ALL for Science™
Authentic Literacy and Language for Science

Baylor College of Medicine
DEPARTMENT OF EDUCATION, INNOVATION & TECHNOLOGY
CENTER FOR EDUCATIONAL OUTREACH

Day 1: Why Do Scientists Work in Teams?

Mini-Lesson	Children learn about the outdoor organisms they will be investigating and the roles they will have as part of a scientific team.
Inquiry Circles	Children will select an organism to investigate as a team.
Guided Science Investigation	Children practice working as a team to rescue a snail trapped on a wire.

Literacy Strategy: introduction to the team roles, research, and science inquiry circles.	**Reading TEKS** ELA.1.6A	**CCSS** RI.1.10
Science Concept: scientists ask questions based on observations before they begin gathering information from texts and the natural world, and they benefit from working collaboratively in teams.	**Science TEKS** **2018–2019:** 1.3A **2020–2014:** 1.3A	**NGSS** K-2 ETS1-1, ETS1.A
Science and Literacy Connection: scientists use different ways to observe the world, including reading scientific texts, conducting investigations, writing reports, and working collaboratively with others in the cycle of inquiry.		

Unit Overview for the Teacher

ORGANIZATION

Throughout this unit, learners will be organized into inquiry circles and science investigation teams that reflect the roles of practicing scientists. By taking on the roles of scientists as they engage in text-based and hands-on investigations, and by learning to read, write, speak, and listen like scientists, children develop deeper science learning and science-specific disciplinary literacies.

DAILY SCHEDULE

The sequence of instruction in this unit will be as follows (you may space the three components throughout the day in the way that best fits your usual schedule):

- mini-lessons on science-specific disciplinary literacies
- science inquiry circles
- guided science investigation

MINI-LESSON

Each day, the teacher will lead a mini-lesson on a science-based disciplinary literacy before the children work in their inquiry circles. The mini-lessons are taught as whole-class lessons in which the teacher models and explains a literacy strategy relevant for use with exploratory texts or media. Mini-lessons are organized around teaching children various literacy strategies associated with science and scientists. They are designed to help learners become more strategic in their reading through intentional instruction. The strategies children learn in the mini-lessons are practiced with texts during the inquiry circles.

Our goal in these lessons is to give you (the teacher) suggested language to use when teaching these strategies and a set of materials that will support you in explaining those strategies to children. We have not scripted the lessons for you. Rather, we hope you take these suggestions as the starting points for working with children on constructing an understanding of what it is we do when we read and write like a scientist.

SCIENCE INQUIRY CIRCLES

Throughout this unit, children will participate in inquiry circles—small teams that work together to investigate a topic. The exploratory texts and media your learners will be using should guide them toward acquiring or building on information that leads to thinking about the topic and asking questions. You will recognize that the instructional model of inquiry circles is similar to that of literature circles in which learners build skills and develop strategies in reading. Inquiry circles in this unit will focus on topics related to the theme of the science investigation: outdoor organisms (**note: the teacher will use roly-polies as a model throughout this unit)**.

In this unit, each inquiry circle team of learners will select an outdoor organism from the list of choices: snails, earthworms, ants, slugs, termites, beetles, millipedes/centipedes; the list can be found in the **"**Before the Unit Begins" section.

An "**Exploratory Texts and Media"** spreadsheet listing suggested books, eBooks, videos, and websites can be found in the "Before the Unit Begins" section. **Please be sure to have texts and media resources prepared prior to beginning the unit**. Learners will need ready access to these resources when they begin their investigations in their inquiry circles.

You, the teacher, will model inquiry and literacy practices for your learners, who will work together to collect data about the organism they choose to investigate.

When creating inquiry circles, **we suggest no more than 4 children per team,** although the number of inquiry circles you have will depend on the size of your class and other considerations. Team roles (see below) will guide children's work in their inquiry circles, which will be based on the outdoor organism they select (e.g., an inquiry circle investigating snails).

SCIENCE LANGUAGE

The strategies related to science-specific reading and writing in the mini-lessons and inquiry circles enable deep science learning. Rather than simply memorizing *vocabulary words* without true

understanding of their relationship to their scientific work, children develop fluency with the language of science **in context,** both in text-based inquiry and scientific inquiry. We encourage you to model using this language in context often to enhance children's learning.

We have provided science language picture cards suitable for building reference-word walls for children. **The science language picture cards (as well as an alphabetized list) can be found in the "Before the Unit Begins" section (teacher will need to print a color copy of the picture cards before Day 1; each day's science language is listed near the end of the lesson).**

GUIDED SCIENCE INVESTIGATIONS

Science investigations are teacher-facilitated science explorations, with children working in collaborative teams. Children will work in the same designated teams they were in for inquiry circles to conduct their science investigation on pill bugs. Team roles (see below) will help guide children's work in their science investigation teams. You may choose to rotate team roles in any way that works for your class.

