

Name _____

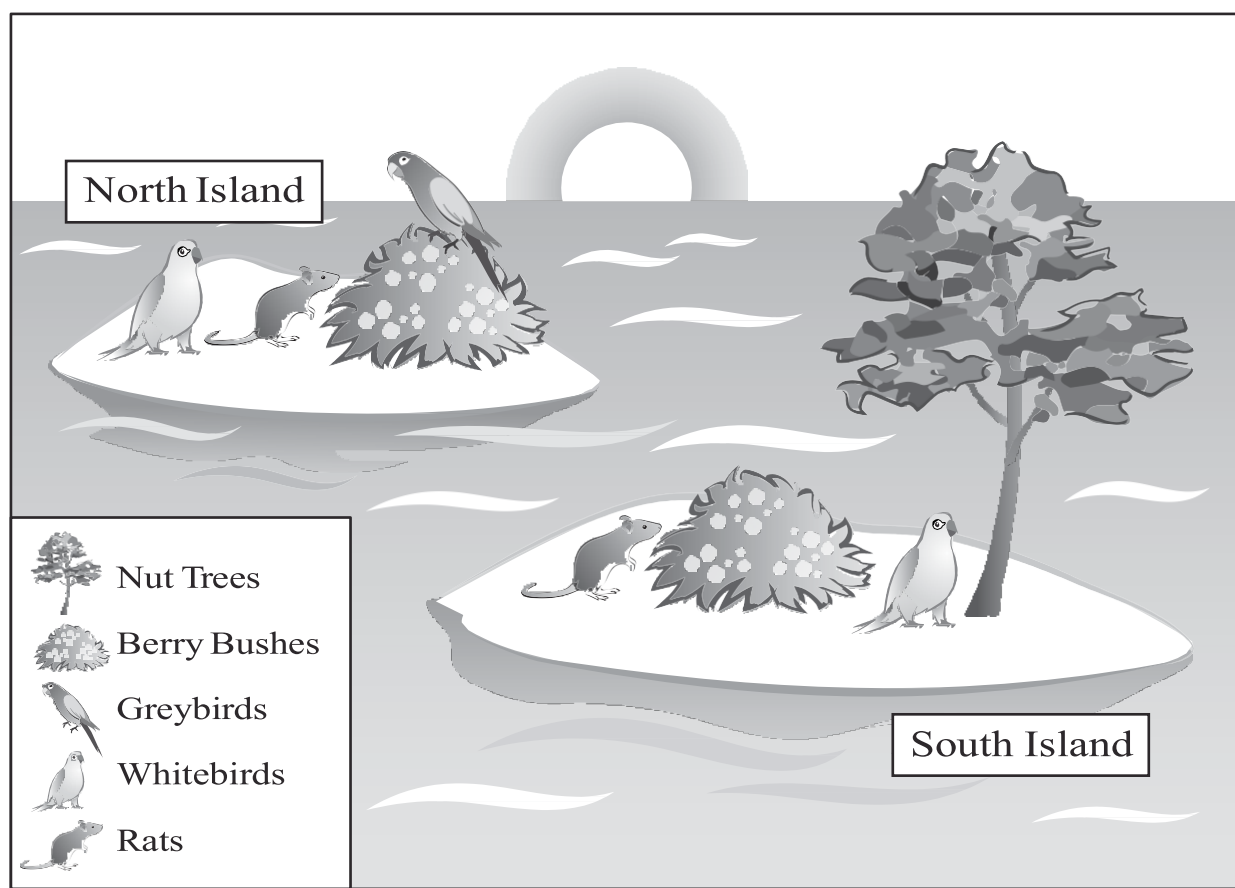
Performance Task

1. Graybirds and whitebirds live on North Island. Both types of birds eat the berries of the berry bush.

The seeds of the berry bush grow best after the berries are eaten by birds and dropped elsewhere around the island.

Whitebirds are also found on nearby South Island. The white birds on South Island eat berries and the nuts of the nut tree.

Rats are found on both islands. Berries and bird eggs are favorite foods of the rats.

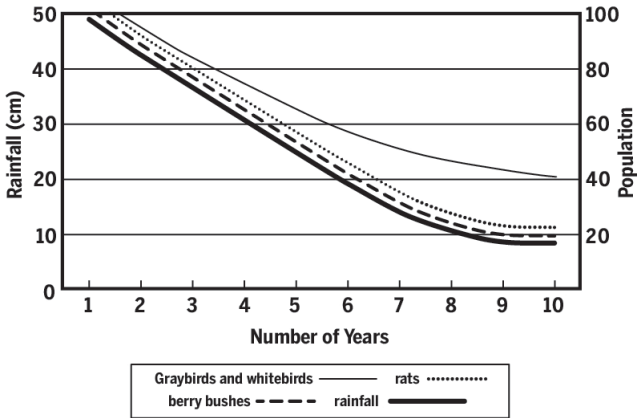


Performance Task

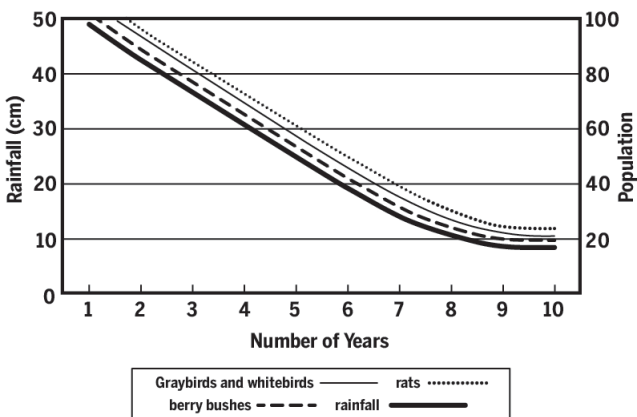
Name _____

Continued

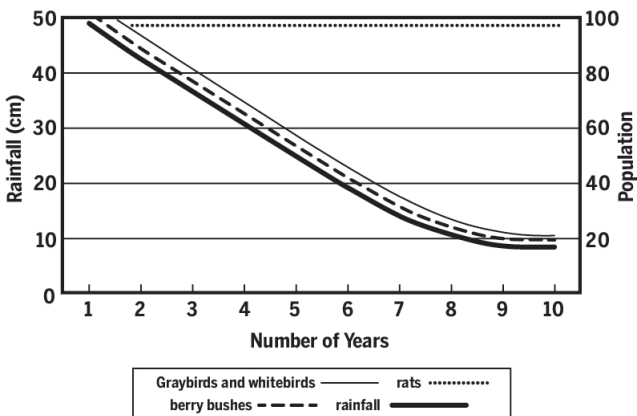
1b. Berry bushes need lots of rainfall. Make an X in the box next to the graph below that best predicts what would happen to the populations on the **North Island** during a 10-year period of decreasing rain. Using the space to the right of the other two graphs, explain why these graphs are not the best predictions of what would happen during the period of decreasing rain. You do not need to write anything next to the graph you chose as the best prediction.



A.



B.



C.

Performance Task

Name _____

Continued

2. East Island has had normal rainfall. Like North Island, it has berry bushes, both Graybirds and Whitebirds, and rats, but no nut trees.

About 20 years ago, people started living on East Island and began hunting Graybirds for food. Five years ago, the local government decided to reduce bird-hunting by limiting hunting licenses.

Years Ago	Graybird Population of East Island	Human Population of East Island	Number of Hunting Licenses Issued
20	1,742	503	50
15	1,510	631	69
10	1,213	759	70
5	1,298	962	40
present	1,350	1,088	40

2a. Use evidence from the table above to construct a scientific argument that answers the question: “Do increases in human population cause negative impacts on the Earth?”

The argument should include the following:

- The scientific question
- Your claim (that is best supported by evidence and reasoning)
- The relevant evidence that supports your claim
- The scientific reasoning that links the evidence and science concepts to the claim

2b. Write a rebuttal stating why you did not argue for the other claim.

Student Checklist for Performance Task

1a. Describe 3 relationships for North Island

Describe 3 relationships for South Island

1b. Put an X in the box of the correct graph

Write an explanation next to one of the incorrect graphs

Write an explanation next to the other incorrect graph

1c.

Claim

Evidence (numbers or trends from graph)

Science Concept

Reasoning (logic statement that uses if, then, because, therefore)

2a.

