Cells Under Investigation

Use observations and test results as evidence about living cells.

MS-LS1-1 "Conduct an investigation to provide evidence that living things are made of cells, either one cell or many different numbers and types of cells..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each microscope observation that is evidence of cells, circle each test result that helps distinguish living yeast cells from nonliving material, and write 1 beside evidence for one-celled organisms or M beside evidence for many-celled organisms.

A Cell Evidence Investigation

1. During a classroom investigation, students prepared three wet-mount slides: pond water, thin onion skin, and baker's yeast mixed with water. Under a microscope, the pond sample showed tiny single-celled organisms. The onion sample showed rows of boxlike cells, each with a visible boundary. The yeast sample showed many round cells. These observations were evidence that the organisms in the pond, the onion plant, and yeast are made of cells. The samples differed in cell shape and in whether the organism was one cell or many cells.

2. To test whether yeast cells were living, the group placed equal amounts of active dry yeast into four bottles. Bottle A held warm sugar water. Bottle B held warm sugar water but no yeast. Bottle C held boiled, cooled yeast in warm sugar water. Bottle D held yeast in cold sugar water. Balloons covered the openings. After 30 minutes, only A's balloon expanded greatly. Living yeast cells in warm sugar water released carbon dioxide as they used sugar. The no-yeast and boiled-yeast results helped rule out the water, sugar, and dead cells as causes.

3. The evidence did not mean every cell in an onion, pond organism, or yeast was alive at the moment it was viewed. A cell's shape or visible boundary shows structure, not life by itself. In this investigation, carbon dioxide production under suitable conditions was evidence that the yeast cells were alive. Boiling removed that result because heat killed the cells. A living thing can consist of one cell, like each yeast organism, or many cells, like an onion plant. In multicellular organisms, cells can have different shapes and jobs, but all are cells.

2 ANSWER WITH EVIDENCE

Use the passage

1. What microscope observations provided evidence that the pond organisms, onion plant, and yeast are made of cells?

2. Which two bottles helped rule out causes other than living yeast cells, and what did each bottle test?

3. What claim about yeast cells is supported by Bottle A compared with Bottle C? Use the balloon results as evidence.

4. Why does seeing a cell boundary under a microscope not prove that a cell is alive? What additional evidence did the investigation use for yeast?

3 YOUR TURN

Your own words

Use a microscope to observe a wet mount of active dry yeast, then conduct a balloon test with three bottles: warm sugar water plus yeast, warm sugar water with no yeast, and warm sugar water plus boiled and cooled yeast. Keep the bottle size, water and sugar amounts, and time the same; record each balloon result and write a claim, supported by your observations, about whether yeast is a living one-celled organism.

ANSWER KEY

Cells Under Investigation

GRADES 6-8 · MS-LS1-1

PART 1 · READ AND MARK

Underline each microscope observation that is evidence of cells, circle each test result that helps distinguish living yeast cells from nonliving material, and write 1 beside evidence for one-celled organisms or M beside evidence for many-celled organisms. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What microscope observations provided evidence that the pond organisms, onion plant, and yeast are made of cells?	**The pond sample showed tiny single-celled organisms, the onion skin showed rows of boxlike cells with visible boundaries, and the yeast sample showed many round cells.**
2	Which two bottles helped rule out causes other than living yeast cells, and what did each bottle test?	**Bottle B, with no yeast, showed that the warm sugar water alone did not inflate the balloon. Bottle C, with boiled yeast, showed that dead yeast cells did not inflate the balloon.**
3	What claim about yeast cells is supported by Bottle A compared with Bottle C? Use the balloon results as evidence.	**Yeast cells are living because the balloon expanded with yeast in warm sugar water, but it did not expand with boiled, dead yeast in warm sugar water.**
4	Why does seeing a cell boundary under a microscope not prove that a cell is alive? What additional evidence did the investigation use for yeast?	**A cell boundary shows structure, not life. Carbon dioxide production, shown by the expanded balloon in suitable conditions, was evidence that the yeast cells were alive.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I observed many separate round yeast cells in the wet mount. After 30 minutes, the warm sugar-water bottle with yeast inflated its balloon, while the no-yeast and boiled-yeast bottles did not. This shows that living yeast cells released carbon dioxide, and it supports the claim that a living yeast organism is made of one cell.

Accept equivalent descriptions of the microscope evidence, controls, and carbon dioxide evidence. For Part 3, accept a claim only if it uses both a microscopic observation of separate cells and comparative balloon data that includes at least one control.