# Extraterrestrial Life

Turn in one copy of this lab with each group member's printed name and signature. By signing, you certify that you have actively participated in the exercise and have put forth effort in equal share to your fellow group members.

| **Printed Name** | **Signature** |
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## Part 1: What is "Life"?

1. List all the different types of life on the Earth you can think of:

2. By emphasizing "life as we know it," what big assumption are we making about life in the Universe?

3. The life bearing, "garden-like" state of the Earth is the result of many fortunate circumstances. What are some of the things that we believe life *needs* to survive? List as many as you can think of. *Try to be as general as possible* (think: does all life need plants to exist?)

4. List the three things that life as we know it *needs* to exist:

5. If we are considering the emergence of life, what things do we need to know about:
   a. Land
   b. Ocean
   c. Atmosphere

6. What was Earth like after heavy bombardment? Use the textbooks and the internet to search out the above parameters.

7. What type(s) of life probably formed earliest?

## Part 2: Life in Extreme Environments on Earth

1. From the World Map, list the properties that make life "extreme". Include the "extreme" ranges for each property.

2. Do you think that the map is complete list? What other things might you want to include? (Use the internet to find information about those extremophiles and list their conditions as well.)

3. Based on your information, how would **you** define "habitable zone"?

## Part 3: Finding Life – our own solar system and beyond

1. Make a list of candidates for life within our solar system. Include the properties that put them on your list.

2. If you ruled out any major planets from your list, explain why.

3. Which properties of the extreme environments can we ***observe*** using the Kepler telescope?

4. Read the Kepler mission's discussion of habitable zone at http://kepler.nasa.gov/Mission/faq/#a14 (questions 14 and 15). Do you agree with their definitions? Why or why not?

5. Come up with *specific* criteria you would use to search for *extra-solar* planets given the capabilities of Kepler. These will be the criteria you use when deciding on which planets ***you*** think might be worth considering in our search for life!

6. Which columns in the Kepler data table will be most useful for determining the habitability of an extra-solar planet?

7. Using the table, find the *most likely* candidates for habitable planets. List them here along with their properties:

8. *Within* your nominal temperature range, which ones are you rejecting? Why?

9. Are there any *outside* your nominal temperature range that you have included? If so, explain why.

10. Given what you have learned in this lab, do you think it is likely life exists elsewhere (other than on Earth)? Why or why not?

11. If you have time, draw an alien here: