



Stackable Instructionally- embedded Portable Science (SIPS) Assessments Project

Grade 8 Science Unit 3 Sample Lesson “Populations Change Over Time” Understanding Earth History and the Origin of Species June 2023

The SIPS Grade 8 Science Unit 3 Sample Lesson “Populations Change Over Time”, Understanding Earth History and the Origin of Species was developed with funding from the U.S. Department of Education under the Competitive Grants for State Assessments Program, CFDA 84.368A. The contents of this paper do not represent the policy of the U.S. Department of Education, and no assumption of endorsement by the Federal government should be made.

All rights reserved. Any or all portions of this document may be reproduced and distributed without prior permission, provided the source is cited as: Stackable Instructionally-embedded Portable Science (SIPS) Assessments Project. (2023). SIPS Grade 8 Science Unit 3 Sample Lesson “Populations Change Over Time”, Understanding Earth History and the Origin of Species. Lincoln, NE: Nebraska Department of Education.



Science Grade 8

Unit 3: Understanding Earth History and the Origin of Species

Sample Lesson: Populations Change Over Time

Suggested Time to Complete: 100 to 150 minutes

Purpose & Use Statement: This sample lesson was developed for state and local administrators and teacher leaders (e.g., curriculum directors, instructional facilitators, professional learning specialists) to (1) illustrate an example of an instructional lesson developed using a principled design approach, and (2) support accompanying process documentation about how to use the SIPS unit as an instructional framework to intentionally design high-quality lessons in an aligned curriculum, instruction, and assessment system. This sample lesson should be evaluated and refined, as necessary, to align appropriately with a standards-based curriculum, instruction, and assessment system prior to its use. Additionally, teachers should refine this lesson to meet the local, cultural, and individual needs of the students.

Desired Results

Overview of the Learning Goals

In this lesson, “Populations Change Over Time”, students use mathematical representations to analyze data about population changes over time, comparing population shifts with different environmental factors. Students use their data and analysis to provide evidence to support an explanation of how the environment causes a change in the proportion of a species across generations.

Connections to Prior Learning

DCIs: LS4.B, LS4.C, LS3.A

- **Prior Learning from 3-5 (NRC Framework)**
 - Fossils provide evidence about the types of organisms (both visible and microscopic) that lived long ago and about the nature of their environments. Fossils can be compared with one another and to living organisms according to their similarities and differences.
 - Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing.
 - Changes in an organism’s habitat are sometimes beneficial to it and sometimes harmful. For any environment, some kinds of organisms survive well, some survive less well, and some cannot.
 - Earth has changed over time. Understanding how landforms develop, are weathered (broken down into smaller pieces), and erode (get transported elsewhere) can help infer the history of the current landscape. Local, regional, and global patterns of rock formations reveal changes over time due to Earth forces, such as earthquakes. The presence and location of certain fossil types indicate the order in which rock layers were formed. Patterns of tree rings and ice cores from glaciers can help reconstruct Earth’s recent climate history.
- **Prior learning from this grade band (e.g., Grades 6 & 7):**
 - Minimal/not applicable

CCC: Patterns

- **Prior learning from 3-5:** Students identify similarities and differences, identify patterns related to time, and use patterns to make predictions and categorizations.
 - Ten PEs in Grades 3-5 use this CCC. Some uses are similar to the elements of the CCC used in this unit’s two PEs with the Patterns CCC (e.g., 3-PS2-2 involves making a prediction, which is possible because of cause-and-effect relationships; 5-ESS1-2 involves representing data in graphical displays to reveal patterns).

Science Grade 8

Unit 3: Understanding Earth History and the Origin of Species

Sample Lesson: Populations Change Over Time

Suggested Time to Complete: 100 to 150 minutes

- **Prior learning from this grade band (e.g., Grades 6 & 7):** Students are expected to use graphs, charts, and images to identify patterns in data. They are also expected to use cause-and-effect relationships to identify patterns in data (Appendix G).
 - Multiple middle school PEs use this CCC, so students will likely have some experience with the middle school CCC elements prior to starting Grade 8 Unit 3.

