



Project QuEST
Model Life Science Lessons
Ecology Set

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Project QuEST
Model Life Science Lesson
Teacher Guide: Introduction to Ecology

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QuEST Middle School Science: Life Science
Ecology Set: Introduction to Ecology



Framework for K-12 Science Education: Dimension 3—Life Science

- **Disciplinary Core Idea (LS2.A)—Interdependent Relationships in Ecosystems:** Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. Growth of organisms and population increases are limited by access to resources. In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving are shared.
- **Science and Engineering Practices:** Developing and Using Models
- **Crosscutting Concepts:** Cause and Effect

Connections to the Common Core State Standards (ELA)

- **WHST.7** (with lesson extension): Conduct short research projects to answer a question (including a self generated question), drawing on several sources and generating additional, related, focused questions that allow for multiple avenues of exploration.
- **L6:** Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Connections to the Common Core State Standards (Math)

- **5.OA:** Analyze patterns and relationships.
- **7.SP3:** Draw informal comparative inference about two populations.

Connections to English Language Development Standards¹

- **ELD Standard 4: Language of Science**
 - **Reading:** Determine the features of an ecosystem based on a text.
 - **Writing:** Describe an ecosystem by taking notes in a graphic organizer.
 - **Listening:** Record peer findings from the habitat investigation on a map.
 - **Speaking:** Describe the location of samples collected as part of the habitat investigation.

Overview of Activities

Focus Activity

- **Student Activity I: Rating and Discussion of Science, Language, and Vocabulary Objectives.** Teacher posts lesson objective poster; students rate their prior knowledge of each objective; brief discussion.

Engagement

- **Student Activity II: Lesson 2 Review.** Students answer review questions from previous lesson on genetics; teacher displays the answers; students correct responses as necessary.
- **Student Activity III: Preteaching of Science Content Words.** Teacher displays PowerPoint slides of science content words one at a time; teacher reads script aloud and elicits responses to teach the following: *ecology, organism, habitat, ecosystem, biotic, abiotic, environment*.
- **Student Activity IV: Which Organism Is in the Wrong Habitat?** Teacher displays four habitats with one organism that is not adapted for that environment; students identify the ill-adapted organism and explain their reasoning.
- **Student Activity V: Features of an Ecosystem.** Teacher displays three pictures of ecosystems and asks students to identify the ecosystem, actual locations where this ecosystem exists, and the biotic and abiotic features of the ecosystem; students complete Student Chart 1.4; teacher displays responses; whole group discussion.

Explanation and Exploration

- **Student Activity VI: Habitat Investigation.** Teacher displays background information for the investigation; students complete Student Chart 1.5; teacher assigns groups and explains roles; teacher reads and distributes materials in Student Chart 1.6; teacher reviews procedures for each group role in Student Chart 1.8a-e; teacher reads the preview for the investigation; class goes outside; as a group, class

¹ Because the WIDA English language development standards are currently used in 29 states, we reference these standards.

completes bare soil observation; students complete Student Chart 1.7; each group chooses a habitat and each group member completes their assigned chart of Student Chart 1.8a-e; class returns inside; each group member shares his or her findings with the class; whole group discussion; opportunity for extension with further questions in Student Chart 1.9.

Elaboration

- **Student Activity VII: General Academic Word Cards.** Teacher displays PowerPoint slide of the general academic word; teacher reads script aloud and elicits responses to teach the following: *identify*.
- **Student Activity VIII: Interactive Reading.** Teacher discusses text illustrations; one student reads guiding questions; teacher and students participate in shared interactive reading; teacher and students discuss guiding questions; students respond to guiding questions by creating and presenting posters.

Evaluation

- **Student Activity IX: Glossary and Key Facts.** Students complete glossary for science content words, answer questions related to key content, and indicate if there is anything else they would like to learn about; whole class review.

Extension/Differentiation

- Concept map on ecosystems
- Brainpop video: "Ecosystems"

Continuation Activity

- Follow-up lesson activity from Ecology Lesson 11.



QuEST Middle School Life Science

Introduction to Ecology

Objectives

- Science:
 - Students will recognize, identify, locate, and observe examples of an ecosystem and habitats.
 - Students will recognize, identify, locate, and observe the biotic and abiotic factors of the ecosystem.
- Language:
 - Students will orally share information about the ecosystem with their peers.
 - Students will record information about ecosystems based on a reading.

Vocabulary

- Science content: *ecology, organism, habitat, ecosystem, biotic, abiotic, environment*
- General academic: *identify*

Teacher Management

Estimated time for completion, in minutes: 90

Materials

- Text: Glencoe, pages 588–591
- Per group of four:
 - plastic petri dish
 - tape measure
 - collection container
 - magnifying glass
 - towel/sheet
 - optional: 4-meter string length
 - optional: insect net

Teacher Prep

1. Review detailed lesson plan in the Teacher Guide.
2. Pull out the Activity Overview page(s), PowerPoint lesson guides, and student charts and add any necessary notes to them from the detailed lesson plan to help guide the lesson.
3. If necessary, organize activities to fit school schedule.
4. Download PowerPoint slides.
5. Display vocabulary cards on the word wall.
6. Group students for partner/small group work.
7. Preview the schoolyard for optimal locations for the students to do the habitat study. **Teacher note: Fencerows can make a surprisingly diverse habitat. Also, set up**

or find a small place where succession might be in evidence over the rest of the year. A place where the soil has been cleared for something (or get permission to do a small area yourself) would work. Do not pick a bare area that has been trampled by student traffic—it is likely nothing will grow there because of the compacted soil.

Safety Considerations:

Be sure to review any safety considerations related to going outside, dangerous situations, or poisonous plants. Also, emphasize the importance of being gentle to the environment and only bringing in small soil samples that will be returned to the collection area. If placed under a light source, the soil can get too hot or dry for the organisms living in it so be careful!

Vocabulary-Building Strategies

- Explicit interactive presentation of vocabulary cards
- Word wall
- Glossary work

Background Information for Teacher

- Glencoe: pages 588, 589 (paragraph about Ecosystems only), and 591

Lesson Content**Focus Activity/Warm-Up****Student Activity I (slides 3–8, Lesson Objective poster; Student Charts 1.2 and 1.3)**

5 minutes

Activity Overview: Rating and Discussion of Science, Language, and Vocabulary Objectives. Teacher posts lesson objective cards; students rate their prior knowledge of each objective; brief discussion.

- Before students enter the room, display the science objectives.
- Make sure the ratings of the previous class have been erased.
- As they enter the classroom, have students rate their prior knowledge of each objective on a continuum of 1 to 4 (1=none, 4=a lot).
- Have students begin the review questions in Student Chart 1.1 until all students have rated their knowledge of the objectives.
- Review correct responses to review activity (see Activity II below).
- Have students turn to Student Chart 1.2.
- Read the science objectives aloud, one at a time, reporting students' level of prior knowledge.
- Read the language objectives.
- Have students turn to Student Chart 1.3.
- Read vocabulary words aloud.

- As appropriate, have students use thumbs up/thumbs down to indicate prior knowledge.



Engagement

Student Activity II (slides 4–6, Student Chart 1.1)

4 minutes

Activity Overview: Plants Lesson Review. Students answer review questions from previous lesson; teacher displays the answers; students correct responses as necessary.

- After students have rated their knowledge of the objectives and as they wait for their peers to enter the room, students should begin working on Student Chart 1.1.
- Once all students have displayed their knowledge of the objectives poster and have had 2 minutes to answer the review questions, have students read the review questions and answer them aloud.
- Display responses.
- Have students correct their responses as necessary.

Student Activity III (slides 9–15, Science Content Word Cards)

8 minutes

Activity Overview: Preteaching of Science Content Words. Teacher displays PowerPoint slides of science content words one at a time; teacher reads script aloud and elicits responses to teach the following: *ecology, organism, habitat, ecosystem, biotic, abiotic, environment*.

- Have students turn to Lesson 1 glossary words.
- Read the target words aloud, one at a time.
- As you display the slides have students rewrite the target words one at a time in English and in Spanish (as appropriate) in their glossaries.
- Display the slides of the science content words one at a time, reading the text on the right side of each PowerPoint slide aloud and eliciting responses from student pairs.
- Point to the appropriate parts of the pictures as you read through the notes.
- Depending on your class, you may want to read (or have a student read) the definitions in Spanish.
- Tell students they may continue to use the science content word cards on the word wall for reference.
- **Teacher note:** To save time you may want to eliminate partner talk and just ask one student to answer the question.

Student Activity IV (slides 16–19)

4 minutes

Activity Overview: Which Organism Is in the Wrong Habitat?

- Display slides 16–19 and:
 - Ask students to name the ecosystem or habitat.
 - Have students find the organism that does not belong.
 - Ask students how they know that the organism does not belong.
 - Display the response.

Student Activity V (slides 20–25, Student Chart 1.4)

10 minutes

Activity Overview: Features of an Ecosystem.

- Pair students.
- Have students turn to Student Chart 1.4.
- Ask students to identify the ecosystem and fill it in Student Chart 1.4. (Response: desert).
- Ask students to identify examples of actual locations where this ecosystem exists (Possible responses: the Sahara desert, the Southwest, Mexico).
- Ask students to identify the biotic and abiotic features of this ecosystem (Possible responses: biotic—cacti, bushes, lizards, turtle, coyote, snake; abiotic—air, sun, sand, rocks).
- **Teacher note: Do this example as a group and then have students work independently for the other ecosystems as you display slides 22 and 24.**
- Display the responses and discuss.
- Have students correct their responses as necessary.
- Have students think about the habitats in the schoolyard and share this information with their partner. (Possible responses: near the basketball hoops; open field; bog area; young forest area; climax forest.)
- Call on several student pairs to share out.

**Explanation and Exploration****Student Activity VI (slides 26–36, Student Charts 1.5–1.9)**

38 minutes

Activity Overview: Habitat Investigation.

- **Background information**
 - (Teacher prep: Identify several areas of the school yard appropriate for this investigation. In addition, find or prepare an area with bare soil; it should be a location away from foot traffic. This location will be observed again during the study of ecological succession.)

- Tell students to turn to Student Chart 1.5.
- Read #1–#3 aloud as students write the key terms in Student Chart 1.5. This is a note-taking exercise.
- Assign groups and roles for each group.
- Have students locate the Student Charts that go with their role.
- **Roles**
 - There is no Student Chart for this activity.
 - Choose someone who will be a bug collector and have them read their role description aloud.
 - Do the same for the other roles.
 - **Teacher note: Some roles may have more than one group member, and some group members may need to fill more than one role.**
- **Materials**
 - Have students turn to Student Chart 1.6.
 - Review list of lab materials and distribute them to students.
 - Have students check off materials.
 - **Teacher note: You may want to have clipboards or binders for each student to write on.**
- **Preview**
 - There is no Student Chart for slide 29.
 - Read the preview for the investigation.
 - Review Students Charts 1.8a–1.8e so students know what information to record. The information will vary according to role.
 - Have students gather the materials they need to conduct the investigation and take them outside.
- **Outside**
 - Do a group observation of the pre-identified bare soil area.
 - Have all students record their observations in #1, Student Chart 1.7.
 - Have each group choose a habitat and record their observations in Student Charts 1.8a–1.8e.
 - After 10–15 minutes of independent group work, return to the classroom.
 - **Teacher note: The bare soil observation #2 is intended to be revisited later in the unit during the study of ecology and is intended as a model of ecological succession (Lesson 11; see Extensions on page 12).**
- **Bare soil observations (inside)**
 - Have students turn to Student Chart 1.7.
 - Have students share their findings.
 - Whole group discussion.
- **Debriefing**
 - Have students turn to their completed Student Charts 1.8a–1.8e.
 - Have a representative from each role share their findings, beginning with the mapmakers.
 - Whole group discussion.
- **Partner talk: Questions for discussion (optional)**

- You may choose to have students answer these questions in their groups, independently, orally, or in their Student Charts.
- **Teacher note:** You may consider dividing up the questions by student pairs or by groups.



Elaboration

Student Activity VII (slides 37 and 38, General Academic Word Cards)

2 minutes

Activity Overview: General Academic Word Cards. Teacher displays PowerPoint slides of science content words one at a time; teacher reads script aloud and elicits responses to teach the following: *identify*.

- Read the general academic vocabulary word to students.
- If you like, have student use thumbs up/thumbs down to indicate prior knowledge.
- Have students turn to Lesson 1 glossary words.
- Read the target word aloud.
- Have students rewrite the target word in English and in Spanish (as appropriate) in their glossaries.
- Read through the notes on the right side of slide 38.
- Point to the appropriate part of the picture as you read through the notes.
- Depending on your class, you may want to read (or have a student read) the definition in Spanish.
- Display the slides of each of the general academic word, reading the script aloud and eliciting responses.
- Tell students they may continue to use the general academic word cards on the word wall for reference.
- **Teacher note:** To save time you may want to eliminate partner talk and just ask one student to answer the question.

Student Activity VIII (slides 39–43, Student Charts 1.10–1.12)

10 minutes

- Glencoe, pages 598–599.

Activity Overview: Interactive Reading. Teacher discusses text illustrations; one student reads guiding questions; teacher and students participate in shared interactive reading; teacher and students discuss guiding question; students respond to guiding question; teacher posts correct response; students revise responses as necessary.

- **Preview**
 - Have students turn to Student Chart 1.10.
 - Read the guiding question aloud.
 - Review all illustrations in the text with students using the document camera.
- **Text**

- Have students turn to Student Chart 1.11.
 - Read text aloud to students as they follow in their Student Chart.
 - Stop and clarify text if necessary.
 - Ask students embedded questions. Elaborate on their responses as necessary.
 - When you get to a figure, stop reading and have students look at the figure as you discuss it.
- **Guiding questions**
 - Have students turn to Student Chart 1.12.
 - Have students complete the chart.
 - Have students display their answers under the document camera.
 - Whole class discussion.



Evaluation

Student Activity IX (slides 44–46, Student Charts 1.13–1.15, Glossary)

8 minutes

Activity Overview: Glossary and Key Facts and Questions for Further Study. Students complete glossary for science content words, answer questions related to key content, and indicate if there is anything else they would like to learn about; whole class review.

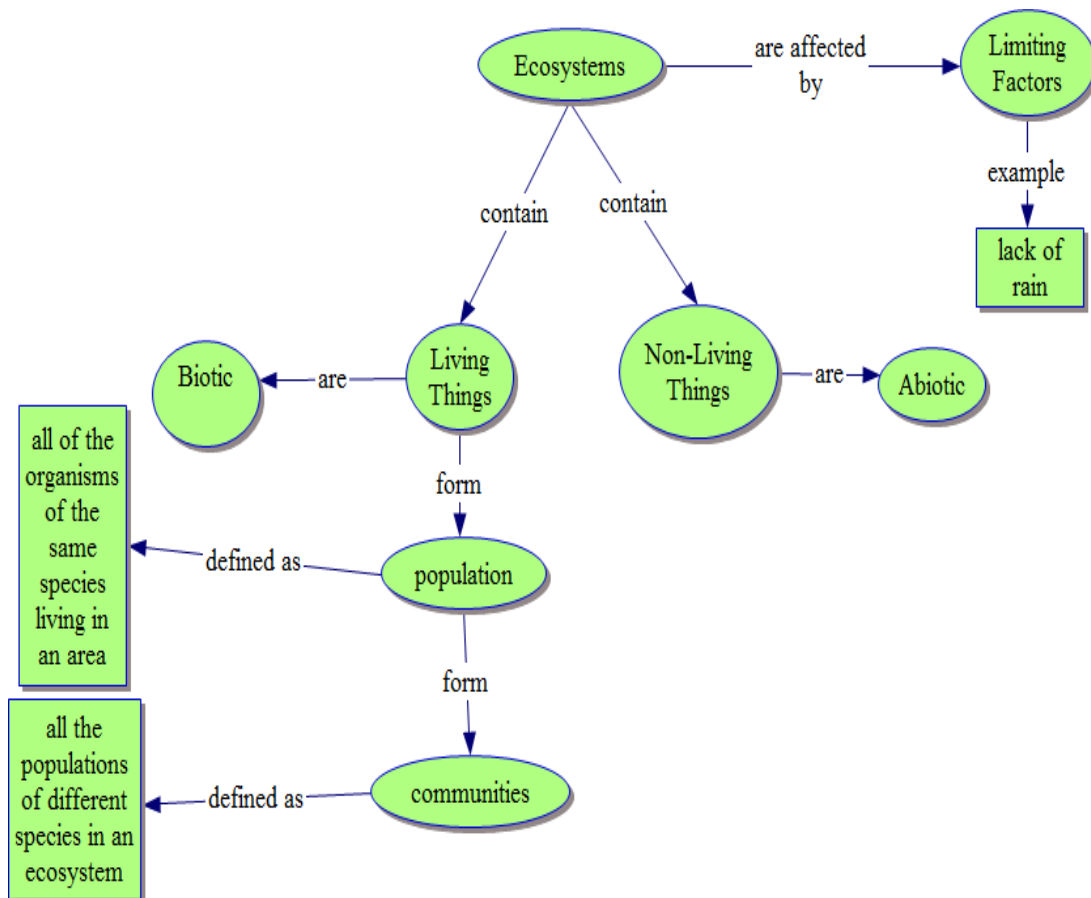
- **Glossary work**
 - Have students locate Student Chart 1.13.
 - For each science content word, have students work in pairs to indicate whether the word is a cognate and to fill in the rest of the information required by the glossary.
 - Review glossary entries with class.
- **Key information**
 - Have students turn to Student Chart 1.14.
 - Give students several minutes to complete the questions.
 - Display responses and discuss.
 - Have students correct responses as necessary.
- **Questions for further study**
 - Have students turn to Student Chart 1.15.
 - Have students complete Student Chart.
 - As time permits, have students share their questions with a partner, with the whole class, or have them write them on a sticky note and put them on a “questions wall” on their way out of class. Students who finish an assessment or who have free time might be assigned to go online to find answers to class questions.



Extension/Differentiation

- **Student Activity XI: Brainpop Video, “Ecosystems.”**
 - See the PowerPoint for the link to a video.
- **Student Activity X: Concept Map on Ecosystems.**
 - Consider also teaching the terms *community*, *population*, and *limiting factor*. Have students fill in the concept map.

Use the words below to fill in the concept map:
communities, populations, limiting factors, biotic, abiotic, same, different



1. Ecosystems contain living things, or *biotic* factors, and non-living things, or *abiotic* factors.
2. Populations are the members of a given *species* in an area; all the populations in an ecosystem make up a *community*.
3. Ecosystems are affected by *limiting factors* such as lack of rain.

Continuation Activity

This activity is from Lesson 11 at the end of the Ecology Unit and refers to Activity 1.7 from this lesson.



Student Activity V (Student Charts 1.7 or 11.8)


14 minutes

Activity Overview: Revisiting Ecological Succession: Returning to the Experimental Bare Soil Site.


- **Inside**
 - Have students turn to Student Chart 1.7 or 11.8.
 - Remind students that you made observations of a patch of bare soil earlier this term. Have students look back at their notes from Lesson 1.
 - Tell students you will now go back to check if any ecological succession has taken place in that same location.
 - Have students bring a pencil and their binders or clip boards.
- **Outside**
 - Lead students outside.
 - Identify the patch of soil that you had observed as a class in Lesson 1.
 - Ask students to make their observations and answer #2 in Student Chart 1.7/11.8.
 - After several minutes, have several students share out.
 - Have students identify any changes.
 - Ask students whether the changes were due to primary or secondary ecological succession and why.
 - **Teacher note: If students cannot locate or do not have Student Chart 1.7, they can use 11.8 to record their second observation.**

Slide 1






Ecology Set




Introduction to Ecology

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Ecology Lesson 1: Teacher Preparation

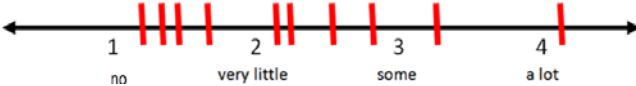
- Erase the ratings from the previous class on the objectives poster.
- Preview the schoolyard for optimal locations for students to do the habitat study.
 - Set up or find a small place where succession might be in evidence over the rest of the year (with a patch of cleared soil).
 - Collect the materials students need for the habitat investigation.



Science Objectives

Students, as you enter the classroom...

- Go to the poster.
- Read each objective.
- Use a marker to rate your knowledge of each objective on a scale of 1-4.
- Begin the review questions.




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3

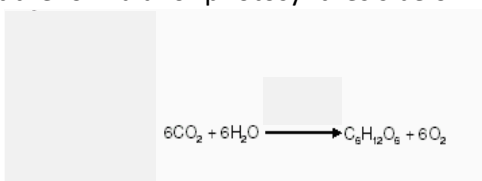
Pacing: 3 minutes.

[There is no Student Chart for this slide].

- Before students enter the room, display the science objectives.
- Make sure the ratings of the previous class have been erased.
- As they enter the classroom, have students rate their prior knowledge of each objective on a continuum of 1-4 (1=no to 4=a lot).
- Have students complete the review questions in Student Chart 1.1.

 **1.1: Genetics Review Questions**

1. Look at the formula for photosynthesis below.



$$6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$$

In addition to the parts of the equation above, which of the following is *most* necessary to complete the process of photosynthesis?

- a. soil
- ☒ b. radiant energy
- c. sugars
- d. cytoplasm

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Pacing: 1 minute.

[Students need to complete Student Chart 1.1 on their own or in pairs before questions are reviewed].

- Have one student read review question #1 from Student Chart 1.1 and answer it aloud.
- Display response.
- Have students correct student response as necessary.

**1.1: Genetics Review Questions (cont.)**

2. In photosynthesis, the energy from the sun is transformed into chemical energy. How is this chemical energy stored?

- a. chlorophyll
- ☒ b. oxygen
- c. glucose
- d. water

Pacing: 1 minute.

- Have one student read review question #2 from Student Chart 1.1 and answer it aloud.
- Display response.
- Have students correct student response as necessary.



1.1: Review Question (cont.)

Choose from the following words to complete the sentences:

determine, differs, glucose, photosynthesis, record, stimulus

3. A plant reacts to the stimulus of light by growing towards the light.
4. Chemical energy differs from radiant energy because radiant energy comes from light and chemical energy is stored in chemical bonds.
5. Only organisms with chloroplasts can generate their own energy in the process of photosynthesis.
6. Glucose is a simple sugar.
7. Botanists were able to determine the plant type by examining the dichotomous key.

- **Pacing: 2 minutes.**
- Follow the same routine as you did with questions #1-2.



1.2: Science and Language Objectives


- In science, we will learn:
 - to recognize, identify, locate, and observe examples of an ecosystem and habitats.
 - to recognize, identify, locate, and observe the biotic and abiotic factors of the ecosystem.
- To develop our language skills, we will learn:
 - to orally share information about the ecosystem with your peers.
 - to record information about ecosystems based on a reading.

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7

Pacing: 1 minute.

- Have students turn to Student Chart 1.2.
- Read the science objectives aloud, one at a time, reporting students' level of prior knowledge.
- Read the language objectives.



1.3: Vocabulary Objectives

- Science content vocabulary:
 - ecology
 - organism
 - habitat
 - ecosystem
 - biotic
 - abiotic
 - environment
- General academic vocabulary:
 - identify

8

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Pacing: 1 minute.

- Have students turn to Student Chart 1.3.
- Read vocabulary words aloud.
- If you like, have students use thumbs up/thumbs down to indicate prior knowledge.

ecology



ecología

- Look at the pictures. These scientists are studying ecology—organisms and their environment.
- Ecology is the study of the interactions that take place among organisms and their environment.
- Ecología es el estudio de las interacciones que se llevan a cabo entre los organismos y su medio ambiente.
- Partner talk: What organisms and environments are these ecologists studying?

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- Pacing: <2 minutes.**
- Have students turn to lesson 1 glossary words.
- Read the target word aloud.
- Have students rewrite the target word in English and in Spanish (as appropriate) in their glossaries.
- Read through the notes on the right side of this PowerPoint slide.
- Point to the appropriate part of the picture as you read through the notes.
- Depending on your class, you may want to read (or have a student read) the definition in Spanish.
- Ask one student pair to answer the question. [Anticipated response: Top picture: a tree in the forest; bottom picture: an orca whale in the arctic ocean].
- Teacher note:** To save time you may want to eliminate partner talk and just ask one student to answer the question.

organism



- Look at the picture. This organism is a deer.
- Organisms are living things.
- Organismos son los seres vivos.
- Partner talk: Which of these things are organisms and which are not?
 - A flower growing in the ground
 - Soil
 - A rock
 - A bee
 - A mushroom
 - A piece of driftwood

organismo

10

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- Pacing: <2 minutes.**
 - Follow the same routine.
 - Ask one student pair to answer the question.
- [Anticipated response: organisms include the flower, the bee, the mushroom].

environment






medio ambiente

- Look at the picture. Penguins live in a cold environment, whereas camels live in a hot environment.
- Environment means everything that surrounds a living thing and affects its growth and health.
- El medio ambiente es todo lo que rodea a un ser vivo y afecta su crecimiento y salud.
- Partner talk: What are some things in your environment that affect your growth and health?

