Color on the Rocks

Investigate how inherited traits affect survival in different environments.

FB.5.4 "Investigate how biological adaptations and genetic variations of traits in a population enhance the probability of survival in an environment (natural selection)."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline the inherited fur-color variations, circle the environmental factors that affect survival, and number the steps that show how a trait becomes more common over generations.

Rock Pocket Mice and Lava

1. On a desert hillside in the American Southwest, rock pocket mice dart between stones to collect seeds at night. Some mice have pale fur, while others have dark fur. The difference comes partly from inherited changes in genes that affect fur pigment. A dark-fur variant can appear through mutation, a random change in DNA. Mutations do not occur because a mouse needs a new color. The mice also face hungry owls that hunt by sight when there is enough moonlight. On pale sand, a pale mouse blends in better than a dark mouse viewed from above.

2. Long ago, a lava flow covered part of this pale desert with black rock. Imagine two nearby groups of mice, one on the older pale ground and one on the dark lava. Both groups already include some pale and dark mice. On the lava, a dark mouse is harder for an owl to spot than a pale mouse. On the pale ground, the reverse is true. Fur color does not make a mouse faster or stronger in this example. Its advantage depends on the surface beneath it and the visual hunters overhead.

3. Over many generations, owls tend to catch more of the mice whose coats contrast with the ground. Mice that escape long enough to reproduce can pass on genes linked to their fur color. Dark-fur variants therefore tend to become more common in the lava group, while pale-fur variants tend to remain more common on pale ground. This shift in inherited trait frequencies is natural selection, not a single mouse changing its fur in response to rock color. If owls were absent, this particular advantage of camouflage against owls would disappear, even though other factors could still affect survival.

2 ANSWER WITH EVIDENCE

Use the passage

1. How can a dark-fur variant first arise, and why does the passage say it does not arise because a mouse needs it?

2. Compare the survival advantage of dark fur on lava and on pale ground when owls hunt by sight.

3. Explain how dark fur can become more common in the lava group over many generations.

4. If owls disappeared from the lava area, what would happen to the camouflage advantage described in the passage? Would that mean dark fur must disappear?

3 YOUR TURN

Your own words

Imagine a wildflower population with inherited differences in root length. After several dry summers, upper soil dries but deep soil stays moist. In three or four sentences, predict how the frequency of long roots could change over generations, explaining survival, seed production, and inheritance.

ANSWER KEY

Color on the Rocks

PART 1 · READ AND MARK

Underline the inherited fur-color variations, circle the environmental factors that affect survival, and number the steps that show how a trait becomes more common over generations. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	How can a dark-fur variant first arise, and why does the passage say it does not arise because a mouse needs it?	**It can arise through a random change in DNA called a mutation. The mutation does not occur in response to a mouse's need for camouflage.**
2	Compare the survival advantage of dark fur on lava and on pale ground when owls hunt by sight.	**Dark fur makes a mouse harder for owls to spot on lava, but easier to spot on pale ground.**
3	Explain how dark fur can become more common in the lava group over many generations.	**Owls tend to catch more pale mice on lava. More dark mice survive to reproduce and pass on genes linked to dark fur, so the trait can become more common.**
4	If owls disappeared from the lava area, what would happen to the camouflage advantage described in the passage? Would that mean dark fur must disappear?	**The advantage of hiding from owls would disappear. Dark fur would not necessarily disappear because other factors could still affect survival.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Wildflowers with longer roots can reach the moist deep soil, so they are more likely to survive dry summers. If they make more seeds than short-root plants, more offspring may inherit long roots. Across generations, long roots could become more common in the population.

Accept explanations that connect an inherited trait to survival, reproduction, and a change in trait frequency across generations. Predictions should be conditional, since other factors may also affect which organisms survive.