SYNTHESIZE THE UNIT

In your Evidence Notebook, make a concept map, graphic organizer, or outline using the Study Guides you made for each lesson in this unit. Be sure to use evidence to support your claims.

When synthesizing individual information, remember to follow these general steps:

- Find the central idea of each piece of information.
- Think about the relationships between the central ideas.
- Combine the ideas to come up with a new understanding.

DRIVING QUESTIONS

Look back to the Driving Questions from the opening section of this unit. In your Evidence Notebook, review and revise your previous answers to those questions. Use the evidence you gathered and other observations you made throughout the unit to support your claims.

PRACTICE AND REVIEW

1. DNA nucleotides are said to be universal because they are the same for all known organisms. What is this evidence of? Select all correct answers.

a. common ancestry
b. fossil record
c. evolution
d. natural selection

2. Which lines of evidence did Darwin use to explain the variety of finches on the Galapagos Islands? Select all correct answers.

a. DNA evidence
b. fossil evidence
c. geological evidence
d. anatomical evidence

3. How did fossils contribute to Darwin's ideas about changes in species over time?

a. Fossils supported Darwin's ideas about common ancestry and the relationship of living species to fossil species.
b. Fossils showed that all species are the result of gradual changes over time.
c. Fossils explained how species develop different traits.
d. Fossils showed how humans had been impacting the traits of organisms for thousands of years.

4. Natural selection acts on which of the following? Select all correct answers.

a. individuals
b. populations
c. genes
d. traits

5. Which statement best describes the relationship between natural selection and variation?

a. All variations are acted upon by natural selection.
b. Variations evolve during natural selection to make a species better adapted to its environment.
c. Natural selection acts on variations that are selected for or against based on the environment.
d. Natural selection creates variations that are selected for or against based on the environment.

6. Which factor is not required in order for natural selection to take place?

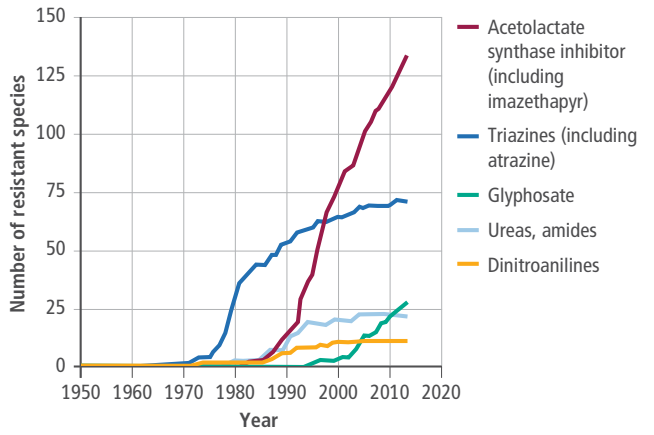
a. adaptation
b. competition
c. overproduction
d. sexual reproduction
e. variation

Use the following information and Figure 4 to answer questions 7–9.

Chemical herbicides are used in agricultural and landscape maintenance to kill unwanted vegetation, such as weeds. As the use of an herbicide becomes more common and widespread, weeds can evolve resistance to particular types of herbicide.

The Rise of Superweeds

FIGURE 4: The number of weed species resistant to herbicides has increased since 1970.



Source: Heap, Ian. "International Survey of Herbicide Resistant Weeds." as quoted in Gilbert, Natasha, (2013) "Case Studies: A hard look at GM crops," *Nature*, 497(7447).

7. Weeds first evolved resistance to which herbicide class?

- **a.** acetolactate synthase inhibitor
- **b.** dinitroanilines
- **c.** glyphosate
- **d.** triazines
- **e.** ureas, amides

8. What is most likely indicated by the fact that the number of species resistant to a class of herbicide does not decrease over time?

- **a.** Individual weeds evolve herbicide resistance and pass the trait to their offspring.
- **b.** The herbicide resistance trait is maintained in resistant populations.
- **c.** The weed populations frequently lose then evolve a resistance to herbicides again.
- **d.** Whenever one weed species loses herbicide resistance, one or more species gains resistance, leading to a net increase in resistant species.

9. Model a likely sequence of events that would lead to herbicide resistance in plants.

10. Use these terms to complete the statement below:

trait, evolution, DNA, genetic

Mitochondria and chloroplasts contain their own _____. The theory of endosymbiosis proposes that this _____ evidence may support the idea that mitochondria and chloroplasts were once free-living prokaryotes that were engulfed by larger prokaryotic host cells. The internalized prokaryotes might have provided nutrients and energy to the host cell, and, in turn, received protection and a stable environment in which to live. This endosymbiotic relationship may have led to the _____ of mitochondria and chloroplasts. These organelles would be an advantageous _____ selected for in populations.

11. Why is the fossil record an imperfect line of evidence for evolution?

UNIT PROJECT

Return to your unit project. Prepare your research and materials into a final presentation to share with the class. In your final presentation, evaluate the strength of your predictions, analysis, and conclusions about the evolution of eyes.

Remember these tips while evaluating:

- Look at the empirical evidence—evidence based on observations and data. Does your line of evidence support the idea that eyes have evolved over time?
- Consider if the explanation is logical. Does it contradict any evidence you have seen?
- Is there enough evidence to answer all reasonable questions? How might you develop tests for any additional questions?