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- **Pacing: <2 minutes.**
 - Follow the same routine.
 - Ask one student pair to answer the question.
- [Anticipated responses: sunlight; water quality; air quality; fresh fruit and vegetables; temperature; social interactions].

habitat

hábitat

•Look at the pictures. The pictures show the habitats of a bird and a fish.

•A habitat is a place where an organism lives and that provides the types of food, shelter, moisture, and temperature needed for survival.

•Hábitat es el lugar donde vive un organismo y le provee el tipo de alimento, refugio, humedad y temperatura que necesita para sobrevivir.

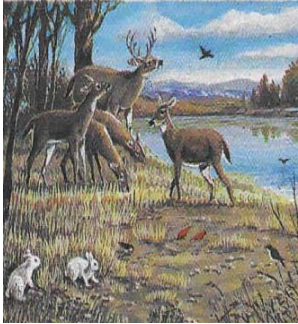
•Partner talk: Describe the habitat of the fish or bird in terms of food, shelter, moisture, and temperature.

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12

- Pacing: <2 minutes.
 - Follow the same routine.
 - Ask one student pair to answer the question.
- [Anticipated responses: bird: worms, tree, temperate climate with moderate rainfall; fish: algae, coral reef, warm aquatic habitat, tropical climate].

ecosystem



ecosistema



- Look at the picture. In this ecosystem we see deer, rabbits, birds, grasses, and trees.
- An ecosystem is all of the living and nonliving things in a particular area, and how they are related to each other and to their environment.
- Un ecosistema está formado por todos los animales y plantas que viven en un área específica, y que se relacionan entre sí y con su medio ambiente.
- Partner talk: Name some living and nonliving things in the ecosystem near our school.

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13

- Pacing: <2 minutes
 - Follow the same routine.
 - Ask one student pair to answer the question.
- [Anticipated responses: birds, squirrels, skunks, trees, ladybugs, etc.]

biotic

biótico

- Look at the pictures. The forest has many living or biotic organisms including trees, plants, birds, and insects. The biotic organisms that live in a field include deer, grasses, and insects.
- Biotic describes the living parts of the environment.
- Biótico se refiere a las partes vivas del medio ambiente.
- Partner talk: What are some biotic organisms found in a lake?

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14

- Pacing: <2 minutes.**
 - Follow the same routine.
 - Ask one student pair to answer the question.
- [Answers will vary: fish and underwater plants; ducks; beavers].

abiotic



abiótico

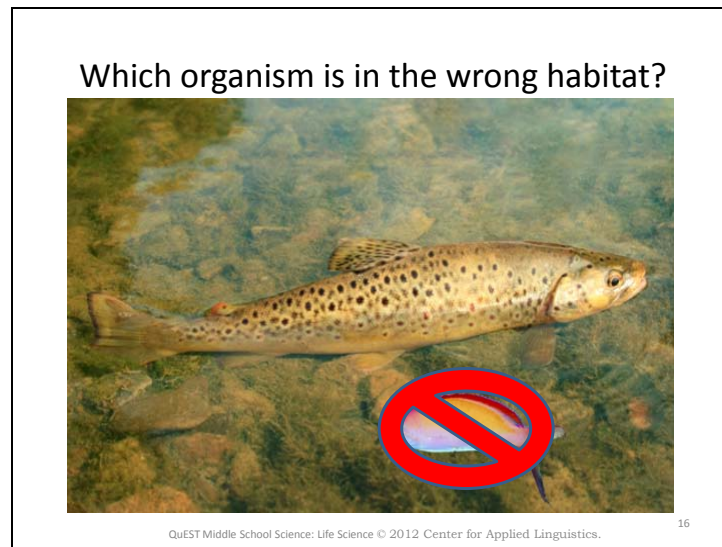
- Look at the pictures. The surface on Mars has nonliving or abiotic parts such as rocks and light; the sky has abiotic parts such as gases and light.
- Abiotic** describes the nonliving parts of the environment, including light, temperature, rocks, and gases.
- Abiótico** describe las partes del medio ambiente que no son vivas, incluyendo la luz, la temperatura, las rocas y los gases.
- Partner talk: Name an abiotic part of the environment found outside the classroom window.

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15

- Pacing: <2 minutes.**
- Follow the same routine.
- Ask one student pair to answer the question.
[Answers will vary].

Slide 16



Pacing: 1 minute.

[There is no Student Chart for this activity].

- Ask students to name the ecosystem or habitat [river bottom].
- Have students find the organism that does not belong [brightly colored fish].
- Ask students how they know that the organism does not belong [it does not blend in; it is a fish that lives near a coral reef].
- Display the response.

Slide 17



Pacing: 1 minute.

[There is no Student Chart for this activity].

- Ask students to name the ecosystem or habitat. [African grassland]
- Have students find the organism that does not belong. [deer]
- Ask students how they know that the organism does not belong. [deer live in forests where they can easily hide from or run away from predators]
- Display the response.

Slide 18

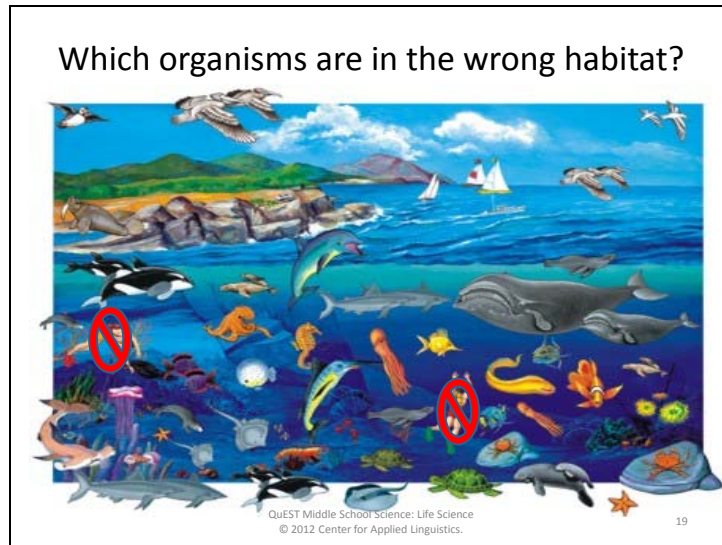


Pacing: 1 minute.

[There is no Student Chart for this activity].

- Ask students to name the ecosystem or habitat [desert].
- Have students find the organism that does not belong [snowshoe hare].
- Ask students how they know that the organism does not belong [the snowshoe hare is adapted for snow; it would easily become prey based on its color and the fur is too thick for the climate].
- Display the response.

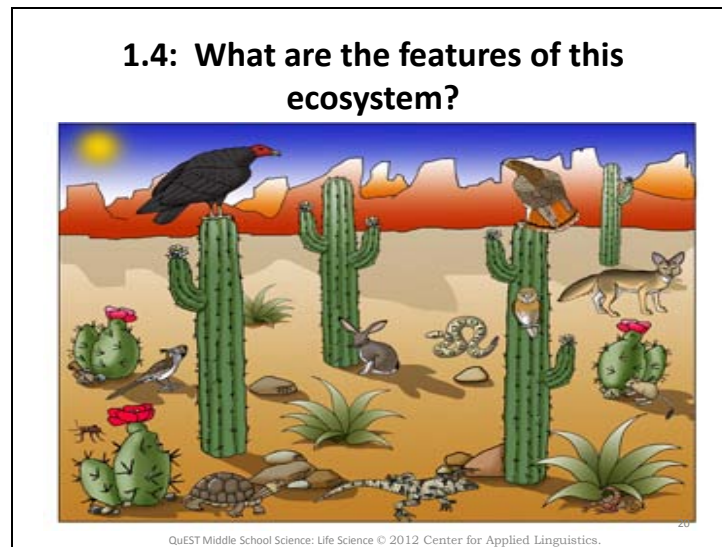
Slide 19



Pacing: 1 minute.


[There is no Student Chart for this activity].

- Ask students to name the ecosystem or habitat [ocean].
- Have students find the organism that does not belong [humans].
- Ask students how they know that the organism does not belong [humans cannot breathe under water; humans cannot swim for long periods of time].
- Display the response.



- **Pacing: 3 minutes.**
- Pair students.
- Have students turn to Student Chart 1.4.
- Ask students to identify the ecosystem and fill it in Student Chart 1.4. [Response: desert].
- Ask students to identify examples of actual locations where this ecosystem exists [Possible responses: the desert, the Southwest, Mexico].
- Ask students to identify the biotic and abiotic features of this ecosystem [Possible responses: biotic—cacti, bushes, lizards, turtle, coyote, snake; abiotic—air, sun, sand, rocks].
- **Teacher’s note: Do this example as a group and then have students work independently for the other ecosystems.**

Slide 21



Student Chart 1.4: What are the features of the ecosystems?
 Look at the image of each ecosystem. Work with a partner to decide the name of the ecosystem. Then fill in the chart below with information about each ecosystem.

Ecosystem	desert		
Examples of the habitat	Sahara Desert, US or Mexico		
biotic factors	cacti, snakes bushes, coyote, turtle		
abiotic factors	air, rocks sun, sand		

- What are some habitats we can find in our own schoolyard?

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- **Pacing: 1 minute.**
- Display the answers to students and have them continue to fill in Student Chart 1.4 as you show the next two ecosystems.

Slide 22


1.4: What are the features of this ecosystem?



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- **Pacing: 2 minutes.**
- Have students continue to work in pairs to fill in the information in the grasslands column in Student Chart 1.4.



Student Chart 1.4: What are the features of the ecosystems?
 Look at the image of each ecosystem. Work with a partner to decide the name of the ecosystem. Then fill in the chart below with information about each ecosystem.

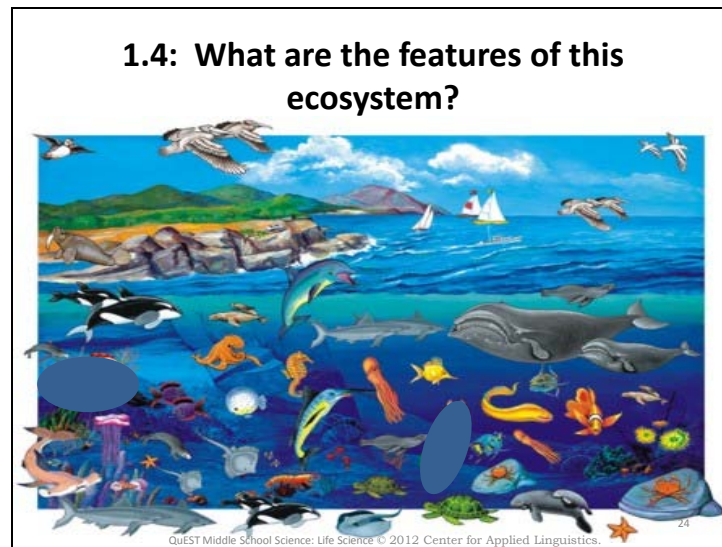
Ecosystem	desert	grassland	
Examples of the habitat	Sahara Desert Mexico	plains Kenya	
biotic factors	cacti, snakes bushes, coyote, turtle	zebra grass antelope	
abiotic factors	air, rocks sun, sand	air, rocks sun	

- What are some habitats we can find in our own schoolyard?


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- **Pacing: 1 minute.**
- Have student pairs share out their answers in the grasslands and ocean “columns.”
- Display the responses and discuss.
- Have students correct their responses as necessary.

Slide 24



- **Pacing: 2 minutes.**
- Have students continue to work in pairs to fill in the information in the ocean column in Student Chart 1.4.



Student Chart 1.4: What are the features of the ecosystems?
 Look at the image of each ecosystem. Work with a partner to decide the name of the ecosystem. Then fill in the chart below with information about each ecosystem.

Ecosystem	desert	grassland	ocean
Examples of the habitat	Sahara Desert Mexico	plains Kenya	Pacific or Indian Ocean
biotic factors	cacti, snakes bushes, coyote, turtle	zebra grass antelope	humans starfish whales dolphins
abiotic factors	air, rocks sun, sand	air, rocks sun	cliffs volcano rocks water

- What are some habitats we can find in our own schoolyard?

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- **Pacing: 1 minute.**
- Have student pairs share out their answers in the grasslands and ocean “columns.”
- Display the responses and discuss.
- Have students correct their responses as necessary.
- Have students think about the habitats in the schoolyard and share this information with their partner. [Possible responses: near the basketball hoops; open field; bog area; young forest area; climax forest].
- Call on several student pairs to share out.

1.5: Habitat Investigation—Background Information

1. We are going to be identifying and observing some habitat areas outside the school.
2. Each group will have roles—circle your role:
 - a. Mapmaker --Student Chart 1.8a
 - b. Bug Collector --Student Chart 1.8b
 - c. Vegetation Inspector --Student Chart 1.8c
 - d. Soil Sampler --Student Chart 1.8d
 - e. Abiotic Data Collector --Student Chart 1.8e
3. We will also observe an area with bare soil outside.

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- **Pacing: 2 minutes.**
- [Teacher prep: Identify several areas of the school yard appropriate for this investigation. In addition, find or prepare an area with bare soil; it should be a location away from foot traffic. This location will be observed again during the study of ecological succession].
- Tell students to turn to Student Chart 1.5.
- Read #1-3 aloud as students write the key terms in Student Chart 1.5. **This is a note-taking exercise.**
- Assign groups and roles for each group.
- Have students locate the Student Chart that goes with their role.

Habitat Investigation—Roles

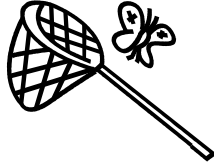
1. **Mapmaker:** To draw a map of your group's ecosystem.
 - Ask each of the other four group members to identify where they found the samples of bugs, abiotic material, vegetation, and soil. Label them. Is there any elevation in your area? Water sources?
2. **Bug Collector:** To collect and catalogue insects and any other critters found within the habitat.
3. **Abiotic Data Collector:** To collect abiotic data.
4. **Vegetation Inspector:** To collect and catalogue each of the different plants at the site.
 - Being able to name and identify the plants is not as important as being able to tell that plants are different types. Also describing the vegetation structure and height.
5. **Soil Sampler:** To examine the soil in the site.

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- **Pacing: 3 minutes.**
- [There is no Student Chart for this activity].
- Choose someone who will be a bug collector and have them read their role description aloud.
- Do the same for the other roles.
- **Teacher's note: Some roles may have more than one group member, and some group members may need to fill more than one role. Also, discuss with students the importance being careful with the organisms they are studying!**

1.6: Habitat Investigation—Materials

- ☐ Petri dish
- ☐ Insect net
- ☐ Tape measure
- ☐ Collection container
- ☐ Magnifying glass
- ☐ Sheet
- ☐ Thermometer
- ☐ Student Charts and something to write on (e.g., clipboard)
- ☐ Pencil

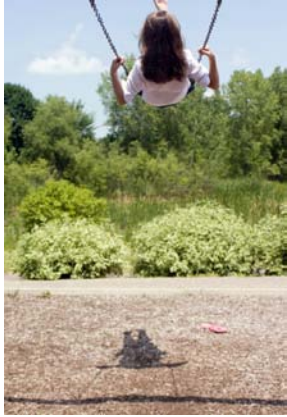


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- **Pacing: 3 minutes.**
- Have students turn to Student Chart 1.6.
- Review list of lab materials and distribute them to students.
- Have students check off materials.
- **Teacher's note: You may want to have clipboards or binders for each student to write on.**

Preview of Habitat Investigation

- We will go outside:
 1. First we will all observe an area with bare soil.
 2. Next each group will choose a habitat and the group members will record their observations in Student Chart 1.8.
 - Remember: Each student has their own role and their own Student Chart.



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Pacing: 5 minutes to preview + 5 minutes on the bare soil investigation + 10 minutes independent group work.


[There is no Student Chart for this slide].

- Read the preview for the investigation.
- Review Students Charts 1.8a-1.8e so students know what information to record. The information will vary according to role.
- Have students gather the materials they need to conduct the investigation and take them outside.

Outside

- Do a group observation of the pre-identified bare soil area.
- Have all students record their observations in #1, Student Chart 1.7.
- Have each group choose a habitat and record their observations in Student Charts 1.8a-1.8e.
- After 10-15 minutes of independent group work, return to the classroom.
- **Teacher's note: The bare soil observation #2 is intended to be revisited later in the unit during the study of ecological succession (lesson 11).**

Slide 30



Student Chart 1.7/11.A: Habitat Investigation—Bare Soil Observations

In the space below write or sketch your observation of the bare soil. Then answer the question.

1. Observation #1 of the bare soil:

- What are some reasons the soil is bare? _____

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
30

Pacing: 2 minutes.

Inside:

- Have students turn to Student Chart 1.7.
- Have students share their findings.
- Whole group discussion.
- [Teacher’s note: the class will refer back to this Student Chart in Lesson 11 when learning about Ecological Succession. This is why it is labeled as 1.7/11.A].

Slide 31



Student Chart 1.8a: Habitat Investigation – Mapmaker

Follow the procedure below.

Mapmakers:

It is the role of the mapmaker or topologist to sketch the group's ecosystem. Is there any elevation in this area? Water sources? Plants? Ask each group member to show you the location of where they found their samples. Label them on the map.

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- **Pacing: 2 minutes.**
- Have students turn to Student Chart 1.8a.
- Have mapmakers from each group share their findings.
- Whole group discussion.

Slide 32

Student Chart 1.8b: Habitat Investigation—Bug Collector

Follow the procedures below and record your observations.

Bug Collector:

It is the role of the bug collector to catalog what different species are found in the microhabitat, using the following procedure:

1. Capture flying insects on branches or the ground, use the collection jar to put over the insect while you identify it.
2. Sweep through the vegetation with a butterfly net to catch butterflies or other winged insects.
3. Spread a sheet at the base of a bush. Shake the bush to cause the insects to fall to the ground.
4. When the bugs are collected, count the **total** number of insects: _____.
5. Count the number of **different species** of insects: _____.
4. Write the names of any species that you are able to identify or describe them using these key terms: *wings, wingless, number of legs, antennae*


6. See the group mapmaker. Record approximate location of the insects you collected on the ecosystem map.

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- **Pacing: 2 minutes.**
- Have students turn to Student Chart 1.8b.
- Have bug collectors from each group share their findings.
- Whole group discussion.

Slide 33



Student Chart 1.8c: Habitat Investigation—Vegetation Inspector

Follow the procedure below and record your observations.

Vegetation Inspectors:

It is the role of the vegetation inspector to record characteristics of the vegetation present at the site.

1. First, use the measuring tape to record the height of the tallest vegetation present. Be sure to record the units you are using.
 - Tallest vegetation: _____
 - Height: _____
2. Record the number of layers of vegetation present. For example, if there is a shrub growing over grasses, there are two different layers.
 - Layers of vegetation: _____
3. Next determine how many different species of plants are present. It is not important to identify each different species, but count how many different species there are.
 - Number of different species: _____
4. See the group mapmaker. Record approximate location of the vegetation you identified on the ecosystem map.

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- **Pacing: 2 minutes.**
- Have students turn to Student Chart 1.8c.
- Have vegetation inspectors from each group share their findings.
- Whole group discussion.

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Student Chart 1.8d: Habitat Investigation—Soil Sampler

Follow the procedure below and record your observations.

Soil Samplers:

It is the job of the soil sampler to record the characteristics of the soil.

1. Record the temperature of the soil: _____
2. Circle one of these adjectives to describe the moisture of the soil:

a little moist
very wet
a little dry
very dry
3. Determine how deep the soil is before the layer of rock. To do this, dig a very small hole into the soil until you reach a rocky layer. Write how deep the soil is: _____ [record the units]
4. Using the measuring tape, measure the distance to the nearest road or parking lot: _____ [record the units]
5. Take a very small amount of soil back to the classroom and observe under microscope.
6. See the group mapmaker. Record approximate location of the soil you collected on the ecosystem map.

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- **Pacing: 2 minutes.**
- Have students turn to Student Chart 1.8d.
- Have soil samplers from each group share their findings.
- Whole group discussion.

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Student Chart 1.8e: Habitat Investigation—Abiotic Data Collector

Follow the procedures below and record your observations.

Abiotic Data Collector:

It is the role of the **abiotic** data collector to measure and record the air temperature, relative humidity, and light characteristics within the microhabitat.

1. Write the **abiotic** factors that you observe in the group ecosystem.
2. Use the thermometer to record the temperature of the air at waist height:
3. Record the light conditions at your site by circling one of the following:

full sun
shady
partly shaded
4. See the group mapmaker. Tell him or her where to sketch the location of any **abiotic** factors you found.

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- **Pacing: 2 minutes.**
- Have students turn to Student Chart 1.8e.
- Have abiotic data collectors from each group share their findings.
- Whole group discussion.

1.9: Habitat Investigation: Extension

1. What elements of your area help support organisms living there?
(Amount of water and light, type of soil, etc.)
2. What would happen if one of those elements were missing or suddenly disappeared?
3. What might be done to your area to make it better for plants?
Animals?
4. What creature(s) and plants were common in all the microhabitats?
5. What would happen if someone put an herbicide or pesticide on your ecosystem?
6. What would happen if garbage were dumped into your ecosystem?
7. What would happen if water were removed from your ecosystem?

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Optional

- You may choose to have students answer these questions in their groups, independently, orally, or in Student Chart 1.9.
- **Teacher's note:** You may consider dividing up the questions by student pairs or by groups.

General Academic Vocabulary

- This lesson's general academic vocabulary:
 - identify

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• **Pacing: <1 minute.**

[There is no Student Chart for this slide].

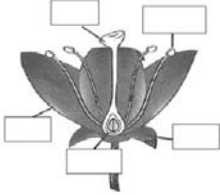
- Read the general academic vocabulary word to students.
- If you like, have student use thumbs up/thumbs down to indicate prior knowledge.

identify



identificar

- Look at the picture. The boy can identify the type of fish that his father caught.
- To identify is to point out, find, or name something.
- Identificar se refiere a reconocer, encontrar o poner un nombre a algo.
- Partner talk: Identify the parts of a plant.



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- **Pacing: 2 minutes.**
- Have students turn to lesson 1 glossary words.
- Read the target word aloud.
- Have students rewrite the target word in English and in Spanish (as appropriate) in their glossaries.
- Read through the notes on the right side of this PowerPoint slide.
- Point to the appropriate part of the picture as you read through the notes.
- Depending on your class, you may want to read (or have a student read) the definition in Spanish.
- Ask one student pair to answer the question. [Anticipated response: pistil, petal, ovary, stamen, sepal].
- **Teacher note:** To save time you may want to eliminate partner talk and just ask one student to answer the question.




1.10: Interactive Reading— Preview

- Turn to Student Chart 1.10.
- Open your Glencoe textbook to pages 598–599
- Listen to the guiding question:
 - What are the features of an ecosystem?
- As the text is read aloud, read along silently in your Student Chart and be prepared to answer the questions.

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- **Pacing: <1 minute.**
- Have students turn to Student Chart 1.10.
- Read the guiding question aloud.



1.11: Interactive Reading—Text

THE BIOSPHERE

What makes Earth different from other planets in the solar system? One difference is Earth's abundance of living organisms. The part of Earth that supports life is the biosphere. The biosphere includes the top portion of Earth's crust, all the waters that cover Earth's surface, and the atmosphere that surrounds Earth.

What makes Earth different from other planets?

What is a biosphere?

As Figure 1 shows, the biosphere is made up of different environments that are home to different kinds of organisms. For example, desert environments receive little rain. Cactus plants, coyotes, and lizards are included in the life of the desert. Tropical rain forest environments receive plenty of rain and warm weather. Parrots, monkeys, and tens of thousands of other organisms live in the rain forest. Arctic regions near the north pole are covered with ice and snow. Polar bears live on the arctic ice. Seals and walrus hunt for fish in the Arctic Ocean.

What kinds of organisms are adapted to live in the dry desert?

What is the climate of the tropical rain forest?

What kinds of organisms are adapted to live in the cold Arctic regions?

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- **Pacing: 10 minutes for entire Interactive Reading.**
- Have students turn to Student Chart 1.11.
- Read text aloud to students as they follow in their Student Chart.
- Stop and clarify text if necessary.
- Ask students embedded questions. Elaborate on their responses as necessary.
- When you get to a figure, stop reading and have students look at the figure as you discuss it.

Embedded Questions:

- **What makes Earth different from other planets?** [Earth has an abundance of living organisms]
- **What is a biosphere?** [The part of Earth that supports life, including the top portion of the Earth's crust, the waters, and the atmosphere that surrounds Earth].
- **What kinds of organisms are adapted to live in the dry desert?** [cacti, coyotes, lizards]

- **What is the climate of the tropical rain forest?** [a lot of rain and warm weather]
- **What kinds of organisms are adapted to live in the cold Arctic regions?** [polar bears, seals, and walruses]

1.11

Ecosystems

On a visit to Yellowstone National Park in Wyoming, you might see a prairie scene like the one shown in Figure 2. Bison graze on prairie grass. Cowbirds follow the bison, catching grasshoppers that jump away from the bison's hooves. An ecosystem consists of all the organisms living in an area and the nonliving features of their environment.

What is an ecosystem?

Bison, grass, birds, and insects are living [or biotic] organisms of this prairie ecosystem. Water, temperature, sunlight, soil, and air are nonliving [or abiotic] features of this ecosystem. Ecology is the study of interactions that occur among organisms and their environment. Ecologists are scientists who study these interactions.

What are the biotic parts of the ecosystem in Figure 2?

What are the abiotic parts of the ecosystem in Figure 2?

What is ecology?

Habitats

Each organism in an ecosystem needs a place to live. The place in which an organism lives is called its *habitat*. The animals shown in Figure 4 live in a forest ecosystem. Trees are the woodpecker's habitat. These birds use their strong beaks to pry insects from tree bark or break open acorns and nuts. Woodpeckers usually nest in holes in dead trees.

What is a habitat?

Why are trees a good habitat for woodpeckers?

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- Follow the same routine.

Embedded Questions:

- **What is an ecosystem?** [all the organisms living in an area and the nonliving features of their environment].
- **What parts of an ecosystem do you see in Figure 2?** [bison, cowbirds, grasshoppers, prairie grass]
- **What are the biotic parts of this ecosystem?** [bison, grass, birds, insects]
- **What are the abiotic parts of this ecosystem?** [water, temperature, sunlight, air]
- **What is ecology?** [the study of interactions that occur among organisms and their environment]
- **What is a habitat?** [the place in which an organism lives]
- **Why are trees a good habitat for woodpeckers?** [woodpeckers get their food from insects in tree bark and can build nests in holes in dead trees]

1.11

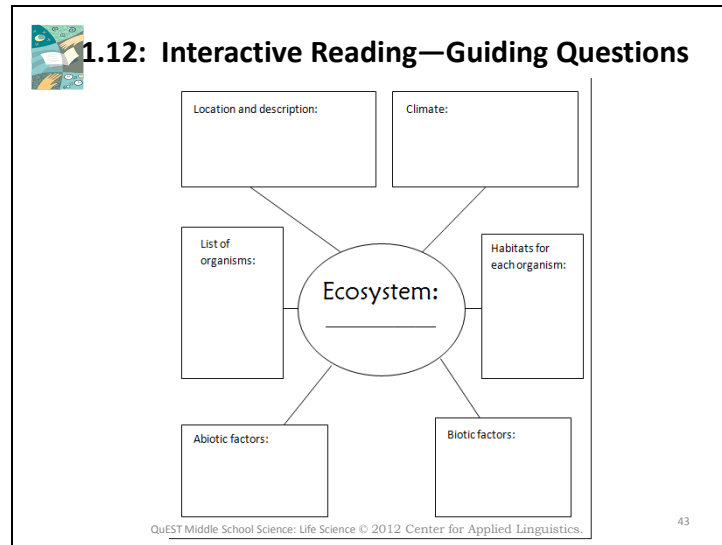
The salamander's habitat is the forest floor, beneath fallen leaves and twigs. Salamanders avoid sunlight and seek damp, dark places. This animal eats small worms, insects, and slugs. An organism's habitat provides the kinds of food and shelter, the temperature, and the amount of moisture the organism needs to survive.

Why is the forest floor a good habitat for salamanders?


What does an organism's habitat provide for it?

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- Follow the same routine.
- Embedded questions:
 - **Why is the forest floor a good habitat for salamanders?** [salamanders avoid sunlight; they find their food on the forest floor; they like the dark, moist environment]
 - **What does an organism's habitat provide for it?** [the kind of food, temperature, moisture, and shelter it needs to survive].



- Have students turn to Student Chart 1.12.
- Read the directions.
- Have students complete the graphic organizer.
- Display several students' charts under the ELMO.




1.13: Closing Activity— Glossary Work

- **Complete glossary entries for the following science content words:**
 - ecology
 - organism
 - habitat
 - ecosystem
 - biotic
 - abiotic
 - environment
 - identify

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- **Pacing: 5 minutes.**
- Have students locate Student Chart 1.13.
- For each science content word, have students work in pairs to indicate whether the word is a cognate and to fill in the rest of the information required by the glossary.
- Review glossary entries with class.




1.14: Closing Activity— Key Information

Use these words or phrases to complete the sentences below in Student Chart 1.14: *abiotic, biotic, ecologists, environment, identify, require*

- The environment is everything that surrounds a living thing and affects its growth and health.
- Ecologists may use dichotomous keys to identify the organisms in an ecosystem.
- Abiotic parts of an ecosystem may include the sun, air, rocks or soil.
- Biotic parts of an ecosystem will include those that get their energy through photosynthesis.
- Organisms in an ecosystem require different sources of energy.

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- **Pacing: 2 minutes.**
- Have students turn to Student Chart 1.14.
- Give students several minutes to complete the questions.
- Display responses and discuss.
- Have students correct responses as necessary.




**1.15: Closing Activity—
Question for Further Study**

- One question I still have or something I want to learn more about is:

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- **Pacing: 1 minute.**
- Have students turn to Student Chart 1.15.
- Have students complete Student Chart 1.15.
- As time permits, have students share their questions with a partner, with the whole class, or have them write them on a sticky note and put them on a “questions wall” on their way out of class. Students who finish an assessment early or who have free time might be assigned to go online to find answers to class questions.



Extension Activities

- www.brainpop.com
 - Video: “Ecosystems”
- Concept Map on Ecosystems

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Optional

- Consider teaching the terms community, population, and limiting factor
- Access the Sharepoint for a worksheet “concept map” or make up your own.

Continuation Activity Revisiting Ecological Succession

Returning to the Experimental Bare
Soil Site

Student Chart 11.8: Habitat Investigation—Bare Soil Observations
In the space below write or sketch your observation of the bare soil. Then answer the question.

1. Observation #1 of the Bare Soil:

• What are some reasons the soil is bare? _____

2. Observation #2 of the Bare Soil (during lesson 11):

• Does the soil look the same? Why or why not? _____

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•**Pacing: 14 minutes.**

•**Inside**

- Have students turn to Student Chart 1.7 or 11.8.
- Remind students that you made observations of a patch of bare soil earlier this term. Have students look back at their notes from lesson 1.
- Tell students you will now go outside to check if any ecological succession has taken place in that same location.
- Have students bring a pencil and their binders or clip boards.

•**Outside**

- Lead students outside.
- Identify the patch of soil that you had observed as a class in lesson 1.
- Ask students to make their observations and answer #2 in Student Chart 1.7/11.8.
- After several minutes, have several students share out.
- Have students identify any changes.
- Ask students whether the changes were due to primary or secondary ecological succession and why.
- **Teacher's note: If students cannot locate or do not have Student Chart 1.7, they can use 11.8 to record their second observation.**



Project QuEST
Model Life Science Lesson
Student Guide: Introduction to Ecology

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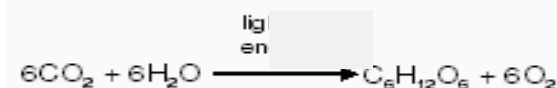
Ecology Set: Introduction to Ecology



Student Chart 1.1: Plants Lesson Review

Complete the following questions.

1. Look at the formula for photosynthesis below.



In addition to the parts of the equation above, which of the following is *most* necessary to complete the process of photosynthesis?

- A. Soil
 - B. Radiant energy
 - C. Sugars
 - D. Cytoplasm
2. In photosynthesis, the energy from the sun is transformed into chemical energy. How is this chemical energy stored?
- A. Chlorophyll
 - B. Oxygen
 - C. Glucose
 - D. Water

Choose from the following words to complete the sentences:

determine, differs, glucose, photosynthesis, record, stimulus

3. A plant reacts to the _____ of light by growing towards the light.
4. Chemical energy _____ from radiant energy because radiant energy comes from light and chemical energy is stored in chemical bonds.
5. Only organisms with chloroplasts can generate their own energy in the process of _____.
6. _____ is a simple sugar.
7. Botanists were able to _____ the plant type by examining the dichotomous key.

**Student Chart 1.2: Science and Language Objectives**

Listen and follow along as your teacher reads this lesson's objectives.

In Science we will learn:

- to recognize, identify, locate, and observe examples of an ecosystem and habitats.
- to recognize, identify, locate, and observe the biotic and abiotic factors of the ecosystem.

To develop our language skills, we will learn:

- to orally share information about the ecosystem with our peers.
- to record information about ecosystems based on a reading.

**Student Chart 1.3: Vocabulary Objectives**

Listen and follow along as your teacher reads this lesson's vocabulary.

Science content vocabulary:

- ecology
- organism
- habitat
- ecosystem
- biotic
- abiotic
- environment

General academic vocabulary:

- identify



Student Chart 1.4: What Are the Features of the Ecosystems?

Look at the image of each ecosystem. Work with a partner to decide the name of the ecosystem. Then fill in the chart below with information about each ecosystem.

Ecosystem			
Examples of the habitat			
Biotic factors			
Abiotic factors			

- What are some habitats we can find in our own schoolyard?



Student Chart 1.5: Habitat Investigation—Background Information

Write the key terms to complete the information about the investigation: *abiotic, bug, habitat, identifying, observe, soil, vegetation, mapmaker*.

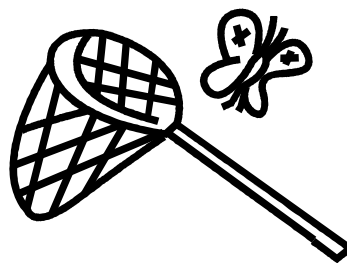
1. We are going to be _____ and observing some _____ areas outside the school.
2. Each group will have five roles—circle your role:
 - a. _____
 - b. _____ Collector
 - c. _____ Inspector
 - d. _____ Sampler
 - e. _____ Data Collector
3. We will also _____ an area with bare soil outside.



Student Chart 1.6: Habitat Investigation—Materials

Put a check mark for each material as you get it.

- ☐ Petri dish
- ☐ Insect net
- ☐ Tape measure
- ☐ Collection container
- ☐ Magnifying glass
- ☐ Sheet
- ☐ Thermometer
- ☐ Student Charts and something to write on.
- ☐ Pencil



**Student Chart 1.7/11.A: Habitat Investigation—Bare Soil****Observations**

In the space below write or sketch your observation of the bare soil. Then answer the question.

1. Observation #1 of the bare soil:

- What are some reasons the soil is bare? _____

2. Observation #2 of the bare soil (during Lesson 11):

- Does the soil look the same? Why or why not? _____



Student Chart 1.8a: Habitat Investigation—Mapmaker

Follow the procedure below.

Mapmaker:

It is the role of the mapmaker or topologist to sketch the group's ecosystem. Is there any elevation in this area? Water sources? Plants? Ask each group member to show you the location of where they found their samples. Label them on the map.





Student Chart 1.8b: Habitat Investigation—Bug Collector

Follow the procedures below and record your observations.

Bug Collector:

It is the role of the bug collector to catalog what different species are found in the microhabitat, using the following procedure:

1. Capture flying insects on branches or the ground, use the collection jar to put over the insect while you identify it.
2. Sweep through the vegetation with a butterfly net to catch butterflies or other winged insects.
3. Spread a sheet at the base of a bush. Shake the bush to cause the insects to fall to the ground.

4. When the bugs are collected, count the **total** number of insects:

_____.

5. Count the number of **different species** of insects: _____

4. Write the names of any species that you are able to identify or describe them using these key terms: *wings, wingless, number of legs, antennae*

6. See the group mapmaker. Record approximate location of the insects you collected on the ecosystem map.

**Student Chart 1.8c: Habitat Investigation—Vegetation Inspector**

Follow the procedure below and record your observations.

Vegetation Inspector:

It is the role of the vegetation inspector to record characteristics of the vegetation present at the site.

1. First, use the measuring tape to record the height of the tallest vegetation present. Be sure to record the units you are using.
 - Tallest vegetation: _____
 - Height: _____
2. Record the number of layers of vegetation present. For example, if there is a shrub growing over grasses, there are two different layers.
 - Layers of vegetation: _____
3. Next determine how many different species of plants are present. It is not important to identify each different species, but count how many different species there are.
 - Number of different species: _____
4. See the group mapmaker. Record approximate location of the vegetation you identified on the ecosystem map.

**Student Chart 1.8d: Habitat Investigation—Soil Sampler**

Follow the procedure below and record your observations.

Soil Sampler:

It is the job of the soil sampler to record the characteristics of the soil.

1. Record the temperature of the soil: _____
2. Circle one of these adjectives to describe the moisture of the soil:
a little moist very wet a little dry very dry
3. Determine how deep the soil is before the layer of rock. To do this, dig a very small hole into the soil until you reach a rocky layer. Write how deep the soil is: _____ [record the units]
4. Using the measuring tape, measure the distance to the nearest road or parking lot: _____ [record the units]
5. Take a very small amount of soil back to the classroom and observe under microscope.
6. See the group mapmaker. Record approximate location of the soil you collected on the ecosystem map.

**Student Chart 1.8e: Habitat Investigation—Abiotic Data Collector**

Follow the procedures below and record your observations.

Abiotic Data Collector:

It is the role of the abiotic data collector to measure and record the air temperature, relative humidity, and light characteristics within the microhabitat.

1. Write the abiotic factors that you observe in the group ecosystem.

2. Use the thermometer to record the temperature of the air at waist height: _____

3. Record the light conditions at your site by circling one of the following:

full sun

shady

partly shaded

4. See the group mapmaker. Tell him or her where to sketch the location of any abiotic factors you found.

**Student Chart 1.9: Habitat Investigation—Extension**

Discuss with a partner. Then answer the question in your own words.

1. What elements of your area help support organisms living there?
(Amount of water and light, type of soil, etc.)
2. What would happen if one of those elements were missing or suddenly disappeared?
3. What might be done to your area to make it better for plants? Animals?
4. What creature(s) and plants were common in all the microhabitats?
5. What would happen if someone put an herbicide or pesticide on your ecosystem?
6. What would happen if garbage were dumped into your ecosystem?
7. What would happen if water were removed from your ecosystem?



Student Chart 1.10: Interactive Reading—Preview

Read the guiding question.

- What are the features of an ecosystem?

**Student Chart 1.11: Interactive Reading Text**
(Glencoe, pages 588–589)

Listen and follow along as the text is read aloud. Be prepared to answer the questions.

THE BIOSPHERE

What makes Earth different from other planets in the solar system? One difference is Earth's abundance of living organisms. The part of Earth that supports life is the biosphere. The biosphere includes the top portion of Earth's crust, all the waters that cover Earth's surface, and the atmosphere that surrounds Earth.

What makes Earth different from other planets?

What is a biosphere?

As Figure 1 shows, the biosphere is made up of different environments that are home to different kinds of organisms. For example, desert environments receive little rain. Cactus plants, coyotes, and lizards are included in the life of the desert. Tropical rain forest environments receive plenty of rain and warm weather. Parrots, monkeys, and tens of thousands of other organisms live in the rain forest. Arctic regions near the north pole are covered with ice and snow. Polar bears live on the arctic ice. Seals and walruses hunt for fish in the Arctic Ocean.

What kinds of organisms are adapted to live in the dry desert?

What is the climate of the tropical rain forest?

What kinds of organisms are adapted to live in the cold Arctic regions?

Ecosystems

On a visit to Yellowstone National Park in Wyoming, you might see a prairie scene like the one shown in Figure 2. Bison graze on prairie grass. Cowbirds follow the bison, catching grasshoppers that jump away from the bison's hooves. An ecosystem consists of all the organisms living in an area and the nonliving features of their environment.

What is an ecosystem?

Bison, grass, birds, and insects are living [or biotic] organisms of this prairie ecosystem. Water, temperature, sunlight, soil, and air are nonliving [or abiotic] features of this ecosystem. Ecology is the study of interactions that occur among organisms and their environment. Ecologists are scientists who study these interactions.

What are the biotic parts of the ecosystem in Figure 2?

What are the abiotic parts of the ecosystem in Figure 2?

What is ecology?

Habitats

Each organism in an ecosystem needs a place to live. The place in which an organism lives is called its *habitat*. The animals shown in Figure 4 live in a forest ecosystem. Trees are the woodpecker's habitat. These birds use their strong beaks to pry insects from tree bark or break open acorns and nuts. Woodpeckers usually nest in holes in dead trees.

What is a habitat?

Why are trees a good habitat for woodpeckers?

The salamander's habitat is the forest floor, beneath fallen leaves and twigs. Salamanders avoid sunlight and seek damp, dark places. This animal eats small worms, insects, and slugs. An organism's habitat provides the kinds of food and shelter, the temperature, and the amount of moisture the organism needs to survive.

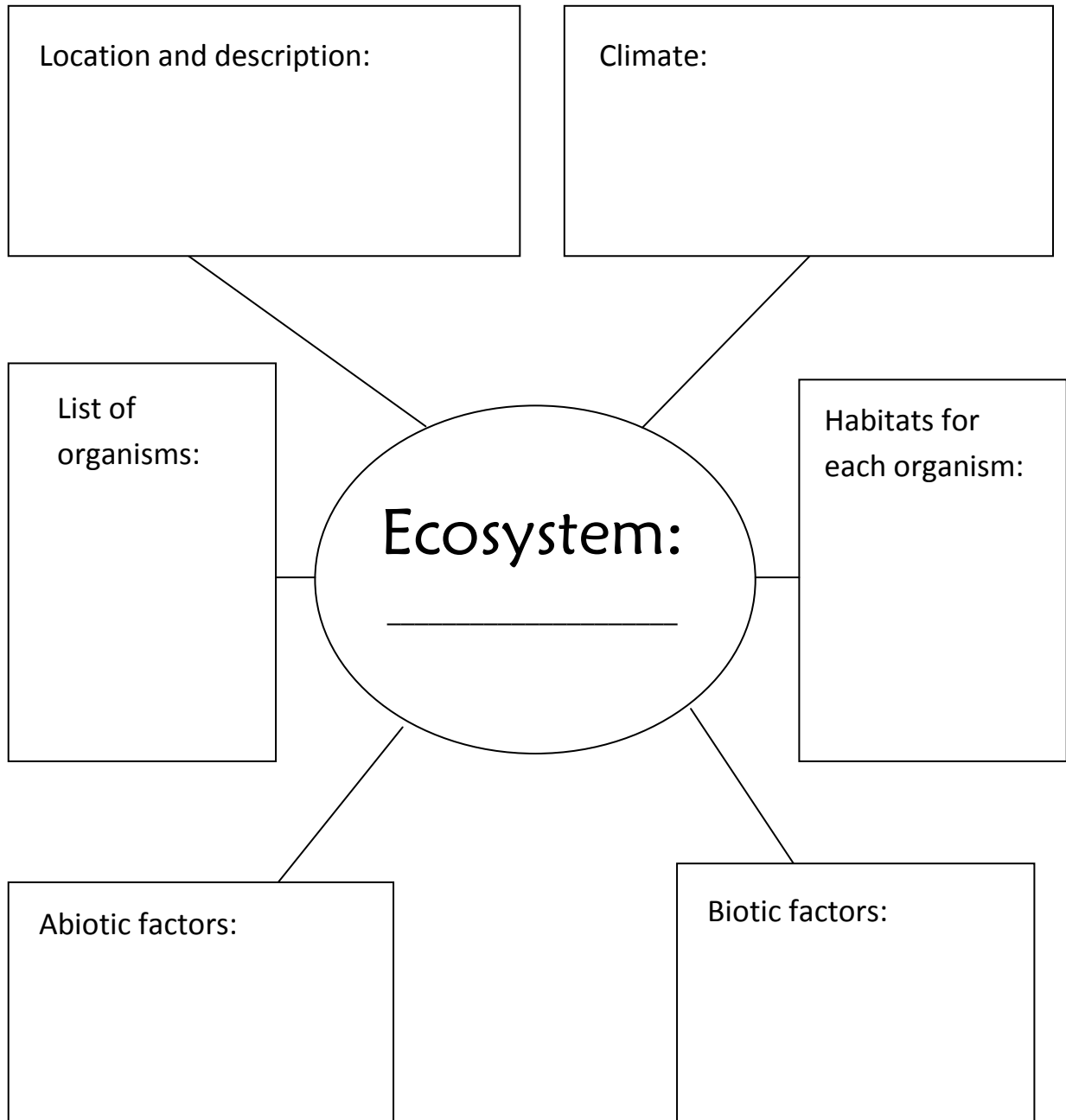
Why is the forest floor a good habitat for salamanders?

What does an organism's habitat provide for it?



Student Chart 1.12: Interactive Reading Question

Think of an ecosystem that you have visited or that is near your home or school. Then fill in the information about that ecosystem.



**Student Chart 1.13: Glossary**

Complete glossary entries for these science content words:

- ecology
- organism
- habitat
- ecosystem
- biotic
- abiotic
- environment
- identify

**Student Chart 1.14: Key Information**

Use these words or phrases to complete the sentences below:
abiotic, biotic, ecologists, environment, identify, require.

- The _____ is everything that surrounds a living thing and affects its growth and health.
- _____ may use dichotomous keys to _____ the organisms in an ecosystem.
- _____ parts of an ecosystem may include the sun, air, rocks, or soil.
- _____ parts of an ecosystem will include those that get their energy through photosynthesis.
- Organisms in an ecosystem _____ different sources of energy.

**Student Chart 1.15: Question for Further Study**

Write a sentence about what you still want to learn.

One question I still have or something I want to learn more about is:



CREATE Model Life Science Lesson:
Ecology Set: Introduction to Ecology
Student Guide



Project QuEST
Model Life Science Lesson
Teacher Guide: Food Chains & Food Webs

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QuEST Middle School Science: Life Science
Ecology Set: Food Chains and Food Webs

Framework for K-12 Science Education: Dimension 3—Life Science

- **Disciplinary Core Idea (LS2.B)—Cycles of Matter and Energy Transfer in Ecosystems:** Food webs are models that demonstrate how matter and energy are transferred between producers, consumers, and decomposers as the three groups interact—primarily for food—within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. For example, when molecules from food react with oxygen captured from the environment, the carbon dioxide and water this produces are transferred back to the environment, and ultimately so are waste products, such as fecal material. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem.
- **Science and Engineering Practices:** Developing and Using Models
- **Crosscutting Concepts:** Energy and Matter

Connections to the Common Core State Standards (ELA)

- **WHST.2:** Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.
- **L6:** Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Connection to the Common Core State Standards (Math)

- **5.OA:** Analyze patterns and relationships.

Connections to English Language Development Standards¹

- **ELD Standard 4:** Language of Science; Performance indicators:
 - **Reading:** Identify the sources of energy for different types of organisms by reading a passage on consumers, food chains, and food webs.
 - **Writing:** Make a hypothesis about extinction by writing a paragraph based on a sample food chain.

¹ Because the WIDA English language development standards are currently used in 29 states, we reference these standards.

- **Listening:** Categorize organisms as producers, consumers, or decomposers based on a video.
- **Speaking:** With a partner, analyze the foods you like to eat and then fill in a graphic organizer.

Overview of Activities

Focus Activity

- **Student Activity I: Rating and Discussion of Science, Language, and Vocabulary Objectives.** Teacher posts lesson objective poster; students rate their prior knowledge of each objective; brief discussion.

Engagement

- **Student Activity II: Lesson 1 Review.** Students answer review questions from previous lesson; teacher displays the answers; students correct responses as necessary.
- **Student Activity III: Preteaching of Science Content Words.** Teacher displays PowerPoint slides of science content words one at a time; teacher reads script aloud and elicits responses to teach the following: *food chain, food web, energy pyramid, producer, consumer, decomposer, autotroph, heterotroph, herbivore, omnivore, carnivore, predator-prey relationship*.
- **Student Activity IV: Food Chains Video.** Teacher reviews directions in Student Chart 2.4; teacher plays video; students complete Student Chart 2.4; students share out their answers; teacher displays responses; whole group discussion.
- **Student Activity V: Energy Pyramid.** Teacher explains an energy pyramid; students label the types of organisms in Student Chart 2.5; teacher displays responses; whole group discussion.
- **Student Activity VI: Personal Food Chain.** Teacher explains directions in Student Chart 2.6; students complete Student Chart 2.6; whole group discussion.

Explanation and Exploration

- **Student Activity VII: Ecosystem Jeopardy.** Teacher reviews directions, assigns groups, and distributes whiteboards; whole group plays Jeopardy.
- **Student Activity VIII: Creating a Food Chain and Energy Pyramid.** Teacher explains directions to students and guides them through creating a food chain and energy pyramid; students access Inspiration software and create their own food chains and energy pyramids; students may print them for display.

