Three-Dimensional Task Modification Sample

Peppered Moths

Grade Level:
3

Designed and revised by Kentucky Department of Education staff
in collaboration with teachers from Kentucky schools and districts.

Three-Dimensional Task Modification Sample Components

The development of three-dimensional tasks for science is a long and complex process. As such, teachers will likely use tasks that come with adapted materials or that they find elsewhere. Session A of the science professional learning module *Three-Dimensional Tasks* provides participants with experience in utilizing tools to screen science tasks to help ensure they meet the intent of the learning.

This third-grade sample demonstrates how the science task screener can be used to inform the modification of an existing task. This sample consists of these four components:

- The original task
- The task screener used to inform the modifications made
- The rationale for changes made to the task
- The modified task with intended purpose and alignment

Alignment, in this case, refers to the specific elements of each of the dimensions. Not every question will provide evidence of every dimension or the complete element of a dimension. The components that are bolded identifies the intended alignment.

Sample:

Question	Disciplinary Core Idea	Science and Engineering Practice	Crosscutting Concept
(question number)	**LS3.A: Inheritance of Traits** **Variations of inherited traits between parent and offspring arise from genetic differences** that result from the subset of chromosomes (and therefore genes) inherited.	**Asking Questions and Defining Problems** **Ask questions that arise from** careful observation of phenomena, **models**, or unexpected results, **to** clarify and/or **seek additional information.**	

In the sample above, a hypothetical question is intended to determine student understanding of the core idea in conjunction with the practice of asking questions. However, no crosscutting concept is being assessed. In addition, only certain components of the elements within these two dimensions are targeted; not the entire element.

It's important to note that this is only a sample of how an existing task may be modified using information from the task screener and does not imply that the modified task is an exemplar.

Original Task

Peppered Moths

Short Performance Assessment: **3-LS4-2**

Grade Level: **Third Grade**

Adapted from SNAP[1]

Title	**The Peppered Moth**
Designed by	**Paul Andersen**
Course(s)	**NGSS Grade 3**

Performance Expectation	**3-LS4-2**: Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. **Clarification Statement**: Examples of cause and effect relationships could be plants that have larger thorns than other plants may be less likely to be eaten by predators; and, animals that have better camouflage coloration than other animals may be more likely to survive and therefore more likely to leave offspring. **Assessment Boundary**: none

Science and Engineering Practice	**Constructing Explanations** • Use evidence (e.g., observations, patterns) to construct an explanation.
Disciplinary Core Ideas	**LS4.B: Natural Selection** • Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing.
Crosscutting Concept	**Cause and Effect** •Cause and effect relationships are routinely identified and used to explain change.

Student Performance	1. Articulating the explanation of phenomena 2. Evidence 3. Reasoning

[1] The Short Performance Assessment (SPA) and the Assessment Rubric adapted from the Stanford NGSS Assessment Project http://snapgse.stanford.edu/

Name_____

The Peppered Moth

The peppered moth feeds and mates during the night. During the day they hide on trees to avoid their main predator, birds. As air pollution has decreased over the last 50 years the color of trees has turned from black to white. This has affected the peppered moths living on these trees.

1. Peppered moths come in two separate forms; white and black. Analyze the traits in the two different types of peppered moth.

source   source	
Similarities in Traits	Difference in Traits

New Environment

A group of peppered moths move into an area with lichen-covered trees. The group contains an equal number of black and white moths.

Three **black** moths on lichen covered trees	Three **white** moths on lichen covered trees
	

Source

How will the new environment affect the survival of the two types of moth?

Claim: Answer the question

Evidence: Provide evidence from the photographs

Reasoning: Use reasoning to logically connect the evidence to the claim.

Task Screener

Peppered Moths

Science Task Screener

Introduction

The purpose of the Next Generation Science Standards (NGSS) Task Screener is **1)** to determine whether classroom assessment tasks are high quality, designed to elicit evidence of three-dimensional performances, and designed to support the purpose for which they will be used, and **2)** to provide a group of reviewers with a common set of features to ground conversations about what it "looks like" for students to demonstrate the kinds of performances expected by three-dimensional standards. This Screener builds off the criteria in Category III of the EQuIP Rubric for Science by more clearly specifying features for the assessment tasks embedded in lessons and units.