Claim

Evidence (numbers from table)

Reasoning (connects claim to evidence)

2b. Rebuttal (why you don't agree with the other claim)

Performance Task Scoring Rubric

Note: The rubrics below are drafts. They are intended as guides for assessing whether your students are achieving learning goals. We encourage you to use a scoring system that works in your classroom context and that is appropriate for the level of your students. So, for example, students may be able to earn a “full credit” score for a “Level 2: Developing” response.

1a. Predict the patterns of types of interactions between species on each island.

Include the following:

- competition
- predator-prey
- mutually beneficial

Level 4: Advanced	Level 3: Proficient	Level 2: Developing	Level 1: Beginning	Level 0: Not evident
<p>Describes all 6 relationships accurately:</p> <p><u>On the North Island:</u></p> <p>A predatory relationship between the rats and the graybird and whitebird (eggs)</p> <p>A mutually beneficial relationship (or mutualism) between the birds and the berries</p> <p>A competitive relationship between the two kinds of birds <i>and</i> between the birds and the rats for berries</p> <p><u>On South Island:</u></p> <p>Rats are predators of the whitebird (eggs)</p> <p>Competition between rats and whitebirds for berries</p> <p>A mutually beneficial interaction (mutualism) between the whitebirds and berries</p>	<p>Describes at least 4 relationships correctly</p>	<p>Describes at least 2 relationships correctly</p>	<p>Describes at least 1 relationship correctly</p>	<p>Does not describe the relationship between the species on the islands</p>

Performance Task Scoring Rubric Continued

1b. Make an X in the box next to the graph below that best predicts what would happen to the populations on the North Island during a 10-year period of decreasing rain.”

Explain why the other two graphs are not the best predictions of what would happen during the period of decreasing rain.

Level 4: Advanced	Level 3: Proficient	Level 2: Developing	Level 1: Beginning	Level 0: Not evident
<p>Selects Graph B</p> <p>AND</p> <p>Explains that A can't be correct because the birds should follow the same pattern as the rats and bushes, since birds also eat berries</p> <p>AND</p> <p>Explains that C can't be correct because rats would decrease as the birds decreased, since rats eat bird eggs</p>	<p>Selects Graph B</p> <p>AND</p> <p>Partially explains what is wrong with Graphs A and C</p>	<p>Selects Graph A</p> <p>AND</p> <p>Partially explains what is wrong with Graph C</p>	<p>Selects Graph C</p> <p>OR</p> <p>Selects any graph but does not explain anything</p>	<p>Student does not select a graph or provide an explanation</p>

Performance Task Scoring Rubric Continued

2a. Construct a scientific argument that answers the question: “Do increases in human population cause negative impacts on an ecosystem?”

	Level 4: Advanced	Level 3: Proficient	Level 2: Developing	Level 1: Beginning	Level 0: Not evident
Claim	Not applicable	Claim completely answers the question. (<i>e.g.</i> Increasing human population has a negative impact on Earth OR Increasing human population does not have a negative impact on Earth)	Claim partly answers the question (<i>e.g.</i> “yes” or “no.”)	Claim doesn’t answer the question	Does not make a claim
Evidence	Appropriate and sufficient evidence In the table, the human population increases from 503 to 1088 during the last twenty years. At the same time, Graybird populations have decreased from 1742 to 1350	Some appropriate evidence In the table, the Graybird population decreased	Some appropriate evidence; insufficient to support claim The data table shows that humans affect the Graybird population	Inappropriate and insufficient evidence (<i>e.g.</i> “the data table.”)	Does not include evidence

Performance Task Scoring Rubric Continued

	Level4: Advanced	Level3: Proficient	Level2: Developing	Level1: Beginning	Level0: Not evident
Scientific Reasoning	<p>Uses relevant science concepts to evaluate the evidence and support the claim</p> <p>Reasoning will depend on initial claim</p> <p><i>E.g.</i> “when the human population increases, there is likely to be more hunting (more predator-prey interactions). The recovery of the birds when hunting is limited confirms my reasoning that humans were having a negative impact on an ecosystem. More people usually means more hunting, and hunting impacts the ecosystem.”</p> <p>Or “Even though the Graybird decreases, it is not possible to see the impact of that decrease on the rest of the ecosystem with only the data table. Also, since the Graybird population went back up when hunting licenses were limited, we know that hunting is the problem for the birds (and not, say, habitat destrubtion). So we cannot say that human population increase is the problem; we only have evidence that more hunting is a problem for the Graybirds.”</p>	<p>Uses science concepts to evaluate evidence and support claim. May include inappropriate evidence or science concepts</p>	<p>Uses inappropriate science concepts to evaluate the evidence provided</p>	<p>Evaluates the evidence provided without mention of science concepts</p>	<p>Does not include reasoning/ evaluate evidence</p>

Performance Task Scoring Rubric Continued

2b. Write a rebuttal stating why you did not argue for the other claim.

<p>Level4: Advanced</p>	<p>Level3: Proficient</p>	<p>Level2: Developing</p>	<p>Level1: Beginning</p>	<p>Level0: Not evident</p>
<p>Offers rebuttal with full justification for why the alternative claim was not selected. The justification should include a critique of the alternative argument. For example, a critique could be the lack of evidence to support the claim, weakness of evidence, or poor connection between claim and evidence</p> <p><u>Rebuttal to “humans cause a negative impact.”</u></p> <p>Can’t say from the data provided: There are only data for East Island; not all ecosystems on Earth.</p> <p>The bird population responded to the requirement of hunting licenses; so, it’s not a problem with the humans, it’s the hunting that causes the negative impacts</p> <p>The decrease in Graybirds may not be permanent or the small decrease may not be enough to cause additional negative impacts</p> <p><u>Rebuttal to the argument “humans do not cause a negative impact.”</u></p> <p>You can see in the table that when there are more hunting licenses, there are fewer Graybirds and Graybirds are an important link the food web. Increasing human population will probably be accompanied by increases in hunting</p>	<p>Offers rebuttal with partial justification. Student attempts to critique an alternative argument</p>	<p>Offers a rebuttal with minimal justification for why the alternative claim was not selected</p>	<p>Offers an inaccurate or unrelated rebuttal</p>	<p>Does not offer a rebuttal</p>

Aligning the Evidence of Learning Specifications to the Performance Task

Middle School Ecology Unit

MS-LS2 Ecosystems: Interactions, Energy and Dynamics

Instructional Sequence 1

Performance Expectation MS-LS2-2

Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems

Clarification Statement: Emphasis is on predicting consistent patterns of interactions in different ecosystems in terms of the relationships among and between organisms and abiotic components of ecosystems. Examples of types of interactions could include competitive, predatory, and mutually beneficial.

Performance Expectation MS-ESS3-4

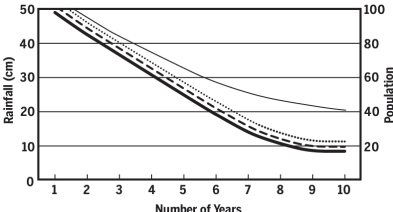
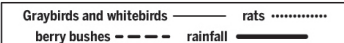
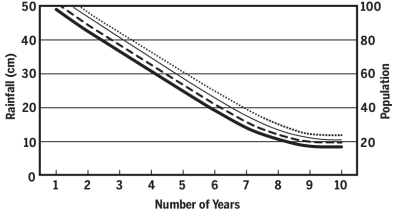
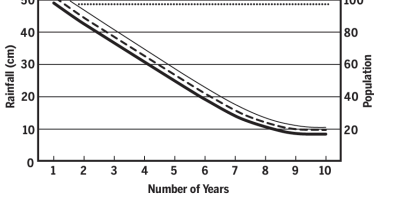
Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

Clarification Statement: Examples of evidence include grade-appropriate databases on human populations and the rates of consumption of food and natural resources (such as freshwater, mineral, and energy). Examples of impacts can include changes to the appearance, composition, and structure of Earth's systems as well as the rates at which they change. The consequences of increases in human populations and consumption of natural resources are described by science, but science does not make the decisions for the actions society takes.

Evidence of Learning Specifications

1. Construct an explanation that predicts:
 - a. consistent patterns of interactions between living and non-living parts of ecosystems
 - b. consistent patterns of types of interactions including competitive, predatory, and mutually beneficial
2. Construct an argument that:
 - a. is supported by empirical evidence of interactions within the ecosystem (a type of Earth system) and scientific reasoning
 - b. supports or refutes how increases in human population cause negative impacts on the Earth

Use the chart below to align each prompt/question in the performance task to an EoLS.

