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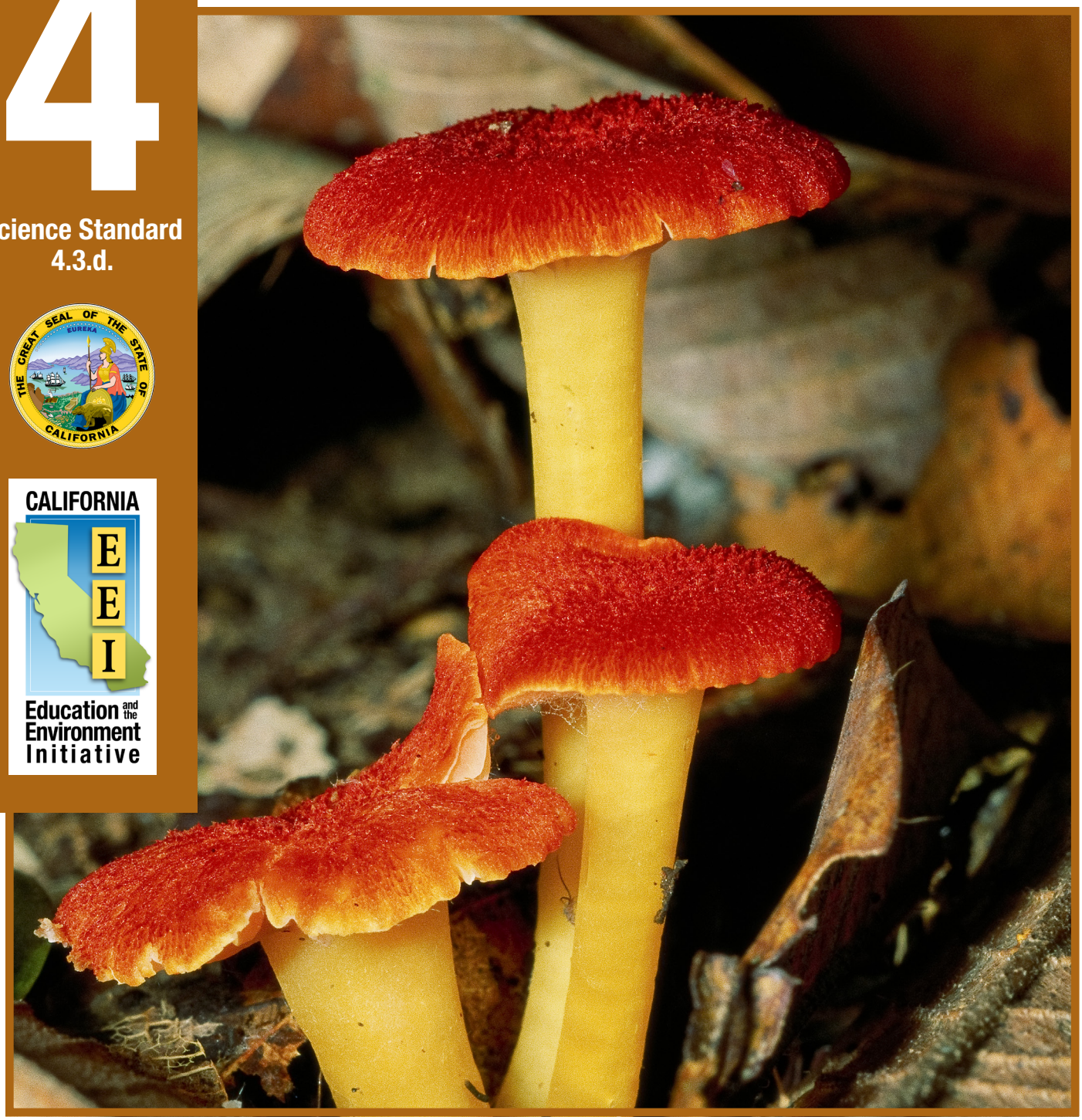
Science Standard
4.3.d.

Student Workbook

California Education and the Environment Initiative



Microorganisms and the Human World

California Education and the Environment Initiative

Approved by the California State Board of Education, 2010

The Education and the Environment Curriculum is a cooperative endeavor of the following entities:

California Environmental Protection Agency
California Natural Resources Agency
Office of the Secretary of Education
California State Board of Education
California Department of Education
California Integrated Waste Management Board

Key Leadership for the Education and Environment Initiative:

Linda Adams, Secretary, California Environmental Protection Agency
Patty Zwarts, Deputy Secretary for Policy and Legislation, California Environmental Protection Agency
Andrea Lewis, Assistant Secretary for Education and Quality Programs, California Environmental Protection Agency
Mark Leary, Executive Director, California Integrated Waste Management Board
Mindy Fox, Director, Office of Education and the Environment, California Integrated Waste Management Board

Key Partners:

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Name: _____

Instructions: Write your answers on the lines below.

