3D Science Performance Assessment Tasks

5TH GRADE

FROM INVITATON TO INVASION

These materials were developed under a grant awarded by the Michigan Department of Education

Task Title	From Invitation to Invasion

Standards Bundle Information
PEs • 5-LS1.1 Support an argument that plants get the materials they need for growth chiefly from air and water. • 5-LS2.1 Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.
Science and Engineering Practices • Engaging in argument from evidence • Developing and using models
Cross-Cutting Concepts • Energy and Matter • Systems and System Models
Disciplinary Core Ideas • LS1.C Organization for Matter and Energy Flow in Organisms • LS2.A Interdependent Relationships in Ecosystems • LS2.B Cycles of Matter and Energy Transfer in Ecosystems
CCSS ELA: • RI.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. (5-LS1-1) • RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (5-LS1-1) • W.5.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (5-LS1-1)
ELA/Literacy - • RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. (5-LS2-1) • SL.5.5 Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes. (5-LS2-1)
CCSS Mathematics: • MP.2 Reason abstractly and quantitatively. (5-LS1-1) • MP.4 Model with mathematics. (5-LS1-1) • MP.5 Use appropriate tools strategically. (5-LS1-1) • 5.MD.A.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems. (5-LS1-1)

Overview / Introduction of the Assessment Task

In this task, students will create a cause and effect model of newly introduced species that damage the balance of an ecosystem due to the components and interactions of the system.

Teacher Background

Please note that this is an assessment tool and not a unit lesson plan. Performance expectation 5-LS2-1 is in two parts. As we were developing our formative assessment and summative task, we thought about teaching the learning performance sequentially and decided these spots would be a good place to check in for student understanding. Our thinking of a model is a representation and explanation of a phenomenon. You may want to choose the format your students create (flow chart, drawing, plus/delta, etc.) There are several templates in the formative and summative assessments that may help you and your class.

There is an article link to provide more information to the teacher about purple loosestrife. There are two links for students as well. There is also an online game for students to play to see how an invasive species can wipe out another species in an ecosystem. For an alternate activity or in addition to, students can model what an invasive species can do to an ecosystem through a game played by them. Remember these suggestions will enhance your unit and is not your whole unit alone.

Information for Classroom Use

Connections to Instruction: Students will need to be taught invasive species being harmful, new species may or may not be harmful, and the difference between invasive and non-native species.

Approximate Duration for the Summative Task: (all components)

Two 50 minute periods

Assumptions:
Students should have knowledge of food webs and have beginning background of the relationships of the components. Students will know that plants need water and light to live and grow. Organisms obtain the materials they need to grow and survive. Materials come from other organisms.

Students will **NOT** be introduced to purple loosestrife until final task. The 3DSPA was designed to assess students' ability to perform the task by applying previous knowledge learned to the new phenomena in the performance assessment without having been exposed to this specific phenomena in advance.

Materials Needed:
Computer lab or other tech platforms for viewing pictures and games. Materials for writing responses and creating models.

Supplementary Resources:

Links found in task templates

Learning Performances
● Students will construct and refine an argument with evidence that plants acquire material for growth chiefly from air and water, not soil and that energy can be transferred in various ways and between objects. ● Students will develop a model that describe how food of almost any animal can be traced back to plants through interactions of animals and plants. ● Students will evaluate the cause and effect of fungi and bacteria (decomposers) breaking down dead organisms to understand that systems are a group of related parts that make up a whole. ● Students will use data to evaluate that organisms can survive only in environments in which their needs are met describing a system's components and interactions. ● Students will create a cause and effect model of a newly introduced species that damage its balance of an ecosystem due to the components and interactions of the system. ● Students will model how matter cycles between air and soil, due to conservation of matter. ● Students will collaborate and revise models to show how organisms obtain gases, water, and minerals that are transferred in various ways.

Performance Assessments

<table>
<tr><th colspan="3">Student Performances</th></tr>
<tr><td rowspan="4">Formative Assessment Task 1</td><td>Learning Performance:

Students will develop a model that describes how food of almost any animal can be traced back to plants through interactions of animals and plants.</td><td rowspan="4">Expected Duration:

50 minutes</td></tr>
<tr><td>Description (Phenomena, Scenario, Task)

Food web model</td></tr>
<tr><td>Directions

Students will create their own food web model with plants and animals showing the transfer of food in various ways. Example: animals eating plants and animals eating other animals that ate plants. This may have arrows to show energy transfer.</td></tr>
<tr><td>Scoring / Teacher Look-For's:

Balanced healthy food web showing food of almost any animal can be traced back to plants.</td></tr>
<tr><td rowspan="4">Formative Assessment Task 2</td><td>Learning Performance:

Students will use data to evaluate that organisms can survive only in environments in which their needs are met describing a system's components and interactions.</td><td rowspan="4">Expected Duration:

50 minutes</td></tr>
<tr><td>Description (Phenomena, Scenario, Task)

Students will add evidence of interactions between plants and animals to the model from Task 1.</td></tr>
<tr><td>Directions

Through simulations, model explanations, and/or other activities provided by the teacher before task 2, students will provide evidence why the ecosystem is balanced and healthy through the interactions within the system (i.e. producers, consumers, and decomposers).