Performance Task prompts/questions	EoL Statements
<p>Graybirds and whitebirds live on North Island. Both types of birds eat the berries of the berry bush. The seeds of the berry bush grow best after the berries are eaten by birds and dropped elsewhere around the island.</p> <p>Whitebirds are also found on nearby South Island. The white birds on South Island eat berries and the nuts of the nut tree.</p> <p>Rats are found on both islands. Berries and bird eggs are favorite foods of the rats.</p> <p>1a. Predict the patterns of interactions between species on North and South Islands. Identify 3 relationships on each island. Use words: competition, predatory-prey, and mutualism. Write a paragraph describing the relationships.</p> <p>1b. Berry bushes need lots of rainfall. Which graph below best predicts what would happen to the populations on the North Island during a 10-year period of decreasing rain. Explain why the other two graphs are not the best predictions of what would happen during the period of decreasing rain.</p> <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;"> <p>A)</p>  </div> <div>  </div> </div> <div style="margin-top: 10px;"> <p>B)</p>  </div> <div style="margin-top: 10px;"> <p>C)</p>  </div>	

Performance Task prompts/questions	EoL Statements																								
<p>East Island has had normal rainfall. Like North Island, it has berry bushes, both Graybirds and Whitebirds, and rats, but no nut trees. About 20 years ago, people started living on East Island and began hunting Graybirds for food. Five years ago, the local government decided to reduce bird-hunting by limiting hunting licenses.</p> <table border="1" data-bbox="144 474 870 819"> <thead> <tr> <th>Years Ago</th> <th>Graybird Population of East</th> <th>Human Population of East</th> <th>Number of Hunting Licenses Issued</th> </tr> </thead> <tbody> <tr> <td>20</td> <td>1,742</td> <td>503</td> <td>50</td> </tr> <tr> <td>15</td> <td>1,510</td> <td>631</td> <td>69</td> </tr> <tr> <td>10</td> <td>1,213</td> <td>759</td> <td>70</td> </tr> <tr> <td>5</td> <td>1,298</td> <td>962</td> <td>40</td> </tr> <tr> <td>present</td> <td>1,350</td> <td>1,088</td> <td>40</td> </tr> </tbody> </table> <p>2a. Use evidence from the table above to construct a scientific argument that answers the question: “Do increases in human population cause negative impacts on the Earth?”</p> <p>The argument should include the following:</p> <ul style="list-style-type: none"> • The scientific question • Your claim (that is best supported by evidence and reasoning) • The relevant evidence that supports your claim • The scientific reasoning that links the evidence and science concepts to the claim <p>2b. Write a rebuttal stating why you did not argue for the other claim.</p>	Years Ago	Graybird Population of East	Human Population of East	Number of Hunting Licenses Issued	20	1,742	503	50	15	1,510	631	69	10	1,213	759	70	5	1,298	962	40	present	1,350	1,088	40	
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Tool 5 Template Example – 3D Assessment

Evaluate: Experiences in the Evaluate phase encourage students to assess and reflect on their conceptual understanding and use of the science and engineering practices. The Evaluate phase includes both an activity and performance task that together allow teachers to evaluate student progress toward achieving the performance expectation(s).

Evidence of Learning Specifications

1. Construct an explanation that predicts:
 - a. Consistent patterns of interactions between living and non-living parts of ecosystems
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2. Construct an argument that:
 - a. Is supported by empirical evidence of interactions within the ecosystem (a type of Earth System) and scientific reasoning
 - b. Supports or refutes how increases in human population cause negative impacts on the Earth

Alignment with EoLS	Performance Task to address EoLS List questions/prompts	Ideal Student Responses Use to guide rubric development
<p>EoLS 1b - Construct an explanation that predicts:</p> <p>Consistent patterns of types of interactions including competitive, predatory, and mutually beneficial</p>	<p>Graybirds and whitebirds live on North Island. Both types of birds eat the berries of the berry bush.</p> <p>The seeds of the berry bush grow best after the berries are eaten by birds and dropped elsewhere around the island.</p> <p>Whitebirds are also found on nearby South Island. The white birds on South Island eat berries and the nuts of the nut tree.</p> <p>Rats are found on both islands. Berries and bird eggs are favorite foods of the rats.</p> <p>1a. Predict the patterns of interactions between species on North and South Islands. Identify 3 relationships on each island. Use words: competition, predatory-prey, and mutualism. Write a paragraph describing the relationships.</p>	<p>On North Island:</p> <ul style="list-style-type: none"> • <i>A predator-prey interaction between the rats and the birds (or, rats are predators, bird eggs are their prey)</i> • <i>A mutually beneficial interaction (or mutualism) between the birds and the berries</i> • <i>Competition between the two kinds of birds and between the birds and the rats for berries.</i> <p>On South Island:</p> <ul style="list-style-type: none"> • <i>Rats are predators of the whitebird eggs (or rats are predators, bird eggs are their prey)</i> • <i>Rats and whitebirds compete for berries</i> • <i>The whitebirds and berries have a mutually beneficial interaction (mutualism)</i>

