

High School Environmental Systems 2019 - 2020

Five Day Instruction

HMH TX <https://my.hrw.com>

Week 1

Day	Worksheet Title
1	Energy Flow in Ecosystems
2	The Cycling of Matter
3	How Ecosystems Change
4	Critical Thinking
5	Map Skills

Active Reading

Section 1: Energy Flow in Ecosystems

Read the passage below and answer the questions that follow.

Energy from the sun enters an ecosystem when a plant uses sunlight to make sugar molecules by a process called photosynthesis. During *photosynthesis*, plants, algae, and some bacteria capture solar energy. Solar energy drives a series of chemical reactions that require carbon dioxide and water. The result of photosynthesis is the production of sugar molecules known as *carbohydrates*. Carbohydrates are energy-rich molecules which organisms use to carry out daily activities. As organisms consume other plants or animals, energy is transferred from one organism to another. Plants produce carbohydrates in their leaves. When an animal eats a plant, some energy is transferred from the plant to the animal. Organisms use this energy to move, grow, and reproduce.

IDENTIFYING MAIN IDEAS

One reading skill is the ability to identify the main idea of a passage. The main idea is the main focus or key idea. Frequently a main idea is accompanied by supporting information that offers detailed facts about main ideas.

In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

- _____ 1. Plants, algae, and some bacteria capture _____ during photosynthesis.
- | | |
|------------------|-------------------|
| a. solar energy | c. carbon dioxide |
| b. carbohydrates | d. organisms |
- _____ 2. The chemical reactions driven by solar energy require
- | | |
|------------------------------|-----------------------------|
| a. carbon dioxide and water. | c. organisms and water. |
| b. plants and algae. | d. carbon dioxide and sugar |
| molecules. | |
- _____ 3. During photosynthesis, plants make
- | | |
|--------------------|----------------------|
| a. carbohydrates. | c. water. |
| b. carbon dioxide. | d. None of the above |
- _____ 4. Where does the production of carbohydrates in a plant take place?
- | | |
|-------------------------|---------------------|
| a. in the carbohydrates | c. in the ecosystem |
| b. in the leaves | d. in the stems |

VOCABULARY DEVELOPMENT

Read each question and write the answer in the space provided.

5. Energy-rich molecules that organisms use to carry out daily activities are.

6. The process by which a plant uses sunlight to make sugar molecules is called

SEQUENCING INFORMATION

One reading skill is the ability to sequence information, or to logically place items or events in the order in which they occur.

Sequence the statements below to show the steps in the process of energy production and consumption. Write “1” on the line in front of the first step, “2” on the line in front of the second step, and so on.

_____ 7. Photosynthesis produces carbohydrates.

_____ 8. Plants, algae, and some bacteria capture solar energy.

_____ 9. Energy is transferred from one organism to another.

_____ 10. Solar energy drives a series of chemical reactions.

_____ 11. Other organisms consume carbohydrates found in plants, algae, and some bacteria.

RECOGNIZING CAUSE AND EFFECT

One reading skill is the ability to recognize cause and effect.

In the space provided, write the letter of the effect that best matches the cause.

_____ 12. Organisms consume food and use energy from carbohydrates.

_____ 13. A plant uses sunlight for photosynthesis.

_____ 14. An animal eats a plant.

a. Carbohydrates are produced.

b. Energy is transferred from one organism to another.

c. Energy from the plant is transferred and used to move, grow, and reproduce.

Active Reading

Section 2: The Cycling of Matter

Read the passage below and answer the questions that follow.

When we burn fossil fuels, we release carbon into the atmosphere. The carbon returns to the atmosphere as carbon dioxide. Cars, factories, and power plants rely on these fossil fuels to operate. In the year 1999, vehicles were the source of one-third of all carbon dioxide emitted in the United States. Each year, about 8.4 billion metric tons of carbon dioxide are released into the atmosphere by the burning, or combustion, of fossil fuels and the natural burning of wood in forest fires. About half of this carbon dioxide remains in the atmosphere. As a result, the amount of carbon dioxide in the atmosphere has steadily increased.

