

NGSS-Designed Lesson Assessment: Darwin's Theory of Evolution Through Natural Selection

Main Ideas

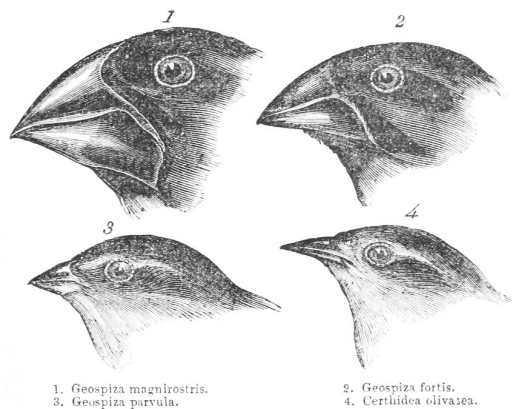
Read each item. Then select the letter next to the best answer.

1. During Darwin's voyage on the *Beagle*, he experienced an earthquake in Chile that caused the land to rise up a small amount. While sailing on the *Beagle*, Darwin continued to think about repeated land movements like the one he had experienced.

How was this event important in the development of Darwin's ideas?

- A. It showed how living things that once lived in the ocean could end up living in the mountains.
 - B. It provided an example of how features could result from gradual processes acting over long time periods.
 - C. It showed how populations of living things change over time to become better suited to their environments.
 - D. It contributed to Darwin's realization that all living things were engaged in a constant struggle to survive and reproduce.
2. You are reading a magazine article about the Galápagos Islands and come across this image about Darwin's work there. You know that the Galápagos finches are closely associated with Charles Darwin's work on natural selection and evolution.

Which feature of the Galápagos finches visible in the image below impressed Darwin?



- A. Certain species of Galápagos finches had unusual reproductive behaviors.
- B. Each species of finch had a distinct beak that was well suited to the finch's diet.
- C. Some Galápagos finches changed during their lifetimes to become better suited to living in their environments.
- D. Galápagos finches were able to survive despite the many different kinds of predators that lived on the Galápagos Islands.

3. Darwin was working on his ideas about how living things change over time when he read the ideas of the economist Thomas Malthus. Malthus argued that there was never enough food to keep up with human population growth. As a result, humans would always suffer from famine and misery.

Which of the following ideas from Darwin was inspired from Malthus's writings?

- A. Fossil species change over time to produce modern species.
 - B. Large changes result from many small changes built up over time.
 - C. Organisms change during their lifetime to become better suited to living in their environments and pass these traits to their offspring.
 - D. All living things are in a constant "struggle for existence" because there are not enough resources for them all to survive and reproduce.
4. One day while visiting a park, you come across a large number of beetles. Some of the beetles are green, and some of the beetles are yellow. You notice that the green beetles blend in with their leafy environment. However, the yellow beetles stand out as you can see in the photo below. You conclude that green beetles are better camouflaged than yellow ones from predators.

How do you predict beetle color in this population will evolve over time?



- A. Yellow beetles have a greater chance of surviving and reproducing and will become more common in the population.
- B. Green beetles have a greater chance of surviving and reproducing and will become more common in the population.
- C. Yellow beetles have a smaller chance of surviving and reproducing and will become more common in the population.
- D. Neither type of beetle will become more common in the population because they have the same chance of surviving and reproducing.

5. While hiking in the woods, you notice that the fir trees around you have roots of different sizes, as shown in the photo. Some trees grow larger root systems that are better at extracting water and other resources from the soil. Other trees grow smaller root systems that are less effective at these activities. You have heard that there has been a drought recently, and you think about whether this could result in natural selection on root size in this tree population.

What do you think will happen to this tree population after a few generations of drought?



- A. Trees with larger root systems will go extinct.
B. Neither type of tree will become more common in the population.
C. Trees with larger root systems will become more common in the population.
D. Trees with smaller root systems will become more common in the population.
6. You are on a safari in Serengeti National Park in Tanzania. One day, you see a zebra nursing its offspring, as shown in the video below. The person next to you asks why zebras do that.

What is the best explanation for why zebras nurse their young?

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- A. Nursing young is an inherited trait that helps zebras survive better.
B. Nursing young is a trait that is very common in the zebra population.
C. Nursing young is an inherited trait that shows genetic variation in the zebra population.
D. Nursing young is an inherited trait that helps zebras survive and reproduce successfully.


Think Like a Scientist

Read about each scientific investigation. Then answer the questions that follow the investigation by selecting the letter next to the best answer.

