Fur and Flow

Model how a changing habitat can shift an inherited trait.

ZOO.1 "Students will develop a model of evolutionary change over time. Develop and use dichotomous keys to distinguish animals from protists, plants, and fungi. Describe how fossil records document the history of life on Earth..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Circle a phrase showing inherited variation, underline the habitat change, and number three steps linking survival, reproduction, and population change.

Mice on the Lava

1. On pale desert sand, rock pocket mice are usually easier to see when their fur is dark. Owls and other hunters can spot a visible mouse and catch it before it has offspring. Long before any lava arrived, some mice carried inherited gene variants that produced darker fur, while others had lighter fur. A mouse does not change its genes to match the ground beneath it. Both colors can occur in one population because offspring inherit gene variants from their parents. Fur color matters to survival when the ground color affects how easily hunters detect a mouse.

2. Now imagine a lava flow hardens into a patch of dark rock beside the pale sand. The lava changes the habitat, not the mice's genes. On the dark rock, hunters more easily spot light-furred mice than dark-furred mice. Dark-furred mice are more likely to survive long enough to reproduce there. Because fur color is inherited, their offspring are also more likely to have dark fur. After many generations, dark fur can become common on the rock even though no individual mouse changed color. On nearby pale sand, light fur may still offer better camouflage.

3. This sequence is a model of natural selection: inherited variation exists, the environment affects survival, and survivors pass gene variants to the next generation. The model predicts a population shift, not a planned change in each animal. If hunters stopped using sight to find prey, fur color might have less effect on which mice survive. Dark fur would not necessarily spread on the lava in that case. To test the model, researchers could compare fur colors across many generations on both surfaces and record whether hunters catch mice of one color more often than the other.

2 ANSWER WITH EVIDENCE

Use the passage

1. What variation existed before the lava arrived, and why does its timing matter to this model?

2. Why can dark fur become more common on the lava even though no individual mouse changes color?

3. How might the fur colors of mice on pale sand differ from those on dark rock after many generations? Explain using the habitat.

4. What two observations could researchers make to test whether the model explains the population shift?

3 YOUR TURN

Your own words

In a marsh, some insects inherit tolerance to salty water, while others do not. A storm makes the marsh saltier. Write a four-step model predicting how this change could affect the insect population over generations, including survival and reproduction.

Fur and Flow

PART 1 · READ AND MARK

Circle a phrase showing inherited variation, underline the habitat change, and number three steps linking survival, reproduction, and population change. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What variation existed before the lava arrived, and why does its timing matter to this model?	**Some mice already had inherited variants for dark fur, while others had light fur. The dark fur did not arise because the lava appeared.**
2	Why can dark fur become more common on the lava even though no individual mouse changes color?	**Hunters spot more light-furred mice on dark rock. Dark-furred mice are more likely to survive and reproduce, passing inherited variants for dark fur to offspring.**
3	How might the fur colors of mice on pale sand differ from those on dark rock after many generations? Explain using the habitat.	**Dark fur may become common on dark rock, while light fur may remain common on pale sand. Each color can help mice blend into its matching habitat.**
4	What two observations could researchers make to test whether the model explains the population shift?	**They could compare fur colors across generations on both surfaces and record whether hunters catch one color more often than the other.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

1. Before the storm, some insects inherit salt tolerance, while others do not. 2. The storm makes the marsh water saltier. 3. Salt-tolerant insects are more likely to survive and reproduce, passing on their tolerance. 4. Over generations, salt tolerance may become more common in the population.

Accept models that begin with inherited variation and show how the saltier habitat affects survival, reproduction, and trait frequency over generations. Do not accept claims that individual insects develop inherited tolerance because they need it.