**IS IT ALIVE?**

**Part I – The Story**

* A robot spacecraft has just returned from a mission to find evidence of life on Mars.
* It took soil samples from three locations off the surface of Mars.
* Your job is to do an experiment to see if there’s any evidence of life in these **mystery soil samples: A, B, & C**.

**Part II – Set-up and Initial Observations**

* Divide into teams of 3.
* Each group should get a sample (3 spoons) of each mystery soil in the correctly marked cup (A, B, or C).
* Be careful not to mix the samples and DO NOT TOUCH THE SOIL SAMPLES!
* Carefully observe the samples – no touching or tasting; looking, listening, and smelling are OK.
* Write down your “Initial Observations” on your Observation and Experiment Log sheet.
* *Do you think there’s life in any of these samples? How do we decide if it’s alive?* (leave to wonder at this point.)
* Pour hot water/food (sugar) in each cup (cover each sample with about ½ in. of water above soil line.
* Examine your samples again and record your observations in the “After Adding Hot Water” section of your log sheet.

**Part III – Discussion: What is Life?**

* Defining life is tricky for scientists. Not everyone agrees.
* Go around and get ideas – write them on the board 🡪 get consensus characteristics (life is defined by common characteristics)
* Common to all living things (highlight on board):
	+ **Use energy/respire – consume O2, give off CO2**
	+ **Grow**
	+ **Reproduce** (make more of themselves)
* When some organisms use energy, they produce carbon dioxide gas. This creates little bubbles that will continue to be formed as long as the organisms are alive and have a source of energy (“food”).

**Part IV – Final Conclusions**

* Now that your samples have had some time with the food and water, what do you observe?
* Do you think any of the soil samples contains life? Which one? Why?
* Write down your conclusions in the “Final Conclusions” section of your log sheet.
* What you need to know:
	+ A – only sand
	+ B – sand + Alka Seltzer – reacted quickly, then went flat
	+ C – sand + yeast – a one-celled fungus that “encysts” until it has water and food, then it uses energy to grow and stay alive 🡪 CO2 gas (what makes bread rise and gives it the little holes)

**Part V – Extensions**

* To demonstrate CO2 production of yeast, you can measure the pH of the solution.

***IS IT ALIVE?***

Observation and Experiment Log

You can use both words and pictures to describe the mystery soil samples from Mars.

**I. FIRST OBSERVATIONS**

 **Mystery Soil A Mystery Soil B Mystery Soil C**

**II. AFTER ADDING HOT WATER**

 **Mystery Soil A Mystery Soil B Mystery Soil C**

**III. FINAL CONCLUSIONS**

 **Mystery Soil A Mystery Soil B Mystery Soil C**