Investigation

For many years, a group of scientists studied medium ground finches on Daphne Major, one of the Galápagos Islands. They followed the medium ground finch population through a major drought in 1977, in which many birds died. During the drought, scientists observed that there were fewer seeds available for the birds to eat. In addition, the seeds that were available were mostly large ones. The scientists noticed that not all birds were able to crack open the larger seeds.

Data collected by the scientists on finch beaks before and after the drought are shown in the table below. Beak thickness is an inherited trait that shows genetic variation in this population.

			
Year	Minimum beak thickness (mm)	Maximum beak thickness (mm)	Average beak thickness (mm)
1976 (before drought)	7.3	10.8	8.8
1978 (after drought)	7.8	10.8	9.8

7. Which statement BEST describes how the medium ground finch population evolved from 1976 to 1978?
- A. Minimum beak thickness decreased between 1976 and 1978.
 - B. Average beak thickness decreased between 1976 and 1978.
 - C. Average beak thickness increased between 1976 and 1978.
 - D. Maximum beak thickness increased between 1976 and 1978.

8. Which statement provides the BEST explanation for how the medium ground finch population evolved between 1976 and 1978?
- A. Finches with thinner beaks were better able to avoid predators and survived and reproduced better than finches with thicker beaks.
 - B. Finches with thicker beaks were better able to avoid predators and survived and reproduced better than finches with thinner beaks.
 - C. Finches with thinner beaks were able to crack the larger seeds and survived and reproduced better than finches with thicker beaks.
 - D. Finches with thicker beaks were able to crack the larger seeds and survived and reproduced better than finches with thinner beaks.
9. Suppose that the drought clears up and conditions return to normal. How would you predict that average beak thickness in the population will change over time?
- A. Average beak thickness will remain close to 9.8 mm.
 - B. Average beak thickness will increase to a value greater than 9.8 mm.
 - C. Average beak thickness will decrease to a value closer to 8.8 mm.
 - D. Average beak thickness will decrease to a value smaller than 7.3 mm.

Expressing Science Practices, Concepts, and Ideas

Read the directions for each item carefully and use the space provided to respond.

10. At the zoo, you and a friend spend a long time watching the cheetahs. Write a one-paragraph essay that describes:

- one adaptation in the cheetah.
- an explanation of how this adaptation increases the probability of the cheetah surviving and reproducing in its environment.

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11. How did each of the following thinkers influence Charles Darwin? Complete the table below.

Thinker	The thinker's idea	How this influenced Darwin
Charles Lyell, a geologist	Some of Earth's features result from gradual processes acting over long time periods.	
Jean-Baptiste Lamarck, a naturalist	Organisms change during their lifetimes to become better suited to living in their environments. They then have offspring that inherit these new traits.	
Thomas Malthus, an economist	There is never enough food to feed the growing human population. As a result, humans will always suffer from famine and misery.	
Alfred Russel Wallace, a naturalist	Came up with the idea of natural selection also, independently of Darwin, and wrote to Darwin about it.	

12. The beach mouse (sometimes called the oldfield mouse) lives in a variety of habitats in the southeastern United States. Beach mouse populations that live in different habitats have different color fur. Populations that live on sandy beaches have light fur that matches the light color of sand. Populations that live in inland areas have dark fur that matches the color of the soil.

Write a one-paragraph essay to explain these observations. In your essay, you should:

- make a claim about why different populations of beach mice have different color fur.
- support your claim with evidence and reasoning.

Be sure to use all the terms in the word bank below.

WORD BANK

adaptation

evolution

genetic variation

natural selection

population

predators

reproduction

survival

trait

13. Working with a group of scientists, you design an experiment to test an idea about why beach mouse populations in different habitats have different color fur. The idea you want to test is that predators are more likely to see and eat beach mice that do not blend in to their environments.

To do this, you and the other scientists make clay models of mice to test how predators react to them. You make some light, sand-colored clay mice and some dark, soil-colored clay mice. Then you place both kinds of clay mice in a sandy beach habitat and record whether predators attack light or dark models. You then repeat the experiment in an inland habitat on soil.

Write a one-paragraph essay in which you predict the results of this experiment. In your essay, be sure to include:

- a prediction about whether predators will attack more light-colored clay mice or dark-colored clay mice in a beach habitat.
- a prediction about whether predators will attack more light-colored clay mice or dark-colored clay mice in an inland, soil habitat.
- an explanation of your reasoning.