Microscopic Life
Unit Blueprint

Learning Experience (LE)	Essential Questions* (for conceptual benchmarks)	Benchmarks (**Bolded** sections indicate portion of benchmark addressed.)	Formative and Summative Assessments (Unless noted as a Summative Assessment, the assessments are formative and should be used to guide teaching and learning.)	Using Assessments to Monitor Student Learning
LE 1: Observing a Penny (See pages 9-12 in STC Microworlds TG) **Pacing Suggestions:** 1 Day **Teacher Resources:** 		Related to 4D(3-5)#3: Materials may be composed of parts that are too small to be seen without magnification. 12D(3-5)#2: Make sketches to aid in [reporting observations and] explaining procedures or ideas.	*Activity Sheet 1—Observing a Penny* (See page 13 in Mircoworlds TG for a copy.)	Do students' drawings for step 3 include many details that accurately represent the penny?

*Essential questions are major questions driving the unit of study. They are directly aligned with the benchmarks. Generally, no one lesson addresses a question in its entirety. By the end of the unit, students should be able to answer these core questions.

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LE 2: **Dot to Dollars** **(See Teacher Tips for details on lesson.)** **Pacing Suggestions:** 1-2 Days **Teacher Resources:** 		12D(3-5)#2: Make sketches to aid in [reporting observations and] explaining procedures or ideas. 12A(3-5)#1: Keep records of their investigations and observations and not change the records later. 12C(3-5)#3: Keep a notebook that describes observations made, carefully distinguishes actual observations from ideas and speculations about what was observed, and is understandable weeks or months later.	*Dots to Dollars Observation Sheet* (This is a teacher-generated sheet.)	• Do the drawings show that the student has in fact observed an object and drawn what was seen? • Does each drawing have an "individual character" and is not a stereotype of what the student expected to find? • Do the drawings show relative size, shape, texture, shading, position, and complexity? • Do students' written observations describe relative size, shape, texture, color, and other relevant details? • Do students refrain from changing their observations (written and sketches) once class sharing has occurred? • Do students record observations, not inferences, ideas, or speculations?

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LE 3: Communicating Your Observations (See pages 15-19 in STC Microworlds TG.) **Pacing Suggestions:** 1-2 Days **Teacher Resources:** 		12D(3-5)#2: Make sketches to aid in [reporting observations and] explaining procedures or ideas. 12A(3-5)#1: Keep records of their investigations and observations and not change the records later. 12C(3-5)#3: Keep a notebook that describes observations made, carefully distinguishes actual observations from ideas and speculations about what was observed, and is understandable weeks or months later.	*Observing With a Hand-Lens* (Use teacher-generated sheet.)	The following questions are also listed in LE 2. The teacher should observe improvement between the two lessons. • Do the drawings show that the student has in fact observed an object and drawn what was seen? • Does each drawing have an "individual character" and is not a stereotype of what the student expected to find? • Do the drawings show relative size, shape, texture, shading, position, and complexity? • Do students' written observations describe relative size, shape, texture, color, and other relevant details? • Do students refrain from changing their observations (written and sketches) once class sharing has occurred? • Do students record observations, not inferences, ideas, or speculations?

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LE 4: Using a Microscope (See Teacher Tips for details on lesson.) **Pacing Suggestion:** 1 day **Teacher Resources:** 		District Written Benchmark: Use a microscope properly and be able to bring an object into focus.	Teacher observation of students using the microscopes	Are students able to: • Correctly place an object on the stage of the microscope? • Adjust the mirror for adequate light? • Bring the object being observed into focus? Proper handling of the microscope: • Do student hold the microscope by the arm and base? • Do students start focusing with the lowest objective? • After using the microscope, do students lower the stage and place it on the lowest objective? Note: These skills and behaviors should improve over time.

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<u>LE 5: Strands of Thread</u> **(See Teacher Tips for details on lesson.)** **Pacing Suggestion:** 1 day **Teacher Resources:** 		12D(3-5)#2: Make sketches to aid in [reporting observations and] explaining procedures or ideas. 12A(3-5)#1: Keep records of their investigations and observations and not change the records later. 12C(3-5)#3: Keep a notebook that describes observations made, carefully distinguishes actual observations from ideas and speculations about what was observed, and is understandable weeks or months later.	*Strands of Thread Observation Sheet* (Teacher-generated sheet)	• Do the drawings show that the student has in fact observed an object and drawn what was seen? • Does each drawing have an "individual character" and is not a stereotype of what the student expected to find? • Do the drawings show relative size, shape, texture, shading, position, and complexity? • Do students' written observations describe relative size, shape, texture, color, and other relevant details? • Do students refrain from changing their observations (written and sketches) once class sharing has occurred? • Do students record observations, not inferences, ideas, or speculations?