The directions for using the Task Screener assume an understanding of *A Framework for K–12 Science Education* and the NGSS, including how the NGSS are different from past standards as outlined in Appendix A of the NGSS and the Innovations of the NGSS. The Task Screener focuses on determining whether what is new and different about three-dimensional expectations are accurately represented in the tasks being evaluated. For more information about how the Task Screener was developed and fits into the EQuIP suite of tools, please see these Frequently Asked Questions.

Task Screener Overview

The Task Screener is organized around four criteria:

A. Tasks are driven by **high-quality scenarios that focus on phenomena or problems.**

B. Tasks require **sense-making using the three dimensions.**

C. Tasks are **fair and equitable.**

D. Tasks support their **intended targets and purpose.**

Each criterion includes:

1. A set of indicators to help reviewers determine whether the criterion is met.
2. A set of response forms for gathering and analyzing evidence, providing suggestions for improvement, and rating the task.

To use the Task Screener effectively, users should use the indicators and response forms to collect specific and detailed evidence from the task under review. Then, users should consider the body of evidence to determine how well each criterion is addressed within the task.

While it is possible for the Screener to be applied by an individual, the real power of the Task Screener lies in the meaningful conversations it can drive among a team of reviewers as part of a collaborative process. Just as when using other resources in the EQuIP suite of tools, collaborative teams of users should:

1. Individually record criterion-based evidence using the provided response forms;
2. Individually make suggestions for improvement; and then
3. Collaboratively discuss findings with team members before checking one of the boxes under the "Evidence of Quality?" section included at the end of the screening process. As part of these discussions, reviewers should address any differences in how they interpreted the criteria and indicator language, as well as the evidence they found, to support a common understanding of the task, the expectations outlined in the screener, and how well the task met those expectations. A rating of "Adequate" means that the task meets the criterion. If the collaborative feedback is being used to improve the task or make decisions about how it should be used, use a blank set of response sheets to capture the consensus feedback.

Science Task Screener

Using the Task Screener. Use this tool to evaluate tasks designed for three-dimensional standards. For each criterion, record your evidence for the presence or absence of the associated indicators. After you have decided to what degree the indicators are present within the task, revisit the purpose of your task and decide whether the evidence supports using it.

Before you begin: Complete the task as a student would. Then, consider any support materials provided to teachers or students, such as contextual information about the task and answer keys/scoring guidance.

A. Tasks are driven by high-quality scenarios that are grounded in phenomena or problems.	B. Tasks require sense-making using the three dimensions.
Making sense of a phenomenon or addressing a problem is necessary to accomplish the task. **The task scenario—grounded in the phenomena and problems being addressed—is sufficient, engaging, relevant, and accessible to a wide range of students.**	**Completing the task requires students to use reasoning to sense-make about phenomena or problems.** **The task requires students to demonstrate grade-appropriate:** **SEP element(s)** **CCC element(s)** **DCI element(s)** **The task requires students to integrate multiple dimensions in service of sense-making and problem-solving.** **The task requires students to make their thinking visible.**

C. Tasks are fair and equitable.	D. Tasks support their intended targets and purpose.
i. **The task provides ways for students to make connections of meaningful local, global, or universal relevance.** ii. **The task includes multiple modes for students to respond to the task.** iii. **The task is accessible, appropriate, and cognitively demanding for all learners, including students who are English learners or are working below or above grade level.** iv. **The task cultivates or explicitly builds upon students' interest in and confidence with science and engineering.** v. **The task focuses on performances for which students' learning experiences have prepared them (opportunity to learn considerations).** vi. **The task uses information that is scientifically accurate.**	i. **The task assesses what it is intended to assess, and supports the purpose for which it is intended.** ii. **The task elicits student artifacts that provide evidence of how well students can use the targeted dimensions together to make sense of phenomena and design solutions to problems.** iii. **Supporting materials include clear answer keys, rubrics, and/or scoring guidelines that are connected to the targeted three-dimensional standards and provide the necessary and sufficient guidance for interpreting student responses relative to all three dimensions and the target as a whole.** iv. **The task's prompts and directions provide sufficient guidance for the teacher to administer it effectively and for the students to complete it successfully while maintaining high levels of students' analytical thinking as appropriate.**

Criterion A.

Tasks are driven by high-quality scenarios that are grounded in phenomena or problems.

Tasks designed for the NGSS include clear and compelling evidence that:	What was in the task, where was it, and why is this evidence?
i. Making sense of a phenomenon or addressing a problem is necessary to accomplish the task.	*1) Is a phenomenon and/or problem present?* Yes, the task presents a change in an organism's environment and states that the change has had an impact on Peppered Moths in the area. *2) Is information from the scenario necessary to respond successfully to the task?* Yes, the task is specifically about Peppered Moths and how the change in the environment has impacted them.

ii. The task scenario is engaging, relevant, and accessible to a wide range of students.

Features of engaging, relevant, and accessible tasks (Check the appropriate box, then describe rationale with evidence)

Features of scenarios	Yes	Somewhat	No	Rationale
Scenario presents real-world observations	☐	☐	☐	The task presents a scenario that is a real world occurrence but could by strengthened by a
Scenarios are based around at least one specific instance, not a topic or generally observed occurrence (e.g., observations related to a specific hurricane rather than "hurricanes" in general)	☑	☐	☐	This task asks specifically about a group of moths that move into an area with lichen covered trees.
Scenarios are presented as puzzling/intriguing	☐	☐	☐	The scenario is presented as facts instead of letting students make sense of the phenomenon.
Scenarios create a "need to know"	☐	☐	☐	The scenario tells the student what is happening and guides students to the "correct" answer
Scenarios are explainable using grade-appropriate SEPs, CCCs, DCIs	☑	☐	☐	This scenario can be explained using 3rd grade SEPs, CCCs and DCIs.

Criterion A. *continued*

	Features of scenarios	Yes	Somewhat	No	Rationale
	Scenarios effectively use at least 2 modalities (e.g., images, diagrams, video, simulations, textual descriptions)	☐	☐	☐	The scenario uses pictures and textual descriptions but they lead the students to the answer too much
	If data are used, scenarios present real/well-crafted data	☐	☐	☐	No data used
	The local, global, or universal relevance of the scenario is made clear to students[2]	☐	☐	☐	The scenario just gives facts about what happens to Peppered Moths habitats as pollution
	Scenarios are comprehensible to a wide range of students at grade-level	☐	☐	☐	Students would have to have regular practice with the terminology in the CER question to
	Scenarios use as many words as needed, no more	☑	☐	☐	The text passages and questions are not too long and are simple.
	Scenarios are sufficiently rich to drive the task	☐	☐	☐	The scenario could be greatly strengthened by created a "need to know" scenario that makes

Across all indicators, there is_____evidence of quality of this criterion (choose one).

- ☐ No
- ☑ Inadequate
- ☐ Adequate
- ☐ Extensive

1. When considering whether the scenario creates a need to know for students, consider whether the scenario makes the uncertainty associated with explaining a phenomenon or solving a problem central, in ways that are likely to 1) connect with students' own experiences or knowledge, and 2) connect to disciplinary core ideas (regardless of whether those ideas are explicitly named or required by the task).

2. Consider whether an authentic stakeholder group is interested in the outcome of the scenario, and/or whether students are given enough information to answer the question "why should I care?".

Suggestions for improvement of the task for Criterion A:

Create a "need to know" scenario that drives the task.
Students should be able to make sense of the phenomena through the scenario, not be given all the answers to rewrite in a response. Perhaps a simulation of the impact of the change in habitats for the moths would be helpful?

Criterion B.

Tasks require sense-making using the three dimensions.

Tasks designed for the NGSS include clear and compelling evidence that:	What was in the task, where was it, and why is this evidence?	
i. Completing the task requires students to use reasoning to sense-make about phenomena or problems.	*Consider in what ways the task requires students to use reasoning to engage in sense-making and/or problem solving.* The task asks students to logically connect evidence from a picture to a claim they have made.	
ii. The task requires students to demonstrate grade-appropriate: • SEP element(s) • CCC element(s) • DCI element(s)	Evidence of **SEPs** (which element [s], and how does the task require students to demonstrate this element in use?)	Use evidence (e.g., observations, patterns) to construct an explanation. The task asks students to create a claim that explains the phenomena.
	Evidence of **CCCs** (which element [s], and how does the task require students to demonstrate this element in use?)	The task asks students to describe the impact of the change in the environment of the moths.
	Evidence of **DCIs** (which element [s], and how does the task require students to demonstrate this element in use?)	Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. The task asks the students to distinguish the different species and how the change in their environment will affect them.
iii. The task requires students to integrate multiple dimensions in service of sense-making and/or problem-solving.	*Consider in what ways the task requires students to use multiple dimensions together to sense-make and/or problem-solve.* This task does not provide many opportunities for sense making, it instead provides a scenario and asks students to make a claim from the information given.	
iv. The task requires students to make their thinking visible.	*Consider in what ways the task explicitly prompts students to make their thinking visible. Look for evidence of how the task surfaces current understanding, abilities, gaps, and problematic ideas.* This task doesn't give a lot of opportunities for students to make their thinking visible as it just asks them to write claims about the information given.	