CCC: Cause & Effect

- **Prior learning from 3-5:** Students become adept at identifying/testing causes and effects and become aware that events can be correlated but not causally related.
 - Thirteen Grade 3-5 PEs use this CCC, so students will likely have substantial experience with the CCC prior to middle school. An example PE that uses the CCC in a way that presages this unit's CCC PE element (*Phenomena may have more than one cause, and some cause and effect relationships in systems can only be described using probability*) is 4-ESS3-2 (*Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans*) because solutions' effectiveness can be impacted by multiple factors and their intended effects might be best described probabilistically.
- **Prior learning from this grade band (e.g., Grades 6 & 7):** Students gain experience with multifaceted causal relationships, distinguishing between correlation and causation, and using cause-and-effect relationships to make predictions.
 - Fifteen middle school PEs use this CCC, so students will likely have substantial experience with the CCC during Grades 6 and 7. For example, MS-ESS2-5 (*Collect data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions*) implies examining multifaceted causes and probabilistic outcomes.

SEP: Developing and Using Models

- **Prior learning from 3-5:** Students continue developing their modeling skills and abilities by developing and revising different types of models, along with beginning to consider that models can have limitations. [Appendix G]
 - PE 4-PS4-2 is an example of a 3-5 grade band PE that uses a Developing and Using Models SEP element that is very similar to the SEP element used in this unit.
- **Prior learning from this grade band (e.g., Grades 6 & 7):** Students develop, use, and revise models to describe, test, and predict more abstract phenomena and to design systems.
 - Multiple middle school PEs use this SEP, so students will likely have some experience with the middle school SEP elements prior to starting Grade 8 Unit 2. MS-PS4-2 is an example middle school PE that uses the same SEP element as this unit's PE (MS-LS3-1).

SEP: Analyzing and Interpreting Data

- **Prior learning from 3-5:** Students will have experience with the collection of data using quantitative approaches to collecting data and conducting multiple trials of qualitative observations. They will be able to carry out the analysis and interpretation of the data using logical reasoning, mathematics, and/or computation.
 - In Grades 3-5, students will represent data in tables and/or various graphical displays to reveal patterns that indicate relationships. They will analyze data to refine a problem statement or the design of a proposed object, tool, or process.
-

Science Grade 8

Unit 3: Understanding Earth History and the Origin of Species

Sample Lesson: Populations Change Over Time

Suggested Time to Complete: 100 to 150 minutes

- **Prior learning from this grade band (e.g., Grades 6 & 7):** Students will build understanding and skills with quantitative analysis of data. They will distinguish between correlation and causation and carry out basic statistical techniques of data and error analysis.
 - Multiple middle school PEs use this SEP, so students will likely have some experience with the SEP element of determining similarities and differences in their data prior to starting Grade 8 Unit 3.

SEP: Constructing Explanations and Designing Solutions

- **Prior learning from 3-5:** Students will have experience using evidence to (a) construct explanations for describing/predicting phenomena and (b) design solutions to problems.
 - In Grades 3-5, multiple PEs use this SEP and relate to the three elements of this SEP that are used in Unit 3. For example, in 3-LS4-2 students use evidence to construct an explanation for the phenomena of natural selection pressures; in 3-LS3-2 students use evidence to support an explanation of the relationship between environmental factors and trait expression; and in 4-ESS3-1 students identify evidence that supports an explanation that landscapes change over time.
- **Prior learning from this grade band (e.g., Grades 6 & 7):** During all middle school grades, students will construct explanations and design solutions that are supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.
 - An example MS PE that uses a similar SEP element as MS-ESS1-4 (this unit) is MS-ESS2-2 (*Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales*).

SEP: Using Mathematics and Computational Thinking

- **Prior learning from 3-5:** This SEP is not introduced in K-5 until Grade 5 (5-PS1-2 and 5-ESS2-2). Therefore, it is likely that students will have minimal exposure to formal learning of this SEP prior to middle school.
- **Prior learning from this grade band (e.g., Grades 6 & 7):** This SEP is only used in two PEs in the 6-8 grade band (MS-PS4-1 and MS-LS4-6 (this unit)). Therefore, it is likely that students will have minimal exposure to formal learning of this SEP in Grades 6 and 7.