Elaboration

- **Student Activity IX: General Academic Word Cards.** Teacher displays PowerPoint slides of general academic words one at a time; teacher reads script aloud and elicits responses to teach: *source*.
- **Student Activity X: Interactive Reading.** Teacher discusses text illustrations; one student reads guiding questions; teacher and students participate in shared interactive reading; teacher and students discuss guiding questions; students respond to guiding questions by creating and presenting posters.

Evaluation

- **Student Activity XI: Glossary and Key Facts.** Students complete glossary for science content words, answer questions related to key content, and indicate if there is anything else they would like to learn about; whole class review.

Extension/Differentiation

- **Student Activity XII: What am I?**
- **Student Activity XIII: Food Chain Game.**
- **Student Activity XIV: Point of View Game.**



QuEST Middle School Life Science

Food Chains and Food Webs

Objectives

- Science:
 - Students will be able to diagram the flow of energy through an ecosystem using the concepts of food chains, food webs, and energy pyramids.
- Language:
 - Students will be able to listen for key vocabulary definitions while playing Jeopardy.
 - Students will be able to summarize a text by taking notes in a graphic organizer.

Vocabulary

- Science content: *food chain, food web, energy pyramid, producer, consumer, decomposer, autotroph, heterotroph, herbivore, omnivore, carnivore, predator-prey relationship*
- General academic: *source*

Teacher Management

Estimated time for completion, in minutes: 90

Materials

- For each student: access to a computer with Inspiration software
- For each group: whiteboards
- document camera
- Optional (if no computer access): colored pencils/markers and plain white paper

Teacher Prep

1. Review detailed lesson plan in the Teacher Guide.
2. Pull out the Activity Overview page(s), PowerPoint lesson guides, and student charts and add any necessary notes to them from the detailed lesson plan to help guide the lesson.
3. If necessary, organize activities to fit school schedule.
4. Download PowerPoint slides.
5. Display vocabulary cards on the word wall.
6. Group students for partner/small group work.
7. Decide on how students will create food chains and energy pyramids (Inspiration software or by drawing). If using Inspiration software, make sure it is installed on each student computer. You might also consider creating a picture bank from which students can design their food chains and energy pyramids.

Safety Considerations:

None.

Vocabulary-Building Strategies

- Explicit interactive presentation of vocabulary cards
- Word wall
- Glossary work

Background Information for Teacher

- ACCESS, pages 120–121
- Glencoe, pages 600–601

Lesson Content**Focus Activity/Warm up****Student Activity I (slides 3–7, Lesson Objective poster, Student Charts 2.2 and 2.3)**

5 minutes

Activity Overview: Rating and discussion of science, language, and vocabulary objectives.

Teacher posts lesson objective cards; students rate their prior knowledge of each objective; brief discussion.

- Before students enter the room, display the science objectives.
- Make sure the ratings of the previous class have been erased.
- As they enter the classroom, have students rate their prior knowledge of each objective on a continuum of 1 to 4 (1=none, 4=a lot).
- Have students begin the review questions in Student Chart 2.1 until all students have rated their knowledge of the objectives.
- Review correct responses to review activity (see Activity II below).
- Have students turn to Student Chart 2.2.
- Read the science objectives aloud, one at a time, reporting students' level of prior knowledge.
- Read the language objectives.
- Have students turn to Student Chart 2.3.
- Read vocabulary words aloud.
- As appropriate, have students use thumbs up/thumbs down to indicate prior knowledge.



Engagement

Student Activity II (slides 4–7, Student Chart 2.1)

4 minutes

Activity Overview: Lesson 1 Review. Students answer review questions from previous lesson; teacher displays the answers; students correct responses as necessary.

- After students have rated their knowledge of the objectives and as they wait for their peers to enter the room, students should begin working on Student Chart 2.1.
- Once all students have displayed their knowledge of the objectives poster and have had 2 minutes to answer the review questions, have them read the review questions and answer them aloud.
- Display responses.
- Have students correct their responses as necessary.

Student Activity III (slides 8–19, Science Content Word Cards)

10 minutes

Activity Overview: Preteaching of Science Content Words. Teacher displays PowerPoint slides of science content words one at a time; teacher reads script aloud and elicits responses to teach the following: *food chain, energy pyramid, consumer, autotroph, herbivore, carnivore, predator-prey relationship, food web, producer, decomposer, heterotroph, omnivore, source.*

- Have students turn to Lesson 2 glossary words.
- Read the target words aloud, one at a time.
- Have students rewrite the target words in English and in Spanish (as appropriate) in their glossaries.
- Display the slides of the science content words one at a time, reading the text on the right side of each PowerPoint slide aloud and eliciting responses from student pairs.
- Point to the appropriate parts of the pictures as you read through the notes.
- Depending on your class, you may want to read (or have a student read) the definitions in Spanish.
- Tell students they may continue to use the science content word cards on the word wall for reference.
- **Teacher note:** To save time, you may want to eliminate partner talk and just ask one student to answer the question.

Student Activity IV (slide 20, Student Chart 2.4)

7 minutes

Activity Overview: Food Chains Video.

- Have students turn to Student Chart 2.4.
- Read the directions for #1–#3 so students know what they will be recording.
- Play the video “Food Chains” from Brainpop [3:17].
- Replay the video as necessary.
- Have students answer items #1–#3.
- Call on students to share their answers.
- Display responses and discuss.
- Have students correct their answers as necessary.
- **Teacher note:** In the PowerPoint slide, the answers to #1 fill in one column at a time.

Student Activity V (slide 21, Student Chart 2.5)

10 minutes

Activity Overview: Energy Pyramid.

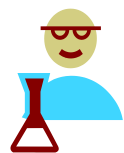
- Have students turn to Student Chart 2.5.
- Read directions.
- Explain the energy pyramid and the vocabulary *primary*, *secondary*, and *tertiary*.
- Have students label the types of organisms in items #1–#4.
- Display responses and discuss.

Student Activity VI (slide 22, Student Chart 2.6)

4 minutes

Activity Overview: Personal Food Chain.

- Have students turn to Student Chart 2.6.
- Read directions.
- Give students 2 minutes to fill in the chart.
- Discuss student answers and the direction of the arrows, representing the transfer of energy.



Explanation and Exploration



Student Activity VII (slides 22–44, whiteboards)

14 minutes

Activity Overview: Ecosystem Jeopardy Game.

- Place students into small groups according to the number of white boards.
- Review directions with students.
- Tell students they may use their glossaries for help.
- **Teacher note:** You may choose to assign points to each group for correct answers. You may assign double points if students provide an example of the organism type. You may also decide to include a word bank on the board.
- Display each slide with a definition and read the statement

- Give students 1 minute to write the answer on their whiteboards.
- After 1 minute, say “display” and have students display their answers.
- Show the next slide, which provides the answer and an example of each term.
- Tally points if you are playing as a game.

Student Activity VIII (slides 45–49, Student Charts 2.7 and 2.8, Inspiration software or paper and colored pencils)

20 minutes

Activity Overview: Create a Food Chain and Energy Pyramid.

- Have students turn to Student Chart 2.7.
- Read directions.
- If possible, show students the Inspiration software on your laptop.
- Use slides 50–52 to show students where to find the images for their food chains.
- Have students turn to Student Chart 2.8.
- Read directions.
- Give students several minutes to write about the food chain and energy pyramid they created.
- Have several students share out.



Elaboration

Student Activity IX (slides 50 and 51, General Academic Word Cards)

2 minutes

Activity Overview: General Academic Word Cards. Teacher displays PowerPoint slide of science content word one at a time; teacher reads script aloud and elicits responses to teach: *source*.

- Read each general academic vocabulary word to students.
- If you like, have students use thumbs up/thumbs down to indicate prior knowledge.
- Have students turn to Lesson 2 glossary words.
- Read the target words aloud.
- Have students rewrite the target words in English and in Spanish (as appropriate) in their glossaries.
- Read through the notes on the right side of each slide.
- Point to the appropriate part of the picture as you read through the notes.
- Depending on your class, you may want to read (or have a student read) the definition in Spanish.
- Display the slide of the general academic word, reading the script aloud and eliciting responses.

- Tell students they may continue to use the general academic word cards on the word wall for reference.
- **Teacher note:** To save time, you may want to eliminate partner talk and just ask one student to answer the question.

Student Activity X (slides 52–57, Student Charts 2.9–2.11)

12 minutes

- Glencoe, pages 598–599

Activity Overview: Interactive Reading. Teacher discusses text illustrations; one student reads guiding questions; teacher and students participate in shared interactive reading; teacher and students discuss guiding questions; students respond to guiding question; teacher posts correct response; students revise responses as necessary.

- **Preview**
 - Have students turn to Student Chart 2.9.
 - Read the guiding question aloud.
 - Review all illustrations in the text with students using the document camera.
- **Text**
 - Have students turn to Student Chart 2.10.
 - Read text aloud to students as they follow in their Student Chart.
 - Stop and clarify text if necessary.
 - Ask students embedded questions. Elaborate on their responses as necessary.
 - When you get to a figure, stop reading and have students look at the figure as you discuss it.
- **Guiding questions**
 - Have students turn to Student Chart 2.11.
 - Have students complete the chart.
 - Have students display their answers under the document camera.
 - Whole class discussion.



Evaluation

Student Activity IX (slides 58–60, Student Charts 2.12–2.14, Glossary)

8 minutes

Activity Overview: Glossary and Key Facts and Questions for Further Study. Students complete glossary for science content words, answer questions related to key content, and indicate if there is anything else they would like to learn about; whole class review.

- **Glossary work**
 - Have students locate Student Chart 2.12.

- For each science content word, have students work in pairs to indicate whether the word is a cognate and to fill in the rest of the information required by the glossary.
- Review glossary entries with class.
- **Key information**
 - Have students turn to Student Chart 2.13.
 - Give students several minutes to complete the questions.
 - Display responses and discuss.
 - Have students correct responses as necessary.
- **Questions for further study**
 - Have students turn to Student Chart 2.14.
 - Have students complete Student Chart.
 - As time permits, have students share their questions with a partner, with the whole class, or have them write them on a sticky note and put them on a “questions wall” on their way out of class. Students who finish an assessment or who have free time might be assigned to go online to find answers to class questions.




Extension/Differentiation

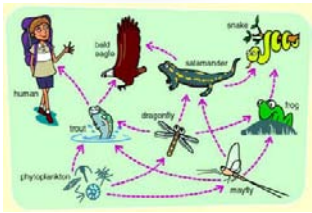

See the PowerPoint slides for the following activities:

- **Student Activity XII: What am I?**
- **Student Activity XIII: Food Chain Game**
- **Student Activity XIV: Point of View Game**

Slide 1




Ecology Set


Lesson 2: Food Chains & Food Webs

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CREATE

Ecology Lesson 2: Teacher Preparation


- Erase the ratings from the previous class on the objectives poster.
- Sign into www.brainpop.com.
- Decide on how students will create food chains and energy pyramids (Inspiration software or by drawing).
 - If using Inspiration software, make sure it is installed on each student's computer.
 - You might also consider creating a picture bank that students can use to design their food chains and energy pyramids.
- Some of the vocabulary is review and might be covered more quickly by deleting partner talk.



Science Objectives

Students, as you enter the classroom...

- Go to the poster.
- Read each objective.
- Use a marker to rate your knowledge of each objective on a scale of 1 to 4.
- Begin the review questions.




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Pacing: 3 minutes.

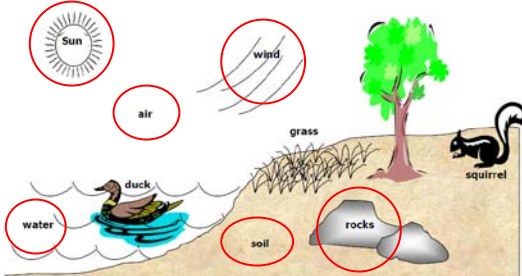
[There is no Student Chart for this slide].

- Before students enter the room, display the science objectives.
- Make sure the ratings of the previous class have been erased.
- As they enter the classroom, have students rate their prior knowledge of each objective on a continuum of 1-4 (1=no to 4=a lot).
- Have students complete the review questions in Student Chart 2.1.



2.1: Review of Habitats Lesson

1. Look at the illustration below. Circle all of the abiotic features of the ecosystem below:




2. These are abiotic features because they are nonliving.

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Pacing: 2 minutes.

- [Students need to complete Student Chart 2.1 on their own or in pairs before questions are reviewed].
- Have one student read each review question (#1-2) from Student Chart 2.1 and answer it aloud.
- Display response.
- Have students correct student response as necessary.



2.1: Review Question (cont.)

Choose from the following words to complete the sentences:
biotic, chromosome, DNA, ecosystem, environment, identify, organisms

3. Organisms are living things and include animals, plants, and bacteria.
4. To identify is to point out, find, or name something.
5. Environment means everything that surrounds a living thing and affects its growth and health.
6. An ecosystem is all of the living and non-living things in a particular area, and how they are related to each other and to their environment.
7. A chromosome is a structure in the cell nucleus that carries genes.
8. DNA is made up of two chains of molecules that are twisted together in a spiral and hold the genetic material of all organisms.

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5

- **Pacing: 2 minutes.**
- Follow the same routine as you did with questions #1-2.



2.2: Science and Language Objectives

- In science, we will learn:
 - to diagram the flow of energy through an ecosystem using the concepts of food chains, food webs, and energy pyramids.
- To develop our language skills, we will learn:
 - to listen for key vocabulary definitions while playing Jeopardy.
 - to summarize text by taking notes in a graphic organizer.


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6

Pacing: 1 minute.

- Have students turn to Student Chart 2.2.
- Read the science objectives aloud, one at a time, reporting students' level of prior knowledge.
- Read the language objectives.

Slide 7



2.3: Vocabulary Objectives

- Science content vocabulary:
 - food chain
 - food web
 - energy pyramid
 - producer
 - consumer
 - decomposer
 - autotroph
 - heterotroph
 - herbivore
 - omnivore
 - carnivore
 - predator-prey relationship
- General academic vocabulary:
 - source

7

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Pacing: 1 minute.

- Have students turn to Student Chart 2.3.
- Read vocabulary words aloud.
- If you like, have students use thumbs up/thumbs down to indicate prior knowledge.

food chain

Trophic Level	Grassland Biome	Pond Biome	Ocean Biome
Primary Producer	grass	algae	phytoplankton
Primary Consumer	grasshopper	mosquito larva	zooplankton
Secondary Consumer	rat	dragonfly larva	fish
Tertiary Consumer	snake	fish	seal

cadena
alimenticia

• Look at the picture. It shows three food chains. In the grassland biome, the snake eats the rat; the rat eats the grasshopper; and the grasshopper eats the grass.

• A **food chain** is a simple model of how energy moves from producers to consumers in an ecosystem.

• La **cadena alimenticia** es un modelo simple de cómo la energía es transferida de productores a consumidores en un ecosistema.

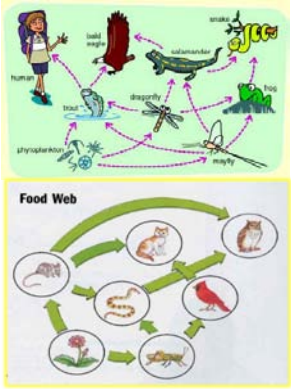
• Partner talk: Describe the food chains in the pond and ocean biomes.

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- **Pacing: 1 minute.**
- Have students turn to lesson 2 glossary words.
- Read the target word aloud.
- Have students rewrite the target word in English and in Spanish (as appropriate) in their glossaries.
- Read through the notes on the right side of the slide.
- Point to the appropriate part of the picture as you read through the notes.
- Depending on your class, you may want to read (or have a student read) the definition in Spanish.
- Ask one student to answer the question. [Anticipated response: the fish eat the dragonfly larva; the dragonfly larva eats mosquito larva; the mosquito larva eat the algae; etc.].
- **Teacher note:** To save time you may want to eliminate partner talk and just ask one student to answer the question.

Slide 9

food web



red alimenticia

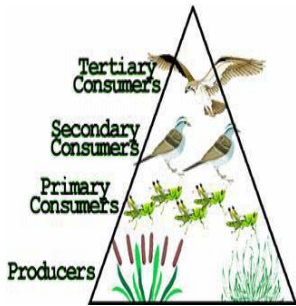
- Look at the pictures. In an ecosystem, the many food chains form a food web.
- A food web is a model showing how food chains interact.
- Una red alimenticia es un modelo que muestra cómo interactúan las cadenas alimenticias.
- Partner talk: Look at the food webs. For each food web, which organisms get eaten, but do not consume any others?

9

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- **Pacing: 1 minute.**
 - Follow the same routine.
 - Ask one student to answer the question.
- [Anticipated responses: the phytoplankton and the flower (producers)].

energy pyramid



pyrámide
energética

- Look at the picture. The energy pyramid shows that there are more types and a greater quantity of plants or producers than consumers in an ecosystem.
- An energy pyramid is a diagram that shows the variety and quantity of organisms in each part of the food chain.
- Una pirámide energética es un diagrama que muestra la cantidad y diversidad de organismos en cada una de las partes de la cadena alimenticia.
- Partner talk: In this energy pyramid, which level has the greatest variety of organisms?

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- Pacing: 1 minute.
- Follow the same routine.
- Ask one student to answer the question.
[Anticipated response: producers].

consumers




- Look at the pictures. Gorillas and people are both consumers. The gorilla is eating leaves and the boy is eating watermelon.
- Consumers are organisms that get their energy by eating other living organisms.
- Consumidores son los organismos que se alimentan de otros organismos vivos para obtener energía.
- Partner talk: Name two other consumers and tell what they consume (eat).



consumidores

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11

- Pacing: 1 minute.**
- Follow the same routine.
- Ask one student to answer the question [Answers will vary].
- Teacher note:** To save time you may want to eliminate partner talk and just ask one student to answer the question.

producers



productores

- Look at the pictures. Trees and flowers are producers because they produce their own energy through photosynthesis.
- Producers are organisms at the beginning of the food chain that make their own food, usually through the process of photosynthesis.
- Productores son las plantas y vegetales que se encuentran al comienzo de la cadena alimenticia y que fabrican su propia comida por medio de la fotosíntesis.
- Partner talk: Are people producers? Why or why not?

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12

- Pacing: 1 minute.
- Follow the same routine.
- Ask one student to answer the question [Anticipated response: no, because they do not make their own food].
- Teacher note: To save time you may want to eliminate partner talk and just ask one student to answer the question.

decomposer



descomponedor

•Look at the pictures. The worms eat the dead organisms in the soil and the fungi digest the dead tree. Both are decomposers.

•A decomposer is a living thing that breaks down dead plants and animals for food.

•Descomponedor es un ser vivo que desintegra plantas y animales muertos como medio de sustentación.


•Did you know? Yeast is a type of fungi that we use as an ingredient in bread.

13

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- Pacing: 2 minutes.
- Follow the same routine.

autotroph




autótrofo

- Look at the picture. Plants do not have to consume other organisms to get the energy to live.
- An autotroph is an organism, such as a plant, that makes its own food.
- Un autótrofo es un organismo similar a una planta, la que fabrica su propio alimento.
- Partner talk: *Auto* is a prefix that means “self.” *Troph* means “nutrition.” An autotroph is an organism that makes food or nutrition for itself. Name some other words you know that start with auto- and explain how they relate to “self.”

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- Pacing: 1 minute.
 - Follow the same routine.
 - Ask one student to answer the question.
- [Anticipated responses: autobiography, automatic, automobile, autograph].

heterotroph



heterótrofo

- Look at the picture. The lion consumes other organisms to get its energy.
- A heterotroph is an organism that obtains the energy it needs by feeding on other organisms.
- Un heterótrofo es un organismo que obtiene la energía que necesita alimentándose de otros organismos.
- Partner talk: Name some other heterotrophs and tell what they eat.

15

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- Pacing: 1 minute.
 - Follow the same routine.
 - Ask one student pair to answer the question.
- [Anticipated responses: bears, penguins, panda bear, hawks, humans, birds, sharks, etc.]

herbivore



herbívoro

- Look at the picture. The koala bear eats the leaves of a eucalyptus tree to get its energy.
- A herbivore is a plant-eating organism with incisors specialized to cut vegetation and large, flat molars to grind it.
- Un herbívoro es un organismo que come plantas, y que tiene incisivos especializados para cortar vegetación y molares planos para molerla.
- Partner talk: Name some other herbivores and tell what they eat.

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16

- Pacing: 1 minute.
 - Follow the same routine.
 - Ask one student to answer the question.
- [Anticipated response: panda bears: bamboo; etc.]

Slide 17

omnivore



omnívoro

- Look at the picture. Bears eat fish and berries to get their energy.
- An omnivore is an organism that eats *both* plants and meat; it has incisors specialized to cut vegetables, premolars to chew meat, and molars to grind food.
- Un omnívoro es un organismo que come plantas y carnes; tiene incisivos especializados para cortar vegetales, premolares para mastigar la carne, y molares para moler la comida.
- Partner talk: Are you an herbivore or an omnívoro?

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17

- Pacing: 1 minute.
- Follow the same routine.
- Ask one student to answer the question. [Answers will vary].

carnivore



carnívoro

- Look at the picture. The lioness eats the buffalo to get her energy.
- A carnivore is a meat-eating organism with sharp canine teeth specialized to rip and tear flesh. Carnivores do not eat plants.
- Un carnívoro es un organismo que come carne y que tiene dientes caninos afilados especializados para desgarrar la carne. Los carnívoros no comen plantas.
- Partner talk: Name some other carnivores and what they eat.

18

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- Pacing: 1 minute.
 - Follow the same routine.
 - Ask one student to answer the question.
- [Anticipated response: shark: fish, penguins: fish, hawks: small birds or rodents].

predator-prey
relationship



relación presa-
predador

- Look at the picture. The predator is the alligator; the prey is a turtle. They have a predator-prey relationship.
- A predator-prey relationship is where one living thing captures and eats another living thing.
- Una relación presa-predador es cuando un ser vivo captura a otro ser vivo y se alimenta de él.
- Partner talk: Name some other pairs of animals that have a predator-prey relationship.

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19

- Pacing: 1 minute.**
- Follow the same routine.
- Ask one student pair to answer the question.
[Anticipated responses: Sharks and fish; foxes and chickens; lions and wildebeest].
- Teacher note: To save time you may want to eliminate partner talk and just ask one student to answer the question.**

2.4: Food Chains

- Producers, consumers and decomposers make up a food web. Categorize the following organisms as either producers (P), consumers (C), or decomposers (D).

D fungi	P oak trees	C dog
C bear	D bacteria	P palm tree
C grasshopper	P bamboo	P ferns
C praying mantis	P lichen	C owl
- Make a food chain using the following organisms: grasshopper, snake, grass, frog, and hawk. Use the arrows to show the flow of energy from one organism to the next.

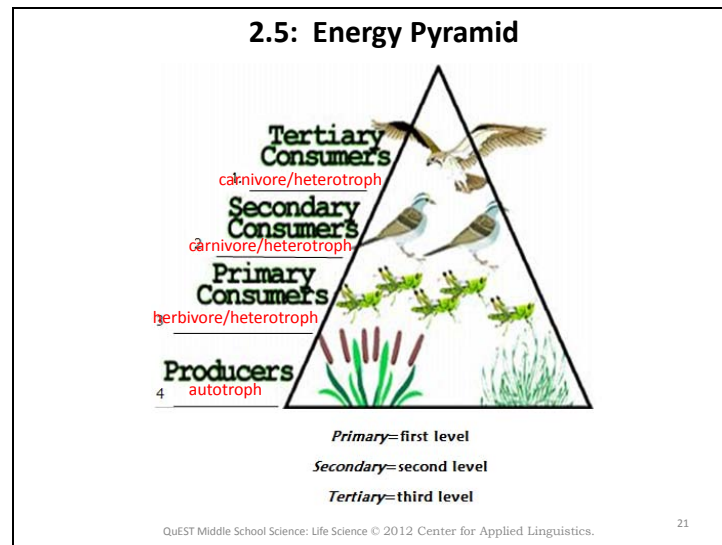
grass → grasshopper → frog → snake → hawk
- In the food chain above, what might happen if all of the frogs suddenly died off?

If all of the frogs suddenly died off, there would be an increase in the population of grasshoppers. There would be a decrease in the population of snakes and hawks. With extra grasshoppers eating grass, the fields might have less grass. This might cause soil erosion.