1. What are microorganisms?

_____

_____

_____

_____

_____

_____

2. Where are microorganisms found in our world?

_____

_____

_____

_____

_____

_____

_____

3. How do microorganisms affect people?

_____

_____

_____

_____

_____

_____

_____

Name: _____

Instructions: Complete the tasks in the spaces provided.

Look at the bread in the bags with magnifying lenses. Make a sketch of what you see in each bag the space below.

Bag #1 (moldy bread):

Bag #2 (fresh bread):

What type of microorganism is mold?

_____

_____

What do you think is happening to the bread?

_____

_____

_____

Name: _____

Instructions: Use words from the Word Bank to fill in the blanks: (1 point each)

Word Bank

bacteria	decomposition
digestion	large intestine

1. The breaking down of once living things into simple parts is called _____.

2. The process of breaking down food in our bodies is called _____.

3. A part of your digestive system that contains the largest number of microorganisms is the _____.

4. The _____ in the large intestine help you digest food.

Instructions: Read the question below and write your answer in complete sentences.

What does the bacteria in your large intestine do for you? (2 points for each part of the answer)

_____

_____

_____

_____

_____

Names of Group Members: _____

_____

Instructions: Complete the task below in the spaces provided.

What was used to wash off the "bacteria"?	Did the "bacteria" come off the hands?	Describe how the hands look. How much "bacteria" is still on the hands?
Cold water		
Cold water with soap		
Warm water with soap		

Conclusion:

We decided that _____ works best for hand washing.

Name: _____

Instructions: Read the following story. Then answer the questions using what you learned today about bacteria.

Maya's mom was getting dinner ready. They were going to have hamburgers. Her mom let Maya help her shape the raw ground meat into burgers. As Maya's mom was going outside to put the burgers on the grill, she reminded Maya to wash her hands. But Maya did not wash her hands.

After dinner, Maya took a bath and got ready for bed. Later that night, Maya felt sick to her stomach. The rest of her family did not get sick.

1. How do you think Maya got sick? (3 points)

_____

_____

_____

_____

2. What could Maya have done to keep from getting sick? (2 points)

_____

_____

_____

_____

3. What type of bacteria do you think might have made Maya sick? Why? (5 points)

_____

_____

_____

_____

Name: _____

Instructions: Read each clue and write the answer in the "Food" column.

	Clue	Food
1	I am a fungus that feeds on sugar, releasing carbon dioxide gas. The gas is trapped in the dough and causes it to rise. What do I make?	
2	I am a bacteria that turns the sugar in milk into acid. This makes a sour taste, but also prevents other microorganisms from growing. I can be flavored with vanilla or fruits. What do I make?	
3	I am a bacteria that feeds on the sugar in milk, releasing lots of gas. The type of food I make is known for the big holes in it that are a result of the gas. What do I make?	
4	I am a bacteria that works with salt to preserve food. If you cover cucumbers with salt, water, and leave me for two to five weeks, I turn the cucumbers into something delicious and crunchy. What do I make?	
5	I am a bacteria that when mixed with cabbage and other vegetables makes a tasty side dish that is considered the national food of Korea. What do I make?	
6	I am a fungus that grows on milk and cream. I smell strong and have a sharp flavor. I produce many spores that form a blue streak. What do I make?	
7	I am a bacteria that turns cabbage into a food that some people like to put on top of hot dogs. What do I make?	
8	We are bacteria and fungi that change soybeans into a dark sauce that is used in many Asian foods. What do we make?	
9	I am a bacteria that makes cream thick and sour. You might use the thick cream on baked potatoes or potato chips. What do I make?	
10	I am a bacteria that grows in the juice of many vegetables, grains, and fruit. I change the juice, and then it is used to preserve and flavor many foods. The food I make has many names including apple cider, rice, malt, and balsamic. What do I make?	

Name: _____

Instructions: Complete the tasks below in the spaces provided.

1. Put the following steps in the right order. (1 point each)

   _____ The gas leaves behind holes or pockets in the bread.

   _____ The yeast decomposes the sugar in the dough and give off a gas.

   _____ The yeast die when the bread is baked.

   _____ The gas makes the dough rise.

2. What is the gas that causes bread dough to rise, root beer to have bubbles, and cheese to have holes? (1 point)

   _____

   _____

3. What ecosystem service uses bacteria and yeast in the making of bread? (1 point)

   _____

   _____

4. Identify four foods that you eat that need the fermentation process. (4 points)

   _____

   _____

   _____

   _____

5. Why is fermentation an important ecosystem service for humans? (2 points)

   _____

   _____

   _____

Name: _____

Instructions: Read the Set Up section below; conduct the experiment with your group; and, record your observations on the chart on the next page.

