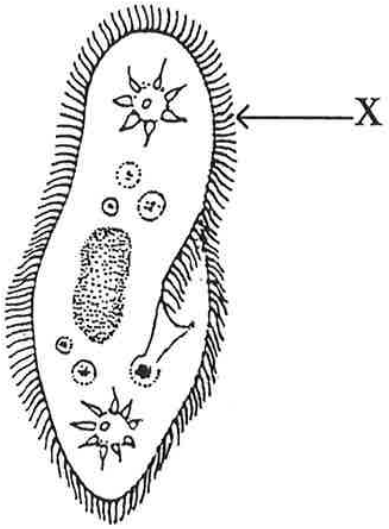
Grade 6 **Standard 5** **Unit Test**

Microorganisms

1. Which of the following correctly describes the size of fungi compared to the size of bacteria?

   A. Fungi are larger.
   B. Bacteria are larger.
   C. They are about the same size.
   D. They are the same size but different shapes.

Use this drawing of a paramecium to answer the next two questions:



2. What composes the paramecium's body?

   A. thousands of cells
   B. four cells
   C. one cell and its parts
   D. several body organ systems

3. What is the function of the cilia marked by "X"?

   A. to move the paramecium
   B. to take in water and remove wastes
   C. to control cell division
   D. to make food from sunshine and air

4. Which of the following describes the most ideal location for microorganisms to live?

   A. underwater
   B. in warm, humid places
   C. nearly everywhere
   D. sunny, dray areas

The foods listed on this data table were left in plastic bags in a warm container for 5 days. Observations were made and recorded at the end of the experiment. Use this information to answer the next 4 questions.

Food	**Observations**
Bread	Covered with black, fuzzy stuff
Banana	Banana turned slimy, black and soft
Hamburger	Turned brown with green spots
Cheese	Has white and green areas

5 Which of these hypotheses was tested?

   A. Foods left in the dark will rot differently than foods in light.
   B. Will foods rot in plastic bags?
   C. If different foods are used, then different bacteria will grow.
   D. What kind of bacteria is best for making cheese?

6. What variable was tested in this experiment?

   A. the length of time it takes for food to rot
   B. what kid of bags allows rotting to occur
   C. the temperature microorganisms like best
   D. how different kinds of food rot

7. Which of the following is a conclusion you could make concerning these data?

   A. Bread is more likely to rot than cheese or meat.
   B. Bread is better for you to eat than cheese.
   C. Different microorganisms grow on different foods.
   D. Meat is less safe to eat than other

8. How might a student improve this experiment?

    A. Count the number of microorganisms on each food with a toothpick.
    B. Use a microscope to identify the kinds of microorganisms.
    C. Add some strong chemicals and see what they do to the foods.
    D. Kill the microorganisms and make the food safe.

9. A scientist wonders if a certain bacteria can survive being frozen. Which of the following is a correctly, written hypothesis?

    A. If bacteria are frozen, then they will die.
    B. Bacteria are small, microscopic life forms.
    C. The bacteria died when it was frozen.
    D. Bacteria survive best when they are moist.

10. What have experiments shown scientists about the cause of disease?

    A. Diseases are caused by sudden changes in the weather.
    B. Diseases are caused by too much exercise.
    C. Microorganisms cause many diseases.
    D. Little can be done to prevent disease.

11. Which of the following practices is based on an understanding of microorganisms?

    A. walking downhill instead of running
    B. looking both ways before crossing a street
    C. wearing lightweight clothes in the summer
    D. washing your hands before eating

12. What important function do microorganisms have in an ecosystem?

    A. They produce food from sunlight
    B. They reduce the number of large animals.
    C. They decompose dead organisms.
    D. They help to clean the air.

1. How does adding yeast change bread dough?

    A. Bubbles of gas form in the dough
    B. Yeast changes the bread's color
    C. More dough is produced as yeast multiply
    D. Yeast makes it less lumpy

2. How do bacteria help our bodies function?

    A. They make our muscles and lungs stronger.
    B. They help to digest food in the intestines.
    C. They circulate in our blood and help carry oxygen.
    D. They make our skin flexible and clean.