Background information relevant to each day's lesson is included **for the teacher**. The information provided is not intended for the children, as it may contain terminology or concepts above their grade level. Rather, it is intended to enhance the teacher's understanding of the daily topic or concept.

TEAM ROLES

Typically, science teams have a leader, called the Lead Scientist, and various other scientific roles, such as Lab Director, Data Scientist, and Equipment Director. To provide variety, learners should rotate positions in different activities, allowing each learner to try each role.

The "Team Roles" anchor chart PDF (in "Supporting Files" for Day 1) contains four 8.5" x 11" reproducible anchor charts that you will review with your learners and display as a reference. Additionally, the smaller role cards can be worn as badges on lanyards or used on a class chart to easily change out roles for the day.

You may use a variety of methods when assigning team roles or allow the learners to choose their roles. Team roles will be the same for science investigations and inquiry circles, with the opportunity to switch roles each day or throughout the unit. Team roles are given below (**be sure to form the teams or allow learners to form the teams during today's mini-lesson)**:

Lab Director

- Makes sure the team follows the safety rules.
- Gives team members a job during cleanup.

Lead Scientist

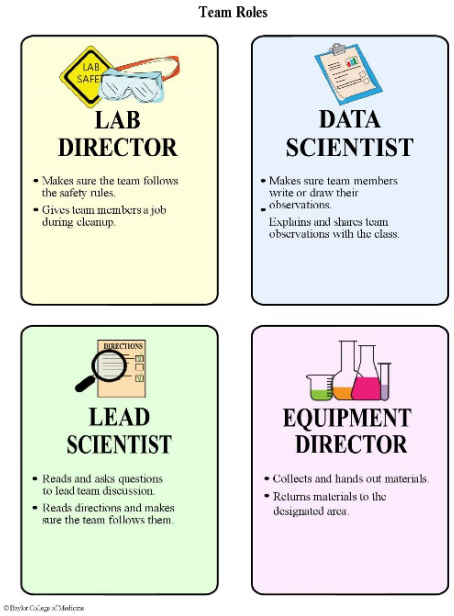
- Reads or asks questions to lead team discussion.
- Reads directions and makes sure the team follows them.

Data Scientist

- Makes sure team members write or draw their observations.
- Explains and shares team observations with the class.

Equipment Director

- Collects and hands out materials.
- Returns materials to the designated area.



SUPPORTING MATERIALS

The **"Lessons at a Glance"** document in the **"Before the Unit Begins" section** lists the materials needed for each day's lesson. Any additional supporting documents referenced in a lesson (including anchor charts and printable or downloadable files) can be found in the **"Supporting Files" section** for that day's lesson.

Mini-Lesson (15 minutes)

OVERVIEW

Mini-lessons are organized around teaching children various literacy strategies associated with science and scientists. These are taught as whole-group lessons in which the teacher models and explains a literacy strategy relevant for use with exploratory (expository) texts or media.

The strategies children learn in the mini-lessons are practiced when learners are in their inquiry circles—small teams of children working collaboratively to conduct inquiry using exploratory texts. Each day, prior to working in their inquiry circles, the children will work with you on a reading mini-lesson designed to help them become more strategic in their reading through intentional instruction.

Teacher instructions are provided for each day's mini-lesson. These instructions consist of **declarative knowledge** (statement of what the children will do or learn), **conditional knowledge** (context or background related to what the children will learn), and **procedural knowledge** (explicit instruction and practice).

Our goal in these lessons is to give you (the teacher) **suggested language** to use when teaching these strategies and a set of materials that will support you in explaining those strategies to children. **We have not scripted the lessons for you**. Rather, we hope you take these suggestions as starting points for working with children on constructing an understanding of what it is we do when we read and write like a scientist.

Today's mini-lesson will simply explain what the children will be doing throughout the unit. **The teacher will need to print out and post the "Inquiry Toolbox" and "Team Roles" anchor charts to use in the discussion!**

MATERIALS

Teacher needs:

- "Team Roles" anchor chart
- "Inquiry Toolbox" anchor chart

PROCEDURE

Each *italicized statement* below contains suggested wording the teacher may use for the lesson; additional teacher actions or considerations are in parentheses.