Evaluate: Experiences in the Evaluate phase encourage students to assess and reflect on their conceptual understanding and use of the science and engineering practices. The Evaluate phase includes both an activity and performance task that together allow teachers to evaluate student progress toward achieving the performance expectation(s).

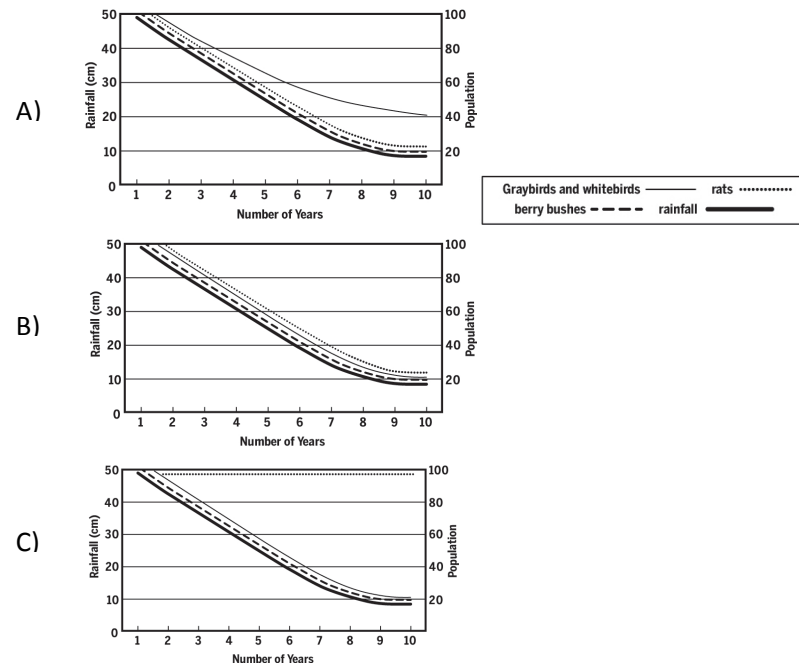
Evidence of Learning Specifications

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 - a. Is supported by empirical evidence of interactions within the ecosystem (a type of Earth System) and scientific reasoning
 - b. Supports or refutes how increases in human population cause negative impacts on the Earth

EoLS 1a - Construct an explanation that predicts:

Consistent patterns of interaction between living and non-living parts of ecosystems

1b. Berry bushes need lots of rainfall. Which graph below best predicts what would happen to the populations on the **North Island** during a 10-year period of decreasing rain. Explain why the other two graphs are not the best predictions of what would happen during the period of decreasing rain.



Answer A) is not correct because the birds should follow the same pattern as the rats and bushes, since birds also eat berries

Answer B) is correct

Answer C) is not correct because rats would decrease as the birds decreased, since rats eat bird eggs

Evaluate: Experiences in the Evaluate phase encourage students to assess and reflect on their conceptual understanding and use of the science and engineering practices. The Evaluate phase includes both an activity and performance task that together allow teachers to evaluate student progress toward achieving the performance expectation(s).

Evidence of Learning Specifications

1. Construct an explanation that predicts:
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East Island has had normal rainfall. Like North Island, it has berry bushes, both Graybirds and Whitebirds, and rats, but no nut trees. About 20 years ago, people started living on East Island and began hunting Graybirds for food. Five years ago, the local government decided to reduce bird-hunting by limiting hunting licenses.

