

## Life Sciences Activities: Guiding and Evaluating Student Work

For the students to get the most out of these activities, it helps to have clear expectations from the start. The “Microbial Survival” activity would serve as a good information-gathering activity, with a discussion as the final product rather than a full report. Before students begin “Looking for Life in the Classroom,” each student in a group could be responsible for a section of writing, with time on the final day to work on this in groups.

**Developing an hypothesis:** Students explain how their group ranked the three sites. They can show this using a table with the three sites across the top of the table, and the four important factors for survival listed on the side. In each box in the table, students include at least a sentence to explain how the site meets the criteria. Assign points according to following schedule:

- 10 points: The student has made a complete table, factors are well-chosen, explanations are clear.
- 8 points: The student has made a complete table, but it is not well laid out, not all factors are chosen well, explanations are fuzzy.
- 6 points: The student’s table is incomplete or very unclear, choice of factors is poor, explanations are missing, incomplete or unclear.

**Recording data:** Have students make data tables recording the total number of growths in the plates, as counted by each member, on each day. Find the average of these counts, include them in these tables, and graph the results. How can students show different results together on the same graph? Be creative! Assign points accordingly:

- 10 points: All data is recorded, averages are calculated, graph is labeled clearly and compares data well.
- 8 points: Some data missing, averages miscalculated, graph complete, but not effective.
- 6 points: Big gaps in data/calculations, graph plotted incorrectly and/or unlabelled.

**Making observations:** Encourage students to make good initial written observations. Did they swab the same area for each site? Did they have the Petri dish open for the same amount of time for each test? Students should record anything besides the sites themselves that might affect their results, especially by contaminating their dishes. In a table of daily observations, they should record notes on colors and sizes of the growths from each site, and any other observations that seem interesting. Assign points accordingly:

- 10 points: Students make keen observations, clear descriptions and no inferences (they should record only what they see, not what they think about what they see!)
- 8 points: Students make basic observations with some clarity, mostly free of inferences.
- 6 points: Students miss some basic observations, observations lack clarity, inferences are recorded as observations.

**Reaching a conclusion:** How well did the students support their hypotheses? If they saw big differences, are they sure it wasn't because of accidental contamination? What surprised them the most? What did this tell them about where bacteria can survive and thrive? What other things would they want to try? Assign points:

- 10 points: Student makes a good evaluations of hypothesis -- results match up with the conclusion. There are thoughtful, original responses to each question.
- 8 points: The student's evaluation of hypothesis is a little suspect. Good responses to most questions.
- 6 points: Student's conclusion statement is poor/missing. Responses are brief.