Your group should have:

- 1 bowl
- 1 cup with sand
- 1 cup with detergent
- 2 spoons
- 2 cotton balls
- 2 plastic plates
- 4 paper towels

Set Up

Have one person in your group be the "Recorder." This person reads these instructions and writes down the group's answers.

Have one person be the "Sand Tester." This person should set one plate, the cup of sand, and the spoon on a paper towel in front of him or her.

Have one person be the "Cotton Tester." This person should set the other plate and the cotton balls on a paper towel in front of him or her.

Have one person be the "Detergent Tester." This person should set the bowl and the cup of detergent on a paper towel in front of him or her.

The last paper towel is for the group to use in cleaning up. Leave it in the middle of the table. When everything is set up, have the Recorder raise his or her hand and ask for the oil.

Explore

Step 1: Your teacher will bring a cup of oil to your table and some water. The Detergent Tester should put some water into the bowl and then pour some oil into the water. The Sand Tester and Cotton Tester should pour some oil onto their plates.

Step 2: Have the Sand Tester use the spoon to put sand on the oil on the plate. The spoon may be used to move the sand around. Have the group watch and describe what happens. Have the Recorder write down what happens on the chart on the next page.

Name: _____

Step 3: Have the Cotton Tester use the cotton balls to wipe up the oil from the second plate. Have the group watch and describe what happens. Have the Recorder write down what happens on the chart below.

Step 4: Have the Detergent Tester pour some of the detergent onto the oil on the water and stir it. Have the group watch and describe what happens. Have the Recorder write down what happens on the chart on the chart below.

Step 5: Read the question under the chart below. Talk about what your group thinks and have the Recorder write down a group answer.

What happened when you used the…

Material	Observations
Sand	
Cotton	
Detergent	

Results/Conclusions: What worked best in cleaning up the oil?

_____

_____

_____

_____

Name: _____

Instructions: Use words from the Word Bank to fill in the blanks below. Not all words will be used. (1 point for each correct word)

Word Bank

bacteria	decomposition	large intestine	digestion
bread	fermentation	fungi	oil spills
E. coli	*Salmonella*	*cyanobacteria*	yeast

1. _____ and _____ are two microorganisms that live in our large intestines.

2. Most microorganisms help with the process of _____.

3. _____ help make bread by _____.

4. Special microorganisms called _____ help us clean up _____ by providing a place for oil-eating bacteria to live.

Instructions: Answer the following questions using complete sentences. (2 points each)

5. What is crude oil?

_____

_____

6. Why are *cyanobacteria* helpful when there is an oil spill?

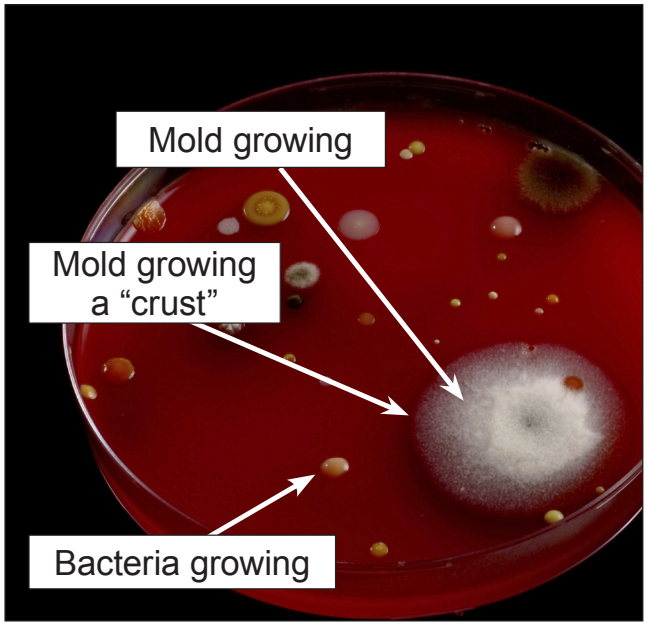
_____

_____

Name: _____

Instructions: Look at the photograph to the right. Bacteria and fungus are growing in the same Petri dish. (Remember, a mold is a type of a fungus.) The bacteria and fungus are not touching.

Write a story about what might happen when the fungus grows and touches the bacteria. Tell what you think might happen. Who might win the battle.



Word Bank

antibiotic	bacteria	infection
penicillin	microorganism	

Use words from the Word Bank and your **Dictionary** if you need help with these words. (2 points each)

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

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