Increased levels of carbon dioxide in the atmosphere are the major contributor to climate change. Carbon dioxide is a greenhouse gas. Greenhouse gases, including water vapor and other gases absorb and reradiate infrared energy, warming Earth. Plants absorb some of the carbon dioxide, but scientists estimate that, each year, over a billion metric tons of carbon dioxide dissolves into the ocean, a carbon sink. The increase in carbon dioxide can lower the pH, which can impact marine organisms.

IDENTIFYING MAIN IDEAS

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Read each question and write the answer in the space provided.

1. What do most cars, factories, and power plants rely on to operate?

2. In what form does carbon return to the atmosphere after it is released from the burning of fossil fuels?

3. One-third of the United States' carbon consumption is used to operate what?

Active Reading *continued*

4. How many tons of carbon are released into Earth's atmosphere every year?

5. Why does the author mention the United States in the fourth sentence?

VOCABULARY DEVELOPMENT

In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

- _____ 6. Which of the following statements is true about fossil fuels, carbon, and carbon dioxide?
- a. Carbon dioxide returns to the atmosphere as carbon when fossil fuels are burned.
 - b. Fossil fuels return to the atmosphere as carbon dioxide when carbon is burned.
 - c. Carbon returns to the atmosphere as carbon dioxide when fossil fuels are burned.
 - d. none of the above

RECOGNIZING CAUSE AND EFFECT

One reading skill is the ability to recognize cause and effect.

Read each question and write the answer in the space provided.

7. What three things cause carbon to be released into the atmosphere as carbon dioxide?

8. What is one effect of increased levels of carbon dioxide in the atmosphere?

Active Reading

Section 3: How Ecosystems Change

Read the passage below and answer the questions that follow.

When farmland is abandoned a type of secondary succession called *old-field succession* occurs. When a field is no longer cultivated, pioneer species such as grasses and weeds quickly grow and cover the abandoned land. The grasses and weeds produce many seeds to cover large areas. Over time, taller plants grow in the area and shade the ground, keeping light from the shorter plants. The long roots of the taller plants also absorb most of the water in the soil. The pioneer plants soon die from lack of sun light and water. As succession continues, growing trees deprive the taller plants of light and water. Finally, slower-growing trees, such as oaks, hickories, beeches, and maples, take over the area and block sunlight to the smaller trees. The area can eventually establish a climax community dominated by a mature oak forest.

IDENTIFYING MAIN IDEAS

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Read each question and write the answer in the space provided.

1. What type of succession is old-field succession?

2. Summarize what happens to a field when a farmer stops cultivating it.

VOCABULARY DEVELOPMENT

Read each question and write the answer in the space provided.

3. What key terms are used in this passage?

Active Reading *continued*

4. Define the terms you identified in the previous question.

SEQUENCING INFORMATION

One reading skill is the ability to sequence information, or to logically place items or events in the order in which they occur.

Sequence the statements below to show the steps in old-field succession. Write “1” on the line in front of the first step, “2” on the line in front of the second step, and so on.

- _____ 5. Taller plants grow in the area and shade the ground.
- _____ 6. A climax community exists.
- _____ 7. Pioneer grasses and weeds grow and produce many seeds.
- _____ 8. A farmer stops cultivating a field.
- _____ 9. Trees grow and shade the taller plants.
- _____ 10. The taller plants die.
- _____ 11. The pioneer plants die.
- _____ 12. Slower-growing trees shade the smaller trees.

RECOGNIZING CAUSE AND EFFECT

One reading skill is the ability to recognize cause and effect.

Read each question and write the answer in the space provided.

13. What causes pioneer grasses and weeds that have grown in an abandoned field to die?

14. What happens after a farmer abandons a field and the stages of old-field succession take place?

Skills Worksheet

Critical Thinking

ANALOGIES

Mark the letter of the pair of terms that best completes the analogy shown. An analogy is a relationship between two pairs of words or phrases written as a : b :: c : d. The symbol : is read “is to,” and the symbol :: is read “as.”