Across all indicators, there is_____evidence of quality of this criterion (choose one).

- [ ] No
- [x] Inadequate
- [ ] Adequate
- [ ] Extensive

Suggestions for improvement of the task for Criterion B:

Stronger integration of the SEP and CCC is possible by increasing the complexity of the scenario and changing the wording of the questions to explicitly ask students to construct an explanation and describe the cause-and-effect relationship they see.

Criterion C.
Tasks are fair and equitable.

Tasks designed for the NGSS include clear and compelling evidence of the following:	What was in the task, where was it, and why is this evidence?
i. The task provides ways for students to make connections of local, global, or universal relevance.	*Consider specific features of the task that enable students to make local, global, or universal connections to the phenomenon/problem and task at hand. Note: This criterion emphasizes ways for students to find meaning in the task; this does not mean "interest." Consider whether the task is a meaningful, valuable endeavor that has real-world relevance--that some stakeholder group locally, globally, or universally would be invested in.* This task does not provide a way for students to make connections as the scenario is very generic and just gives facts about what has happened to the moths.
ii. The task includes multiple modes for students to respond to the task.	*Describe what modes (written, oral, video, simulation, direct observation, peer discussion, etc.) are expected/ possible for student responses.* Students can only respond to the task through written response.
iii. The task is accessible, appropriate, and cognitively demanding for all learners, including students who are English learners or are working below or above grade level.	*Consider how the task supports all learners, including:*

	Yes	Somewhat	No	Rationale
Task includes appropriate scaffolds	☐	☐	☐	Students can only answer through written response.
Tasks are coherent from a student perspective	☐	☐	☐	The questions do not explicitly state what the students need to do, especially in the CER
Tasks respect and advantage students' cultural and linguistic backgrounds	☐	☐	☐	

3. For more information about culturally and linguistically responsive classroom assessments, please see this resource.

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Tasks designed for the NGSS include clear and compelling evidence of the following:	What was in the task, where was it, and why is this evidence?				
iii. *(continued)*		Yes	Somewhat	No	Rationale
	Tasks provide both low- and high-achieving students with an opportunity to show what they know	☐	☐	☐	The task is very simple and may not be challenging enough for high-achieving students.
	Tasks use accessible language	☐	☐	☐	
iv. The task cultivates students' interest in and confidence with science and engineering.	*Consider how the task cultivates students interest in and confidence with science and engineering, including opportunities for students to reflect their own ideas as a meaningful part of the task; make decisions about how to approach a task; engage in peer/self-reflection; and engage with tasks that matter to students.* There are not a lot of opportunities for students to build their confidence in this task as it is not very rich, students are given much of the answer and then are asked to rewrite it in a claim.				
v. The task focuses on performances for which students' learning experiences have prepared them (opportunity to learn considerations).	*Consider the ways in which provided information about students' prior learning (e.g., instructional materials, storylines, assumed instructional experiences) enables or prevents students' engagement with the task and educator interpretation of student responses.* Students would have to be familiar with what lichen is to understand the impact it would have on the environment. They would also need an understanding of how an organisms environment can impact its ability to survive.				

Criterion C. *continued*

Tasks designed for the NGSS include clear and compelling evidence of the following:	What was in the task, where was it, and why is this evidence?
vi. The task presents information that is scientifically accurate.	*Describe evidence of scientific inaccuracies explicitly or implicitly promoted by the task.* All of the evidence is scientifically accurate.

Across all indicators, there is_____evidence of quality of this criterion (choose one).

