PEEBEDU

Pocket Mice Natural Selection

Name: _____ **Period:** _____ **Date:** _____

> Open **peebedu.com** and navigate to **Pocket Mice Natural Selection**. Click the **Start Exploring** button to begin. Read the introduction popup, which describes how the MC1R gene controls coat color in pocket mice and how owl predation drives changes in allele frequencies across generations.

Free Response Questions

Question 1 — Conceptual Analysis

> **Simulation Task:** *Reset the simulation and set the Starting R Allele Frequency to 5%. Keep the environment as Sandy Desert with 2 owls. Click Skip to advance through at least 5 generations. Observe the allele frequencies, genotype counts, and the number of mice captured by owls each generation.*

(A) (1 pt) **Describe** how the numbers of dark and light coat color phenotypes shown in the simulation change over the five generations you observed in the sandy desert.

(B) (1 pt) **Explain** why the frequency of the R allele decreases over multiple generations in the sandy desert environment.

(C) (1 pt) **Predict** what would happen to the frequency of the R allele if the number of hunting owls were increased from 2 to 5 while the environment remains sandy desert.

(D) (1 pt) **Justify** your prediction.

Question 2 — Analyze Model / Visual Representation

> **Simulation Task:** *Reset the simulation and set the Starting R Allele Frequency to 50%. Run the simulation in the sandy desert for 3 generations. Then click Trigger Volcanic Eruption to change the environment to dark lava rock and continue running the simulation for at least 5 more generations. Observe how the allele frequencies and phenotype counts change before and after the eruption.*

(A) (1 pt) **Describe** how the Dark and Light phenotype counts shown in the simulation change after you trigger the volcanic eruption.

(B) (1 pt) **Explain** why the change from sandy desert to lava rock reverses the direction in which natural selection acts on coat color in this population.

(C) (1 pt) **Represent** the predicted change in R allele frequency across 10 generations, before and after the volcanic eruption, by drawing a labeled line graph in the box below.

Draw your diagram here.

(D) (1 pt) **Explain** why mice with the heterozygous Rr genotype are just as visible to the owls as mice with the homozygous RR genotype in the sandy desert environment.

7.1.B.2, 7.2.A.1, 7.2.A.3