- _____ 1. producer : consumer ::
a. car : driver
b. factory : shopper
c. deer : wolf
d. photosynthesis : decomposition
- _____ 2. herbivores : omnivores ::
a. photosynthesis : respiration
b. elephant : ocean
c. fruit : bird
d. deer : bear
- _____ 3. carbon dioxide : carbon cycle ::
a. fertilizer : phosphorus cycle
b. atmospheric nitrogen : nitrogen cycle
c. decomposers : carbon cycle
d. limestone : carbon cycle
- _____ 4. deep ocean : hydrogen sulfide ::
a. sunlight : deep ocean
b. darkness : sunlight
c. surface : carbon dioxide
d. photosynthesis : sunlight
- _____ 5. oxygen : cellular respiration ::
a. cup : saucer
b. carbon dioxide : photosynthesis
c. plants : adaptation
d. needle : thread
- _____ 6. climax forest : clear-cut forest ::
a. plants : animals
b. food web : food chain
c. sun : fire
d. full : empty

INTERPRETING OBSERVATIONS

Read the following passage, and then answer the questions below.

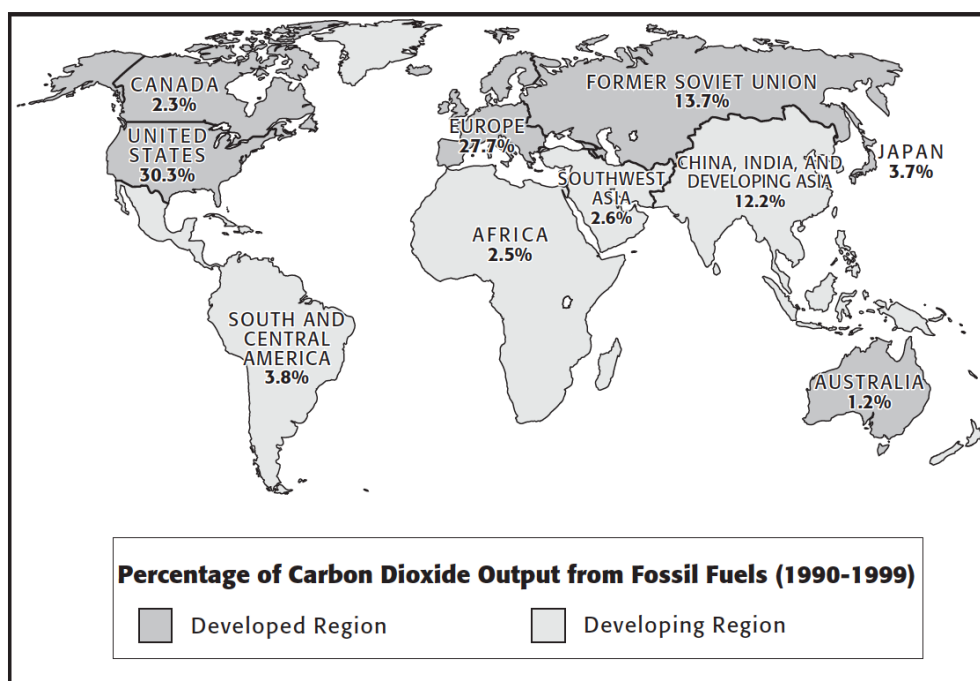
Your family is considering buying a house near a nature preserve that has been established to maintain a portion of the original ecosystem. You attend a meeting in which the developer is explaining the plans for the project. One woman in the audience complains that she does not like the natural prairie grasses on the nature preserve. She wants the grasses removed and replanted with an imported grass. A man in the audience suggests that exotic animals on the preserve would make it more beautiful. One woman proposes that the developer construct a playground in the center of the preserve and build a paved road to it. She wants picnic tables set up throughout the preserve for family picnics.

