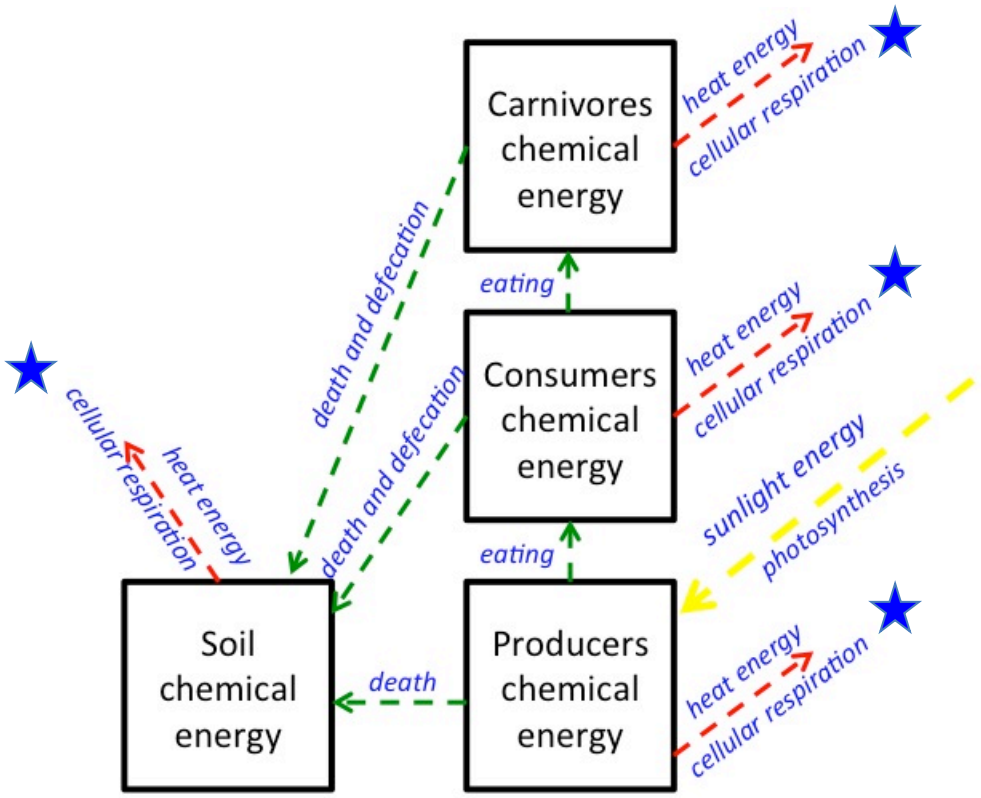
Name _____ Teacher _____ Date _____

3.5: Grading the Tracing Energy Worksheet

*This worksheet has "grading" in the title because at this point, students can be held accountable for correct answers. Level 4 (correct) responses to the questions are in **blue bold italics** below. There are also comments about common Level 2 and Level 3 responses to help you with grading and making decisions about what to emphasize in future lessons.*
Red italics suggest ways to grade student responses by giving them points for correct or partially correct answers. There are 23 points total on this worksheet.

A. Tracing energy through an ecosystem.
1. Draw arrows (- - - ->) to show how carbon moves through an ecosystem and label the carbon-transforming processes responsible for that movement (photosynthesis, cellular respiration, eating, death and defecation).
2. Next to each arrow, label the form of energy involved with the carbon-transforming process (sunlight, chemical, heat).



3. When energy is in the form of chemical energy, it is associated with matter in the form of a food (or fuel). Put stars on your diagram where matter and energy part ways. What is the name of the process that happens when matter and energy part ways?

Cellular respiration.
1 point for correct response

B. Answering the Energy Flow Question

4. Explain how energy enters an ecosystem. Where does it come from? How is it transformed?

The source of energy to an ecosystem is the sun. Through the process of photosynthesis, plants covert sunlight energy into chemical energy stored in organic molecules (like glucose).
1 point for identifying the source of energy and 1 point for identifying how it is transformed; 2 points total

5. Explain how chemical energy moves between carbon pools. Why does the carnivore pool have less chemical energy?

When organic molecules move between carbon pools through herbivory, predation, and death/defecation, chemical energy stored in the organic bonds (C-C, C-H) also moves between carbon pools. Carnivores can eat only the organic matter that herbivores use for biosynthesis; organic matter that goes into feces or cellular respiration is not available to carnivores.

1 point for recognizing the chemical energy in high energy bonds in organic molecules and 1 point for explaining why most of the organic matter that herbivores consume is not used for biosynthesis (and is not available to carnivores); 2 points total

6. Explain how chemical energy is transformed when plants or animals use it. When a plant or animal dies, does it still have chemical energy?

When plants or animals do cellular respiration or other energy-requiring activities (growing, moving, etc.), chemical energy is converted to heat or motion energy as organic molecules are converted into inorganic molecules. The chemical energy is stored in organisms even after they die.

1 point for explaining that chemical energy is converted to heat and/or motion energy and 1 point for explaining the chemical energy remains even after organisms die; 2 points total

7. Explain how chemical energy eventually leaves an ecosystem. Can plants or animals in this ecosystem use that energy again?

When *chemical energy* is converted to *heat energy*, it is lost from the ecosystem and eventually radiates out into space.

1 point for explaining that energy leaves the ecosystem as heat energy and cannot be recycled.