Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Pd: \_\_\_\_\_\_

Energy Practice: 10 pts

1. What is free energy, and how is it different than chemical energy or heat energy? (2 pts)
**Sample student answers that received full credit:
“Free energy is released during chemical reactions. Free energy is available to do work. Chemical energy is just stored in molecules until it is needed. Heat energy cannot be used for work.”
“Free energy is the energy available in a chemical reaction that can do work. Free energy is different from chemical energy because chemical energy is stored in an organic molecule and free energy is the portion of the chemical energy that is released during the chemical reaction that does the work.”**
2. Producers and decomposers are both vital roles in an ecosystem. Describe one similarity and one difference between producers and decomposers (2 pts).

**“Producers and decomposers both make resources available to other organisms. Producers create their own food while decomposers do not.”
“Producers and decomposers make things available to other organisms. Decomposers make nutrients available, and producers make energy available. Decomposers are heterotrophs. Producers are autotrophs.”**
3. Complete the following chart (3 pts; 0.5 pt for each box):

|  |  |  |
| --- | --- | --- |
| **Process** | **Does entropy increase or decrease?** | **Does this process require energy or does it release energy?** |
| Forming peptide bonds between amino acids | **Decrease** | **Require** |
| Breaking down starch into individual glucose molecules | **Increase** | **Release** |
| Assembling nucleotides to synthesize an RNA strand | **Decrease** | **Require** |

1. If the universe tends to become less ordered and less organized, then how do organisms manage to maintain highly ordered internal environments and synthesize complex, ordered macromolecules? (3 pts)
**“Organisms maintain order by applying energy to help restore/build larger molecules that can be broken down and used for energy.”**