NextGen TIME: Prescreen Tool

Name of Instructional Materials

Lesson/Instructional Sequence Title

Grade Level

Prescreen Consensus

Use the following questions to create a summary of the evidence collected:

- How does a phenomenon/problem organize the learning?
- How are learning opportunities sequenced to enable students to make sense of the phenomenon or problem?
- What is the path of student thinking from their prior knowledge to the expected three-dimensional learning outcomes?
- How do students show/demonstrate their three-dimensional understanding of the phenomenon?

Summary Recommendation:
### Prescreen Tool

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Evidence: What was in the materials, where was it, and why is this evidence?</th>
<th>Shows promise</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Use of Phenomena/Problems.</strong> Materials provide relevant and authentic learning contexts through which students</td>
<td>• engage as directly as possible with phenomena or problems to ask and answer their questions as well as questions from other sources and • have the potential to use the three dimensions to make sense of phenomena or design solutions to problems.*</td>
<td></td>
</tr>
<tr>
<td><strong>Presence of Logical Sequence.</strong> Student learning across the three dimensions is</td>
<td>• arranged in a logical sequence and • sufficient and appropriate for students to figure out the phenomena or problems.*</td>
<td></td>
</tr>
<tr>
<td><strong>Students Are Figuring Out.</strong> Materials position students to make sense of phenomena and design solutions to problems by</td>
<td>• asking and answering questions that link learning over time and • using the three dimensions to link prior knowledge and negotiate new understandings and abilities.*</td>
<td></td>
</tr>
<tr>
<td><strong>Three-Dimensional Performances.</strong> Materials include assessments designed to</td>
<td>• match the targeted learning goals and • elicit evidence of students’ use of the three dimensions to make sense of phenomena and/or to design solutions to problems.*</td>
<td></td>
</tr>
</tbody>
</table>

*to the extent possible when reviewing a limited portion of the instructional materials.
Resources to Build Common Understanding

Instructional materials programs designed for the NGSS include the criteria as described in the “More of this” column of these charts.

<table>
<thead>
<tr>
<th>Use Phenomena/Solve Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Less of this ...</strong></td>
</tr>
<tr>
<td>Making sense of phenomena and designing solutions to problems may be used occasionally as engagement strategies but are not a central part of student learning.</td>
</tr>
<tr>
<td>Topics, rather than phenomena, are used to direct student learning experiences and are not necessarily designed to answer student questions.</td>
</tr>
<tr>
<td>Only talking or reading about phenomena or how other scientists and engineers are engaged with phenomena and problems</td>
</tr>
</tbody>
</table>

*Statements adapted from ACESSE Survey*
## Resources to Build Common Understanding

<table>
<thead>
<tr>
<th>Students Figuring Out Phenomena or Solving Problems</th>
<th>Less of this ...</th>
<th>More of this ...</th>
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<tbody>
<tr>
<td><strong>Less of this ...</strong></td>
<td></td>
<td></td>
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<tr>
<td>Learning science that may be relevant to adults</td>
<td></td>
<td>Learning science that is personally relevant to</td>
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<tr>
<td>and may be useful to students someday in their</td>
<td></td>
<td>student lives*</td>
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<tr>
<td>lives*</td>
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<td></td>
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<tr>
<td>Using science practices and crosscutting concepts</td>
<td></td>
<td>Careful design to build student proficiency in all</td>
</tr>
<tr>
<td>only to serve the purpose of students acquiring</td>
<td></td>
<td>three dimensions of the standards</td>
</tr>
<tr>
<td>more DCI information</td>
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<td></td>
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<tr>
<td>Learning experiences are 1–2 dimensional or</td>
<td></td>
<td>Multiple opportunities, experienced in a logical</td>
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<tr>
<td>marginally connected to one another and provide</td>
<td></td>
<td>sequence, to use the three dimensions to make</td>
</tr>
<tr>
<td>limited opportunities to use the dimensions</td>
<td></td>
<td>sense of phenomena or solve problems</td>
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<tr>
<td>together to make sense of phenomena or solve</td>
<td></td>
<td></td>
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<tr>
<td>problems</td>
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<tr>
<td>Learning experiences are designed for the “right</td>
<td></td>
<td>Learning experiences are designed so that initial</td>
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<tr>
<td>answer”.</td>
<td></td>
<td>explanations for phenomena are negotiated and</td>
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<td></td>
<td></td>
<td>revised over time as understanding increases in</td>
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<tr>
<td></td>
<td></td>
<td>complexity.*</td>
</tr>
<tr>
<td>Rote memorization of facts and terminology;</td>
<td></td>
<td>Facts and terminology are learned as needed</td>
</tr>
<tr>
<td>providing discrete facts and concepts in science</td>
<td></td>
<td>while developing explanations and designing</td>
</tr>
<tr>
<td>disciplines, with limited application of practice</td>
<td></td>
<td>solutions supported by evidence-based arguments and</td>
</tr>
<tr>
<td>or the interconnected nature of the disciplines</td>
<td></td>
<td>reasoning.</td>
</tr>
</tbody>
</table>

