

Cells Under Investigation

Collect microscope evidence about single cells and multicellular tissues.

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 Read the investigation plan. Underline how observations will be compared. Answer Question 1 before investigating; complete the drawings and Questions 2-4 from your actual observations.

What can a microscope reveal?

- ① Question: What evidence distinguishes a single-celled organism from tissues of a multicellular organism and from a mineral sample? Work in pairs at a teacher-prepared microscope station. Materials: one compound light microscope, labeled prepared slides of baker's yeast, maize leaf cross-section and maize root cross-section, a sealed slide with a thin layer of fine sand, and a pencil and worksheet per learner. The teacher identifies the specimens and checks that they are visible at 100x and 400x total magnification. All slides remain closed; no collecting, growing or tasting specimens is needed.
- ② First examine each labeled slide at 100x total magnification. Center a clear area, then use 400x with the fine-focus control as demonstrated. Observe two different fields of view per sample. Keep magnification the same when comparing sizes and record it with each drawing. Each partner must look, focus with teacher guidance and record independently. Compare bounded units, their internal appearance and their arrangement; do not identify a cell from a round or boxlike outline alone. If you cannot resolve a feature, ask for help and record that limit rather than inventing it.

- ③ Background for interpretation: baker's yeast is a unicellular fungus; each yeast cell can be an organism. A maize plant is multicellular: its leaf and root contain many organized cells, including different cell types. A piece of tissue is only part of that organism. Sand grains are mineral fragments, not cells. Prepared slides preserve structures but do not establish that those cells are alive now. Use observations of several specimens as evidence consistent with the cellular basis of living things; this small sample cannot prove a claim about every organism.

2 ANSWER WITH EVIDENCE Use the passage

- ① Before observing: predict two features you will compare across the specimens, and explain how two fields at matched magnification improve the comparison.

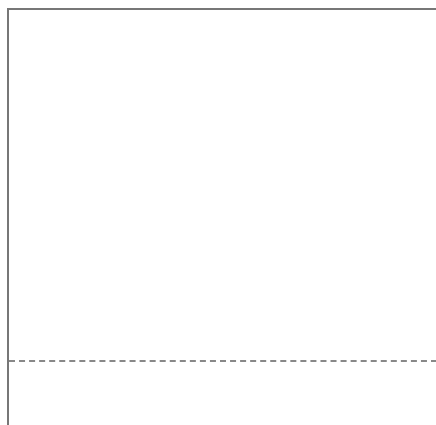
- ② After observing: describe the sand in two fields. Compare it with one biological specimen using more than outline shape.

- ③ Use your yeast, leaf and root observations plus the background to explain single-celled versus multicellular organization. Include a difference between the two tissues.

- 4** What can this investigation support, and what cannot be concluded about life from these prepared slides?

3 YOUR TURN _____ Your own words

During the investigation, use the three panels for yeast, maize leaf and maize root, in that order. In each, draw a small group of observed units from one field; label visible boundaries and internal features. Add a note comparing the second field. In each caption, record specimen and total magnification. Use the lines below to note a visibility problem and what you tried. Report what you see, not a memorized cell diagram.

		
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PART 1 • READ AND MARK

Read the investigation plan. Underline how observations will be compared. Answer Question 1 before investigating; complete the drawings and Questions 2-4 from your actual observations. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	Before observing: predict two features you will compare across the specimens, and explain how two fields at matched magnification improve the comparison.	Accept features such as boundaries plus internal appearance, and arrangement or relative size. Multiple fields reduce reliance on one unusual area; matched magnification makes size comparisons meaningful.
2	After observing: describe the sand in two fields. Compare it with one biological specimen using more than outline shape.	Accept actual observations of mineral grains and a biological sample, including internal appearance or organization as well as boundaries. Record unresolved features honestly; roundness alone is not proof of a cell.
3	Use your yeast, leaf and root observations plus the background to explain single-celled versus multicellular organization. Include a difference between the two tissues.	A yeast sample can contain many individual single-celled organisms; it is not thereby one multicellular organism. Root and leaf sections show many cells organized as parts of a maize plant. Accept observed tissue differences in arrangement, size or cell appearance; use the identified specimens/background to support organism-level interpretation.
4	What can this investigation support, and what cannot be concluded about life from these prepared slides?	The observations support that these organisms have cellular structures and that a unicellular organism differs from multicellular tissues. They do not demonstrate current viability of preserved cells or prove that all organisms everywhere are cellular.

PART 3 · YOUR TURN (SAMPLE ANSWER)

Drawings vary with the specimens, preparation and microscope. Yeast may show small individual oval cells, sometimes attached budding pairs. Maize leaf and root sections show multiple adjoining cells in organized tissues; the two tissues may differ in the distribution, sizes and arrangements of visible cells. Do not require organelles that the microscope does not resolve. Sand may show irregular solid grains without comparable tissue organization. A student should record the actual second-field comparison and total magnification. The source identification and biological background support interpreting isolated yeast cells as organisms and the plant sections as parts of one multicellular organism; outline shape by itself is insufficient.

Teacher preparation: use commercially prepared, labeled baker's yeast and maize leaf/root cross-section slides, plus a securely sealed fine-sand slide. Check each with the actual microscope before class, selecting areas with resolvable cell boundaries and contrasting tissue organization. Demonstrate focusing and safe glass handling; learners do not open slides. Plan a 40-50 minute lab or two shorter sessions and enough stations for every learner to observe all four specimens. Confirm each partner actually observes and records. Accept limited visibility with a reasonable retry; do not supply fictional measurements or mark expected drawings as observed data. This is a microscopy investigation of cellular organization, not a test of current cell viability.