- ☐ No
- ☑ Inadequate
- ☐ Adequate
- ☐ Extensive

Suggestions for improvement of the task for Criterion C:

Provide opportunities for students to find relevance to their own experiences and scaffold questions to be accessible to all students.

NEXT GENERA TION SCIE NCE ST ANDARDS T ASK SCR E ENER VE R SION 1 . 0

Criterion D.
Tasks support their intended targets and purpose.

Before you begin:

1. Describe what is being assessed. Include any targets provided, such as dimensions, elements, or PEs.:

3-LS4-2: Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.

2. What is the purpose of the assessment? (check all that apply)

- ☐ Formative (including peer and self-reflection)
- ☑ Summative
- ☐ Determining whether students learned what they just experienced
- ☐ Determining whether students can apply what they have learned to a similar but new context
- ☐ Determining whether students can generalize their learning to a different context
- ☐ Other (please specify) _____

Tasks designed for the NGSS include clear and compelling evidence that:	What was in the task, where was it, and why is this evidence?
i. The task assesses what it is intended to assess and supports the purpose for which it is intended.	*Consider in what ways:* *1) The assessment target is necessary to respond to the task.* The task attempts to explicitly assess the students' knowledge of this PE and it is necessary to respond to the task. *2) Any ideas, practices, or experiences not targeted by the assessment are necessary to respond to the task. Consider the impact this has on students' ability to complete the task and interpretation of student responses.* *3) The student responses elicited support the purpose of the task (e.g., if a task is intended to help teachers determine if students understand the distinction between cause and correlation, does the task support thisinference?).* The task would not elicit the purpose of the task. Students are not asked to construct an explanation or to describe cause and effect relationships.

Tasks designed for the NGSS include clear and compelling evidence that:	What was in the task, where was it, and why is this evidence?
ii. The task elicits artifacts from students as direct, observable evidence of how well students can use the targeted dimensions together to make sense of phenomena and design solutions to problems.	*Consider what student artifacts are produced and how these provide students the opportunity to make visible their 1) sense-making processes, 2) thinking across all three dimensions, and 3) ability to use multiple dimensions together[note: these artifacts should connect back to the evidence described for Criterion B].* The task would not elicit the purpose of the task. Students are not asked to construct an explanation or to describe the cause-and-effect relationships.
iii. Supporting materials include clear answer keys, rubrics, and/or scoring guidelines that are connected to the three-dimensional target. They provide the necessary and sufficient guidance for interpreting student responses relative to the purpose of the assessment, all targeted dimensions, and the three-dimensional target.	*Consider how well the materials support teachers and students in making sense of student responses and planning for follow up (grading, instructional moves), consistent with the purpose of and targets for the assessment. Consider in what ways rubrics include:* *1) Guidance for interpreting student thinking using an integrated approach, considering all three dimensions together as well as calling out specific supports for individual dimensions, if appropriate:* There are no rubrics or scoring guides available. *2) Support for interpreting a range of student responses, including those that might reflect partial scientific understanding or mask/misrepresent students' actual science understanding (e.g., because of language barriers, lack of prompting or disconnect between the intent and student interpretation of the task, variety in communication approaches):* There are no rubrics or scoring guides available. *3) Ways to connect student responses to prior experiences and future planned instruction by teachers and participation by students:* The task does not provide an opportunity to connect to students' prior experiences.

Tasks designed for the NGSS include clear and compelling evidence that:	What was in the task, where was it, and why is this evidence?
iv. The task's prompts and directions provide sufficient guidance for the teacher to administer it effectively and for the students to complete it successfully while maintaining high levels of students' analytical thinking as appropriate.	*Consider any confusing prompts or directions, and evidence for too much or too little scaffolding/supports for students (relative to the target of the assessment—e.g., a task is intended to elicit student understanding of a DCI, but their response is so heavily scripted that it prevents students from actually showing their ability to apply the DCI).* "How will the new environment affect the survival of the two types of moth?" This question will very likely not elicit the desired performance expectation as it is not asking students to construct an explanation or to describe a cause/effect relationship.

Across all indicators, there is_____evidence of quality of this criterion.

- ☐ No
- ☑ Inadequate
- ☐ Adequate
- ☐ Extensive

Suggestions for improvement of the task for Criterion D:

Overall Summary

Consider the task purpose and the evidence you gathered for each criterion. Carefully consider the purpose and intended use of the task, your evidence, reasoning, and ratings to make a summary recommendation about using this task. While general guidance is provided below, it is important to remember that the intended use of the task plays a big role in determining whether the task is worth students' and teachers' time.