7. What would be your response to the woman who wants to replace the native grasses?

8. What would be your response to the man who wants exotic animals placed on the site?

9. What would be your response to the woman who wants to put a playground on the site?

Map Skills



Global warming is a rise in the average temperature of Earth's atmosphere over a long period of time. It is caused by the release of gases, especially carbon dioxide. Harmful levels of carbon dioxide are emitted into the air by car exhaust, power plants, and other human activities. This map shows which regions of Earth contribute most to global warming.

Use the map above to answer the questions below.

- Using a Key** Are developed regions or developing regions responsible for the highest percentage of carbon dioxide output from fossil fuels?

- Finding Locations** Which region has the highest percentage of carbon dioxide output? the lowest?

- Making Conclusions** Why do you think developed regions have a higher output of carbon dioxide?

- Making a Hypothesis** What might explain the fact that although Australia is developed, it has the lowest percentage of carbon dioxide output?

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Week 2

Day	Worksheet Title
1	Freshwater Ecosystems
2	Marine Ecosystems
3	Critical Thinking: Analogies & Interpreting Observations
4	Critical Thinking: Agree or Disagree & Refining Concepts
5	Map Skills

Active Reading

Section 1: Freshwater Ecosystems

Read the passage below and answer the questions that follow.

Aquatic organisms are grouped by location and by their adaptations. There are three groups of aquatic organisms.

Plankton are organisms that cannot swim against currents, so they are drifters. Drifting algae, called *phytoplankton*, are the food base for most aquatic ecosystems. Most phytoplankton are microscopic. Drifting animals, which may be microscopic or as large as a jellyfish, are called *zooplankton*. **Nekton** are free-swimming organisms, such as fish and whales. **Benthos** are bottom-dwellers, such as mussels, worms, and barnacles. Many benthic organisms live attached to hard surfaces or burrow into softer sediments. Decomposers, which break down dead organisms, also live in aquatic ecosystems.

IDENTIFYING MAIN IDEAS

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In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

- _____ 1. How are organisms in an aquatic ecosystem grouped?
 - a. by size and shape
 - b. by the food they eat
 - c. by how they reproduce
 - d. by location and adaptations
- _____ 2. Where do many benthic organisms live?
 - a. attached to hard surfaces
 - b. in open water
 - c. near the surface of the water
 - d. attached to benthos
- _____ 3. How many groups of aquatic organisms are discussed in this passage?
 - a. 2
 - b. 3
 - c. 5
 - d. 4
- _____ 4. Which groups of aquatic organisms are discussed?
 - a. phytoplankton and zooplankton
 - b. plankton, nekton, and benthos
 - c. plankton, nekton, benthos, and decomposers
 - d. plankton, phytoplankton, zooplankton, nekton, and benthos

Active Reading *continued*

- _____ 5. The food base of most aquatic ecosystems are
- a. worms.
 - b. phytoplankton.
 - c. zooplankton.
 - d. fish.

VOCABULARY DEVELOPMENT

In the space provided, write the letter of the term that best matches the description.

- | | |
|---|------------------|
| _____ 6. aquatic organisms that float near the surface of the water | a. phytoplankton |
| _____ 7. aquatic organisms that break down dead organisms | b. plankton |
| _____ 8. drifting algae | c. nekton |
| _____ 9. drifting animals | d. benthos |
| _____ 10. aquatic organisms that dwell at the bottom of the water | e. decomposers |
| _____ 11. aquatic organisms that are free-swimming | f. zooplankton |

Write “P” on the line in front of each example of plankton, “N” on the line in front of each example of nekton, and “B” on the line in front of each example of benthos.

- | | |
|-----------------------|-------------------------|
| _____ 12. turtles | _____ 16. mussels |
| _____ 13. worms | _____ 17. barnacles |
| _____ 14. zooplankton | _____ 18. phytoplankton |
| _____ 15. fish | _____ 19. whales |

Active Reading

Section 2: Marine Ecosystems

Read the passage below and answer the questions that follow.

