Subject: Concept Physics Grade: 8 Unit #: 4 Title: Energy of Life

UNIT OVERVIEW

<table>
<tr><th colspan="3">STAGE ONE: Identify Desired Results</th></tr>
<tr><td rowspan="5">Established Goals/ Standards

Standards found within from the Intermediate Level Science Standards:

P.I 5.1 “Organisms”

6.1, 6.2 “Flow of energy”

7.1 “Human Impact”

4.1 “Forms of Energy”</td><td colspan="2">Long-Term Transfer Goal</td></tr>
<tr><td colspan="2">At the end of this unit, students will use what they have learned to independently…
Engage in conversation about a real world environmental issue in the local Rochester community drawing from their base of knowledge on the flow of energy and matter in an ecosystem. Students will explain how the actions of humans have directly and indirectly affected the flow of energy in an ecosystem and what we can do going forward in making ecological and environmental decisions (think purposefully, be tenacious and advocate for self and others).</td></tr>
<tr><td colspan="2">Meaning</td></tr>
<tr><td>Enduring Understandings
Students will understand that…
Energy and matter flow from one organism to another. Energy enters ecosystems as sunlight, and is eventually lost from the community to the environment, mostly as heat.

Disruptions to the ecosystem at any level can affect/impact the whole.

Unregulated human activity can have adverse effects on an ecosystem.

Energy cannot be created or destroyed, but only changed from one form to another. Some energy is always converted into heat in a transformation process.</td><td>Essential Questions
Students will consider such questions as…
Why do we need energy and where does our energy come from?
How do we affect the flow of energy in our environment?</td></tr>
<tr><td colspan="2">Acquisition</td></tr>
<tr><td>What knowledge will students learn as part of this unit?

● All organisms require energy to survive.
● The methods for obtaining nutrients vary among organisms. Producers, such as green plants, use light energy to make their food. Consumers, such as animals, take in energy-rich foods.
● Herbivores obtain energy from plants. Carnivores obtain energy from animals. Omnivores obtain energy from both plants and animals. Decomposers, such as bacteria and fungi, obtain energy by</td><td>What skills will students learn as part of this unit?

● Model the flow of energy in an ecosystem through food webs and energy pyramids.
● Utilize models to predict how a change in one population affects all other populations in an ecosystem.
● Identify negative impact humans have on environment.
● Research a local controversial topic on environmental pollution.</td></tr>
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	consuming wastes and/or dead organisms. ● Energy flows through ecosystems in one direction, usually from the sun, through producers to consumers and then to decomposers. This process may be visualized with food chains or energy pyramids. ● Food webs identify feeding relationships among producers, consumers, and decomposers in an ecosystem. ● Photosynthesis is carried on by green plants and other organisms containing chlorophyll. In this process, the Sun's energy is converted into and stored as chemical energy in the form of a sugar. ● Green plants are the producers of food which is used directly or indirectly by consumers. ● The environment may contain dangerous levels of substances (pollutants) that are harmful to organisms. Therefore, the good health of environments and individuals requires the monitoring of soil, air, and water, and taking steps to keep them safe. ● Most activities in everyday life involve one form of energy being transformed into another. For example, the chemical energy in gasoline is transformed into mechanical energy in an automobile engine. Energy, in the form of heat, is almost always one of the products of energy transformations.	● Use scientific evidence to craft a persuasive letter advocating for change in their community.

STAGE TWO: Determine Acceptable Evidence	
	Assessment Evidence
Criteria to assess understanding: *(This is used to build the scoring tool.)* Feeding relationships and flow of energy through the species's ecosystem is accurately represented by a food web and energy pyramid.	Performance Task focused on Transfer: Students create a model demonstrating how energy is transferred through their local ecosystem, including its original source (sun) and eventual form (heat). Based on the model, students explain how our actions have directly and indirectly affected the flow of energy in the ecosystem. To do so they use their model as a platform for overall energy transfer in Rochester, NY and relate this to the environmental issue of dumping waste into our waterways. Students advocate for their community based on their understanding of ecosystems and energy transfer.

-A minimum of ten different populations are included in the models. Narrative explicitly discusses the flow and availability of energy through the ecosystem with direct references to the above models in support of the students' argument (students' claims are supported with explicit evidence from their models and research). Identifies the sun as the original source of energy, and explains what forms this energy takes as it is transformed and transferred through an ecosystem (ending up as heat). Describes/discusses that disruptions to the ecosystem can have cascading effects on the overall flow of energy in a given ecosystem.	Other Assessment Evidence: Unit ILS style quiz Daily Bridge Daily Summary/Closure Questions Daily Extended learning Activities Lab Reports Teacher observations

T, M, A *(Code for Transfer, Meaning Making and Acquisition)*	**STAGE THREE: Plan Learning Experiences**
A: Acquisition M: Meaning Making T: Transfer	Evidence of learning: *(formative assessment)* Summary + Closure at end of each lesson utilizing the "Workshop Model". Investigation reports if applicable.
Day by Day 1. A, M 2. A, M 3. A, M 4. A, M 5. A, M 6. A, M 7. A, M 8. M 9. T 10. T 11. T 12. T	Learning Events: 1. Day 1: What do we use energy for? **(energy transformations)** a. Students experience a series of stations where they create different types of energy with their bodies. 2. Day 2-4: Where do we get our energy? **(models of energy transfer)**. Students rotate through set of 3 day long stations. a. Introduction to energy flow activity. b. Building an energy pyramid. c. Close readings on energy transfer 3. Day 5: Food Webs. (**models of energy transfer)** a. Review and connect three day stations into food web model. 4. Day 6-7: What affects our access to energy? **(population relationships)** a. Students rotate through a series of human impact stations to examine the ways humans impact their environment. b. Students predict, predict, and explain how changes in one population affect others in an ecosystem though an energy level simulation gizmo. 5. Day 8-9: Owl Pellets Investigation a. Background information on owl's ecosystem & pellet dissection. b. Analysis of pellet's contents & creation of ecosystem energy flow model. 6. Day 10-12: Answering Essential Questions (Why do we need energy and where does our energy come from? How do we affect the flow of energy in our environment?) a. Expand on model created with owl investigation to local ecosystem as a whole. Identify explicitly each transfer and transformation of energy on model. b. Use model to write an explanation of how dumping waste into our waterways affects all populations in the ecosystem. c. Write letter to local community advocating for change based on their understanding of the local ecosystem and the negative changes on the transfer of energy throughout.