EXPLAIN THE STRATEGY

Tell what the strategy is (declarative knowledge)

1. *Today, we will start a new unit in which we will take on the role of a scientist—we will become scientists! We will be using texts to help us learn more about small organisms we can find outdoors, such as snails, slugs, and earthworms.*
2. *Later, you will work together with a team in an inquiry circle to investigate one particular organism that will help you understand more about the relationship between living things and the environments they live in. During inquiry circles, you can ask questions, discuss information you collected, and think about other questions you might have about your organism.*

Tell when and why to use the strategy (conditional knowledge)

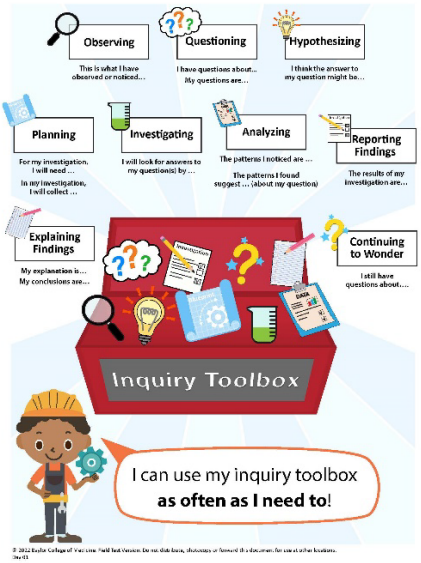
1. *When we investigate these outdoor organisms, we will practice our roles as scientists. We will do this because scientists use different ways to observe the world, read scientific texts, and write reports*. *While conducting your inquiry, you will use new science language to speak like a scientist, read for information like a scientist, and use your journals to write and organize important information and observations like a scientist. There is no better way to learn about science than to become a scientist!*

Tell how to use the strategy (procedural knowledge)

1. *While in your inquiry circles, you will take on different scientific roles within your team. Typically, science teams have a leader, called the Lead Scientist, and various other positions, such as Lab Director, Data Scientist, and Equipment Director. These roles are the same as the roles you will have during the science investigations.* (**Point out and read out loud each of the roles on the "Team Roles" anchor chart. At this point, you can assign roles or allow children to choose their roles, reminding them that they will have the opportunity to assume different roles later.**)
2. *When working in inquiry circles, we also want to practice speaking like a scientist. In order to do this, we have a chart to help us remember what kind of language to use. (*Point to the "Inquiry Toolbox" anchor chart and read to the class, giving examples of when to use the sentence stems.)

3. *Every day, we will have a mini-lesson that helps us know how to read and speak like a scientist and how to record our information like a scientist. We will talk about that more tomorrow.*

Post the "Team Roles" and "Inquiry Toolbox" anchor charts in your classroom so that the children can refer to them while in their inquiry circles. Encourage scientists to use them while in their inquiry circles.



Science Inquiry Circles (30 minutes)

OVERVIEW

Scientists frequently work in teams when conducting investigations or carrying out routine tasks. Each day of this unit, learners will work in inquiry circle teams while they each take on the role of a scientist.

Each inquiry circle team of learners will select an outdoor organism to explore throughout this unit using exploratory texts. A list of suggested organisms, text and media resources, and a PowerPoint of images have been provided for you. Learners may choose to be in teams that will explore snails, earthworms, ants, slugs, termites, beetles, and millipedes/centipedes. You may want to choose outdoor organisms that can be found in your school community. Depending on the classroom size, you may use all of the suggested organisms, or just a few. You may also have multiple teams explore the same organism. The availability of resources may determine the choices.

Teams will use exploratory texts and media to investigate their chosen organisms. **The "Exploratory Texts and Media" spreadsheet can be found in the "Before the Unit Begins" section. We suggest you choose one print text for each outdoor organism. If print texts are not available, you may also choose to use an EPIC eBook for each outdoor organism.** If you feel your learners may have difficulty reading the texts independently, you may choose to read the texts aloud to your learners prior to starting this unit. That option still allows the opportunity for learners to become interested when deciding which ecosystem to investigate.

Please be sure to gather or obtain access to these resources **prior to beginning the unit**. You, the teacher, will model inquiry and literacy practices for learners, who will work together to gather information about the outdoor organisms they selected.

MATERIALS

Each team needs:

- exploratory texts/media (you might use NearPod, Google Slides, or another tool to organize these resources for your learners)

Teacher needs:

- "Inquiry Toolbox" anchor chart
- "List of Outdoor Organisms" sheet copied onto chart paper
- "Outdoor Organisms" PPT
- "Exploratory Texts and Media" spreadsheet
- chart paper
- marker(s)

PROCEDURE

Each *italicized statement* below contains suggested wording the teacher may choose to use for the lesson; additional teacher actions and considerations are in parentheses.