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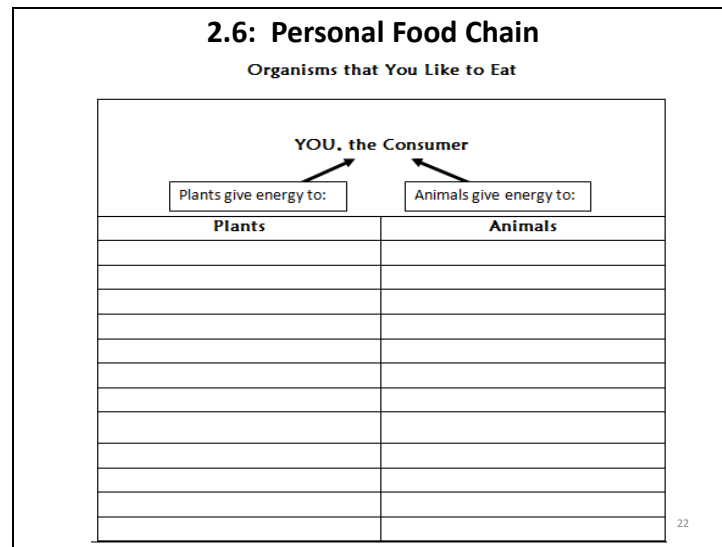
- **Pacing: 7 minutes.**
- Have students turn to Student Chart 2.4.
- Read the directions for #1-3 so students know what they will be recording.
- Play the video “Food Chains” from Brainpop [3:17]
- Replay the video as necessary.
- Have students answer #1-3.
- Call on students to share their answers.
- Display responses and discuss.
- Have students correct their answers as necessary.
- **Teacher’s note: The answers to #1 come in one “column” at a time, from left to right.**

Slide 21



- **Pacing: 4 minutes.**
- Have students turn to Student Chart 2.5.
- Read directions.
- Explain the energy pyramid and the vocabulary “primary, secondary, and tertiary.”
- Have students label the types of organisms in #1-4.
- Display responses and discuss.

Slide 22



- Optional (if students need further understanding of the directionality of the arrows)
- **Pacing: 4 minutes.**
- Have students turn to Student Chart 2.6.
- Read directions.
- Give students 2 minutes to fill in the chart.
- Discuss student answers and the direction of the arrows, representing the transfer of energy.

Slide 23

Ecosystem Jeopardy

[There is no Student Chart for this activity].

Directions

1. I will read a **clue statement** about the types of organisms in an ecosystem.
2. You have 1 minute to **write** the name of the organism type on the white board
3. When I say “**display**,” show your white board.
4. Then I will show you a slide that has an **example** of the answer.

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24

- **Pacing: 14 minutes for the Jeopardy Game.**
- Place students into small groups according to the number of white boards.
- Review directions with students.
- Tell students they may use their glossaries for help.
- **Teacher note: You may choose to assign points to each group for correct answers. You may assign double points if students provide an example of the organism type. You may also decide to include a word bank on the board.**

5 points

- This is an organism that hunts other animals for food.

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- Read the statement aloud.
- Give students 1 minute to write the answer on their whiteboards.
- After 1 minute, say “display” and have students display their answers.
- Show the next slide which provides an example of the term.
- Tally points if you are playing as a game.

Slide 26

Predator



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26

5 points

- This is an animal being hunted, caught, and eaten by another animal.

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27

- Give students 1 minute to write the answer on their whiteboards.
- After 1 minute, say “display” and have students display their answers.
- Show the next slide which provides an example of the term.
- Tally points if you are playing as a game.

Slide 28

Prey



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28

10 points

- This is a plant-eating organism with incisors specialized to cut vegetation and large, flat molars to grind it.

29

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- Read the statement aloud.
- Give students 1 minute to write the answer on their whiteboards.
- After 1 minute, say “display” and have students display their answers.
- Show the next slide which provides an example of the term.
- Tally points if you are playing as a game.

Slide 30

Herbivore



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30

10 points

- This is a meat-eating organism with sharp canine teeth specialized to rip and tear flesh.

31

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- Read the statement aloud.
- Give students 1 minute to write the answer on their whiteboards.
- After 1 minute, say “display” and have students display their answers.
- Show the next slide which provides an example of the term.
- Tally points if you are playing as a game.

Slide 32

Carnivore



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10 points

- This is a plant- and meat-eating organism with incisors specialized to cut vegetables, premolars to chew meat, and molars to grind food.

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33

- Read the statement aloud.
- Give students 1 minute to write the answer on their whiteboards.
- After 1 minute, say “display” and have students display their answers.
- Show the next slide which provides an example of the term.
- Tally points if you are playing as a game.

Slide 34

Omnivore



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34

20 points

- This is an organism at the beginning of the food chain that makes its own food, usually through the process of photosynthesis.

35

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- Read the statement aloud.
- Give students 1 minute to write the answer on their whiteboards.
- After 1 minute, say “display” and have students display their answers.
- Show the next slide which provides an example of the term.
- Tally points if you are playing as a game.

Slide 36

Producer



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36

20 points

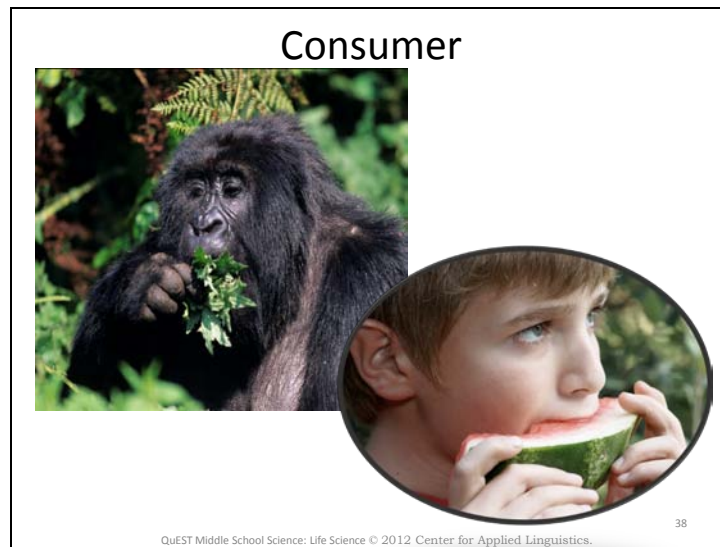
- This is the organism that gets its energy by eating other living organisms.

37

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- Read the statement aloud.
- Give students 1 minute to write the answer on their whiteboards.
- After 1 minute, say “display” and have students display their answers.
- Show the next slide which provides an example of the term.
- Tally points if you are playing as a game.

Slide 38



20 points

- This is a living organism that breaks down dead plants and animals for food.

39

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- Read the statement aloud.
- Give students 1 minute to write the answer on their whiteboards.
- After 1 minute, say “display” and have students display their answers.
- Show the next slide which provides an example of the term.
- Tally points if you are playing as a game.

Slide 40

Decomposer



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40

Slide 41

30 points

- This is an organism, such as a plant, that makes its own food.

41

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- Read the statement aloud.
- Give students 1 minute to write the answer on their whiteboards.
- After 1 minute, say “display” and have students display their answers.
- Show the next slide which provides an example of the term.
- Tally points if you are playing as a game.

Slide 42

Autotroph



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42

30 points

- This is an organism that obtains the energy it needs by feeding on other organisms.

43

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- Read the statement aloud.
- Give students 1 minute to write the answer on their whiteboards.
- After 1 minute, say “display” and have students display their answers.
- Show the next slide which provides an example of the term.
- Tally points if you are playing as a game.

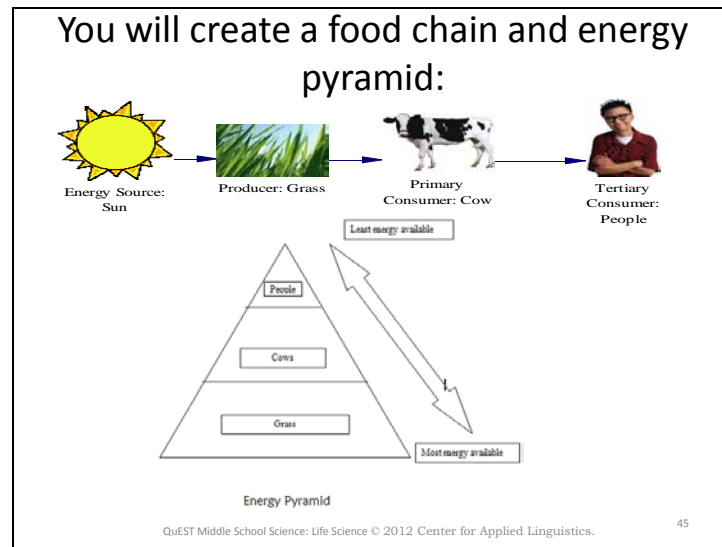
Slide 44

Heterotroph



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44



- **Pacing: 20 minutes for the Creation of a Food Chain and Energy pyramid.**
- Tell students they will be creating food chains and energy pyramids using pictures from Inspiration.
- Review example with students, telling them that this is a model of what they will be creating.
- **Teacher's note: If you do not have the technology, you may have students draw and label using paper and colored pencils. Otherwise, students may print their food chains and energy pyramids for display.**

2.7: Create a Food Chain and Energy Pyramid



Student Chart 2.7: Create a Food Chain and Energy Pyramid
Follow the instructions to create a food chain and an energy pyramid.

Make your own food chain:

1. Open Inspiration.
2. Under the View menu, click on **Symbol Palette**.
3. Go through the library of symbols looking for some **images** that could be combined to make a food chain. Remember, the food chain should start with the **sun**.
4. Create a food chain. You must have a **producer** and at least two **consumers** (see example). One of the animals could be your favorite animal. You must **label** the producers and consumers by typing in the text box below the organism.

Make an energy pyramid:

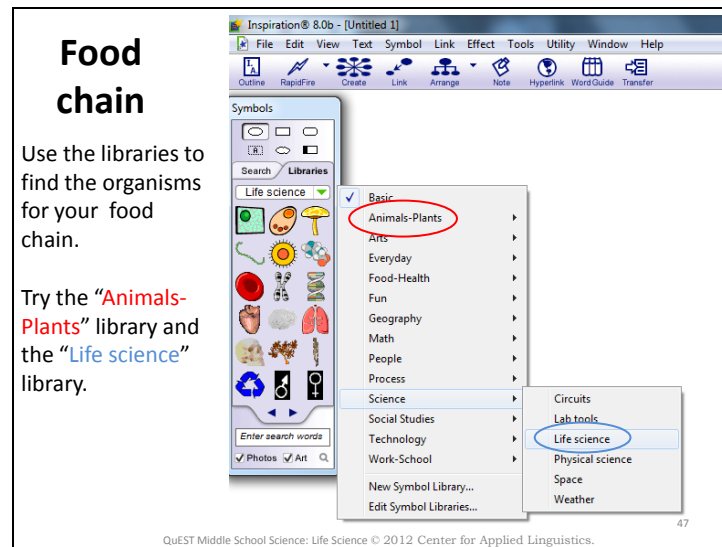
1. Open Inspiration.
2. Use the library of symbols to find a **triangle** for the pyramid.
3. Use the **drawing tools** at the bottom of the screen to draw the trophic levels. **Label** all levels. You must use the text tool to type.
4. Use the library of symbols to look for images or organisms for your energy pyramid. **Label** the type of organism by typing in the text box.
5. Before printing, copy and paste the pyramid into a **Word document**. You can also do use the text boxes to do labeling in Word.
6. Write a **paragraph** description of what is happening in your food chain and how the energy pyramid represents the number of each type of animal in Student Chart 2.8.

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- Have students turn to Student Chart 2.7.
- Read directions.
- If possible, show students the Inspiration software on your laptop.
- Use the following slide to show students where to find the images for their food chains.

Slide 47

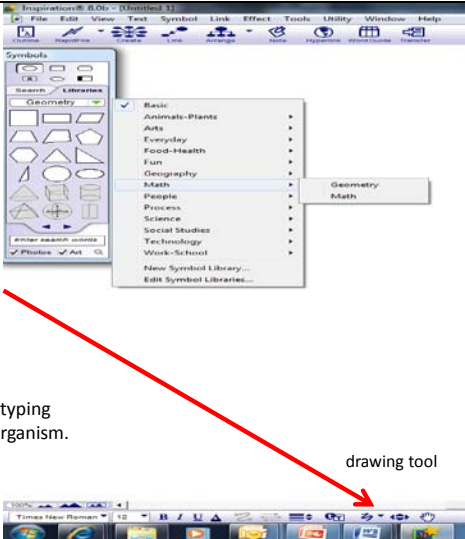


[There is no Student Chart with this slide].

- Show students that they might find organisms for their food chains using the “Science” tab or the “Animals-Plants” tab.


Energy Pyramid

1. Choose a triangle from the Math "library."
2. Use the drawing tool to create the trophic levels.
3. Use the libraries to find the organisms.
4. Label the organisms by typing in the text box below the organism.



The screenshot shows the Inspiration 8.0 software interface. On the left, the 'Symbol Library' is open, displaying various geometric shapes. A red arrow points from the 'drawing tool' icon in the bottom toolbar to the 'drawing tool' text label. The 'drawing tool' text label is positioned to the right of the red arrow. The 'Symbol Library' is divided into sections: 'Basic', 'Animals-Plants', 'Arts', 'Everyday', 'Food-Health', 'Fun', 'Geography', 'Math', 'People', 'Process', 'Science', 'Social Studies', 'Technology', 'Work-School', 'New Symbol Library...', and 'Edit Symbol Libraries...'. The 'Math' section is expanded, showing 'Geometry' and 'Math' sub-sections. The 'drawing tool' icon is located in the bottom toolbar, represented by a small icon of a drawing tool.

Slide 49



Student Chart 2.8: Create a Food Chain and Energy Pyramid

Follow the instructions to create a food chain and an energy pyramid.

1. Describe the variety and quantity of organisms at each level of your energy pyramid (Example: At the producer level, there are two grasses and one berry bush. At the primary consumer level, there is one bird, etc.)

2. Write a **paragraph** description of what is happening in your food chain.

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- Have students turn to Student Chart 2.8.
- Read directions.
- Give students several minutes to write about the food chain and energy pyramid they created.
- Have several students share out.

General Academic Vocabulary

- This lesson's general academic vocabulary:
 - source

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• **Pacing: <1 minute.**

[There is no Student Chart for this slide].

- Read the general academic vocabulary word to students.
- If you like, have student use thumbs up/thumbs down to indicate prior knowledge.

source

- Look at the picture. The Sun is a source of energy for the planet. The solar panels on the house capture the energy from the sunlight so it can be used for energy in the house.
- A source is the start or cause of something.
- Un fuelle es el comienzo o causa de algo.
- Partner talk: What is the source of the smoke in the sky?

fuelle

51

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- **Pacing: 2 minutes.**
- Have students turn to lesson 2 glossary words.
- Read the target word aloud.
- Have students rewrite the target word in English and in Spanish (as appropriate) in their glossaries.
- Read through the notes on the right side of this PowerPoint slide.
- Point to the appropriate part of the picture as you read through the notes.
- Depending on your class, you may want to read (or have a student read) the definition in Spanish.
- Ask one student pair to answer the question. [Anticipated response: fire].
- **Teacher note:** To save time you may want to eliminate partner talk and just ask one student to answer the question.




2.9: Interactive Reading— Preview

- Turn to Student Chart 2.9.
- Open your Glencoe textbook to pages 600–601.
- Listen to the guiding question:
 - What is the source of energy for different types of organisms?
- As the text is read aloud, read along silently in your Student Chart and be prepared to answer the questions.

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- **Pacing: <1 minute.**
- Have students turn to Student Chart 2.9.
- Read the guiding question aloud.



2.10: Interactive Reading—Text

INTERACTIONS WITHIN COMMUNITIES

Obtaining Energy

Just as a car engine needs a constant supply of gasoline, living organisms need a constant supply of energy. The energy that fuels most life on Earth comes from the Sun. Some organisms use the Sun's energy to create energy-rich molecules through the process of photosynthesis. The energy-rich molecules, usually sugars like glucose, serve as food. They are made up of different combinations of carbon, hydrogen, and oxygen atoms. Energy is stored in the chemical bonds that hold the atoms of these molecules together. When the molecules break apart—for example, during digestion—the energy in the chemical bonds is released to fuel life process.

Where does most of the energy that fuels life on Earth come from?

What is photosynthesis?

What is one product of photosynthesis?

What atoms make up glucose?

Where is the energy stored?

When is energy released?

What happens when the molecules break apart?

Producers

Organisms that use an outside energy source like the Sun to make energy-rich

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- **Pacing: 12 minutes for entire Interactive Reading.**
 - Have students turn to Student Chart 2.10.
 - Read text aloud to students as they follow in their Student Chart.
 - Stop and clarify text if necessary.
 - Ask students embedded questions. Elaborate on their responses as necessary.
 - When you get to a figure, stop reading and have students look at the figure as you discuss it.
- Embedded Questions:

- **Where does most of the energy that fuels life on Earth come from?** [the sun]
- **What is photosynthesis?** [when organisms use the sun's energy to create energy-rich molecules]
- **What is one product of photosynthesis?** [energy-rich molecules like glucose (sugars)]
- **What atoms make up glucose?** [different combinations of carbon, hydrogen, and oxygen]
- **Where is the energy stored?** [in the chemical bonds that bind the atoms of these molecules together]
- **When is energy released?** [When the molecules break apart—for example, during digestion]
- **What happens when the molecules break apart?** [the energy in the chemical bonds is released to fuel the life process]

2.10

molecules are called producers. Most producers contain chlorophyll, a chemical that is required for photosynthesis. As shown in Figure 12, green plants are producers. Some producers do not contain chlorophyll and do not use energy from the Sun. Instead, they make energy-rich molecules through a process called chemosynthesis. These organisms usually are found near volcanic vents on the ocean floor. Mineral molecules in the water provide the energy source for chemosynthesis.

What are producers?

What do most producers contain?

What is chlorophyll used for?

What is chemosynthesis?

What is an energy source for organisms involved in chemosynthesis?

Consumers

Organisms that cannot make their own energy-rich molecules are called consumers. Consumers obtain energy by eating other organisms. Figure 13 shows the four general categories of consumers. Herbivores are the vegetarians of the world. They include rabbits, deer, and other plant eaters. Carnivores are animals that eat other animals. Frogs and spiders are carnivores that eat insects.

What are consumers and how do they obtain their energy?

What are the four general categories of consumers?

What are herbivores?

What are carnivores?

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- Follow the same routine.

Embedded Questions:

- **What are producers?** [organisms that use an outside energy source like the sun to make energy-rich molecules]
- **What do most producers contain?** [chlorophyll]
- **What is chlorophyll used for?** [photosynthesis]
- **What is chemosynthesis?** [a process of making energy-rich molecules that does not involve the sun or chlorophyll]
- **What is an energy source for organisms involved in chemosynthesis?** [in the mineral molecules in ocean water near volcanic vents]
- **What are consumers and how do they obtain their energy?** [organisms that cannot make their own energy-rich molecules and eat other organisms]
- **What are the four general categories of consumers?** [herbivores, carnivores, omnivores, and decomposers]
- **What are herbivores?** [plant eaters]
- **What are carnivores?** [organisms that eat other animals]

2.10

Omnivores, including pigs and humans, eat mostly plants and animals. Decomposers, including fungi, bacteria, and earthworms, consume wastes and dead organisms. Decomposers help recycle once-living matter by breaking it down into simple, energy-rich substances. These substances might serve as food for decomposers, be absorbed by plant roots, or be consumed by other organisms.

What are omnivores?

What are decomposers?

How do decomposers recycle once-living matter?

What do decomposers do for the ecosystem?

Food Chains

Ecology includes the study of how organisms depend on each other for food. A food chain is a simple model of how energy moves from producer plants to consumer animals. A food chain is all about eating and being eaten. A single ecosystem can have many food chains. For example, in a Midwestern farm field, food chains might include:

- corn→mouse→owl
- corn→blackbird→cat
- corn→caterpillar→crow

What is a food chain?

Partner talk: Explain one of the food chains in a Midwestern farm field.

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- Follow the same routine.
- Embedded questions:
- **What are omnivores?** [organisms that eat mostly plants and animals]
- **What are decomposers?** [organisms that consume wastes and dead organisms]
- **How do decomposers recycle once-living matter?** [by breaking it down into simple, energy-rich substances]
- **What do decomposers do for the ecosystem?** [they create energy-rich substances that might be food for other decomposers, be absorbed by plant roots, or be consumed by other organisms].
- **What is a food chain?** [a simple model of how energy moves from producers to consumers]
- **Partner talk: Explain one of the food chains in a Midwestern farm field.**

2.10

Food Webs

When a member of one food chain eats a member of another food chain, the chains connect. Then scientists draw bigger models called food webs. They show how food chains interact.


Each ecosystem contains many food chains and food webs. In this way, all living things depend on each other. Every individual in the ecosystem helps all the others live and survive.

What is a food web?
What does each ecosystem contain?
Why is every individual in an ecosystem important?





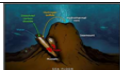

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- Follow the same routine.
- Embedded questions:
 - **What is a food web?** [a model of how different food chains interact]
 - **What does each ecosystem contain?** [many food chains and food webs]
 - **Why is every individual in an ecosystem important?** [they all help the others live and survive].




2.11: Interactive Reading—Guiding Question

Organism	Source of energy	Type of organism
	grass	herbivore
	from dead wood and waste	decomposer
	radiant energy: sunlight	producer
	eating other animals	carnivore
	from minerals in water near volcanoes	producer
	animal meat and plants	omnivore

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- Have students turn to Student Chart 2.11.
- Read the directions.
- Do the first example together.
- Display the answer.
- Have students complete the rest of the chart.
- Display responses and discuss.



2.12: Closing Activity—Glossary Work


– Complete glossary entries for the following science content words:

- food chain
- food web
- energy pyramid
- producer
- consumer
- decomposer
- autotroph
- heterotroph
- herbivore
- omnivore
- carnivore
- predator-prey relationship
- source

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- **Pacing: 5 minutes.**
- Have students locate Student Chart 2.12.
- For each science content word, have students work in pairs to indicate whether the word is a cognate and to fill in the rest of the information required by the glossary.
- Review glossary entries with class.




2.13: Closing Activity— Key Information

- **Use these words or phrases to complete the sentences below in Student Chart 2.13:** *carnivore, decomposer, fungi, predator-prey relationship, producer, fish*
 - grass : cows :: phytoplankton : fish
 - A predator-prey relationship is where one living thing captures and eats another living thing.
 - A carnivore is a meat-eating organism with sharp canine teeth specialized to rip and tear flesh.
 - A decomposer, such as fungi, is a living thing that breaks down dead plants and animals for food.
 - A producer is an organism at the beginning of the food chain that makes its own food, usually through the process of photosynthesis.

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- **Pacing: 2 minutes.**
- Have students turn to Student Chart 2.13.
- Give students several minutes to complete the questions.
- Display responses and discuss.
- Have students correct responses as necessary.




**2.14: Closing Activity—
Question for Further Study**

- One question I still have or something I want to learn more about is:

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- **Pacing: 1 minute.**
- Have students turn to Student Chart 2.14.
- Have students complete Student Chart 2.14.
- As time permits, have students share their questions with a partner, with the whole class, or have them write them on a sticky note and put them on a “questions wall” on their way out of class. Students who finish an assessment early or who have free time might be assigned to go online to find answers to class questions.

Slide 61

A small, square icon with a colorful, abstract design, possibly representing a game or activity.

Extension Activity

- What am I?
- Food Chain Game
- Point of View Game

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Optional

- Access the Sharepoint for the additional activities listed above.



Project QuEST
Model Life Science Lesson
Student Guide: Food Chains & Food Webs

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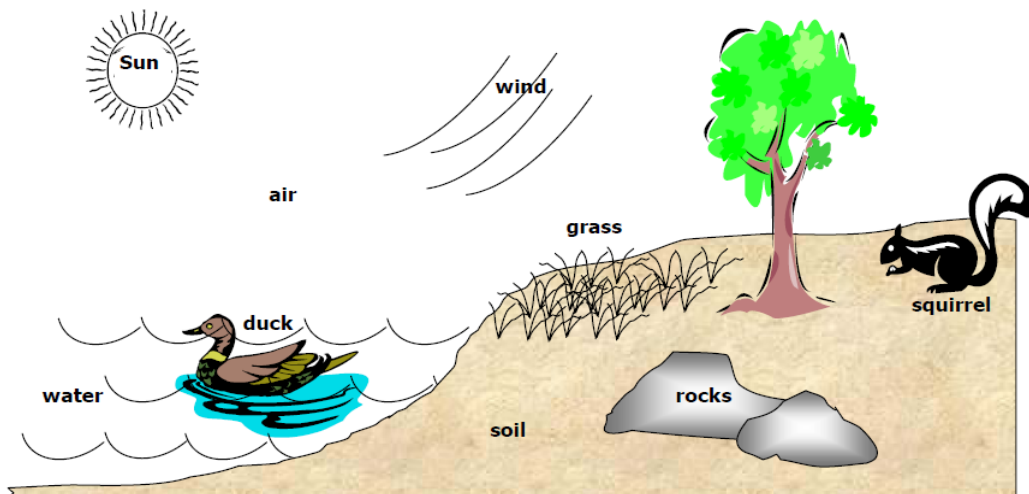
Ecology Set: Food Chains and Food Webs



Student Chart 2.1: Review of Habitats Lesson

Complete the following questions.