The task could be greatly strengthened by using this phenomenon to create a "need to know" scenario. This can be done by connecting to their world or their experiences.
The questions can be modified to explicitly ask what for what is needed to meet the PE.
There should be an opportunity for students to "make sense" of the phenomena on their own, not be told in the scenario.

Final recommendation

- [ ] Use this task (all criteria had at least an "adequate" rating)
- [x] Modify and use this task
- [ ] Do not use this task

Rationale for Modification

Peppered Moths

Peppered Moth 3D Task Modification Rationale

The original Peppered Moth performance assessment was originally intended to be explicitly tied to Performance Expectation 3-LS4-2. Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. However, the original assessment did not provide enough data points for students to use to construct an explanation for how the variations in characteristics among individuals can provide advantages in surviving. The goal of this modification is to provide students with data to construct their own explanations to meet the performance expectation. This modification was made using the Achieve Task Screening tool. One of the criteria on this screener is that a task scenario is engaging, relevant, and accessible to a wide range of students. In its original form, the task did not create a "need to know" scenario as students were given a small passage about peppered moths and were asked to describe the cause-and-effect relationship between their physical characteristics and their survival. This modification's goal is to create an engaging scenario that is based in a specific instance, is puzzling/intriguing, and creates a "need to know" situation for students. The original assessment also lacked rigor as many questions "led" students to the answer the assessment question was trying to elicit. The addition of the simulation and the examining for patterns in the data provides a richness that was lacking in the original assessment.

The Achieve Task Screener also states that tasks should use at least 2 modalities in its scenarios. The original assessment used pictures and textual descriptions but did not give students a real opportunity to "make sense" of the phenomena presented as the descriptions lacked rigor. By completing the simulation and using the data that students gain from the simulation, students will have more sources of data to use to construct their explanations and make sense of the phenomena presented. They will complete the simulation two times, once in a dark forest and once in a light forest in order to obtain two sets of data. Combined with the scenario and pictures, students should be able to construct an explanation to meet the performance expectation. The data from the simulation helps to create a deeper understanding of the DCI.

As this is a formative task, the purpose is to identify student understanding around key core ideas and their use of specific practices and crosscutting concepts. Students may work individually on questions 1, 2, and 4 while small groups of 3 or 4 could work together to complete the simulation on question 3. Students in the group could share their findings and discuss the patterns in their data before answering the task individually.

Modified Task and Alignment

Peppered Moths

Name_____

The Peppered Moth

The peppered moth feeds and mates during the night. During the day they hide on trees to avoid their main predator, birds. As air pollution has decreased over the last 50 years the color of trees has turned from black to white. This has affected the peppered moths living on these trees.

You and your brother were playing in your backyard when you noticed some insects resting on the trees. Upon further inspection, you found two moths huddled together and barely moving on one tree. You noticed that even though the moths looked similar, they were different colors. You grabbed your camera and snapped a picture to begin research about what kind of moth you found.

1. Below are examples of the two moths that you saw. Record the similarities and differences in the physical traits of each moth and then respond to the claim on the next page.

Image courtesy Chiswick Chap

Image courtesy Chiswick Chap

Similarities in Traits	Difference in Traits

2. After examining the moths, you used your observations to make a claim that these moths must be the same type of moth. Use evidence from the scenario and pictures to explain your claim.

_____

_____

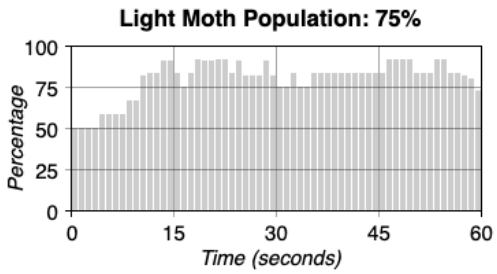
_____

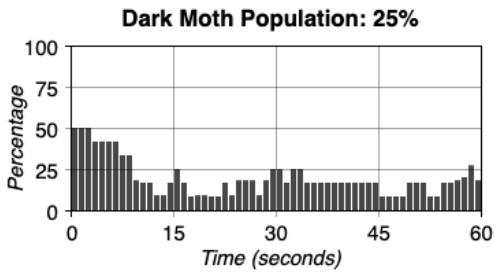
_____

Different Environments

3. Click on the link below to complete the Simulation Activity. In this simulation you will act as a bird hunting black and white Peppered Moths. You will complete the simulation two times, once in a light forest and another time in a dark forest. Take a screenshot of the Moth Population Data Tables for the Light and Dark Forest and post them in the labeled boxes.

