

PEEBEDU Founders Effect Simulator

Unit 7: Natural Selection and Evolution

Name: _____ Period: _____ Date: _____

Open **peebedu.com** and navigate to **Founder's Effect Simulator**. Click **Start Exploring** to dismiss the introduction popup. Read the six information panels, which describe island evolution, adaptive coloration, migration challenges, mutation and variation, population dynamics, and carrying capacity.

Free Response Questions

Question 1 — Conceptual Analysis

Simulation Task: Set the Population slider to 200 and Water Survival to 0.30. Keep Mutation at 0.01 and all island Selection values at 4. Click Start and let the simulation run for approximately 100 frames. Observe the Population Over Time graph and note which insect colors are present on each island.

(A) (1 pt) **Describe** what happens to the frequencies of the insect colors when a small group of insects becomes separated from the central island population and founds a new population on a peripheral island.

(B) (1 pt) **Explain** why the small group of insects that survives the water crossing to a peripheral island may not carry the same set of color alleles as the central island population.

(C) (1 pt) **Predict** what will happen to the genetic diversity of the island populations if Water Survival is reduced to 0.10.

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

Question 2 — Analyze Model / Visual Representation

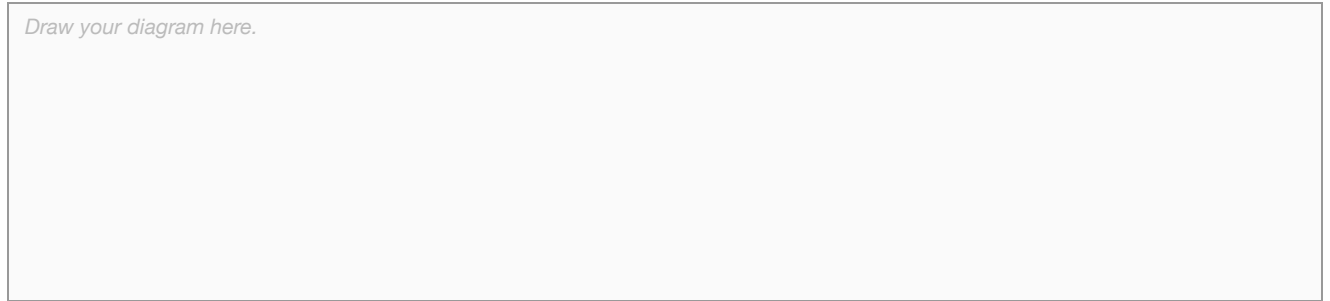
Simulation Task: Reset the simulation. Set Population to 200, Water Survival to 0.50, and Mutation to 0.00. Set the Green island Distance to 80 and its Size to 30. Set Brown island Distance to 200 and its Size to 60. Leave Red island at defaults. Click Start and run for at least 150 frames. Compare the populations on the Green and Brown islands.

(A) (1 pt) **Describe** how the color composition of the Green island population differs from the color composition of the Brown island population at the end of the run.

(B) (1 pt) **Explain** why the Green island population (closer, smaller) and the Brown island population (farther, larger) show different patterns of genetic diversity, referencing the role of population size and migration rate in genetic drift.

(C) (1 pt) **Represent** the effect of founding population size on genetic diversity by drawing, in the box below, two labeled bar graphs of insect color frequency, one for a large founding population and one for a small founding population.

Draw your diagram here.



(D) (1 pt) **Explain** why an island population with no migration and Mutation set to 0.00 cannot produce new colour variants.

7.4.B.1, 7.4.C.1