Estuaries support many marine organisms because estuaries receive plenty of light for photosynthesis and plenty of nutrients for plants and animals. Rivers supply nutrients that have been washed from the land, and because the water is shallow, sunlight can reach all the way to the bottom of the estuary. The light and nutrients support large populations of rooted plants as well as plankton. The plankton in turn provides food for larger animals, such as fish. Dolphins, manatees, seals, and other mammals often feed on fish and plants in estuaries. Oysters, barnacles, and clams live anchored to marsh grass or rocks and feed by filtering plankton out of the water. Organisms that live in estuaries are able to tolerate variations in salinity because the salt content of the water varies as fresh water and salt water mix when tides go in and out.

Estuaries provide protected harbors, access to the ocean, and connection to a river. As a result, many of the world's major ports are built on estuaries. Of the 10 largest urban areas in the world, 6 were built on estuaries. These 6 cities are Tokyo, New York, Shanghai, Buenos Aires, Rio de Janeiro, and Bombay.

IDENTIFYING MAIN IDEAS

One reading skill is the ability to identify the main idea of a passage. The main idea is the main focus or key idea. Frequently, a main idea is accompanied by supporting information that offers detailed facts about main ideas.

Read each question and write the answer in the space provided.

1. What types of organisms do estuaries support?

2. How do oysters, barnacles, and clams feed?

3. What do dolphins, seals, and other mammals eat?

4. What two ingredients make estuaries suitable for plants and animals?

5. How many of the world's 10 largest urban areas are built on estuaries? List them.

VOCABULARY DEVELOPMENT

Read each question and write the answer in the space provided.

6. Write a title for the first paragraph of the reading selection.

7. Write a title for the second paragraph of the reading selection.

RECOGNIZING CAUSE AND EFFECT

One reading skill is the ability to recognize cause and effect.

Read each question and write the answer in the space provided.

8. Because water in an estuary is shallow,

9. Because rivers carry water from places inland to an estuary,

10. Because estuaries receive plenty of light and nutrients,

11. Because the light and nutrients support plankton,

12. Because estuaries provide a connection to rivers, ocean access, and protected harbors,

13. Because the salt content of the water in an estuary varies as fresh and salt water mix with the changing tides,

Skills Worksheet

Critical Thinking

ANALOGIES

Mark the letter of the pair of terms that best completes the analogy shown. An analogy is a relationship between two pairs of words or phrases written as a : b :: c : d. The symbol : is read “is to,” and the symbol :: is read “as.”

- _____ 1. phytoplankton : zooplankton ::
a. primary producers : predators
b. nekton : benthos
c. bacteria : decomposers
d. plants : animals
- _____ 2. fresh water wetland : Everglades ::
a. barrier island : New York
b. estuary : Chesapeake Bay
c. mangrove : Rio de Janeiro
d. coral reef : tropics
- _____ 3. beavers : ponds ::
a. reptiles : swamps
b. amphibians : lakes
c. humans : artificial lakes
d. waterfowl : wetlands
- _____ 4. surface water : photosynthesis ::
a. brackish water : salinity
b. deep water : decomposition
c. wetlands : filtration
d. algae : eutrophication
- _____ 5. marshes : swamps ::
a. grasslands : forests
b. ponds : oceans
c. mosses : rivers
d. cactuses : deserts
- _____ 6. rivers : snow melt ::
a. lakes : groundwater
b. Arctic : ice
c. coastal wetlands : rain
d. littoral zones : flooding
- _____ 7. trout : headwaters ::
a. oxygen : runoff
b. sediment : riverbed
c. plankton : downstream
d. rhizoids : rocks

INTERPRETING OBSERVATIONS

Read the following passage, and answer the questions below.

A small community was nestled along the edge of a sparkling, blue lake. Local residents often flocked to the lake to swim, boat, and fish. Many of the local residents were dairy farmers or grew crops for the local people. As the community grew, more factories came to the area and used the water from the lake for their manufacturing processes. Several years later the residents noticed that the fish were dying and a layer of thick, slimy algae was gradually covering the lake.