1. Look at the illustration below. Circle all of the abiotic features of the ecosystem below.



2. These are abiotic features because they are _____.

Choose from the following words to complete the sentences:

biotic, chromosome, DNA, ecosystem, environment, identify, organisms

3. _____ are living things and include animals, plants, and bacteria.
4. To _____ is to point out, find, or name something.
5. _____ means everything that surrounds a living thing and affects its growth and health.
6. An _____ is all of the living and non-living things in a particular area, and how they are related to each other and to their environment.
7. A _____ is a structure in the cell nucleus that carries genes.
8. _____ is made up of two chains of molecules that are twisted together in a spiral and hold the genetic material of all organisms.

**Student Chart 2.2: Science and Language Objectives**

Listen and follow along as your teacher reads this lesson's objectives.

In Science we will learn:

- to diagram the flow of energy through an ecosystem using the concepts of food chains, food webs, and energy pyramids.

To develop our language skills, we will learn:

- to listen for key vocabulary definitions while playing Jeopardy.
- to summarize a text by taking notes in a graphic organizer.

**Student Chart 2.3: Vocabulary Objectives**

Listen and follow along as your teacher reads this lesson's vocabulary.

Science content vocabulary:

- food chain
- food web
- energy pyramid
- producer
- consumer
- decomposer
- autotroph
- heterotroph
- herbivore
- omnivore
- carnivore
- predator-prey relationship

General academic vocabulary:

- source



Student Chart 2.4: Food Chains

Watch the video and answer questions #1–#3 below.

- Producers, consumers, and decomposers make up a food web. Categorize the following organisms as either producers (P), consumers (C), or decomposers (D).

_____ fungi

_____ oak trees

_____ dog

_____ bear

_____ bacteria

_____ palm tree

_____ grasshopper

_____ bamboo

_____ ferns

_____ praying mantis

_____ lichen

_____ owl

- Make a food chain using the following organisms: grasshopper, snake, grass, frog, and hawk. Use the arrows to show the flow of energy from one organism to the next.



- In the food chain above, what might happen if all of the frogs suddenly died off?

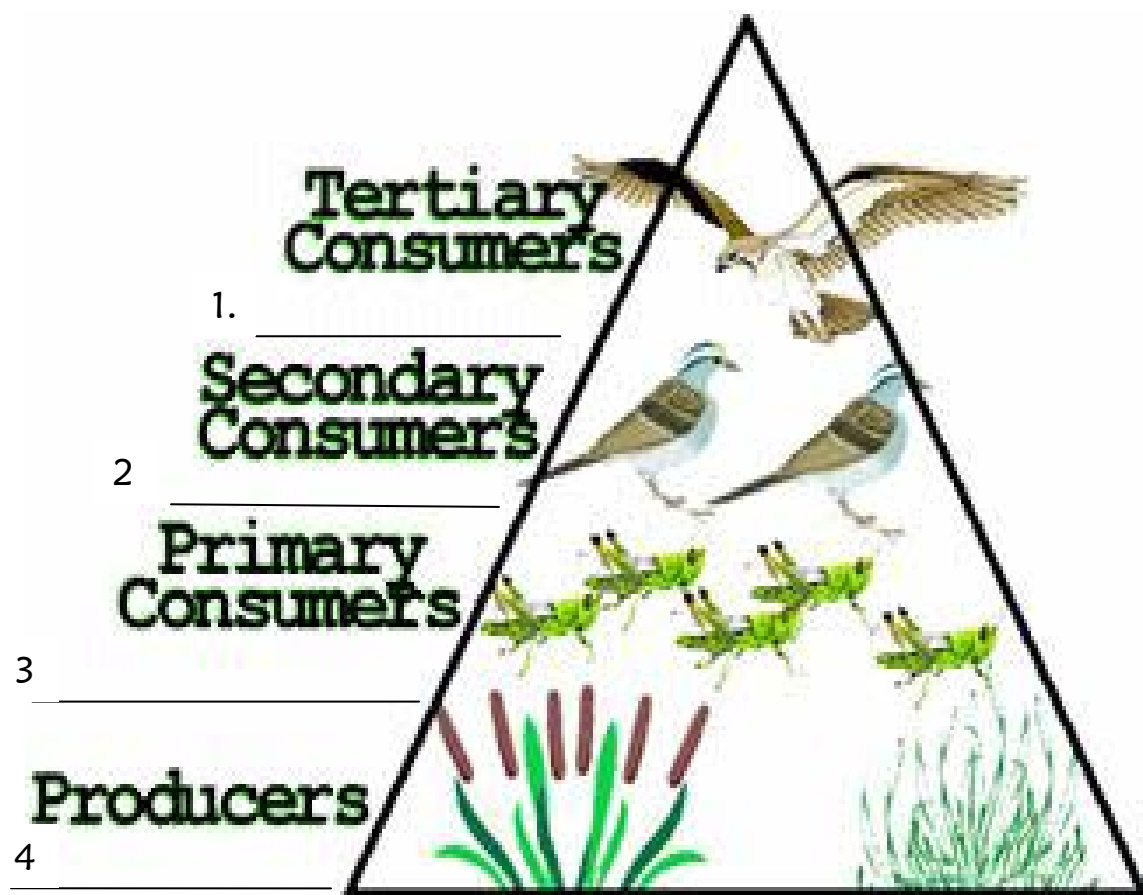


Student Chart 2.5: Energy Pyramid

Look at the energy pyramid below. Choose from the following words to label the organisms in the energy pyramid in #1–#4: *autotrophs*, *carnivores*, *herbivores*, *heterotrophs*.

Note that there might be more than one correct answer.

Energy Pyramid



Primary=first level

Secondary=second level

Tertiary=third level



Student Chart 2.6: Personal Food Chain

Discuss with your partner the organisms you like to eat. Then make a list below.

Organisms You Like to Eat

[illegible]



Student Chart 2.7: Create a Food Chain and Energy Pyramid

Follow the instructions to create a food chain and an energy pyramid.



Make your own food chain:

1. Open Inspiration.
2. Under the View menu, click on **Symbol Palette**.
3. Go through the library of symbols looking for some **images** that could be combined to make a food chain. Remember, the food chain should start with the **sun**.
4. Create a food chain. You must have a **producer** and at least two **consumers** (see example). One of the animals could be your favorite animal. You must **label** the producers and consumers by typing in the text box below the organism.

Make an energy pyramid:

1. Open Inspiration.
2. Use the library of symbols to find a **triangle** for the pyramid.
3. Use the **drawing tools** at the bottom of the screen to draw the trophic levels. **Label** all levels. You must use the text tool to type.
4. Use the library of symbols to look for images or organisms for your energy pyramid. **Label** the type of organism by typing in the text box.
5. Before printing, copy and paste the pyramid into a **Word document**. You can also do use the text boxes to do labeling in Word.
6. Write a **paragraph** description of what is happening in your food chain and how the energy pyramid represents the number of each type of animal in Student Chart 2.8.



Student Chart 2.8: Create a Food Chain and Energy Pyramid

Follow the instructions to create a food chain and an energy pyramid.

1. Describe the **variety and quantity** of organisms at each level of your energy pyramid (Example: *At the producer level, there are two grasses and one berry bush. At the primary consumer level, there is one bird, etc.*)

2. Write a **paragraph** description of what is happening in your food chain.



Student Chart 2.9: Interactive Reading—Preview

Read the guiding question.

- **What is the source of energy for different types of organisms?**

**Student Chart 2.10: Interactive Reading Text**

(Glencoe, pages 600–601; ACCESS, page 121)

Listen and follow along as the text is read aloud. Be prepared to answer the questions.

INTERACTIONS WITHIN COMMUNITIES**Obtaining Energy**

Just as a car engine needs a constant supply of gasoline, living organisms need a constant supply of energy. The energy that fuels most life on Earth comes from the Sun. Some organisms use the Sun's energy to create energy-rich molecules through the process of photosynthesis. The energy-rich molecules, usually sugars like glucose, serve as food. They are made up of different combinations of carbon, hydrogen, and oxygen atoms. Energy is stored in the chemical bonds that hold the atoms of these molecules together. When the molecules break apart—for example, during digestion—the energy in the chemical bonds is released to fuel life process.

Where does most of the energy that fuels life on Earth come from?

What is photosynthesis?

What is one product of photosynthesis?

What atoms make up glucose?

Where is the energy stored?

When is energy released?

What happens when the molecules break apart?

Producers

Organisms that use an outside energy source like the Sun to make energy-rich

molecules are called producers. Most producers contain chlorophyll, a chemical that is required for photosynthesis. As shown in Figure 12, green plants are producers. Some producers do not contain chlorophyll and do not use energy from the Sun. Instead, they make energy-rich molecules through a process called chemosynthesis. These organisms usually are found near volcanic vents on the ocean floor. Mineral molecules in the water provide the energy source for chemosynthesis.

What are producers?

What do most producers contain?

What is chlorophyll used for?

What is chemosynthesis?

What is an energy source for organisms involved in chemosynthesis?

Consumers

Organisms that cannot make their own energy-rich molecules are called consumers. Consumers obtain energy by eating other organisms. Figure 13 shows the four general categories of consumers. Herbivores are the vegetarians of the world. They include rabbits, deer, and other plant eaters. Carnivores are animals that eat other animals. Frogs and spiders are carnivores that eat insects.

What are consumers and how do they obtain their energy?

What are the four general categories of consumers?

What are herbivores?

What are carnivores?

Omnivores, including pigs and humans, eat mostly plants and animals. Decomposers, including fungi, bacteria, and earthworms, consume wastes and dead organisms. Decomposers help recycle once-living matter by breaking it down into simple, energy-rich substances. These substances might serve as food for decomposers, be absorbed by plant roots, or be consumed by other organisms.

What are omnivores?

What are decomposers?

How do decomposers recycle once-living matter?

What do decomposers do for the ecosystem?

Food Chains

Ecology includes the study of how organisms depend on each other for food. A food chain is a simple model of how energy moves from producer plants to consumer animals. A food chain is all about eating and being eaten. A single ecosystem can have many food chains. For example, in a Midwestern farm field, food chains might include:

- corn→mouse→owl
- corn→blackbird→cat
- corn→caterpillar→crow

What is a food chain?

Partner talk: Explain one of the food chains in a Midwestern farm field.

Food Webs

When a member of one food chain eats a member of another food chain, the

chains connect. Then scientists draw bigger models called food webs. They show how food chains interact.

Each ecosystem contains many food chains and food webs. In this way, all living things depend on each other. Every individual in the ecosystem helps all the others live and survive.

What is a food web?

What does each ecosystem contain?

Why is every individual in an ecosystem important?



Student Chart 2.11: Interactive Reading Question

Look at the organism in the left column. Based on the reading, write where the organism gets its energy and what type of organism it is. Choose from the word bank below (you may repeat words): *carnivore*, *decomposer*, *herbivore*, *omnivore*, *producer*

Organism	Source of energy	Type of organism
		
		
		
		
		
		



Student Chart 2.12: Glossary

Complete glossary entries for these words:

- | | |
|--|-----------------------------------|
| <input type="radio"/> food chain | <input type="radio"/> food web |
| <input type="radio"/> energy pyramid | <input type="radio"/> producer |
| <input type="radio"/> consumer | <input type="radio"/> decomposer |
| <input type="radio"/> autotroph | <input type="radio"/> heterotroph |
| <input type="radio"/> herbivore | <input type="radio"/> omnivore |
| <input type="radio"/> carnivore | <input type="radio"/> source |
| <input type="radio"/> predator-prey relationship | |



Student Chart 2.13: Key Information

Use these words or phrases to complete the sentences below:

carnivore, decomposer, fungi, predator-prey relationship, producer, fish

- grass : cows : : phytoplanktons : _____
- _____ is where one living thing captures and eats another living thing.
- A _____ is a meat-eating organism with sharp canine teeth specialized to rip and tear flesh.
- A _____, such as _____, is a living thing that breaks down dead plants and animals for food.
- A _____ is an organism at the beginning of the food chain that makes its own food, usually through the process of photosynthesis.



Student Chart 2.14: Question for Further Study

Write a sentence about what you still want to learn.

One question I still have or something I want to learn more about is:



CREATE Model Life Science Lesson:
Ecology Set: Food Chains & Food Webs
Student Guide



Project QuEST
Model Life Science Lesson
Teacher Guide: Ecology Set Review

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QuEST Middle School Science: Life Science
Ecology Lesson Set Review

Framework for K-12 Science Education: Dimension 3—Life Science

- **Disciplinary Core Idea (LS2.A)—Interdependent Relationships in Ecosystems:** Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. Growth of organisms and population increases are limited by access to resources. In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction.
- **Disciplinary Core Idea (LS2.B)—Cycles of Matter and Energy Transfer in Ecosystems:** Food webs are models that demonstrate how matter and energy are transferred between producers, consumers, and decomposers as the three groups interact—primarily for food—within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. For example, when molecules from food react with oxygen captured from the environment, the carbon dioxide and water this produces are transferred back to the environment, and ultimately so are waste products, such as fecal material. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem.

Connections to the Common Core State Standards (ELA)

- **L6:** Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Materials

- **Engagement Activity I**
 - Mix and Match Cards
- **Evaluation**
 - Ecology Lesson 3 Student Guide--handout

Teacher Prep

- Review instructions for review activity.

- Review teacher and student charts.

Objectives

- **Science**
 - Students review science content.
- **Language**
 - Students write vocabulary.
- **Vocabulary**
 - Students review vocabulary from Lessons 1 and 2.
 - General academic: *identify, source*
 - Science content: *abiotic, autotroph, biotic, consumer, decomposer, ecosystem, energy pyramid, environment, food chain, food web, organism, predator-prey relationship, producer*

Overview of Activities

Engagement

- **Activity I: Mix and Match.** Teacher distributes cards; students read their cards; students have 2 minutes to mix and trade cards; students match their cards to the corresponding word or definition on another student's card; student pairs share the word and definition with the whole class.

Evaluation

- **Activity II: Vocabulary and science assessments.** Teacher hands out Student Charts for lesson 3; teacher reviews instructions for each assessment; students complete assessment in allotted time—20 minutes.
- **Activity III: Review of vocabulary and science assessment. Review of vocabulary and science assessment.** Teacher reviews assessment questions, one by one; students correct incorrect responses; teacher asks students if they have any questions; teacher reviews crossword puzzle from previous week.

Extension/Differentiation Activity

- **Activity IV: Crossword Puzzles.** Students complete crossword puzzles when they finish their assessments or as homework.

Lesson Content



Engagement

Student Activity I (Mix and Match cards)

10 minutes

Activity Overview: Mix and Match. Teacher introduces game; students play Mix and Match.

- Review instructions with students.
- Distribute cards.
- Have students mix (the opportunity to trade cards) and match (find the word or definition which matches what is on their card).
- Make sure each student has a match.
- Have student pairs share their word and definition with the class.



Evaluation

Student Activity II (Student Charts 3.1 –3.3)

20 minutes

Activity Overview: Vocabulary and Science Assessment. Teacher hands out Student Charts for Lesson 3; teacher reviews instructions for each assessment; students complete assessment in allotted time (20 minutes).

Teacher's note: For students who have not yet finished in 20 minutes, the answers will be reviewed in Student Activity III.

- Hand out Student Charts 3.1, 3.2, and 3.3.
- Tell students to turn to the Vocabulary Assessment in Student Chart 3.1 and the Science Assessment in Student Chart 3.2.
- Review instructions with students.
- Give students 20 minutes to complete the Charts.
- Students who finish early can work on a crossword puzzle. Those who don't finish early can complete the crossword for homework or the following week if they complete activities early.

Student Activity III

20 minutes

Activity Overview: Review of Vocabulary and Science Assessment. Teacher reviews assessment questions, one by one; students correct incorrect responses; teacher asks

students if they have any questions; teacher reviews crossword puzzle from previous week.

Teacher note: Please devote up to 20 minutes to this activity. It is very important that you review assessment results with students and they correct their mistakes.

- Review assessment items by displaying responses one by one.
- Ask students to highlight number of each incorrect response and correct it.
- Explain any misunderstandings.



Extension/Differentiation

- Student Activity IV: Crossword Puzzle (Student Chart 3.3).

Lesson 3 Student Assessment



Teacher Chart 3.1: Answers to Vocabulary Assessment

Write the letter that matches each definition in the space provided.

<u>I</u> 1. A(n) _____ is a simple model of how energy moves from producers to consumers in an ecosystem.	A. abiotic
<u>C</u> 2. _____ describes the living parts of the environment.	B. autotroph
<u>K</u> 3. To _____ is to point out, find, or name something.	C. biotic
<u>F</u> 4. A(n) _____ is all of the living and nonliving organisms in a particular area, and how they are related to each other and to their environment.	D. consumer
<u>N</u> 5. A(n) _____ is an organism at the beginning of the food chain that makes its own food, usually through the process of photosynthesis.	E. decomposer
<u>B</u> 6. A(n) _____ is an organism, such as a plant, that makes its own food.	F. ecosystem
<u>J</u> 7. A(n) _____ is a model showing how food chains interact.	G. energy pyramid
<u>M</u> 8. A(n) _____ is where one living thing captures and eats another living thing.	H. environment
<u>E</u> 9. A(n) _____ is a living thing that breaks down dead plants and animals for food.	I. food chain
<u>H</u> 10. _____ means everything that surrounds a living thing and affects its growth and health.	J. food web
<u>A</u> 11. _____ describes the nonliving parts of the environment, including light, temperature, rocks, and gases.	K. identify
<u>O</u> 12. A(n) _____ is the start or cause of something.	L. organism
<u>G</u> 13. A(n) _____ is a diagram that shows how many organisms are in each part of the food chain.	M. predator-prey relationship
<u>L</u> 14. A(n) _____ is a living thing.	N. producer
<u>D</u> 15. A(n) _____ is an organism that gets its energy by eating other living organisms.	O. source

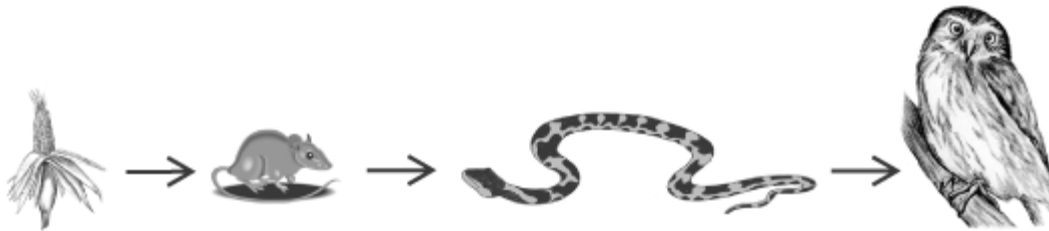


Student Chart 3.2: Science Assessment

DIRECTIONS:

Read each question and choose the best answer.

1. In the food chain below, where does the snake get its energy?



- A. from the owl
- B. from the corn.
- C. from the mouse.**
- D. from bacteria in the soil.

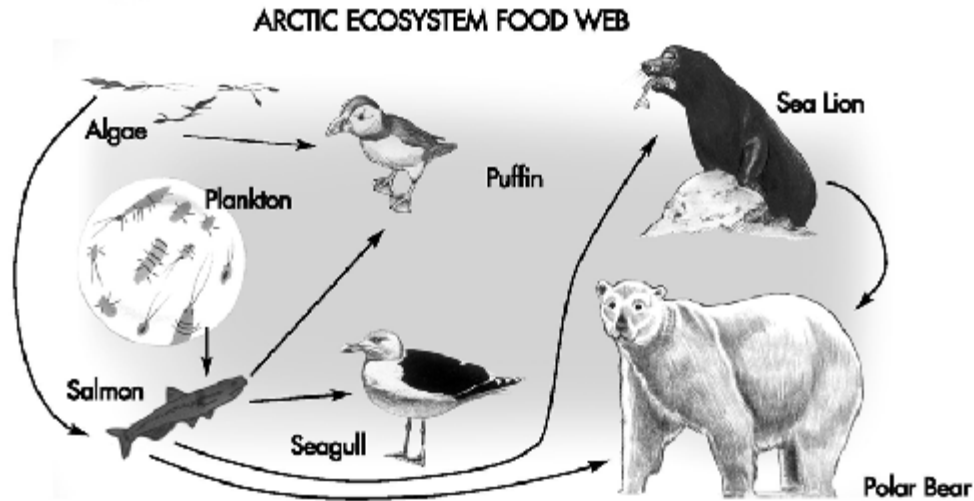
2. In a meadow ecosystem, grasses carry out photosynthesis and serve as the main producers of the ecosystem. Which of the following organisms is most likely to carry out this same role in an Arctic ocean ecosystem?

- A. bacteria
- B. algae**
- C. mosquito larvae
- D. protozoans

3. Which of these is true about energy pyramids?

- A. Producers are the top trophic level in the pyramid.
- B. Producers are the most numerous, so they are on the bottom.**
- C. Consumers are the most numerous, so they are on the bottom.
- D. Producers are the most numerous, so they are on top.

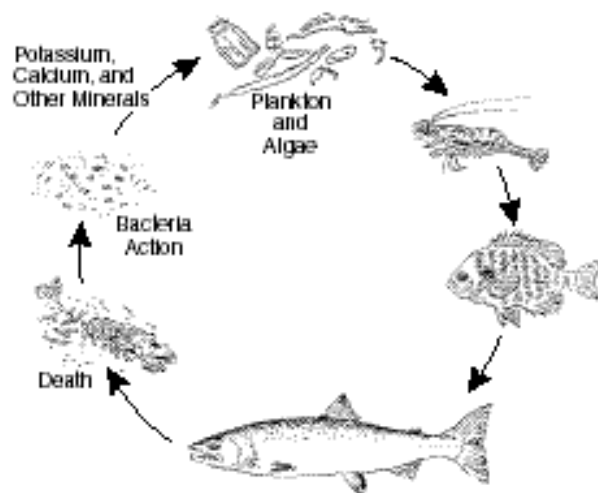
4. Which of the following correctly describes the flow of energy in one food chain from the food web below?



- A. Energy flows from the plankton to the salmon and then to the polar bear.
- B. Energy flows from the plankton to the salmon to the sea lion and then to the polar bear.
- C. Energy flows from the algae to the puffin to the sea lion and then to the polar bear.
- D. *Both A and B are correct*

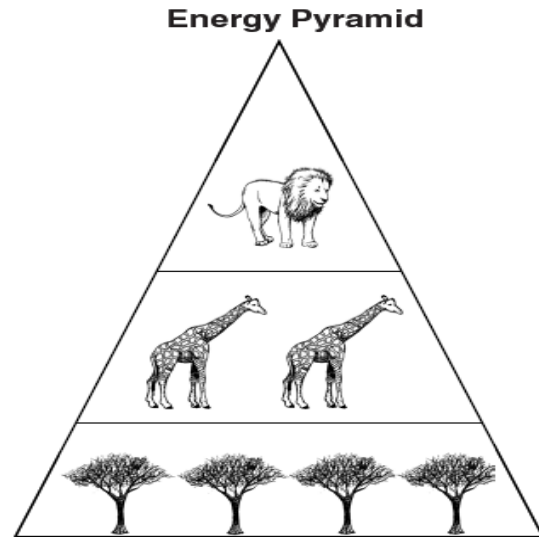
5. According to the diagram on the below, both of these fish...

- A. eat bacteria.
- B. give off toxic wastes
- C. take in minerals through their gills.
- D. *get their energy from other animals.*



6. Which of these best describes a relationship shown by this African energy pyramid?

- A. *The lion is a predator of the giraffes.*
- B. The lion is the prey of the giraffes.
- C. Giraffes are the prey of the trees.
- D. Giraffes are predators of the lion.

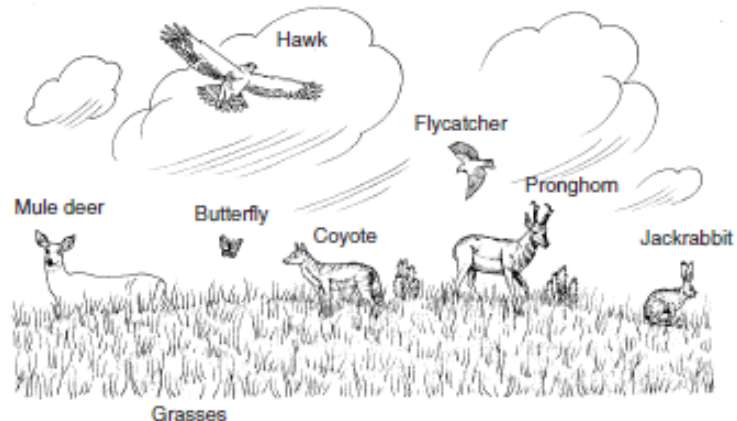


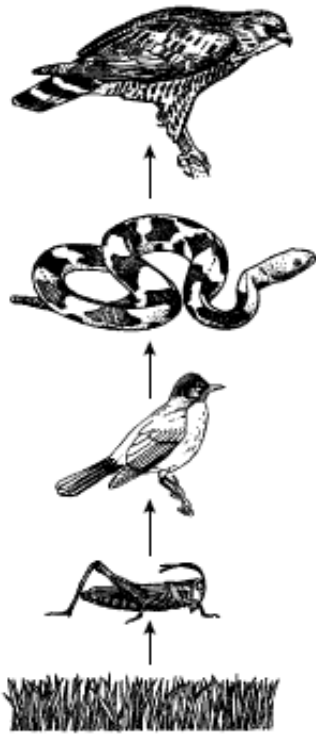
7. Organisms that absorb nutrients from dead plants and animals are called...

