Name: Class Date:

HANDS-ON ACTIVITY

Modeling Natural Selection

Scientists use simulations to model phenomena in the natural world and make predictions about future events. In this activity, you will make a simulation that models the four main principles of natural selection: overproduction, variation, competition, and adaptation. Your simulation should include the concepts outlined below, and you will explain how they are modeled in a presentation for your peers. The simulation can be in the form of a computer model, a video, a mathematical model, a conceptual model, or a hands-on activity. Alternatively, you can search for an existing simulation and address whether it accurately depicts these concepts:

- The simulation should model a population in a given environment.
- The population should show variation in one or more traits.
- Some traits should be more beneficial than others in a given environment.
- Multiple generations should be modeled, and the number of individuals in each generation should be reflected in a visual format or as quantitative data.
- After a few generations, you should introduce a change in the environment, and model how this change affects the population.
- After a few more generations, you should introduce a new trait that results from a mutation, and demonstrate whether this new trait is beneficial in the environment.

POSSIBLE MATERIALS

- beads or other small items
- computer
- computer simulation program
- cutlery, plastic
- markers
- posterboard
- tray, plastic or metal

PROCEDURE

1. Decide which type of simulation you will make. Discuss the types of organisms you want to depict, the environmental pressures they will face, and how the population(s) might change over time. Write your plan in your Evidence Notebook.
2. In your Evidence Notebook, explain how you will model the principles of natural selection in your simulation. Refer to the requirements listed at the beginning of the lab to ensure you fulfill each of them. If you plan to use an existing simulation, explain how this simulation models the principles of natural selection.
3. Make your simulation. Before letting the simulation run, make data tables in your Evidence Notebook to record qualitative and quantitative data. Record any observations in your Evidence Notebook as the simulation runs. Print out any data tables or graphs that are an output of the simulation and attach them to your Evidence Notebook.

ANALYZE

1. What patterns can you identify in the data? Which traits are advantageous in this scenario? Provide evidence to support your claims.

_____

_____

_____

_____

_____

_____

2. How does the simulation model a change in the environment, and how does this change affect which traits are advantageous? Provide evidence to support your claims.

3. How does the simulation model a new trait arising from a mutation? Is this trait harmful or beneficial in this environment? Provide evidence to support your claims.

4. What are the strengths and limitations of this model? How could this model be improved?

COMMUNICATE

Prepare a presentation to demonstrate your simulation to your peers. Your presentation should answer the questions above and use different types of media to add interest. The presentation could be in the form of a slideshow, video, or demonstration of the simulation itself.