Key Vocabulary

Students build conceptual meaning with and use key tier II and tier III vocabulary terms as they make sense of phenomena and phenomena-based design problems. This is not an exhaustive list of terms, and should be reviewed and modified by educators, as appropriate.

- Frequency
- Relative frequency
- Adaptation
- Allele
- Inheritance
- Mutation
- Phenotype
- Genotype
- Variation
- Selection

Science Grade 8
Unit 3: Understanding Earth History and the Origin of Species
Sample Lesson: Populations Change Over Time
Suggested Time to Complete: 100 to 150 minutes

Targeted Stage 1 Learning Goals

Acquisition Goals (AG)

A16: Determine similarities and differences using patterns in findings related to the proportions of a species in a population across generations.
A17: Use mathematical representations to support scientific conclusions about how environmental conditions caused species to change over time.

Common Core State Standards (CCSS):

SL.8.1	7.RP.A.2	WHST.6-8.2
SL.8.5	6.EE.B.6	6.RP.A.1
MP.4	SL.8.4	6.SP.B.5
7.EE.B.6		

Enduring Understandings (EU)/ Essential Questions (EQ):

EU1/EQ1	EQ4/EU4
---------	---------

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<input checked="" type="checkbox"/> Analyze & Interpret Data <input type="checkbox"/> Ask Questions <input checked="" type="checkbox"/> Construct Explanations <input type="checkbox"/> Define Problems <input type="checkbox"/> Design Solutions <input checked="" type="checkbox"/> Develop & Use Models <input type="checkbox"/> Engage in Argument from Evidence <input checked="" type="checkbox"/> Mathematics & Computational Thinking <input type="checkbox"/> Obtain, Evaluate, & Communicate Information <input type="checkbox"/> Plan & Carry Out Investigations	<input checked="" type="checkbox"/> LS4.B: Natural Selection <input checked="" type="checkbox"/> LS4.C: Adaptation <input checked="" type="checkbox"/> LS3.A: Inheritance of Traits	<input checked="" type="checkbox"/> Cause & Effect <input type="checkbox"/> Energy & Matter <input checked="" type="checkbox"/> Patterns <input type="checkbox"/> Scale, Proportion, & Quantity <input type="checkbox"/> Stability & Change <input type="checkbox"/> Structure & Function <input type="checkbox"/> Systems & System Models

Formative Assessment Opportunities

Monitoring	Success Criteria	Possible Instructional Adjustments
<ul style="list-style-type: none"> While students are responding to the opening prompts, check for understanding of fractions, mathematical practices, and the students' use of logic to explain their reasoning. Use these checks to inform the modeling of calculating relative frequency. Following the gradual release model, listen to students as they work together in pairs. Ask 	<p>Students can:</p> <ul style="list-style-type: none"> Calculate the relative frequency for a population using provided population data. Create graphs to show a population's relative frequency and how that frequency changes over time. Develop investigative questions related to a population's relative frequency of alleles. 	<ul style="list-style-type: none"> Consider heterogeneous groupings and peer-to-peer relationships when setting up groups. Have students share their thinking orally or in writing instead of both. Provide students with a list of factors to choose from for developing their questions. Provide students with question stems to use to write their questions.