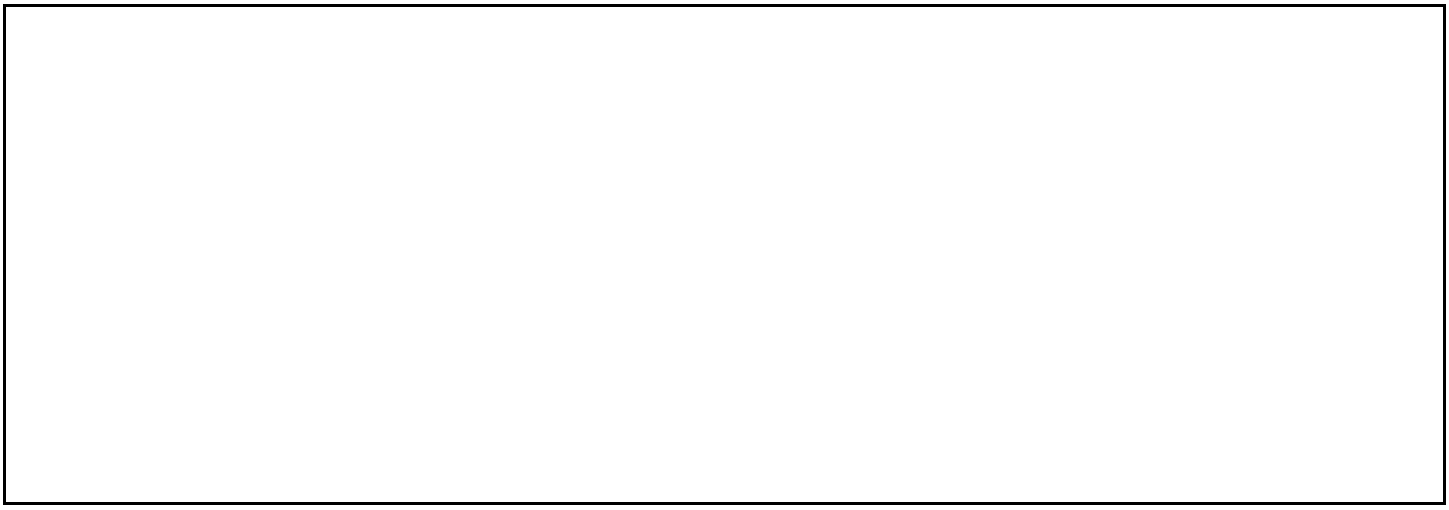
Example data table for the light forest:



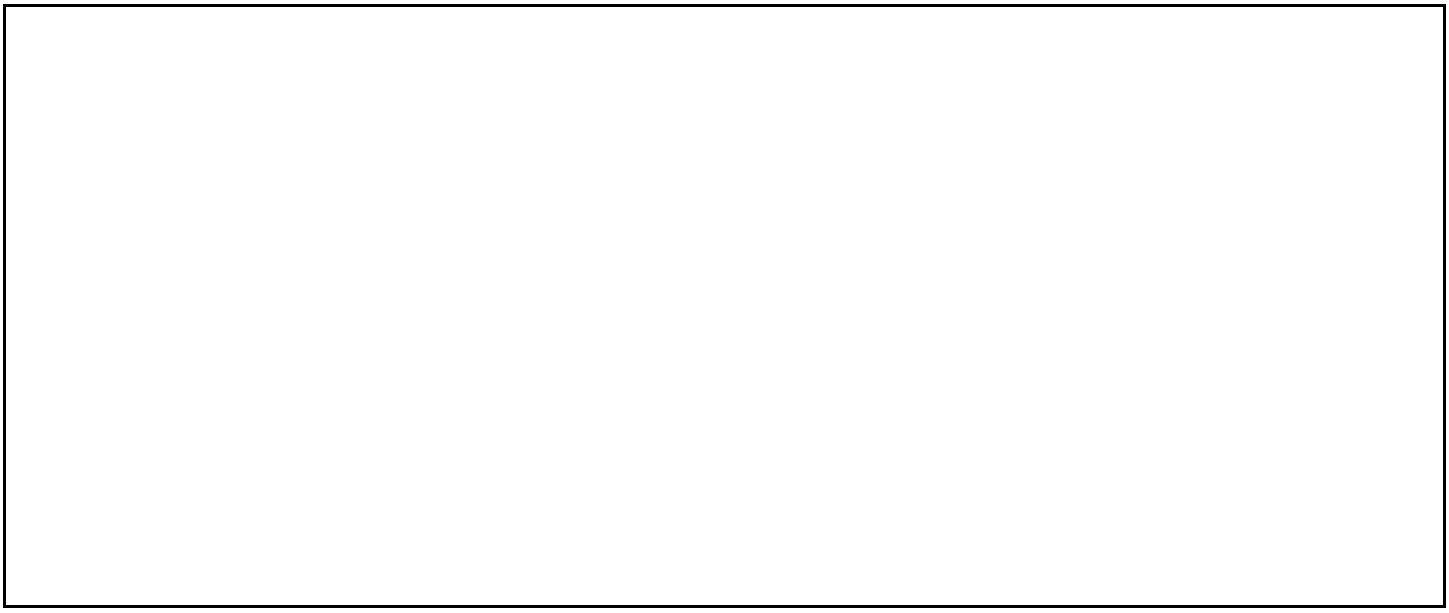


Click here to begin the simulation: https://askabiologist.asu.edu/peppered-moths-game/play.html

Light Forest Simulation Population Data



Dark Forest Simulation Population Data



How do the patterns in the data allow you to decide whether differences in physical characteristics caused advantages in surviving for individual moths?

_____

_____

_____

_____

_____

4.

Three **black** moths in the light-colored forest.	Three **white** moths in the light-colored forest.
	

Source

Using the data from your simulation and the pictures above, construct an explanation using evidence about how an organism's physical traits can help it survive better in an environment than others.
Claim: Make a statement that answers the question.
Evidence: Provide evidence from the data tables and the photograph.
Reasoning: Use reasoning to logically connect the evidence to the claim.

Peppered Moth 3D Alignment

Purpose: Formative task used in the middle of a larger unit of study investigating how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. This task focuses solely on how variations in characteristics among individuals of the same species provide advantages in surviving. It also assesses the students' ability to use evidence to construct an explanation and to identify cause and effect relationships.

Supports understanding of:

LS4.B: Natural Selection

- Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing.

Question	Disciplinary Core Idea	Science and Engineering Practice	Crosscutting Concept
Question 1: Below are examples of the two moths that you saw. Record the similarities and differences in the physical traits of each moth and then respond to the claim on the next page.	LS4.B: Natural Selection Sometimes the **differences in characteristics between individuals** of the same species provide advantages in surviving, finding mates, and reproducing.		
Question 2: After examining the moths, you used your observations to make a claim that these moths must be the same type of moth. Use evidence from the scenario and pictures to explain your claim.	LS4.B: Natural Selection Sometimes the **differences in characteristics between individuals** of the same species provide advantages in surviving, finding mates, and reproducing.	Constructing Explanations and Designing Solutions **Use evidence** (e.g., measurements, **observations**, patterns) **to construct** or support **an explanation** or design a solution to a problem.	

Question 3: How do the patterns in the data allow you to decide whether differences in physical characteristics caused advantages in surviving for individual moths?	LS4.B: Natural Selection Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing.	Analyzing and Interpreting Data Represent data in tables and/or various graphical displays (bar graphs, pictographs, and/or pie charts) to reveal patterns that indicate relationships.	Cause and Effect Cause and effect relationships are routinely identified and used to explain change.
Question 4: Using the data from your simulation and the pictures above, construct an explanation using evidence about how an organism's physical traits can help it survive better in an environment than others.	LS4.B: Natural Selection Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing.	Constructing Explanations and Designing Solutions Use evidence (e.g., measurements, observations, patterns) to construct or support an explanation or design a solution to a problem.	Cause and Effect Cause and effect relationships are routinely identified and used to explain change.