Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period:\_\_\_\_\_\_\_

**COLOR VARIATION OVER TIME IN ROCK POCKET MOUSE POPULATIONS**

**AP Biology (Adapted from HHMI Activity)**

A typical rock pocket mouse is about 170 millimeters long from nose to rump, shorter than an average pencil. And at just 15 grams, this tiny mouse weighs about as much as a handful of paper clips. Rock pocket mice, however, have had an enormous impact on science. What’s so special about them?

You can find populations of rock pocket mice all over the Sonoran Desert in the southwestern United States. There are two common varieties—a light-colored variety and a dark-colored variety. There are also two major colors of substrate, or surface materials, that make up the desert floor. Most of the landscape consists of light-colored sand and rock, but patches of dark volcanic rocks that formed from cooling lava flows are found, separated by several kilometers of light colored substrate.

The illustrations given to you represent snapshots of rock pocket mouse populations. Each full-page illustration shows the color variation at two different locations, A and B, at a particular moment in time. (*Note: The images are out of order.)*

**Procedure:**

1. Count the number of light-colored and dark-colored mice present at each location at each moment in time. Record your counts in the spaces provided at the top of each illustrations. Note that in each location there is always a total of 10 mice.

2. Place the illustrations in what you think is the correct order from oldest to most recent. Indicate your order by circling the appropriate number under the illustration. *Note: Both locations A and B originally started as the same type of environment, but a volcanic eruption changed one of the locations.*

3. Explain *in full sentences* how you decided which illustration represents the most recent rock pocket mouse population and why you positioned the others in the sequence as you did. (2-4 sentences)

4. As a class we will check the order in which you arranged the illustrations. Change the order as necessary. Once you are satisfied that you are correct, fill out the data table below using the counts you recorded above the illustrations.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | First (oldest) | Second | Third | Fourth (most recent) |
| Location A | # of Mice with Light Fur |  |  |  |  |
| # of Mice with Dark Fur |  |  |  |  |
| Location B | # of Mice with Light Fur |  |  |  |  |
| # of Mice with Dark Fur |  |  |  |  |

6. Use colored pencils to prepare two bar graphs based on the data that shows the distribution of the mice at locations A and B through time (one graph should be the data from Location A, one graph should be the data from Location B). Be sure to provide an appropriate *title* for each of the graphs, *titles and labels for the x- and y-axes*, along with a *key*.

[](http://www.google.com/url?sa=i&rct=j&q=&esrc=s&frm=1&source=images&cd=&cad=rja&uact=8&ved=0CAcQjRw&url=http://mathbits.com/MathBits/StudentResources/GraphPaper/GraphPaper.htm&ei=kXEiVay3H8ilgwSdoIOoBg&bvm=bv.89947451,d.b2w&psig=AFQjCNEYjRYM8Cg5bA3XMnOobgjO2q2ZKw&ust=1428407051832960)

[](http://www.google.com/url?sa=i&rct=j&q=&esrc=s&frm=1&source=images&cd=&cad=rja&uact=8&ved=0CAcQjRw&url=http://mathbits.com/MathBits/StudentResources/GraphPaper/GraphPaper.htm&ei=kXEiVay3H8ilgwSdoIOoBg&bvm=bv.89947451,d.b2w&psig=AFQjCNEYjRYM8Cg5bA3XMnOobgjO2q2ZKw&ust=1428407051832960)

**QUESTIONS:**

1. Explain why a rock pocket mouse’s fur color influences its overall fitness. Remember that “fitness” is defined by an organism’s ability to survive and produce offspring.
2. Explain the presence of dark-colored mice at location A. In other words, why are there dark colored mice present, even though the sand in location A is light? Why didn’t this phenotype become more common in the population?
3. Write a scientific summary paragraph (3-4 sentences) that describes changes in the rock pocket mouse populations at **location B**. Your summary should include
   1. A description of how the population has changed over time
   2. An explanation of what caused the changes (both the original change in color and the change over time)
   3. A prediction that describes what the population will look like 100 years in the future. Base your prediction on trends in the data you have organized. You can assume that environmental conditions do not change over the 100 years.
4. Use the data and what you have learned about evolution to explain how mutation is a random process, but natural selection is not random (you may want to revisit the video we watched in Unit 7).