Astronomy 101 Lab: Finding Life Beyond Earth

If you own a laptop, please bring it to class. You will submit your answers into the dropbox on Cobra.

Pre-Lab Assignment: In this lab, you will be watching a video about the moons of the Solar System. Although it was originally thought that most of these moons would be uninteresting, in many cases, that couldn't be further from the truth. Earth's Moon has been observed since antiquity, but it was only within the past few hundred years that other moons were discovered and studied. Answer the following questions before coming to lab.

A) Galileo is credited with discovering the first moons beyond Earth in 1610. How many moons did he discover and what planet do they orbit?

B) Which type of planets of the Solar System has fewer moons?

For the last two pre-lab questions, you will find this information in the appendices of your textbook. Objects whose diameter are presented as three numbers are not large enough to be spherical and have three dimensions listed.

C) Which moon is the largest size? Which planet has a smaller size than this moon?

Introduction: Scientists are studying other worlds for signs of life. This work challenges our understanding of how life began on Earth as well as how life is possible throughout the Universe. The worlds being studied include seemingly cold moons which orbit the Jovian planets.

Procedure: Watch the NOVA special, “Finding Life Beyond Earth,” during the lab period. This video is longer, so no internet questions accompany this lab. Your answers to video labs should be typed and in complete sentences. You may use the answer sheets at either URL below.
http://natsci.parkland.edu/ast/101/labs/findinglife.docx
http://natsci.parkland.edu/ast/101/labs/findinglife.rtf

1. What three components are required for life to exist on Earth?

2A. What objects provide clues to the formation of the Solar System?
2B. Why do they provide clues to the Solar System’s formation?

3. According to measurements made by the Hayabusa spacecraft, what does 40% of Itokawa consist of?

4. There were about 100 protoplanets in the inner solar system. Why are there so few today?

5. How do scientists believe a giant impact allowed for water to be present on Earth’s surface?
6A. Where do scientists believe Earth’s organic molecules came from in the Solar System?
6B. Why do scientists believe these chemicals had to come from so far away?

7A. Glycine is an example of what type of molecule essential to all life?
7B. Where did scientists find this molecule in space?

8. Describe how all the Jovian planets disturbed the Kuiper belt.

9A. How did the Late Heavy Bombardment possibly affect Earth?
9B. How do we see the effects of this event on other worlds?

10A. Water has been found everywhere on Mars. Where is it?
10B. Why don’t we see it as a liquid?

11. What gas has been detected in Mars’s atmosphere and may indicate the presence of life?

12A. What did the Voyager spacecraft discover on Io?
12B. Where does the energy that drives this activity come from?

13A. What piece of evidence on the surface shows that Europa has liquid water underneath?
13B. What non-visual evidence shows the presence of a liquid ocean under the surface?

14. Why is it so difficult to probe Europa’s ocean for life?

15. What two surprising discoveries did Cassini make about the "tiger stripes" on Enceladus?

16. How could scientists test for evidence of life on Enceladus?

17A. What unique property does Titan share with Earth and no other world in the Solar System?
17B. What is the composition of this substance?

18A. What do scientists believe happened to organic molecules on Earth that caused life to occur?
18B. For life to exist on the surface of Titan, how must those conditions be replicated?

19A. What is seen surrounding young stars in the Orion Nebula?
19B. Since these are common, what does that imply about most stars?

20. Why are the first rocky planets discovered by the Kepler telescope unable to sustain life?

21. How will the James Webb Space Telescope detect signs of life from planets orbiting other stars?