8. Describe what happened to the lake. What role did bacteria play in the transformation of the lake?

9. How could this problem impact the entire ecosystem?

10. Could this same problem occur at the headwaters of a river? Why or why not?

Critical Thinking *continued*

AGREE OR DISAGREE

Agree or disagree with the following statements, and support your answer.

11. Plants and animals prefer to live on sandy shores rather than rocky shores.

12. Human activities do not threaten coral reefs.

13. Most photosynthesis occurs in the upper 100 meters of the ocean.

Critical Thinking *continued*

REFINING CONCEPTS

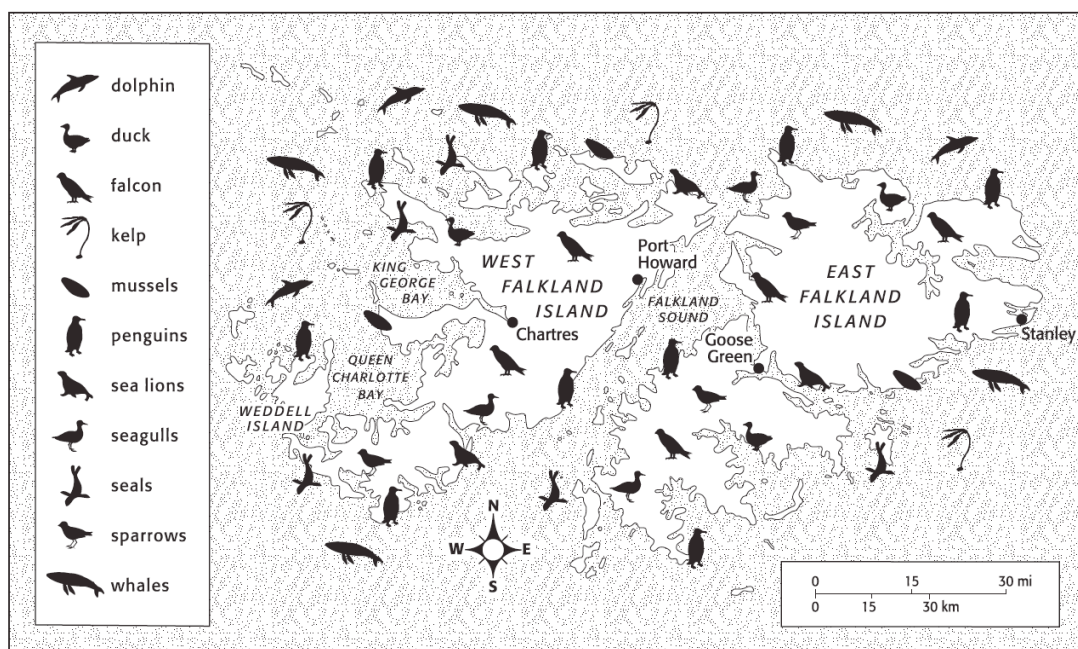
The statements below challenge you to refine your understanding of concepts covered in the chapter. Think carefully, and answer the questions that follow.

14. Why is a toxic chemical spill on land potentially harmful to animals that live in the ocean?

15. Eutrophication sometimes occurs naturally. Explain how the process can be accelerated.

16. What do you think would happen to a North American freshwater trout if it were placed in a tropical ocean? Explain your answer in terms of factors that affect organisms in different aquatic ecosystems.

Map Skills



The Falkland Islands are located in the South Atlantic Ocean, not too far from the southern tip of South America. Millions of penguins breed on the islands. Sea lions, seals, dolphins, and many birds are also native to the area. The map shows where these organisms are found.

Use the map above to answer the questions below.

1. **Using a Key** According to the map, how many species are native to the Falkland Islands?

2. **Analyzing Data** Which species are part of a marine ecosystem?

3. **Using a Key** Which species has the largest population?

4. **Inferring Relationships** Which species do you think is at the top of the food chain? Explain your answer.