Science Grade 8

Unit 3: Understanding Earth History and the Origin of Species

Sample Lesson: Populations Change Over Time

Suggested Time to Complete: 100 to 150 minutes

<p>probing questions to check for understanding and informally assess student responses. Look for patterns of common student misunderstandings and common areas of strength to inform possible reteaching.</p>	<ul style="list-style-type: none">• Create a procedure to investigate their questions.• Gather and organize data from an experiment in a logical way.	<ul style="list-style-type: none">• Have advanced students seek out real-world population data on field mice to analyze.• Provide students with a list of sub-questions or steps to guide the development of their procedure.
<ul style="list-style-type: none">• Listen to student responses and class discussions to monitor for student understanding.• Review student questions, predictions, procedures, data tables, and use guiding questions to support students in developing scientific questions that can be investigated with the tool. Ensure students have a procedure that will provide evidence to answer their questions.		
<ul style="list-style-type: none">• Listen and observe students as they analyze their data with their partners. Ask probing questions to check for understanding and provide feedback and guidance as they find patterns in their data.• As the groups share their results, note common misconceptions to be revisited and ask probing questions to encourage students to make connections across groups. (e.g., “How do these results relate to (other group’s) results? Are these factors	<p>Students can:</p> <ul style="list-style-type: none">• Analyze population data to find the impact of different environmental conditions on the traits of a population over generations.• Draw and write a scientific conclusion based on population data using mathematical representations about how environmental conditions caused a species’ traits to change over time.• Present a report of an experiment and the results in a way that makes sense for the audience, and the class.	<ul style="list-style-type: none">• Provide students with sample graphs that show different types of relationships (linear, inverse, etc.)• Encourage the use of language tools such as translators to support students in writing their conclusions.• Allow students to select alternative means of presenting their data to the class, such as a video recording instead of a live presentation.• Provide sub-questions to help students break up the data analysis.

Science Grade 8
Unit 3: Understanding Earth History and the Origin of Species
Sample Lesson: Populations Change Over Time
Suggested Time to Complete: 100 to 150 minutes

connected? How do we know?")	<ul style="list-style-type: none"> Identify patterns across experiments on a related topic and draw conclusions based on those patterns about the factors that influence the population. Accurately identify patterns related to the proportions of a species with a particular trait or traits across generations. Accurately describe similarities and differences in the proportions of a species with a given trait(s) across generations of a population. 	<ul style="list-style-type: none"> Encourage advanced students to identify a real-world situation where a species is experiencing environmental pressure and create a science fair project exploring the factors influencing that population.
------------------------------	---	--

Instructional Plan

Lesson Overview

In this lesson, students zoom out to look at how the population changes because of environmental factors using resources from [Lesson 5.1](#) of the deer mouse curriculum. Students are introduced to relative frequency, then use simulation data to see how the relative frequency of alleles changes over generations. In addition, students can adjust the simulation and decide to introduce additional mutations into the population. Students write up a procedure, conduct their experiment, gather and analyze their data, and then create a report with conclusions to share with peers.

Students share their conclusions with the class and gather feedback. Then, as a class, students examine the data overall to find patterns across the data sets. The class revisits the driving question board to determine if there are any additional questions that they need to answer.

Materials & Set-Up

- One printed copy of [Deer Mouse Student Field Notebook](#) for each student.
- Teacher and student access to ConnectedBio’s [Deer Mouse Fur Color: From the Field to the Beach](#) (free)

Anchor or Investigative Phenomenon: The anchor phenomenon is based on the shared experience the class will have of selecting from an online database of fossils found in their area using [The PBDB Navigator](#). Students select a particular organism to think about throughout the unit by zooming into a region/state on the map of interest and selecting an interesting organism. Over the unit, students learn about how species change over long periods of time through natural selection with a focus on their particular species.

Driving Question: How can a population of a species change over time?

	Teacher Does	Students Do
Engage		

Science Grade 8
Unit 3: Understanding Earth History and the Origin of Species
Sample Lesson: Populations Change Over Time
Suggested Time to Complete: 100 to 150 minutes

-
- ☑ Introduce object, event, phenomenon, problem, or question
 - ☑ Build background knowledge
 - ☑ Facilitate connections
-

Explore

- ☑ Explore object, event, phenomenon, problem, or question
- ☑ Guided exploration with hands-on activities

To begin class, the teacher presents to the class the introduction page of [Lesson 5.1](#) from Deer Mouse Fur Color: From Field to the Beach. Either as a class or individually, students read the introduction and then answer questions #1 and #2. Students can answer the question either online through the tool or submit it in a manner consistent with the classroom’s procedures.

