, Oxygen • Lipids: Carbon, Hydrogen, Oxygen (some contain phosphorus) • Proteins: Carbon, Nitrogen • Nucleic Acids: Carbon, Nitrogen, Phosphorus
On your poster backdrop, appropriately move the carbon through organisms and the environment.	Find a diagram of the carbon cycle	• Move CO_2 from the atmosphere to the plant. • Move H_2O from the soil, through the roots, to the leaves. • Combine water and carbon dioxide to make glucose in photosynthesis • Show an animal eating this plant glucose. • Show CO_2 being released by the animal, returning to the atmosphere.
Appropriately move nitrogen in proteins and nucleic acids through organisms and the environment.	Find a diagram of the nitrogen cycle.	• Show atmospheric nitrogen (N_2) being removed from the atmosphere by nitrogen fixing bacteria. • Show the movement of nitrogen compounds into a plant and the incorporation of N into proteins and nucleic acids. • Show animals receiving this element by eating and the return to the environment by excretion.
Appropriately move phosphorus through organisms and the environment.	Find a diagram of the phosphorus cycle.	• Show phosphate release from weathering. • Show phosphate entering plants and the incorporation into nucleic acids and some lipids. • Show animals receiving this element by eating and the return to the environment by excretion.

Make a script and provide it to your teacher. You learn more detail as the year progresses. Your teacher may make a video of your presentation to show this growth.

Element and Macromolecule Tiles

H	H	H	H	H	H	H
H	H	H	H	H	H	H
C	C	C	C	C	C	C
C	C	C	C	C	C	C
O	O	O	O	O	O	O
N	N	N	N	N	N	N
Carbohydrate	Protein	Nucleic Acid	Lipid	P	P	P
Carbohydrate	Protein	Nucleic Acid	Lipid			