Name: _____ Block: _____ Date: _____

Unit 1: The Chemistry of Life, Evolution Connection #1: Abiogenesis

> "Nothing in biology makes sense except in the light of evolution."
> - Theodosius Dobzhansky

Evolution is such a broad topic that it relates to *every* unit in biology. In fact, it is often said that biology is difficult to understand unless you study it in the context of evolution. During each unit this year, we will discuss an "evolution connection" in which we will study an aspect of evolution that relates to our unit.

Rather than taking notes in your science notebook, the evolution connections will be self-contained worksheets. This way, by the end of the year, you will have several packets that collectively represent a whole unit on evolution.

Unit 1 was all about chemicals. Believe it or not, even chemicals evolve! For our first unit, we will explore the origin and evolution of the first organic molecules. (Uh-whoa.)

You will watch 4 short videos and read a textbook section as you work on this packet. Links for the videos can be found on the class website. As you watch, you should answer the accompanying questions.

Video 1: Abiogenesis

http://www.bozemanscience.com/010-abiogenesis

1.What is abiogenesis?

2.Create a flow diagram to illustrate a sequence of steps that needed to occur for life to originate from non-life.

Non-life → _____ → _____ → _____ → Life

3.What is the significance of the Miller-Urey experiment? Which part of your flow chart (above) were Miller and Urey trying to address?

4.What do we mean when we say "primordial soup"?

5.Why is it so difficult to find evidence of the earliest living things?

Video 2: The Miller-Urey Experiment

http://highered.mheducation.com/sites/9834092339/student_view0/chapter26/animation_-_miller-urey_experiment.html

6.How was the atmosphere of Early Earth different from the atmosphere found on Earth today? (List molecules that were present and those that were absent.)

7.Briefly describe the Miller-Urey experiment. What did they do? What did they find?

Video 3: Hydrothermal vents

http://www.pbslearningmedia.org/resource/tdc02.sci.ess.earthsys.deepseavents/deep-sea-vents-and-lifes-origins/

8.What makes the Mid Ocean Ridge System a possible location for the origin of life?

9.What is the black smoke that comes from vents and chimneys made of?

10. What challenges to organisms living in the deep ocean face?

11.What types of organisms live there now? How do they get energy?

Video 4: RNA World

http://www.pbslearningmedia.org/resource/nvra.sci.origin/the-rna-origin-of-life/

12. Discuss the limitations scientists encounter when using DNA to trace evolutionary history. How far back can they go?

13. Explain the "chicken and egg" problem that evolutionary biologists face when studying origins of life.

14. What is the "RNA World" hypothesis?

15. What are some functions of RNA in our cells today?

Use section 17.4 from your textbook to answer the last two questions.

16.Discuss Oparin and Haldane's **heterotroph hypothesis**, which attempts to explain the origin of organic molecules.

17. In the chart below, describe the following experiments and observations, and explain how they support the Oparin-Haldane hypothesis.

a. The **Miller-Urey experiments**, which attempted to simulate the **prebiotic environment**.
b. **Meteors** contain some organic molecules
c. **Polymerization reactions** occur on clay mineral surfaces.
d. Volcanic (**hydrothermal**) **vents** release hot gases from the Earth's crust.
e. Some RNA molecules are self-replicating.

Experiment/ Observation	**Description/Explanation**	**How this supports the Oparin-Haldane hypothesis**
Miller-Urey		
Meteors		
Polymerization on clay surfaces		
Hydrothermal (Volcanic) vents		
Catalytic RNA		