3. Which of the following correctly pairs a microorganism with the disease it causes?

    A. protozoa/the flu
    B. virus/athlete's foot
    C. bacteria/strep throat
    D. fungi/a cold

Constructed Response

1. Fill in the chart with information about each microorganism.

	Bacteria	**Fungus**	**Protozoan**
Relative Size			
Food source			
Environment in which they live			

2. Katie wants to see if apples that are kept cold will rot or stay edible. She places an apple in the refrigerator and records the date. What should she use as a control?

3. Ben notices the milk he poured on his breakfast cereal is lumpy and tastes sour. What inference should Ben make?

4. A group of students wonders if pond water smells bad because it has microorganisms in it. Describe a way they could find out.

5. Louis Pasteur discovered how to prevent microorganisms from growing in food. What did he do to the food?

6. Describe a way microorganisms are helpful to people and a way they are harmful.

Answers:

Multiple Choice

1. A
2. C
3. A
4. B
5. C
6. D
7. C
8. B
9. A
10. C
11. D
12. C
13. A
14. B
15. C

Constructed Response

1.

	Bacteria	**Fungus**	**Protozoan**
Approximate size	Smallest, invisible to eye	Some large and visible, some small	Small, single-celled
Food source	Other organisms, some make their own food (photo-synthetic)	Other organisms, rotting things	Other Organisms, some are photosynthetic
Environment they live in	Warm, moist, near other organisms	Moist, on land	Water

2. Another apple should be placed in a warm place the same length of time.

3. The milk is old or has been left in a warm place.

4. Use a microscope and look at the pond water to see if microorganisms are visible; or boil the pond water to kill or get rid of microorganisms to see if it still smells.

5. Heated it.

6. They help in production of foods like bread and cheese. They also act as decomposers in the environment which is good. They are harmful when they cause disease and destroy food.

Grade 6 **Standard 5** **Performance Test 1**

Pond Water Creatures

Activity Description: Students will grow a pond-water culture and observe how it changes over time.

Materials needed: glass jar, hay/tap water mixture or pond water with hay, microscopes capable of 40X magnification, hand lenses, slides, cover slips, medicine droppers.

Prior to assessment: Students should know how to use a microscope and make a slide. They should be familiar with what a protozoan is and what some of its structures are.

Time needed: a 50 minute period followed by several 30 minute periods for follow-up-observations.

Procedure:

1. Students should add water to a small sample of hay in their jar. If tap water is used, it should sit out overnight to remove any chlorine.

2. Students should start a lab write-up including a title, materials, hypothesis, and observations (if we observe the jar for several days then _____ will happen.) and a place for observations.

3. Students should make an observation of what their jars look like, smell like and view a slide under the microscope. They probably will not see any protozoa on this day. It takes several days for them to reproduce into numbers large enough to be easily found.

4. Wait a couple of days and have students take additional observations. They should date their observations and organize them neatly. It will help students to focus their microscopes if they are encouraged to place a bit of hay on the slide. The protozoa will be found near the hay.

5. Continue to take observations over a ten-day period. The water will begin to smell, turn cloudy and protozoa should become very numerous. Students should try to draw all the different types they see.

6. At the end of the experiment students could answer questions such as:
   - What changes did you observe in your jar?
   - What happened to the number and kind of protozoa you saw as time went by? *The number increased, new kinds appeared.*
   - Why? *They were reproducing.*
   - What may have been creating the smell in the jar? *Waste products from the protozoa and decay of the hay.*
   - Why were the protozoa found near hay? *That is what they eat.*
   - Would you want to drink the pond water?
   - Why or why not? *No, it might make you sick*

7. Students should write a conclusion to summarize their experiment.

Scoring Guide

Student includes all steps of lab write-up …….. 7 pts
Observations neatly and accurately recorded ……. 10 pts
Questions answered correctly ……. 6 pts
Conclusion is specific and complete ……... 3 pts

Grade 6 **Standard 5** **Performance Test 2**

Experiments with Microorganisms

Activity description: Students will design their own experiment with microorganisms.