2a. My claim is that increases in human population do cause negative impacts on an ecosystem. My claim is based on evidence that the graybird population of East Island dropped from 20 years ago to 5 years ago, at the same time that the human population was increasing. Every five years, as the human population grew, the graybird population fell. Additional evidence is based on the beginning of an increase in the number of birds when hunting was changed from unlimited hunting licenses to limited licenses. My reasoning is that when the human population increases, there is likely to be more hunting (more predator-prey interactions) between humans and birds, so the drop in bird population is likely to be due to hunting. The recovery of the birds when hunting is limited confirms my reasoning that humans were having a negative impact on an ecosystem. The evidence is pretty strong that more people usually means more hunting, and hunting impacts the ecosystem.

2b. You can see in the table that when there are more hunting licenses, there are fewer Graybirds and Graybirds are an important link the food web. Increasing human population will probably be accompanied by increases in hunting.

Years Ago	Graybird Population of East	Human Population of East	Number of Hunting Licenses Issued
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2a. Use evidence from the table above to construct a scientific argument that answers the question: "Do increases in human population cause negative impacts on the Earth?"

The argument should include the following:

- The scientific question
- Your claim (that is best supported by evidence and reasoning)
- The relevant evidence that supports your claim
- The scientific reasoning that links the evidence and science concepts to the claim

2b. Write a rebuttal stating why you did not argue for the other claim.

2a. My claim is that increases in human population do cause negative impacts on an ecosystem. My claim is based on evidence that the graybird population of East Island dropped from 20 years ago to 5 years ago, at the same time that the human population was increasing. Every five years, as the human population grew, the graybird population fell. Additional evidence is based on the beginning of an increase in the number of birds when hunting was changed from unlimited hunting licenses to limited licenses. My reasoning is that when the human population increases, there is likely to be more hunting (more predator-prey interactions) between humans and birds, so the drop in bird population is likely to be due to hunting. The recovery of the birds when hunting is limited confirms my reasoning that humans were having a negative impact on an ecosystem. The evidence is pretty strong that more people usually means more hunting, and hunting impacts the ecosystem.

2b. You can see in the table that when there are more hunting licenses, there are fewer Graybirds and Graybirds are an important link the food web. Increasing human population will probably be accompanied by increases in hunting.

Guide to Developing a Performance Task & Rubric

Using EoLS to Develop a Performance Task, Scoring Rubric, and Student Checklist

Step 1: Review your **Evidence of Learning Specifications** (EoLS) developed in Tool 2.

Decide if the EoLS are still pertinent to your performance task. Do the EoLS align with your current learning goals for students and the instruction designed in Tool 4? If not, revise your EoLS.

Record the EoLS in the box at the top of Tool 5.

Step 2: Explore resources (test items, formative assessments, or sample questions from instructional materials) that might be used in whole or in part to meet one or more of the specifications.

Review the phenomena and anchoring events used in Tools 3 and 4 for instruction.

Use the **Evaluate Analysis Guide** to help you determine if any prompts, questions, or lab experiences may be used as part of your performance task.

Step 3: Construct the **performance task** as a set of questions/prompts that can be aligned with EoLS. Be sure to ground the questions/prompts in an anchoring event(s) connected to the phenomenon in your Tool 4 sequence.

For each prompt, prepare an ideal student response. Complete Tool 5 by recording the performance task in the middle column, showing the alignment of each question/prompt with an EoLS in the first column, and recording the ideal student responses to each question/prompt from the task in the third column.

Step 4: Develop a **scoring rubric** for the performance task that includes a component for each part, question, or prompts in the assessment task. Write descriptors for each component that describes the full range of student understanding. Use the steps categories below to construct a scoring rubric

- **High Level of Proficiency:** Answer each prompt with an ideal student response. This response is scientifically accurate, complete and coherent, and consistent with your expectation for student understanding.
- **Low Level of Proficiency:** Revisit each prompt and answer with student response that includes naïve conceptions or misconceptions. This response is not scientifically accurate, may be incomplete/coherent, and is not consistent with your expectation for student understanding.
- **Medium Level(s) of Proficiency:** Revisit each prompt and answer with a student response that includes partial understanding. This response is partially accurate, mostly complete/coherent, and somewhat consistent with your expectation for student understanding.

Step 5: Develop a **student checklist** for the performance task by using the scoring rubric from Step 4 to write out criteria specific to each question/prompt to serve as a checklist for students in helping them to complete the performance task.