- A. carnivores
- B. *decomposers*
- C. herbivores
- D. producers

8. Look at the grassland community below. Grasses are considered...

- A. secondary consumers
- B. primary consumers
- C. decomposers
- D. *producers*





9. In a food chain such as the one on the left, the numbers of each type of population stay in the same proportion. If humans interfered by spraying an insecticide to kill the insects, what would be the next thing that would happen?

- A. The number of hawks would increase.
- B. *The number of songbirds would decrease.***
- C. The number of grass plants would decrease.
- D. The number of snakes would increase.

10. Create and label your own food chain. Then draw the energy pyramid that corresponds with your food chain:

A large empty rectangular box provided for the student to draw their own food chain and the corresponding energy pyramid.

**Student Chart 3.3****Student Crossword Puzzle 1**

Use your glossary to complete the crossword puzzle.

Across

2. Food [web] is a model showing how food chains interact.
4. [Abiotic] describes the nonliving parts of the environment, including light, temperature, rocks, and gases.
5. A [decomposer] is a living thing that breaks down dead plants and animals for food.
7. To [identify] is to point out, find, or name something.
8. [Environment] means everything that surrounds a living thing and affects its growth and health.
10. An [organism] is a living thing.
11. A [source] is the start or cause of something.
13. [Producers] are organisms at the beginning of the food chain that make their own food, usually through the process of photosynthesis.

Down

1. [Consumers] are organisms that get their energy by eating other living organisms.
3. [Biotic] describes the living parts of the environment.
6. [Predator]-prey relationship is where one living thing captures and eats another living thing.
8. An [ecosystem] is all of the living and nonliving things in a particular area, and how they are related to each other and to their environment.
9. A food [chain] is a simple model of how energy moves from producers to consumers in an ecosystem.
12. An [autotroph] is an organism, such as a plant, that makes its own food.
13. An energy [pyramid] is a diagram that shows how many organisms are in each part of the food chain.

Slide 1







Ecology Set


Ecology Set Review:
Food Chains & Food Webs



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CREATE

Slide 2



Mix and Match


1. Every student gets **1 card**.
2. **Read** your card to understand it:
 - Half of the cards have **vocabulary words**.
 - Half of the cards have **definitions**.
3. You have 2 minutes to **trade your card** for another one if you do not understand the meaning of the vocabulary word or definition.
4. Now **walk around the room** and find the person who has the word or definition that **matches** what is on your card. Read the word and definition aloud to each other.
5. **Stay** with your partner and the matching cards.
6. Be prepared to **share the word and the definition** with the whole class.

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[No Student Chart for this Activity]

Pacing for Mix and Match: 10 minutes

- Review instructions with students.
- Distribute cards.
- Have students mix (the opportunity to trade cards) and match (find the word or definition which matches what is on their card).
- Make sure each student has a match.
- Have student pairs share their word and definition with the class.



Assessments

- Turn to **Student Charts 3.1 and 3.2.**
- These charts assess the vocabulary and science knowledge covered in the last two lessons.
- Now we will review the instructions to both assessments and then you can begin.
- You have **20 minutes** to complete the assessments.
- Once you finish, start the **crossword puzzle**, Student Chart 3.3.

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Pacing for Students to Complete Assessments: 20 minutes

- Hand out Student Charts for lesson 3.
- Review instructions with students.
- Give students 20 minutes to complete the Charts.

3.1: Assessment Answers

I 1. A(n) food chain is a simple model of how energy moves from producers to consumers in an ecosystem.

C 2. Biotic describes the living parts of the environment.

K 3. To identify is to point out, find, or name something.

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Pacing for Review of Assessments: 20 minutes

- Have students turn to Student Chart 3.1.
- Display responses.
- Have students correct responses as necessary.
- Explain any misunderstandings.

3.1: Assessment Answers, cont.

F 4. A(n) ecosystem is all of the living and nonliving things in a particular area, and how they are related to each other and to their environment.

N 5. A(n) producer is an organism at the beginning of the food chain that makes its own food, usually through the process of photosynthesis.

B 6. A(n) autotroph is an organism, such as a plant, that makes its own food.

Note: Producer and autotroph mean the same thing and can be used in either sentence #5 or #6.

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- Follow the same routine.

3.1: Assessment Answers, cont.

J 7. A(n) food web is a model showing how food chains interact.

M 8. A(n) predator-prey relationship is where one living thing captures and eats another living thing.

E 9. A(n) decomposer is a living thing that breaks down dead plants and animals for food.

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- Follow the same routine.

3.1: Assessment Answers, cont.

H 10. Environment means everything that surrounds a living thing and affects its growth and health.

A 11. Abiotic describes the nonliving parts of the environment, including light, temperature, rocks, and gases.

O 12. A(n) source is the start or cause of something.

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- Follow the same routine.

3.1: Assessment Answers, cont.

G 13. A(n) energy pyramid is a diagram that shows how many organisms are in each part of the food chain.

L 14. A(n) organism is a living thing.

D 15. A(n) consumer is an organism that gets its energy by eating other living organisms.


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- Display responses.
- Have students correct responses as necessary.
- Explain any misunderstandings.

3.2: Assessment Answers

DIRECTIONS:
Read each question and choose the best answer.

1. In the food chain below, where does the snake get its energy?



```

graph LR
    A[Plant] --> B[Mouse]
    B --> C[Snake]
    C --> D[Owl]
  
```

A. from the owl
 B. from the corn.
☒ C. from the mouse.
 D. from bacteria in the soil.

2. In a meadow ecosystem, grasses carry out photosynthesis and serve as the main producers of the ecosystem. Which of the following organisms is most likely to carry out this same role in an Arctic ocean ecosystem?

A. bacteria
☒ B. algae
 C. mosquito larvae
 D. protozoans

3. Which of these is true about energy pyramids?

A. Producers are the top trophic level in the pyramid.
☒ B. Producers are the most numerous, so they are on the bottom.
 C. Consumers are the most numerous, so they are on the bottom.
 D. Producers are the most numerous, so they are on top.

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- Have students turn to Student Chart 3.2.
- Display responses.
- Have students correct responses as necessary.
- Explain any misunderstandings.

3.2: Assessment Answers

4. Which of the following correctly describes the flow of energy in one food chain from the food web below?

ARCTIC ECOSYSTEM FOOD WEB

The diagram shows an Arctic ecosystem food web. Algae is at the bottom left, with arrows pointing to Plankton and Salmon. Plankton has an arrow pointing to Puffin. Salmon has an arrow pointing to Puffin. Puffin has an arrow pointing to Sea Lion. Sea Lion has an arrow pointing to Polar Bear. There is also a direct arrow from Algae to Polar Bear.

A. Energy flows from the plankton to the salmon and then to the polar bear.
 B. Energy flows from the plankton to the salmon to the sea lion and then to the polar bear.
 C. Energy flows from the algae to the puffin to the sea lion and then to the polar bear.
 D. Both A and B are correct

5. According to the diagram on the below, both of these fish—

A. eat bacteria.
 B. give off toxic wastes
 C. take in minerals through their gills.
 D. get their energy from other animals.

The diagram shows a cycle of energy flow. Plankton, Crustaceans, and Other Invertebrates are at the top, with an arrow pointing to Fish and Algae. Fish and Algae have an arrow pointing to Bacteria. Bacteria has an arrow pointing back to Plankton, Crustaceans, and Other Invertebrates.

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- Have students turn to Student Chart 3.2.
- Display responses.
- Have students correct responses as necessary.
- Explain any misunderstandings.

3.2: Assessment Answers

6. Which of these best describes a relationship shown by this African energy pyramid?

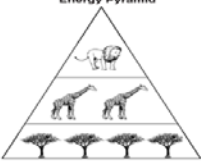
☒ A. The lion is a predator of the giraffes.
 B. The lion is the prey of the giraffes.
 C. Giraffes are the prey of the trees.
 D. Giraffes are predators of the lion.

7. Organisms that absorb nutrients from dead plants and animals are called—


A. carnivores
☒ B. decomposers
 C. herbivores
 D. producers

8. Look at the grassland community below. Grasses are considered—

A. secondary consumers
 B. primary consumers
☒ C. decomposers
 D. producers




Energy Pyramid



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- Have students turn to Student Chart 3.2.
- Display responses.
- Have students correct responses as necessary.
- Explain any misunderstandings.

3.2: Assessment Answers



9. In a food chain such as the one on the left, the numbers of each type of population usually stay in the same proportion. If humans interfered by spraying an insecticide to kill the insects, what would be the next thing that would happen?

- A. The number of hawks would increase.
- ☒ B. The number of songbirds would decrease.
- C. The number of grass plants would decrease.
- D. The number of snakes would increase.

10. Create and label your own food chain. Then draw the energy pyramid that corresponds with your food chain:

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- Have students turn to Student Chart 3.2.
- Display responses.
- Have students correct responses as necessary.
- Explain any misunderstandings.
- You ask students to display their answers for #9 under the ELMO. Answers will vary.



Project QuEST
Model Life Science Lesson
Student Guide: Ecology Set Review

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Lesson 3 Ecology Set Student Assessment



Student Chart 3.1: Vocabulary Assessment

Write the letter that matches each definition in the space provided.
Note that some words can be used in more than one sentence.

- | | |
|--|-------------------------------|
| ___ 1. A(n) ___ is a simple model of how energy moves from producers to consumers in an ecosystem. | A. abiotic |
| ___ 2. ___ describes the living parts of the environment. | B. autotroph |
| ___ 3. To ___ is to point out, find, or name something. | C. biotic |
| ___ 4. A(n) ___ is all of the living and nonliving things in a particular area, and how they are related to each other and to their environment. | D. consumer |
| ___ 5. A(n) ___ is an organism at the beginning of the food chain that makes its own food, usually through the process of photosynthesis. | E. decomposer |
| ___ 6. A(n) ___ is an organism, such as a plant, that makes its own food. | F. ecosystem |
| ___ 7. A(n) ___ is a model showing how food chains interact. | G. energy pyramid |
| ___ 8. A(n) ___ is where one living thing captures and eats another living thing. | H. environment |
| ___ 9. A(n) ___ is a living thing that breaks down dead plants and animals for food. | I. food chain |
| ___ 10. ___ means everything that surrounds a living thing and affects its growth and health. | J. food web |
| ___ 11. ___ describes the nonliving parts of the environment, including light, temperature, rocks, and gases. | K. identify |
| ___ 12. A(n) ___ is the start or cause of something. | L. organism |
| ___ 13. A(n) ___ is a diagram that shows how many organisms are in each part of the food chain. | M. predator-prey relationship |
| ___ 14. A(n) ___ is a living thing. | N. producer |
| ___ 15. A(n) ___ is an organism that gets its energy by eating other living organisms. | O. source |

**Student Chart 3.2: Science Assessment**

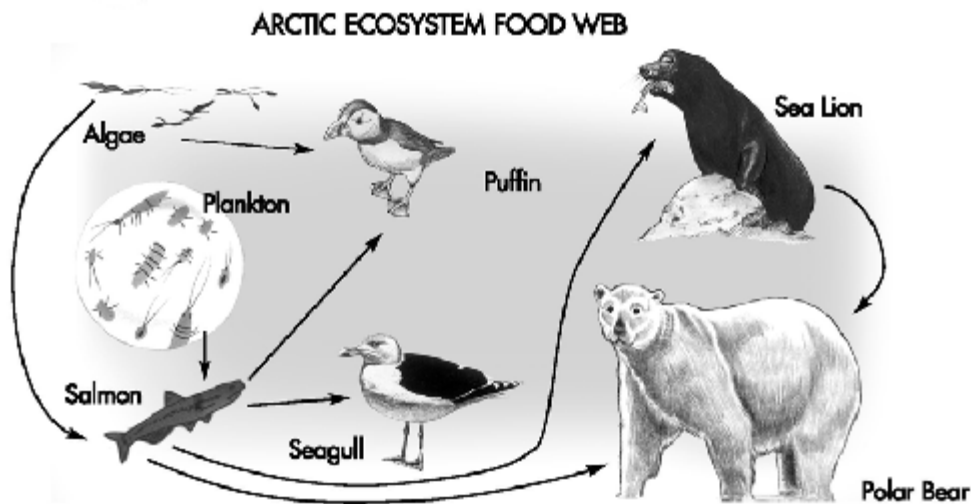
Read each question and choose the best answer.

1. In the food chain below, where does the snake get its energy?



- A. from the owl
 - B. from the corn.
 - C. from the mouse.
 - D. from bacteria in the soil.
2. In a meadow ecosystem, grasses carry out photosynthesis and serve as the main producers of the ecosystem. Which of the following organisms is most likely to carry out this same role in an Arctic ocean ecosystem?
- A. bacteria
 - B. algae
 - C. mosquito larvae
 - D. protozoans
3. Which of these is true about energy pyramids?
- A. Producers are the top trophic level in the pyramid.
 - B. Producers are the most numerous, so they are on the bottom.
 - C. Consumers are the most numerous, so they are on the bottom.
 - D. Producers are the most numerous, so they are on top.

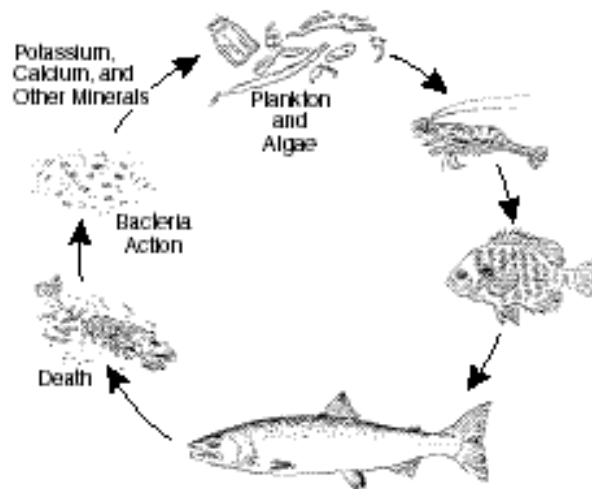
4. Which of the following correctly describes the flow of energy in one food chain from the food web below?



- A. Energy flows from the plankton to the salmon and then to the polar bear.
- B. Energy flows from the plankton to the salmon to the sea lion and then to the polar bear.
- C. Energy flows from the algae to the puffin to the sea lion and then to the polar bear.
- D. Both A and B are correct.

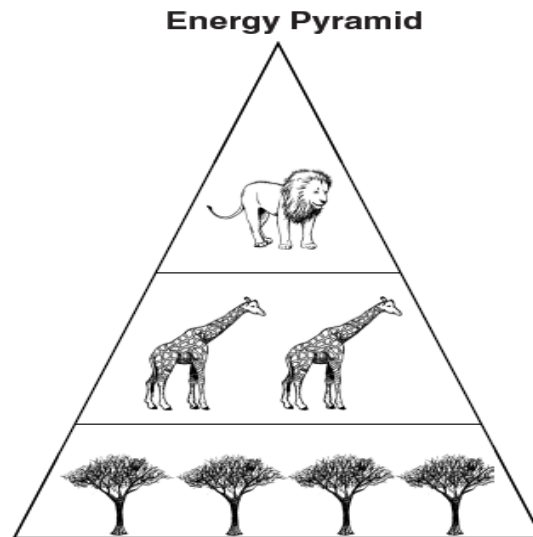
5. According to the diagram on the below, both of these fish...

- A. eat bacteria.
- B. give off toxic wastes.
- C. take in minerals through their gills.
- D. Get their energy from other animals.



6. Which of these best describes a relationship shown by this African energy pyramid?

- A. The lion is a predator of the giraffes.
- B. The lion is the prey of the giraffes.
- C. Giraffes are the prey of the trees.
- D. Giraffes are predators of the lion.

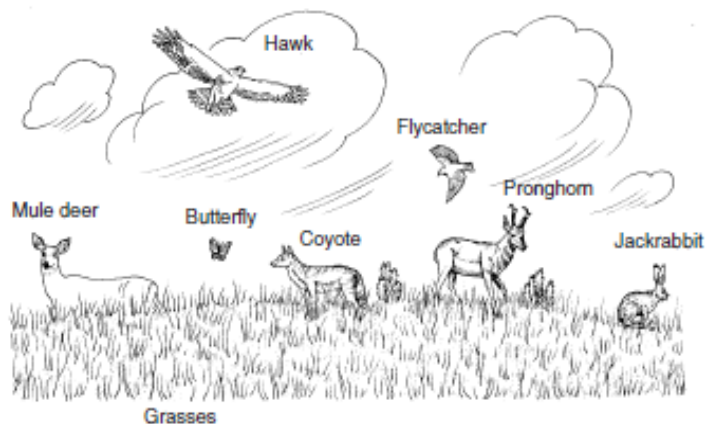


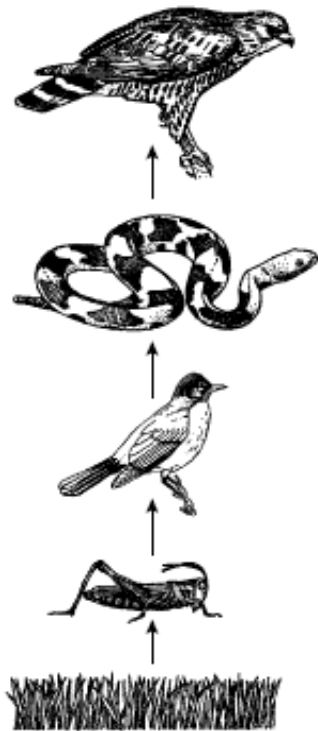
7. Organisms that absorb nutrients from dead plants and animals are called...

- A. carnivores
- B. decomposers
- C. herbivores
- D. producers

8. Look at the grassland community below. Grasses are considered...

- A. secondary consumers
- B. primary consumers
- C. decomposers
- D. producers





9. In a food chain such as the one on the left, the numbers of each type of population usually stay in the same proportion. If humans interfered by spraying an insecticide to kill the insects, what would be the next thing that would happen?

- A. The number of hawks would increase.
- B. The number of songbirds would decrease.
- C. The number of grass plants would decrease.
- D. The number of snakes would increase.

10. Create and label your own food chain. Then draw the energy pyramid that corresponds with your food chain:

A large, empty rectangular box with a black border, intended for a student to draw their own food chain and the corresponding energy pyramid.

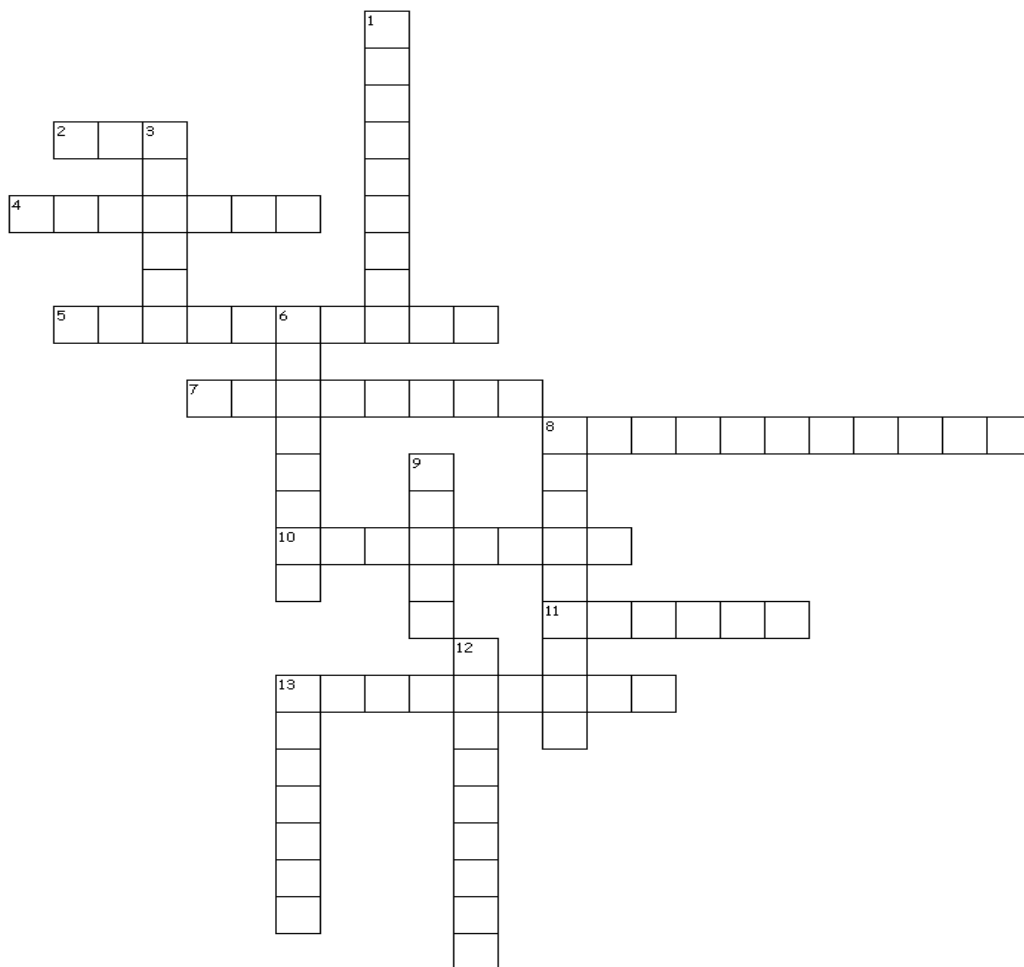


Student Chart 3.3: Student Crossword Puzzle

Use your glossary to complete the crossword puzzle.

Word Bank

identify
source
organism
environment
ecosystem
biotic
abiotic
producers
consumers
predator
chain
web
pyramid
autotroph
decomposer







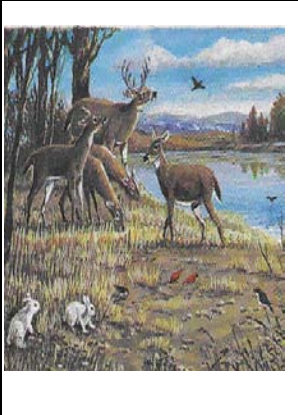
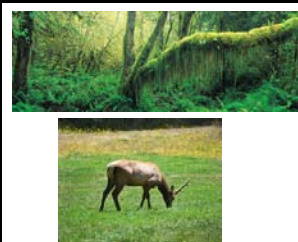
Across

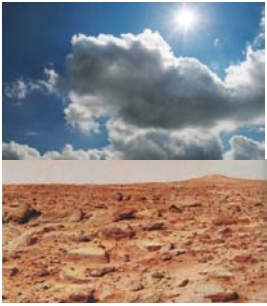

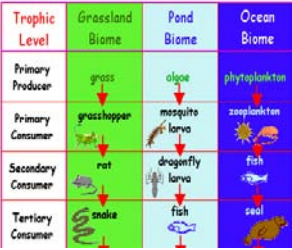
2. A food _____ is a model showing how food chains interact.
4. _____ describes the nonliving parts of the environment, including light, temperature, rocks, and gases.
5. A _____ is a living thing that breaks down dead plants and animals for food.
7. To _____ is to point out, find, or name something.
8. _____ means everything that surrounds a living thing and affects its growth and health.
10. An _____ is a living thing.
11. A _____ is the start or cause of something.
13. _____ are organisms at the beginning of the food chain that make their own food, usually through the process of photosynthesis.

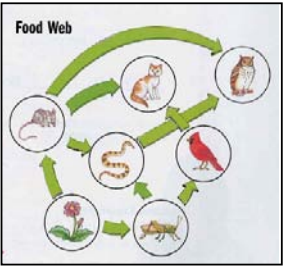
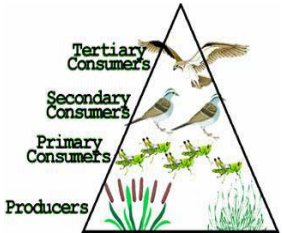

Down





1. _____ are organisms that get their energy by eating other living organisms.
3. _____ describes the living parts of the environment.
6. _____-prey relationship is where one living thing captures and eats another living thing.
8. An _____ is all of the living and nonliving things in a particular area, and how they are related to each other and to their environment.
9. A food _____ is a simple model of how energy moves from producers to consumers in an ecosystem.
12. An _____ is an organism, such as a plant, that makes its own food.
13. An energy _____ is a diagram that shows how many organisms are in each part of the food chain.