After providing time for students to respond to the two prompts, the teacher facilitates a class discussion around the potential answers to the question (there is more than 1 possible answer). The teacher encourages students to share and build on each other’s responses and highlights the idea that there is more than one correct answer to the question.

The teacher models for students how to calculate relative frequency using one of the images from question 1. Then, the teacher directs students to page 1 of the [student field notebook](#). Students work in pairs to complete Table 1 on page 1.

Students turn and talk with another pair of students about the prompt for question 3. The teacher asks students to record their responses to the prompt before moving forward as a

Students use a computer to navigate to the student version of [Lesson 5.1](#) from Deer Mouse Fur Color: From Field to the Beach. After reading over the page, students respond to questions #1 and #2 on the page.

After responding to the prompts, students discuss the questions and their thinking. Some may recognize that there is more than one possible correct answer.



Working in pairs, students calculate the relative frequency of different populations of field mice. Students record their responses in the [student field notebook](#).

Students talk in small groups about how they calculated the relative frequency and check their work with peers. They move forward with their partner to complete pages 2 and 3 in the [student field notebook](#) while utilizing page 2 from [Lesson 5.1](#).



Next, students read page 3 of [Lesson 5.1](#) and with their partner decide on what factors they will test with the simulation. Students write an investigative question about their factors, make predictions on how the factors will influence the population, and create a procedure and data

Science Grade 8

Unit 3: Understanding Earth History and the Origin of Species

Sample Lesson: Populations Change Over Time

Suggested Time to Complete: 100 to 150 minutes

class to the next page of the online lesson.

Students read over the text and instructions on page 2 of the website and complete pages 2 and 3 of the [student field notebook](#). As students are working, the teacher cycles around the room, checks on students' understanding, and identifies areas of common struggle.

Next, students advance to page 3 of the online lesson and page 4 of the [student field notebook](#). The teacher brings the class together to review the full page and directs their attention to the next tasks: 1. creating a question to investigate, 2. predicting how those factors they select will impact the simulation population, 3. creating a procedure to investigate their questions using the simulation, and 4. creating a data table to log their data. There are boxes for students to record this in their [student field notebook](#).

Once students have developed their questions, predictions, procedures, and tables, the students share their procedures with the teacher. The teacher reviews the procedures and provides immediate feedback to the students. If necessary, the students revise and return their work to the teacher. When students are ready, the teacher instructs them to run their procedures and gather their data.

table to test their prediction and explore their question.

After developing a procedure and data table, students bring their written-out procedure to the teacher for feedback. Students revise their procedures if necessary and present them to the teacher. Once their procedure is approved by the teacher, the students conduct their experiments and record their data in their data tables.

Science Grade 8
Unit 3: Understanding Earth History and the Origin of Species
Sample Lesson: Populations Change Over Time
Suggested Time to Complete: 100 to 150 minutes

Explain

- Explain understanding of concepts and processes
- Introduce new concepts and skills to seek conceptual clarity

After students have completed their experiment, the teacher asks them to write a conclusion based on the results, including a data table and graphs to help visualize the results. As students work on their conclusions, the teacher cycles around the room providing feedback, asking guiding questions, and informally assessing student understanding of the content and their ability to write an evidence-based conclusion.

The teacher provides each group with the opportunity to share their data and conclusions with the class. This could be as an oral presentation, through a shared document such as a Google Slide, or some other medium that makes sense for the students.



After students have completed their experiments, they write up a conclusion based on their results, including data/graphs, to share with the class.

Students create a presentation for the class to share their results. This could be an oral presentation, a poster for a gallery wall, or some other strategy that makes sense for the students.

Elaborate

- Build on or extend understanding and skill
- Apply concepts in new or related contexts

Evaluate

- Self-assess knowledge, skills, and abilities
- Evaluate student development and lesson effectiveness

Closing

After all groups have shared their results, students individually review Table 3 in the [student field notebook](#) on page 6 and complete each column. The class discusses each column and the teacher encourages students to document additional thinking that was shared by their peers in the notes space underneath the table.

Finally, students return to the driving question board to determine what questions they have answered, what new questions they have, and what questions they still need to answer as a class.