*Statements adapted from ACESSE Survey*
### Resources to Build Common Understanding

#### Three-Dimensional Performance

<table>
<thead>
<tr>
<th>Less of this ...</th>
<th>More of this ...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers only posing questions that have one correct answer and/or measure understanding in one moment in time</td>
<td>Teachers posing questions that elicit the range of student understanding and capture student thinking over time</td>
</tr>
<tr>
<td>Only providing summative assessments that measure the end point of student understanding</td>
<td>Formative assessment processes embedded into instruction to provide feedback data to adjust instruction as well as inform students of their progress</td>
</tr>
<tr>
<td>Assessments that focus on one dimension at a time and are mostly concerned with measuring students’ ability to remember information</td>
<td>Assessments reflect each of the three distinct dimensions of science, their interconnectedness and their use by students to figure out phenomena or solve problems.</td>
</tr>
<tr>
<td>Assessed on core ideas of science*</td>
<td>Students’ increasing grasp of science and engineering practices helps them to develop understanding of the core ideas and crosscutting concepts.*</td>
</tr>
<tr>
<td>Students are assessed in the same way to reveal the achievement gaps.*</td>
<td>Student experience multiple measures and types of assessment to show the range of understanding about something being learned.*</td>
</tr>
</tbody>
</table>

*Statements adapted from ACESSE Survey

*Citations for ACESSE Survey


The frog is more than just a colorful animal.

How does the frog interact with other organisms in its environment?

How long have frogs and other amphibians lived on earth?

Do the activities of humans affect frogs?

In *BSCS Biology: An Ecological Approach*, also known as Green Version, you will explore key concepts in Biology that will help you answer questions such as the ones above. You will have opportunities to complete interesting investigations and readings, discuss important ideas with your classmates, and ask questions of your own as you monitor your own learning.

In Green Version, you will explore the big ideas in biology from an ecological perspective. Through this approach to biology, you will gain an appreciation for the complexity and interrelatedness of life on Earth. You also will learn about, and participate in, the processes of scientific inquiry.

"BSCS" and "BIOLOGY" will be dome embossed on FRONT COVER ONLY
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BSCS Revision Coordinator: Dottie Watkins
BSCS Production Manager: Barbara Perrin
BSCS Production Staff: Stacey Luce, Lisa Rasmussen
New Art: Paige Louis Thomas, Colorado Springs, Colorado
BSCS Review: Steve Getty, Chapter 21

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1.2 Plants, Animals, and Other Organisms Make Up a Food Chain

Organisms play various roles in the web of life. The green plants use light energy to make food. Because they make their own food, they are called producers. Animals cannot make their own food, so they eat plants or other animals or both. Organisms that are unable to make their own food are called consumers. During the process of decay, consumers that break down the bodies of dead plants and animals are called decomposers. Bacteria and fungi, such as those shown in Figure 1.4, are examples of decomposers. The producers, consumers, and decomposers that live and interact in one area form a community.

Let's see how a community works. Not far from the spider's web discussed in Section 1.1 is a raspberry bush. Underneath the bush, a rabbit (see Figure 1.5) finds shelter and a place to hide from animals that may kill it. The bush is an ideal place to hide because its thorns can dig into the flesh of larger animals, and its low-hanging red fruit provides the rabbit with food. A small bird feasts on insects that hover near the top of the bush. Because rabbits usually do not eat raspberry leaves, the rabbit ventures out to look for grasses to eat once the berries are gone. Its movement is spotted by a hungry fox, which slinks forward and suddenly makes a leap for the rabbit. The rabbit looks up just in time, and a wild chase begins. This time, the rabbit reaches safety in another raspberry bush.

Not far from the rabbit's bush is the fox's den (see Figure 1.6). The fox had carried last week's rabbit to the den and eaten most of it. What he did not eat, he buried. Microorganisms (organisms too small to be seen with the unaided eye, such as bacteria) began to break down the remains, causing them to decay.

The raspberry bush, the rabbit, the fox, and the microorganisms can be connected in a food chain, a pathway that tells what eats what. Several food chains are shown in Figure 1.7. We might look at the food chain labeled path a: the fox eats the rabbit, and the rabbit eats the berries from the bush. Path b illustrates another food chain: the bird eats insects that...
Figure 1.6

What role do decomposers play in the food web?

hover over the raspberry bush. These two food chains are connected by the raspberry bush. Section 1.1 described a food chain in which a spider ate a grasshopper that ate a plant (path c). When the bird eats the spider, two food chains are connected (path d). Figure 1.7 does not include all the plants a rabbit might eat, all the animals that might eat a rabbit, or any decomposers.

When all the food chains in a community are connected to each other, a food web is formed. What would the web look like if there were two

Figure 1.7

There is more than one food chain here. How many can you find?
spiders instead of just one? Figure 1.8 shows a larger food web that includes the organisms discussed in this chapter. You can see that a food web can be large and complex.

