

Beetles Through Time

Use population data to test an explanation for trait change.

S7L5.a "Use mathematical representations to evaluate explanations of how natural selection leads to changes in specific traits of populations over successive generations."

NAME _____ DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline every number or percentage in the passage, and circle the words that explain why one shell color left more offspring. Use your marks to connect the population data to natural selection.

Dark Shells, Changing Numbers

- ① On an island, ground beetles vary in shell color. After a wildfire, the soil became dark. Field scientists counted adult beetles each spring for four generations. They sorted 100 beetles in every sample as dark-shelled or light-shelled. The table shows the counts. Dark shells are an inherited trait, so parents can pass alleles for shell color to offspring.

ADULT BEETLES COUNTED EACH SPRING

Generation	Dark-shelled beetles	Light-shelled beetles
1	35	65
2	49	51
3	63	37
4	78	22

- ② At first, light beetles were more common. On dark soil, birds more easily spotted and ate light beetles. More dark beetles survived long enough to reproduce. Their offspring were therefore more likely to receive alleles for dark shells. This difference in survival and reproduction is natural selection. Individual beetles did not change shell color because of need.
- ③ The counts support natural selection. Dark beetles rose from 35% in generation 1 to 78% in generation 4, a 43-percentage-point increase. Light beetles fell by 43 percentage points. Because dark beetles survived and reproduced more, their inherited shell-color alleles became more frequent over generations. A claim that all shells darkened during life fails.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 Because each sample included 100 beetles, what percent of the generation 2 beetles had dark shells?

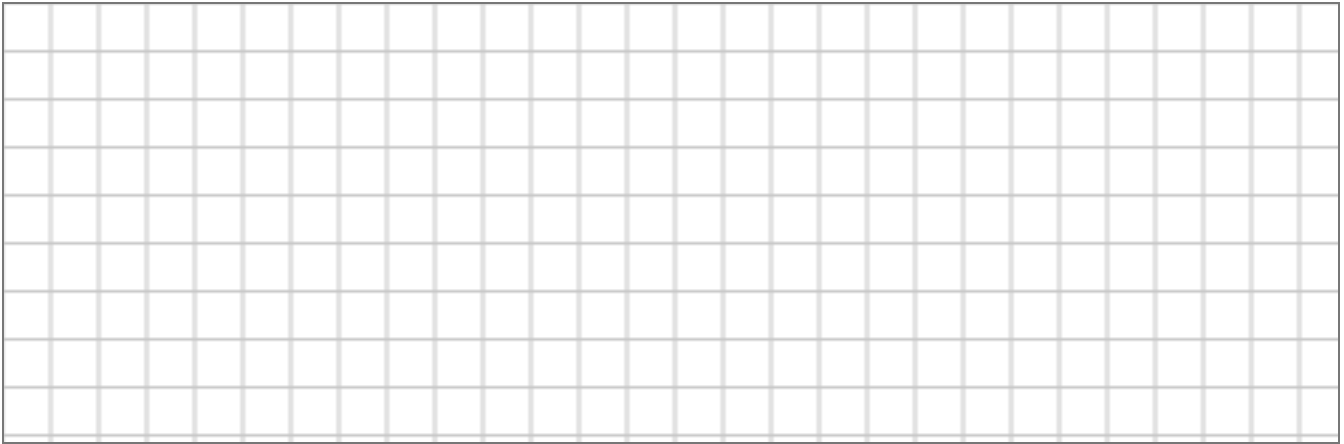
2 Calculate the change in the percentage of dark-shelled beetles from generation 1 to generation 4.

3 Use the table and the passage to explain how the changing numbers support natural selection instead of a random change.

4 A student says every light-shelled beetle turned dark during its lifetime. Give one numerical fact and one inheritance fact that show why this explanation does not fit.

3 YOUR TURN _____ Your own words

On another island, striped lizards are harder for hawks to see among striped rocks. Scientists count 100 lizards each generation, and striped lizards make up 20%, 37%, 56%, and 71% in generations 1 through 4. On the grid, make a line graph of the striped-lizard percentages, then write two sentences that use the data to evaluate a natural-selection explanation.



PART 1 • READ AND MARK

Underline every number or percentage in the passage, and circle the words that explain why one shell color left more offspring. Use your marks to connect the population data to natural selection. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	Because each sample included 100 beetles, what percent of the generation 2 beetles had dark shells?	49%
2	Calculate the change in the percentage of dark-shelled beetles from generation 1 to generation 4.	The dark-shelled percentage increased by 43 percentage points, from 35% to 78%.
3	Use the table and the passage to explain how the changing numbers support natural selection instead of a random change.	Dark-shelled beetles increased across all four generations. The passage explains that birds ate more light beetles, so more dark beetles survived and reproduced.
4	A student says every light-shelled beetle turned dark during its lifetime. Give one numerical fact and one inheritance fact that show why this explanation does not fit.	The dark-shelled group rose from 35 to 78 beetles over generations. Shell color is inherited through alleles, so offspring can receive dark-shell alleles from parents.

PART 3 • YOUR TURN (SAMPLE ANSWER)

The line graph plots striped-lizard percentages of 20, 37, 56, and 71 for generations 1 through 4. The 51-percentage-point increase supports natural selection because better-hidden striped lizards were more likely to survive and reproduce.

Accept calculations stated as a 43 percentage-point increase, not a 43 percent increase. For explanations, students should connect a numerical trend across generations with inherited variation and different survival or reproduction.