Ecology Unit Glossary					
Vocabulary Word	Cognate?	Definition	Question	Picture	My Understanding: drawing, examples, or notes
Lesson 1					
English: _____		<u>Ecology</u> is the study of the interactions that take place among organisms and their environment.	If you were an ecologist what habitat would you like to study? _____ _____ _____		
Español: _____		<u>Ecología</u> es el estudio de las interacciones que se llevan a cabo entre los organismos y su medio ambiente.			
English: _____		<u>Organisms</u> are living things.	Circle the organism(s): _____		
Español: _____		<u>Organismos</u> son los seres vivos.	  		
English: _____		<u>Environment</u> means everything that surrounds a living thing and affects its growth and health.	How can you affect your environment in a positive way? _____ _____ _____		
Español: _____		El <u>medio ambiente</u> es todo lo que rodea a un ser vivo y afecta su crecimiento y salud.			



<p>English:</p> <hr/> <p>Español:</p> <hr/>	<p>A <u>habitat</u> is a place where an organism lives and that provides the types of food, shelter, moisture, and temperature needed for survival.</p> <p><u>Hábitat</u> es el lugar donde vive un organismo y le provee el tipo de alimento, refugio, humedad y temperatura que necesita para sobrevivir.</p>	<p>Could a deer survive in a desert habitat? Why or why not?</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		
<p>English:</p> <hr/> <p>Español:</p> <hr/>	<p>An <u>ecosystem</u> is all of the living and nonliving things in a particular area, and how they are related to each other and to their environment.</p> <p>Un <u>ecosistema</u> está formado por todos los animales y plantas que viven en un área específica, y que se relacionan entre sí y con su medio ambiente.</p>	<p>Describe the ecosystem near your house.</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>		
<p>English:</p> <hr/> <p>Español:</p> <hr/>	<p><u>Biotic</u> describes the living parts of the environment.</p> <p><u>Biótico</u> se refiere a las partes vivas del medio ambiente</p>	<p>Name a biotic part of the ecosystem near your house.</p> <hr/> <hr/> <hr/> <hr/>		

English: _____		Abiotic describes the nonliving parts of the environment, including light, temperature, rocks, and gases.	Name an abiotic part of the ecosystem near your house. _____ _____ _____ _____ _____		
Español: _____		<u>Abiótico</u> describe las partes del medio ambiente que no son vivas , incluyendo la luz, la temperatura, las rocas y los gases.			
English: _____		To <u>identify</u> is to point out, find, or name something.	Identify some inherited traits in your family: _____ _____ _____ _____ _____		
Español: _____		<u>Identificar</u> se refiere a reconocer, encontrar o poner un nombre a algo.			
Lesson 2					
English: _____		A <u>food chain</u> is a simple model of how energy moves from producers to consumers in an ecosystem.	The mosquito larva consumes _____ The seal consumes _____		
Español: _____		La <u>cadena alimenticia</u> es un modelo simple de cómo la energía es transferida de productores a consumidores en un ecosistema.			

<p>English:</p> <hr/> <p>Español:</p> <hr/>	<p>A <u>food web</u> is a model showing how food chains interact.</p> <p>Una <u>red alimenticia</u> es un modelo que muestra cómo interactúan las cadenas alimenticias.</p>	<p>The cat eats</p> <hr/> <p>and</p> <hr/>		
<p>English:</p> <hr/> <p>Español:</p> <hr/>	<p>An <u>energy pyramid</u> is a diagram that shows how many organisms are in each part of the food chain.</p> <p>Una <u>pirámide energética</u> es un diagrama que muestra cuántos organismos hay en cada una de las partes de la cadena alimenticia.</p>	<p>An energy pyramid shows that an ecosystem requires more</p> <hr/> <p>than consumers.</p>		
<p>English:</p> <hr/> <p>Español:</p> <hr/>	<p><u>Producers</u> are organisms at the beginning of the food chain that make their own food, usually through the process of photosynthesis.</p> <p><u>Productores</u> son las plantas y vegetales que se encuentran al comienzo de la cadena alimenticia y que fabrican su propia comida por medio de la fotosíntesis.</p>	<p>Name some producers that live in the ecosystem near your house or school.</p> <hr/> <hr/> <hr/>		

<p>English:</p> <hr/> <p>Español:</p> <hr/>	<p><u>Consumers</u> are organisms that get their energy by eating other living organisms.</p> <p><u>Consumidores</u> son los organismos que se alimentan de otros organismos vivos para obtener energía.</p>	<p>Name some consumers that live in the ecosystem near your house or school.</p> <hr/> <hr/> <hr/>		
<p>English:</p> <hr/> <p>Español:</p> <hr/>	<p>A <u>decomposer</u> is a living thing that breaks down dead plants and animals for food.</p> <p><u>Descomponedor</u> es un ser vivo que desintegra plantas y animales muertos como medio de sustentación.</p>	<p>Name some decomposers that likely live in the ecosystem near your house or school.</p> <hr/> <hr/> <hr/>		
<p>English:</p> <hr/> <p>Español:</p> <hr/>	<p>An <u>autotroph</u> is an organism, such as a plant, that makes its own food.</p> <p>Un <u>autótrofo</u> es un organismo similar a una planta, la que fabrica su propio alimento.</p>	<p>An autotroph is a synonym for a _____.</p>		
<p>English:</p> <hr/> <p>Español:</p> <hr/>	<p>A <u>heterotroph</u> is an organism that obtains the energy it needs by feeding on other organisms.</p> <p>Un <u>heterótrofo</u> es un organismo que obtiene la energía que necesita alimentándose de otros organismos.</p>	<p>A heterotroph is a synonym for a _____.</p>		

<p>English:</p> <hr/> <p>Español:</p> <hr/>	<p>An <u>herbivore</u> is a plant-eating organism with incisors specialized to cut vegetation and large, flat molars to grind it.</p> <p>Un <u>herbívoro</u> es un organismo que come plantas, y que tiene incisivos especializados para cortar vegetación y molares planos para molerla.</p>	<p>Do herbivores eat producers?</p> <p>Yes or No?</p>		
<p>English:</p> <hr/> <p>Español:</p> <hr/>	<p>An <u>omnivore</u> is a plant- and meat-eating organism with incisors specialized to cut vegetables, premolars to chew meat, and molars to grind food.</p> <p>Un <u>omnívoro</u> es un organismo que come plantas y carnes, y que tiene incisivos especializados para cortar vegetales, premolares para masticar la carne, y molares para moler la comida.</p>	<p>Identify some omnivores:</p> <hr/> <hr/> <hr/>	 	
<p>English:</p> <hr/> <p>Español:</p> <hr/>	<p>A <u>carnivore</u> is a meat-eating organism with sharp canine teeth specialized to rip and tear flesh.</p> <p>Un <u>carnívoro</u> es un organismo que come carne y que tiene dientes caninos afilados especializados para desgarrar la carne.</p>	<p>Do carnivores eat producers?</p> <p>Yes or No?</p>		

<p>English:</p> <hr/> <p>Español:</p> <hr/>	<p>A <u>predator-prey relationship</u> is where one living thing captures and eats another living thing.</p> <p>Una <u>relación presa-predador</u> es cuando un ser vivo captura a otro ser vivo y se alimenta de él.</p>	<p>Which pair of animals below have a predator-prey relationship?</p> <p>cat worm eagle bear mouse frog</p>		
<p>English:</p> <hr/> <p>Español:</p> <hr/>	<p>A <u>source</u> is the start or cause of something.</p> <p>Un <u>fuelle</u> es el comienzo o causa de algo.</p>	<p>What is the source of energy for a carnivore?</p> <hr/> <hr/> <hr/>		

ecology



ecología

- Ecology is the study of the interactions that take place among organisms and their environment.
- Ecología es el estudio de las interacciones que se llevan a cabo entre los organismos y su medio ambiente.

organism



organismo

- An organism is a living thing.
- An organismo es un ser vivo.

environment



medio ambiente

- Environment means everything that surrounds a living thing and affects its growth and health.
- El medio ambiente es todo lo que rodea a un ser vivo y afecta su crecimiento y salud.

habitat



habitat

- A habitat is a place where an organism lives and that provides the types of food, shelter, moisture, and temperature needed for survival.
- Un hábitat es el lugar donde vive un organismo y le provee el tipo de alimento, refugio, humedad y temperatura que necesita para sobrevivir.

ecosystem



ecosistema

- An ecosystem is all of the living and nonliving things in a particular area, and how they are related to each other and to their environment.
- Un ecosistema está formado por todos los animales y plantas que viven en un área específica, y que se relacionan entre sí y con su medio ambiente.

biotic



biótico

- Biotic describes the living parts of the environment.
- Biótico se refiere a las partes vivas del medio ambiente.

abiotic



abiótico

- Abiotic describes the nonliving parts of the environment, including light, temperature, rocks, and gases.
- Abiótico describe las partes del medio ambiente que no son vivas, incluyendo la luz, la temperatura, las rocas y los gases.

identify



identificar

- To identify is to point out, find, or name something.
- Identificar se refiere a reconocer, encontrar o poner un nombre a algo.

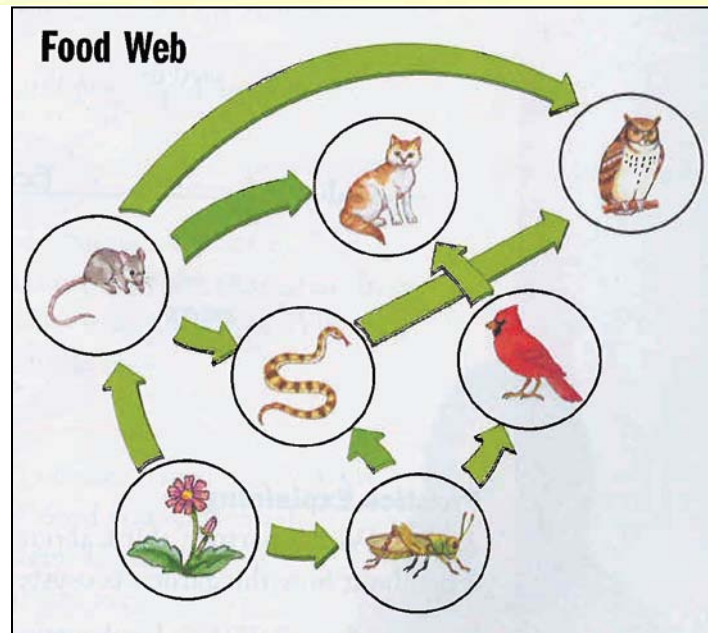
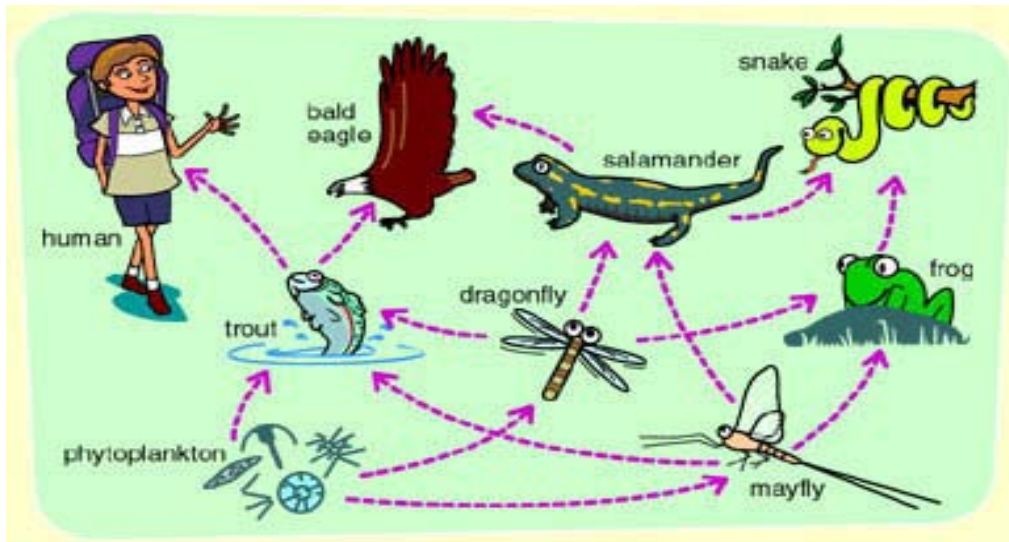
food chain

Trophic Level	Grassland Biome	Pond Biome	Ocean Biome
Primary Producer	grass ↓	algae ↓	phytoplankton ↓
Primary Consumer	grasshopper ↓	mosquito larva ↓	zooplankton ↓
Secondary Consumer	rat ↓	dragonfly larva ↓	fish ↓
Tertiary Consumer	snake ↓	fish ↓	seal ↓

cadena alimenticia

- A food chain is a simple model of how energy moves from producers to consumers in an ecosystem.
- La cadena alimenticia es un modelo simple de cómo la energía es transferida de productores a consumidores en un ecosistema.

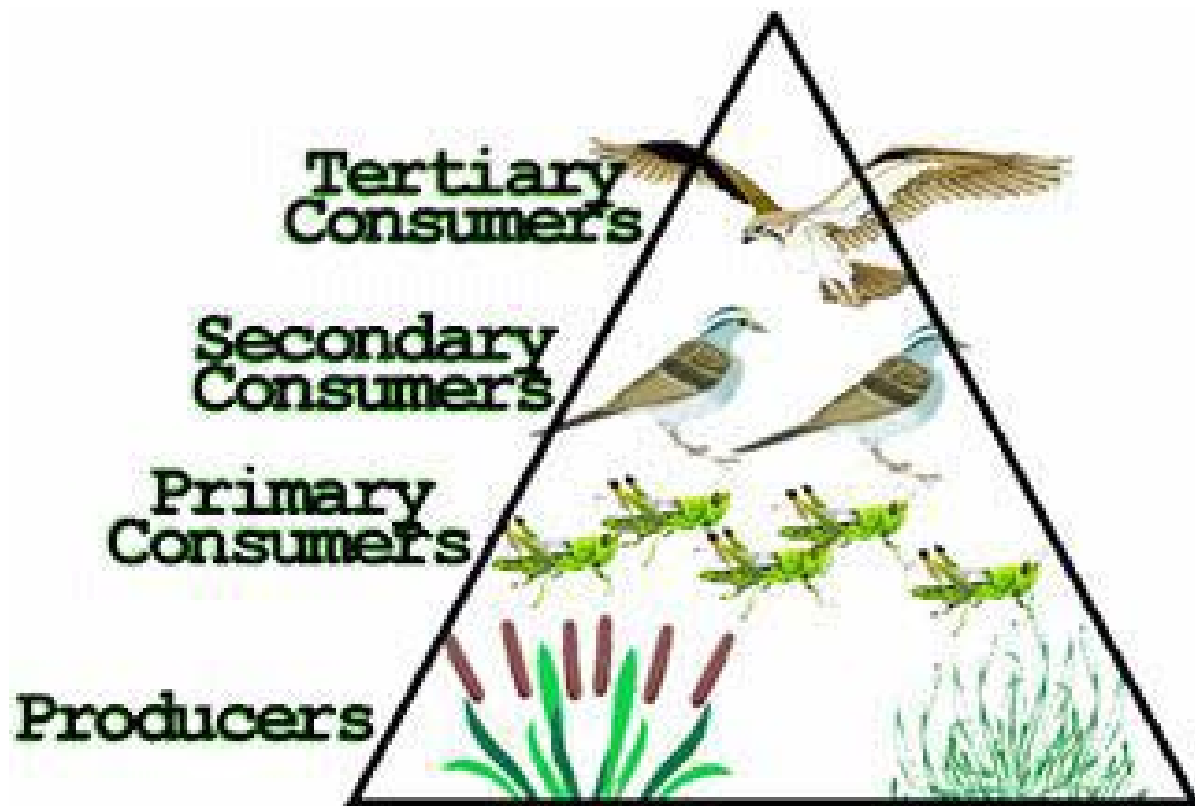
food web



red alimenticia

- A food web is a model showing how food chains interact.
- Una red alimenticia es un modelo que muestra cómo interactúan las cadenas alimenticias.

energy pyramid



pirámide energética

- An energy pyramid is a diagram that shows how many organisms are in each part of the food chain.
- Una pirámide energética es un diagrama que muestra cuántos organismos hay en cada una de las partes de la cadena alimenticia.

consumers



consumidores

- Consumers are organisms that get their energy by eating other living organisms.
- Consumidores son los organismos que se alimentan de otros organismos vivos para obtener energía.

producers



productores

- Producers are organisms at the beginning of the food chain that make their own food, usually through the process of photosynthesis.
- Productores son las plantas y vegetales que se encuentran al comienzo de la cadena alimenticia y que fabrican su propia comida por medio de la fotosíntesis.

decomposer



descomponedor

- A decomposer is a living thing that breaks down dead plants and animals for food.
- Descomponedor es un ser vivo que desintegra plantas y animales muertos como medio de sustentación.

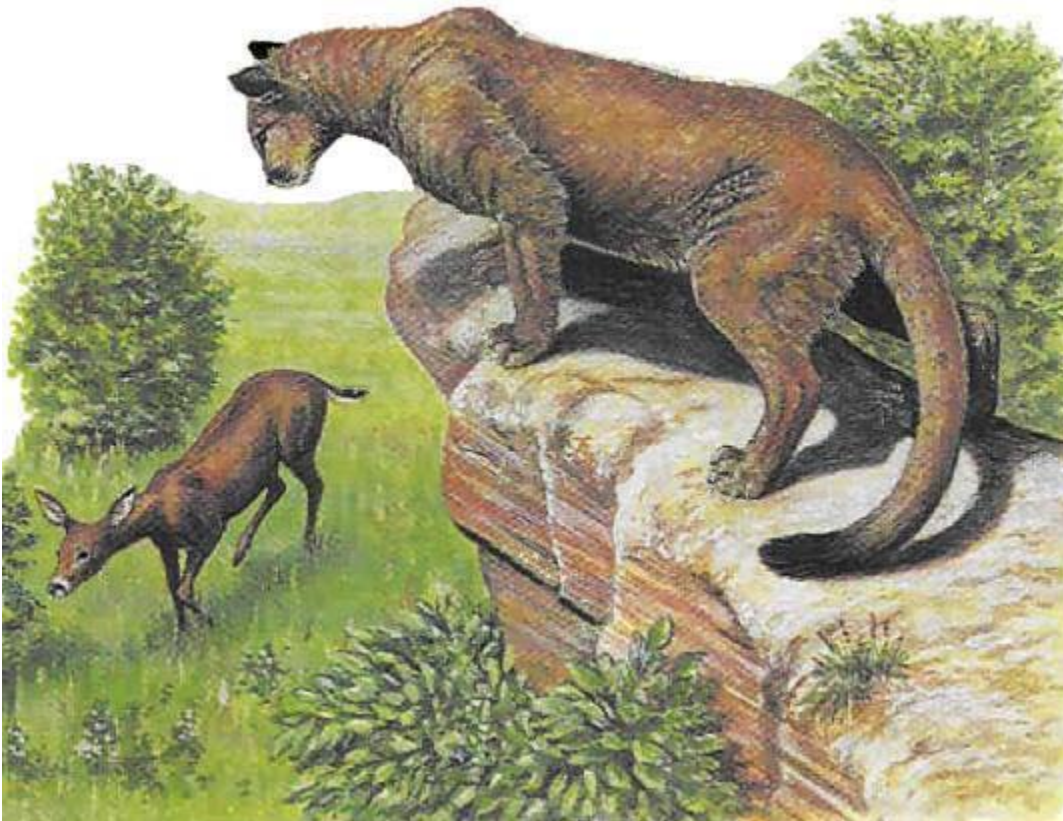
autotroph



autótrofo

- An autotroph is an organism, such as a plant, that makes its own food.
- Un autótrofo es un organismo similar a una planta, la que fabrica su propio alimento.

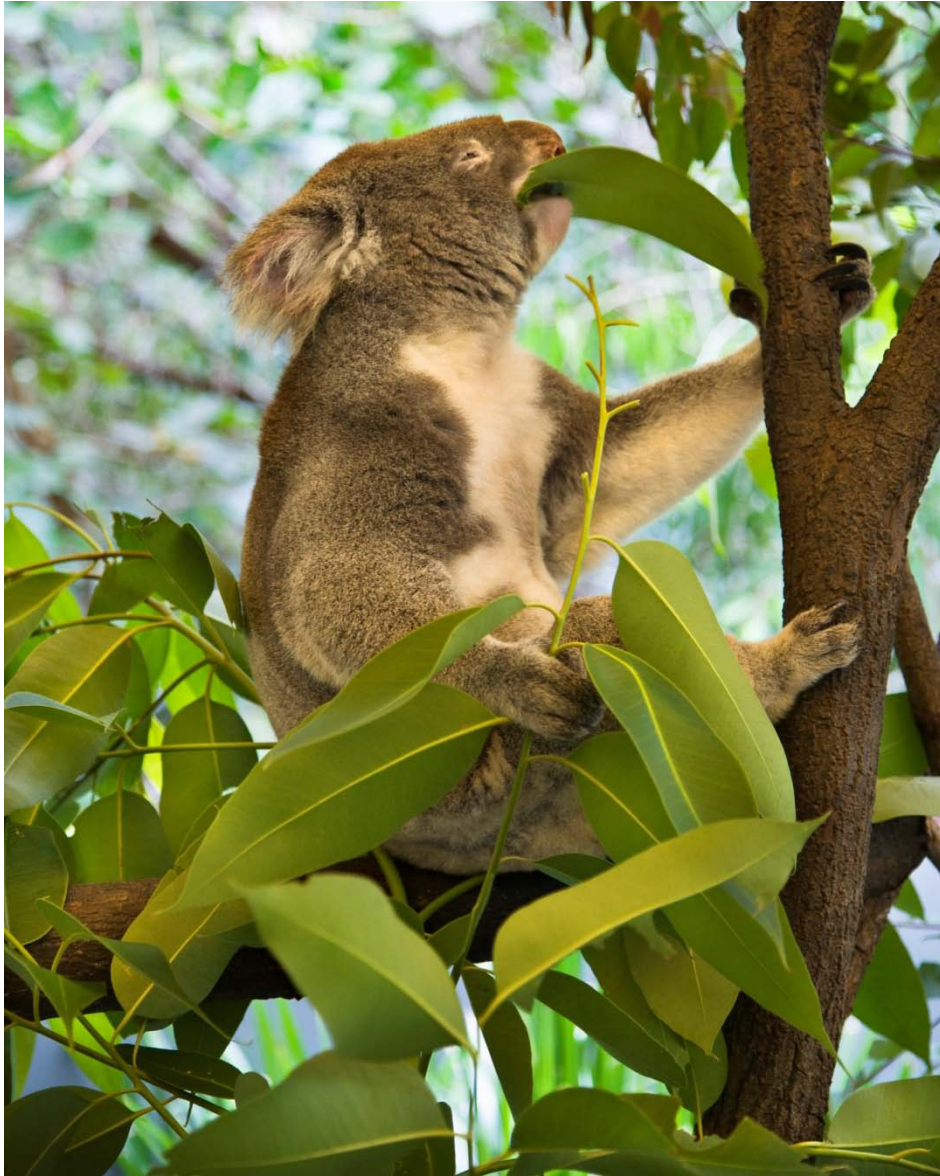
heterotroph



heterótrofo

- A heterotroph is an organism that obtains the energy it needs by feeding on other organisms.
- Un heterótrofo es un organismo que obtiene la energía que necesita alimentándose de otros organismos.

herbivore



herbívoros

- A herbivore is a plant-eating organism with incisors specialized to cut vegetation and large, flat molars to grind it.
- Un herbívoro es un organismo que come plantas, y que tiene incisivos especializados para cortar vegetación y molares planos para molerla.

omnivore



omnívoro

- An omnivore is a plant- and meat-eating organism with incisors specialized to cut vegetables, premolars to chew meat, and molars to grind food.
- Un omnívoro es un organismo que come plantas y carnes, y que tiene incisivos especializados para cortar vegetales, premolares para masticar la carne, y molares para moler la comida.

carnivore



carnívoro

- A carnivore is a meat-eating organism with sharp canine teeth specialized to rip and tear flesh.
- Un carnívoro es un organismo que come carne y que tiene dientes caninos afilados especializados para desgarrar la carne.

predator-prey relationship



relación presa
predador

- A predator-prey relationship is where one living thing captures and eats another living thing.
- Una relación presa-predador es cuando un ser vivo captura a otro ser vivo y se alimenta de él.

source



fuentes

- A source is the start or cause of something.
- Un fuelle es el comienzo o causa de algo.