Food webs and food chains tend to keep the numbers of living organisms in balance. The rabbits live off the green plants, and many other animals, including humans, live off the rabbits. This might appear to be hard on the rabbits, but rabbits produce many offspring in a short time. Imagine how many rabbits there would be if they reproduced without control. They
CONCEPT REVIEW

1. What parts of the environment does an ecologist study?
2. How do producers differ from consumers?
3. How is a food chain related to a food web?
4. Explain how reproduction and death are part of the balance of nature.
5. In what way do decomposers differ from other consumers.

soon would be so numerous that they would eat all the plants. Without the plants, the rabbits would starve. Foxes and other animals that eat rabbits may help keep the rabbit population in balance. Disease or lack of food also may help keep the rabbit population from growing too large. These controls, or checks, apply to all living organisms, including humans, and are just one part of the balance of nature. Investigation 1.2 may help you understand your place in the web of life.

Matter and Energy—
The Foundations of Life

1.3 All Biological Activity Requires Energy

Food chains and food webs are based on the cycling of matter from one organism to another organism and the flow of energy through the food web. The details of this cycling and flow are developed throughout this course. Here, you will look at just the broad outline.

All of an organism's activities require energy. Imagine the runners shown in Figure 1.9a trying to run without having eaten energy-rich foods. An activity does not have to be very intense to require energy; even the

Figure 1.9 △
Where do these organisms get their energy?
Disruptions in Ecosystems

Ecosystem Interactions, Energy, & Dynamics

Middle School Unit aligned with the Next Generation Science Standards

American Museum of Natural History

Third Field Test Version
Ecological Interactions

Scientists use diagrams to show the feeding relationships within an ecosystem. These relationships can be shown as a single chain (Figure 1a) or as a web that provides a more complete picture (Figure 1b). Arrows point from the organism that is eaten to the organism that eats it. For example, in the chain in Figure 1a, the arrow from the grass to the grasshopper shows that the grasshopper eats the grass.

Figure 1a. Food Chain

Figure 1b. Food Web
Guiding Question
What effect did the reintroduction of wolves have on the food web in Yellowstone National Park?

Materials
For each group of four students:
- 1 set of 12 Yellowstone Food Web cards
- 1 additional Yellowstone Food Web card: Gray Wolf

For each student:
- Handout 1.2-1, “Yellowstone Food Web Data”

Process & Procedure
Part One: Investigating the Yellowstone Food Web in 1990
1. Work with your group to examine the 12 Yellowstone Food Web cards in your set. Consider which organisms are familiar to you and which are not.

2. Think about what the organisms on the Food Web cards might eat.

3. Work with your group to sort the cards into groups. Explain how you decided to group the cards.

4. As a group, choose three cards that make a simple food chain. Record your food chain in your science notebook.

5. Work with your group to create a food web using all of the cards in your set.

6. Record your food web in your science notebook. Use a full page of paper to draw your food web. Leave space around the name of each organism so that you have room to draw in arrows. Then draw arrows from the eaten organism to the animal that eats it.

7. Share and discuss your food web with another group of students. How similar or different are your ideas?

8. Obtain a copy of Handout 1.2-1, “Yellowstone Food Web Information,” from your teacher. Use the information on the handout to revise your food web.

Explore: Ecological Interactions
9. Record your revised food web in your science notebook.

10. Discuss with your group the patterns of interaction among the organisms in your food web:
   - Which organisms play a similar role in the food web? Describe these roles.
   - What do you predict would happen to the food web if all of the plants died?

**Part Two: Reintroducing the Gray Wolf in 1995**

11. Your teacher will give you another Yellowstone Food Web card: the Gray Wolf.

12. Add the wolf to your revised food web.

13. Discuss with your group how the reintroduction of this species affected your food web.

14. Your teacher will introduce another organism into the food web: bacteria. Discuss the role this organism plays in the ecosystem and where to add it to the food web.

**Analysis**

1. Describe the patterns of interaction among the organisms in your food web:
   a. Which animals eat other animals for food?
   b. Which animals compete for the same food source(s)?
   c. What role did the winter tick play in the food web?
   d. What role did the bacteria play in the food web?
   e. Look again at your food web and Handout 1.2-1. Find an example of a helpful relationship between two animals.

2. How did the wolf affect your food web?

3. a. Add humans and cattle to your food web diagram.
   b. Describe how humans and cattle change the food web.
4. What effect do you think restoring wolves to the Yellowstone food web had on each of the following populations in the park? Explain your ideas.
   a. Elk
   b. Small animals
   c. Plants

5. People often think of grizzly bears as carnivores. Grizzlies are omnivores, eating plants, insects, and other animals. More than 80% of their diet comes from seeds, nuts, and other vegetation. Does a food web address the importance of different food sources in an organism’s diet? Explain.

6. Review the list of organisms in a familiar ecosystem that you developed for Part One of Activity 1.1.
   a. Construct a food web for that area.
   b. What similarities do you see between the food web you drew for question 6a and the Yellowstone food web?