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LE 5: Strands of Thread (Continued)		District Written Benchmark: Use a microscope properly and be able to bring an object into focus.	Teacher observation of students using the microscopes	**Observation of Student Use of Microscope** Are students able to: • Correctly place an object on the stage of the microscope? • Adjust the mirror for adequate light? • Bring the object being observed into focus? Proper handling of the microscope: • Do student hold the microscope by the arm and base? • Do students start focusing with the lowest objective? • After using the microscope, do students raise the body tube and place it on the lowest objective? Note: These skills and behaviors should improve over time.

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LE 6: Introducing Microscopic Life in a Pond (See Teacher Tips for details on lesson.) **Pacing Suggestion:** 1-2 days **Teacher Resources:** 	Why is it sometimes helpful to magnify things? What do living things made up of one cell need to live?	Introduce 4D(3-5)#3: Materials may be composed of parts that are too small to be seen without magnification. Introduce 5C(3-5)#1: Some living things consist of a living cell. Like familiar organisms, they need food, water, ~~air, a way to dispose of waste~~; and an environment they can live in.	Class discussion about microscopic organisms (based on books) Suggested Questions: 1. What do you think lives in a pond? 2. What do you think are the needs of living things that live in a pond?	What prior knowledge do students appear to have about microscopic life?

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LE 7: Investigating Single-Celled Organisms (See Teacher Tips for details on lesson.) **Pacing Suggestion:** 3 days **Teacher Resources:** 	Why are microscopes important? What do living things made up of one cell need to live?	5C(3-5)#2: **Microscopes make it possible to see that living things are made mostly of cells.** Some organisms are made of a collection of similar cells that benefit from cooperating. Some organisms' cells vary greatly in appearance and perform very different roles in the organism. Introduce: 5C(3-5)#1: Some living things consist of a living cell. Like familiar organisms, they need food, water, and air; a way to dispose of waste; and an environment they can live in.	Class discussion about what the students observed.	• Do students understand they are observing organisms that consist of only 1 cell? • While the students will not be able to observe the organisms eat, do they see behaviors common to other organisms, such as movement?
		12D(3-5)#2: Make sketches to aid in [reporting observations and] explaining procedures or ideas. 12A(3-5)#1: Keep records of their investigations and observations and not change the records later. 12C(3-5)#3: Keep a notebook that describes observations made, carefully distinguishes actual observations from ideas and speculations about what was observed, and is understandable weeks or months later.	*Single-Celled Organisms Observation Sheet* (Teacher-generated sheet)	• Do the drawings show that the student has in fact observed an object and drawn what was seen? • Does each drawing have an "individual character" and is not a stereotype of what the student expected to find? • Do the drawings show relative size, shape, texture, shading, position, and complexity? • Do students' written observations describe relative size, shape, texture, color, and other relevant details? • Do students refrain from changing their observations (written and sketches) once class sharing has occurred? • Do students record observations, not inferences, ideas, or speculations?

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LE 8: Exploring Single-Celled Organisms through the Internet (See Teacher Tips for details on lesson.) **Pacing Suggestion:** 1 day **Teacher Resources:** 	Why are microscopes important? What do living things made up of one cell need to live?	5C(3-5)#2: **Microscopes make it possible to see that living things are made mostly of cells.** Some organisms are made of a collection of similar cells that benefit from cooperating. Some organisms' cells vary greatly in appearance and perform very different roles in the organism. 5C(3-5)#1: Some living things consist of a living cell. Like familiar organisms, they need food, water, ~~air, a way to dispose of waste~~, and an environment they can live in.	Class discussion of web sites Quick Write: What do living things made of one cell need to live?	**Quick Write** Do students know that just like their hermit crabs and isopods, microscopic, single-celled organisms need food, water, and an environment?
LE 9: Microscope Performance Assessment (See Teacher Tips for details on lesson.) **Pacing Suggestion:** 1 day **Teacher Resources:** 		District Written Benchmark: Use a microscope properly and be able to bring an object into focus.	Teacher observation of individual student use of microscope. (See "Teacher Tips" for additional information.)	See *Using a Microscope Performance Assessment* Rubric/Checklist, which is available on the electronic curriculum