Students will label producers, consumers, and decomposers to task 1. This will show the flow of matter between organisms while still showing that all matter started with plants. It should also show that everything is balanced and one species is not taking over the ecosystem.

Video clip resource Finding Forests.</td></tr>
<tr><td>Scoring / Teacher Look-For's:

Students are using argument to add evidence to their model to show a healthy system interactions between producers, consumers, and decomposers. Look for labels of producers, consumers, and decomposers done accurately. They will also add written explanation that the system is balanced due to transferring of matter and the balance of each species.</td></tr>
</table>

<table>
<tr><td rowspan="4">Formative Assessment Task 3</td><td>Learning Performance:

Students will describe the cause and effect of newly introduced species that damage the balance of an ecosystem due to the components and interactions of the system.</td><td rowspan="4">Expected Duration:

50 minutes</td></tr>
<tr><td>Description (Phenomena, Scenario, Task)

Invasive species examples (i.e. Asian carp, sea lamprey, zebra mussels, Eurasian milfoil, emerald ash borer, etc.)

In groups, students will interact with an online game. As the game progresses, students will give examples of the changes that are occurring in the game and how it affects the ecosystem.

http://www.pbslearningmedia.org/resource/plum14.sci.life.invaders/invaders/

Alternate idea (no technology needed): https://sites.duke.edu/bayougrace/smithridge-curriculum-summer-2012/week-2-rivers-and-estuaries/invasive-species-tag/</td></tr>
<tr><td>Directions

Have students play the interactive online game in small groups observing the changes to the ecosystem and having conversations about what they observe. When students have completed several rounds or when you feel it has been effective, have them create a chart that shows how the balanced system changes to an unbalanced system (see below for ideas). Use invasive species above to bring forth additional discussions on the effects invasive species have on an ecosystem.</td></tr>
<tr><td>Scoring / Teacher Look-For's:

Cause/Effect model (which could be in the form of a chart) to show the disruption to a healthy ecosystem from one of the invasive species studied. One side of the chart is healthy system and the other side could be unbalanced system. They could draw the changes by including species that started in the game on one side and the species that took over on the other side. At your discretion they could use tally marks to show changes on each side with the amount of species. Under it, they need to write and explain the changes that occurred disrupting the balance of the ecosystem.

For teaching your own invasive species organism, here is a chart Template for student use (make a copy and adapt as you need).</td></tr>
<tr><td>Final Task:

)</td><td>Learning Performance:

Students will create and evaluate a cause and effect model of newly introduced species that damage the balance of an ecosystem due to the components and interactions of the system.</td><td></td></tr>
<tr><td></td><td>Phenomena:

A wetland area that has abundance of plant varieties and waterfowl. Same area later with purple loosestrife added and the plant life and waterfowl have disappeared.

Teacher article</td><td>Expected Duration:

Two 50 minute periods</td></tr>
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	Student article Student Article  Invasive Species, Purple Loosestrife, Montezuma NWR, NY, FWS http://refugeassociation.org/wp-content/uploads/2011/08/purple-loosestrife-fws-montezuma.jpg  Photo: Ned Hettinger http://www.watershedcouncil.org/uploads/7/2/5/1/7251350/3407497_orig.jpg	

CheckBric

Student Name _____

Teacher Name _____

Learning Performance: Students will create a cause and effect model of newly introduced species that damage its balance of an ecosystem due to the components and interactions of the system.					**Comments**
Evidence Statements below:					
Can create a cause and effect model.	**1**	**2**	**3**	**4**	
Can explain how a newly introduced species becomes invasive by damaging the ecosystem.	**1**	**2**	**3**	**4**	
Can explain how the ecosystem components are unbalanced due to the damage of a native species.	**1**	**2**	**3**	**4**	
LP Total:					
Learning Performance: Students will use data to evaluate that organisms can survive only in environments in which their needs are met describing a system's components and interactions.					**Comments**
Evidence Statements here:					
Uses evidence as their data in explanation.	**1**	**2**	**3**	**4**	
Can explain how organism's needs are no longer met if new species is added.	**1**	**2**	**3**	**4**	
Can describe the disruption of a system's components and interactions.	**1**	**2**	**3**	**4**	
LP Total:					
Checkbric Total					

4 Exemplary	Work at this level is of exceptional quality. It is both thorough and accurate. It exceeds the standard. It shows a sophisticated application of knowledge and skills.
3 Proficient	Work at this level meets the standard. It is acceptable work that demonstrates application of essential knowledge and skills. Minor errors or omissions do not detract from the overall quality.
2 Developing	Work at this level does not meet the standard. It shows basic, but inconsistent application of knowledge and skills. Minor errors or omissions detract from the overall quality. Your work needs further development.
1 Emerging	Work at this level shows a partial application of knowledge and skills. It is superficial (lacks depth), fragmented or incomplete and needs considerable development. Your work contains errors or omissions.