Materials needed: Students will need different materials depending on the type of experiment they choose. If they need items not found at school, they will need to bring them from home. Suggested items include: a variety of foods (not milk, eggs or meats), sealable plastic bags, a heat source, a dark place, a cool place, etc.

Prior to assessment: Students should have had experience with the scientific method. They should understand what a control is and why it is needed. They can be given a lab write-up form or you might see how much they can generate themselves. A lab write-up may include a title, research question, materials, procedure, hypothesis, data, analysis questions, and a conclusion. Students should know that the bags should not be opened during the experiment.

Time needed: 2 fifty-minute periods, additional time for observation as needed.

Procedure:

1. Explain to students that they will be designing an experiment to test one thing (the variable about microorganisms. Discuss which materials you can supply for the experiment.

2. They could work in groups or alone depending on the amount of materials and desire of the teacher.

3. Allow students time to formulate a research question and hypothesis. You can check them off on this to ensure a good start. *Sample question: Do microorganisms grow better in the light or the dark?* Sample hypothesis: *If I put food in the dark then it will not grow microorganisms as fast as in the light.*

4. Students should describe their materials needed and their procedure. *Sample: I need two dishes with the same food and a dark and light place. I will put the same amount of food in each dish, cover it, and place one in the light and one in the dark.*

5. Students should identify their control. *Sample: My control is the dish in the light.*

6. Allow several days for students to make observations. Bags should not be opened.

7. Students should analyze the data. Questions may be asked.

8. A conclusion should be stated to answer the question posed and decide if his/her hypothesis was correct or not.

Scoring Guide

Student correctly describes each step in the lab write-up……. 14 pts
Data has been taken …… 5 pts
Analysis is complete and accurately details the results found …… 5 pts
Conclusion answers question and summarizes hypothesis ……. 5 pts

Grade 6 **Standard 5** **Performance Test 3**

Pasteur and Microorganisms

Activity Description: Students will recreate Pasteur's famous experiment showing that microorganisms from the air cause rotting and decomposition of foods.

Materials needed: A nutrient broth. This can be made from any sort of edible material (fruit juice, thin soup), however, meat products should be avoided; clean glass containers (baby food jars), a cover for one container, a heat source (hot plate, stove burner, microwave oven).

Prior to assessment: Students should understand that Pasteur proved that microorganisms from the air will cause rot and decay in foods. He heated one dish to kill the microorganisms and covered it so they couldn't get in. (He actually used a fancy flask) A control dish is left out in the air.

Time needed: One 45-minute period for set up. Additional time in following days for observation.

Procedure:

1. Explain to students that they will be doing a famous experiment done by Pasteur. Describe the experiment.
2. Students should evaluate the lab in an organized way. A suggestion:
   Title
   Materials
   Procedure
   Hypothesis
   Data
   Analysis
   Conclusion
3. Show the students the materials and allow for them to set up two jars with the nutrient broth in it. If it is easier, heat the broth in a covered container with the lid very loosely attached. The longer it is heated, the better. It should boil for at least 10 minutes.
4. The broth in the sealed jar should never be exposed to air.
5. Students should observe the jars for several days. The sealed jar may develop decay, but students should be able to see that it contains fewer microorganisms.
6. Analysis can be done in a couple of ways. One is to allow the students to write what they think their results mean. Another is to ask a series of questions about the experiment. Examples:
   a. Which jar had more microorganisms?
   b. Why?
   c. If you wanted to preserve food in a jar or can, what would you do to it first?
   d. Why are the results of this experiment so important to people?
   e. If you left food in a covered dish but didn't heat it, what would you expect to happen?
   f. Why?

Scoring Guide

Student correctly lists each step in lab write-up ……. 7 pts
Data had been taken during observation period ……. 4 pts
Analysis is complete and thorough ……. 6 pts
Conclusion describes learning and summarizes hypothesis ……... 3 pts