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LE 10: Multi-Cellular Plants (See Teacher Tips for details on lesson.) **Pacing Suggestion:** 2 days **Teacher Resources:** 	Why are microscopes important?	5C(3-5)#2: Microscopes make it possible to see that living things are made mostly of cells. **Some organisms are made of a collection of similar cells** that benefit from cooperating. Some organisms' cells vary greatly in appearance and perform very different roles in the organism. ***Note: The teacher will need to deliberately point out the above concept.* 12D(3-5)#2: Make sketches to aid in [reporting observations and] explaining procedures or ideas. 12A(3-5)#1: Keep records of their investigations and observations and not change the records later. 12C(3-5)#3: Keep a notebook that describes observations made, carefully distinguishes actual observations from ideas and speculations about what was observed, and is understandable weeks or months later.	*Multi-Cellular Plants Observation Sheet* (Teacher-generated sheet)	• Do students' drawings and written observations indicate they observed a collection of similar cells? The following skills should be improving considerably. • Do the drawings show that the student has in fact observed an object and drawn what was seen? • Does each drawing have an "individual character" and is not a stereotype of what the student expected to find? • Do the drawings show relative size, shape, texture, shading, position, and complexity? • Do students' written observations describe relative size, shape, texture, color, and other relevant details? • Do students refrain from changing their observations (written and sketches) once class sharing has occurred? • Do students record observations, not inferences, ideas, or speculations?

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LE 11: Specialized Cells within an Organism (See Teacher Tips for details on lesson.) **Pacing Suggestion:** 2 days **Teacher Resources:** 	How and why do the cells within some living things differ?	5C(3-5)#2: Microscopes make it possible to see that living things are made mostly of cells. Some organisms are made of a collection of similar cells that benefit from cooperating. **Some organisms' cells vary greatly in appearance and perform very different roles in the organism.** ***Note: The teacher will need to deliberately point out the above concept. Students need to think about why the cells look different. For example, why does a root cell look different from a leaf cell? While they don't need to know the specifics, the students should understand that the cells do different things, thus they look different (shape, size, and color are typical differences). This concept is only introduced at 4th grade.* 12D(3-5)#2: Make sketches to aid in [reporting observations and] explaining procedures or ideas. 12A(3-5)#1: Keep records of their investigations and observations and not change the records later. 12C(3-5)#3: Keep a notebook that describes observations made, carefully distinguishes actual observations from ideas and speculations about what was observed, and is understandable weeks or months later.	**Summative Assessment of Sketches and Observations:** *Cells within a Living Thing Observation Sheet* Use *Drawings and Observations Checklist to assess students' skills.* (Both items are teacher-generated sheets)	• Do students' drawings and written observations indicate they observed very different cells within one organism? **Criteria to formally assess:** • Do the drawings show that the student has in fact observed an object and drawn what was seen? • Does each drawing have an "individual character" and is not a stereotype of what the student expected to find? • Do the drawings show relative size, shape, texture, shading, position, and complexity? • Do students' written observations describe relative size, shape, texture, color, and other relevant details? • Do students refrain from changing their observations (written and sketches) once class sharing has occurred? • Do students record observations, not inferences, ideas, or speculations?

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LE 12: Summative Assessment (See Teacher Tips for details on lesson.) **Pacing Suggestion:** 1 day **Teacher Resources:** 	How and why do the cells within some living things differ?	5C(3-5)#2: Microscopes make it possible to see that living things are made mostly of cells. Some organisms are made of a collection of similar cells that benefit from cooperating. Some organisms' cells vary greatly in appearance and perform very different roles in the organism. 5C(3-5)#1: Some living things consist of a living cell. Like familiar organisms, they need food, water, ~~air, a way to dispose of waste~~, and an environment they can live in.	*Single-Celled and Multi-Celled Living Things* (Teacher-generated sheet)	Students should be able to identify the first picture as single-celled and the second as multi-celled. The needs of living things should include food, water, and a place to live.