Science Grade 8
Unit 3: Understanding Earth History and the Origin of Species
Sample Lesson: Populations Change Over Time
Suggested Time to Complete: 100 to 150 minutes

Differentiation Strategies and Resources

“Universal Design for Learning (UDL) is a framework to improve and optimize teaching and learning for all people based on scientific insights into how humans learn” (CAST, 2022). Taking time to reflect on prior instruction when planning for accessible, differentiated, and culturally responsive instruction for diverse learners and culturally diverse classrooms serves to identify ways to improve future instructional practices. The UDL Guidelines provide a framework for this reflection. The guidelines include three principles as ways to focus on variety and flexibility in instructional practices:



Multiple Means of Engagement



Multiple Means of Representation






Multiple Means of Action & Expression

By examining instruction and instructional materials through the lens of each of these principles, teachers can identify and thus reduce or remove barriers to diverse learners.

Learning Opportunities	UDL Principle	Example Differentiation Strategies & Resources
Explore		
<i>Students review and calculate relative frequency of alleles for sample populations.</i>		Provide different levels of support and scaffolds. <ul style="list-style-type: none"> Paraphrase relative frequency information and provide support of calculations for students who struggle with fractions. Encourage collaboration with partners and in groups. <ul style="list-style-type: none"> Utilize heterogenous groupings when creating pairs. Support self-reflection and evaluation. <ul style="list-style-type: none"> Encourage students to respond to written questions and to evaluate their own understanding.
		Describe the meaning of vocabulary and symbols. <ul style="list-style-type: none"> Place descriptions with examples and images on the wall or in students' notebooks of content vocabulary. Explain structure of graphs, charts, diagrams, models, etc. <ul style="list-style-type: none"> Demonstrate how to graph data (e.g., the pie charts). Support language acquisition (e.g., English Learners, AAC users, ASL users). <ul style="list-style-type: none"> Connect dominant language (e.g., English) with first language (e.g., Spanish). Supply or activate background knowledge.

Science Grade 8
Unit 3: Understanding Earth History and the Origin of Species
Sample Lesson: Populations Change Over Time
Suggested Time to Complete: 100 to 150 minutes





		<ul style="list-style-type: none"> • Provide background information prior to having students complete a task (e.g., alleles and the passing on of traits, fractions, percentages, etc.).
<p><i>Students develop and investigate questions to understand the impact of different factors on the relative frequency of alleles in a simulated population.</i></p>		<p>Provide options for accessing instructional activities and materials.</p> <ul style="list-style-type: none"> • Provide printouts of the online resources or provide students with a digital version of the student field notebook.
		
		<p>Support language acquisition (e.g., English Learners, AAC users, ASL users)</p> <ul style="list-style-type: none"> • Connect dominant language (e.g., English) with first language (e.g., Spanish). <p>Emphasize key information.</p> <ul style="list-style-type: none"> • Provide a list of factors for students to consider exploring. <p>Provide models and scaffolds to aid in comprehension.</p>

Science Grade 8




Unit 3: Understanding Earth History and the Origin of Species

Sample Lesson: Populations Change Over Time

Suggested Time to Complete: 100 to 150 minutes

		<ul style="list-style-type: none"> • Provide sentence starters for writing tasks (e.g., This change was caused by _____). • Provide a variety of explicit prompts for each step or chunk of an activity (e.g., verbal, visual steps, checklist, checklist paired with graphics, tactile steps).
		<p>Provide varied levels of support and practice.</p> <ul style="list-style-type: none"> • Provide additional prompts to guide students in developing their questions, predictions, procedure, and table. <p>Vary the ways for students to respond to questions or a task.</p> <ul style="list-style-type: none"> • Have students enter data online to create graphs using standard or adapted keyboards. • Provide a variety of ways in which students can “write” to respond to questions (e.g., traditional form of writing, with sentence starters, using pictures, etc.) <p>Support planning and strategy skills.</p> <ul style="list-style-type: none"> • Provide feedback to students on procedures and tables. • Highlight potential challenges students will experience when executing their procedure and gathering data. <p>Provide supports to help with managing information and resources.</p> <ul style="list-style-type: none"> • Share with students sample data tables from other experiments.
Explain		
<p><i>Students analyze population data and draw conclusions based on their data.</i></p>		<p>Support self-reflection and evaluation.</p> <ul style="list-style-type: none"> • Provide guidance to students on answering their investigative questions as part of the conclusion.
		<p>Provide models and scaffolds to aid in comprehension.</p> <ul style="list-style-type: none"> • Provide subquestions and guidance to support students in writing a conclusion.
		<p>Vary the ways for students to respond to questions or a task.</p> <ul style="list-style-type: none"> • Encourage students to create their report in ways that make sense for them, e.g. presentation, video, explanatory poster, etc. <p>Use technology or assistive technology (AT) to broaden access to instructional materials.</p> <ul style="list-style-type: none"> • Make use of technology such as spellcheckers, word prediction software, and text-to-speech.

Science Grade 8
Unit 3: Understanding Earth History and the Origin of Species
Sample Lesson: Populations Change Over Time
Suggested Time to Complete: 100 to 150 minutes

<i>Students present the results of their investigation to peers for feedback.</i>		Support self-reflection and evaluation. <ul style="list-style-type: none"> Have students evaluate their report and conclusion before presenting.
		Emphasize key information. <ul style="list-style-type: none"> After presentations ask students to share what stood out to them in the presentation and encourage them to make connections to their own results.
		Vary the ways for students to respond to questions or a task. <ul style="list-style-type: none"> Give students choices in how to share feedback, e.g. writing on a sticky note, posting comments on a Google Doc, or oral feedback to the speaker.

Resources

- [Deer Mouse Student Field Notebook](https://docs.google.com/document/d/1Kjpd4ZfciT72lDUyZYEmlel6oooxEU1hWOoaZQcglqE/edit)
[https://docs.google.com/document/d/1Kjpd4ZfciT72lDUyZYEmlel6oooxEU1hWOoaZQcglqE/edit]
- [Deer Mouse Fur Color: From the Field to the Beach](https://activity-player.concord.org/?domain=https%3A%2F%2Flearn.concord.org&domain_uid=1180629&logging=true&mode=teacher-edition&page=page_1&sequence=https%3A%2F%2Fauthoring.concord.org%2Fapi%2Fv1%2Fsequences%2F573.json&sequenceActivity=activity_10932&show_index=true)
[https://activity-player.concord.org/?domain=https%3A%2F%2Flearn.concord.org&domain_uid=1180629&logging=true&mode=teacher-edition&page=page_1&sequence=https%3A%2F%2Fauthoring.concord.org%2Fapi%2Fv1%2Fsequences%2F573.json&sequenceActivity=activity_10932&show_index=true]
- [ConnectedBio: Relative Frequency of Alleles](https://connectedbio.org/resources/relative-frequency-of-alleles.html) (Teacher Resource)
[https://connectedbio.org/resources/relative-frequency-of-alleles.html]

Core Text Connections

- Khan Academy: [Allele Frequency & the Gene Pool](https://www.khanacademy.org/science/ap-biology/natural-selection/hardy-weinberg-equilibrium/a/allele-frequency-the-gene-pool) (Includes some content that is above grade-level expectations)
[https://www.khanacademy.org/science/ap-biology/natural-selection/hardy-weinberg-equilibrium/a/allele-frequency-the-gene-pool]
- [Khan Academy: Natural Selection in Populations](https://www.khanacademy.org/science/ap-biology/natural-selection/population-genetics/a/natural-selection-in-populations) (Includes some content that is above grade-level expectations)
[https://www.khanacademy.org/science/ap-biology/natural-selection/population-genetics/a/natural-selection-in-populations]
- [UC Berkeley: Evolution at Different Scales](https://evolution.berkeley.edu/evolution-at-different-scales-micro-to-macro/what-is-microevolution/)
[https://evolution.berkeley.edu/evolution-at-different-scales-micro-to-macro/what-is-microevolution/]