Before Inquiry Circles

1. *Today, we will practice working within our inquiry circles. Each team will pick an outdoor organism to explore together. You may choose from several different outdoor organisms.* (Point to the list on chart paper and read aloud.) *No matter which organism you choose, you will explore things such as where they live, what they eat, and the relationship between your organism and others in its environment.*
2. *When we investigate outdoor organisms, we will practice being scientists. We will do this because scientists use different ways to observe the world, read scientific texts, and write reports.*
3. *While in our inquiry circles, you will take on different scientific roles. These roles are the same as the roles we will have during the science investigation*. (You may wish to remind the children of their team roles and how the roles will be rotated.)
4. *Remember, when we are in our inquiry circles we will help each other become scientists. Look at the "Inquiry Toolbox" anchor chart to find sentence stems to assist you as you work.* (Review them with the class if needed.)
5. *Before you decide which outdoor organism to explore, you will have the opportunity to read some exploratory texts to see what may interest your team the most.* (Be sure to have any books or digital media readily accessible. If you are using physical books, you may have the Equipment Director choose a resource for the team or you may distribute the books. We have also provided an "Outdoor Organisms" PPT with images you may want to project of each outdoor organism for the learners to see.)

During Inquiry Circles (20 minutes)

1. *Now that each team has some texts to explore, you need to decide how to read it together. You may want to take turns by paragraph or page, but decide before you start.* (You may decide whether you want your learners to read the text closely or browse the text and read only certain sections. Encourage learners to look at the texts to spark conversations about what they may

learn. What do they see in the pictures? What questions do they have? Alternatively, you may also read the texts to the class if needed.)

2. *While each team is exploring the texts, I will be listening for questions you may have and looking for evidence of teamwork in the classroom*. (Give the class time to explore while you facilitate when necessary.)
3. (Rotate the texts so that each team has a chance to explore a book about each of the outdoor organisms. If you are using the EPIC eBooks, you may want to set a timer and let learners know when to switch to the next book.)
4. *When all teams are finished exploring the texts, you will work together to briefly summarize what you read and decide which outdoor organism you want to learn more about. The Data Scientist should be ready to share that information with the class.*
5. (After learning something about each outdoor organism, teams will discuss them together and make a list of which organism they would like to investigate, ranking them from favorite [1] to least favorite [4]. Collect their choices.)

After Inquiry Circles (10 minutes)

1. *The Data Scientist from each inquiry circle will share with the class anything interesting your team discovered today. What grabbed your attention?* (Be sure all members of the scientific inquiry team assist the Data Scientist so that she/he is prepared to speak. Allow time for all inquiry circles to share.)
2. *I will assign each team the organisms for exploration tomorrow*. (Depending on learner preferences, you might have each team investigate a different organism, or some teams might investigate the same organism. You will need to assign all teams their outdoor organism by the next lesson.)

Guided Science Investigation (30–45 minutes)

OVERVIEW

To practice working as a team, learners will use consumable materials to "rescue" a snail trapped on a wire hanging from the ceiling!

GUIDING QUESTIONS

Why do scientists work in teams? What is the value of teamwork?

BACKGROUND INFORMATION FOR THE TEACHER

Over the course of the next three weeks, children will plan and conduct investigations as members of scientific teams. The science team members will have the same roles as in the inquiry circles: Lead Scientist, Lab Director, Data Scientist, and Equipment Director. To provide variety for learners, the positions can be rotated among them, allowing each child to try each job. In practice, members of each team will participate in all tasks the team performs during the investigation, e.g., measuring, making observations, etc.

MATERIALS

Each team member needs:

- blank sheet of paper
- pencil

Each team needs:

- ziplock bag containing 20 index cards, 20 straws, and tape
- 1 large paper plate

Teacher needs:

- 1 pkg of air-dry clay
- fishing line or string
- "Snail Model" mp4
- dark plastic grocery bag
- ziplock bags
- index cards (20 per team)
- straws (20 per team)
- tape (1 per team)
- paper plates (1 per team)

SETUP

Before the class:

- The teacher will construct **snails (1 per team)** out of air-dry clay (see the instructional video); allow the snails to dry before this activity.
- The snails will be attached by string or fishing line to the ceiling and should hang approximately 3 feet above each team's table or workspace. (It needs to be high enough for a challenge but not impossible.)
- Cover the snails loosely with a dark plastic bag so that the class can't see them before you are ready to unveil them.
- Place 20 index cards, 20 straws, and tape in a ziplock bag, **one bag per team**.
- Decide on a designated area to set up materials for distribution throughout the unit. Place bags and paper plates there for today's lesson.

PROCEDURE

Engage

1. Ask, *What do you think of when you hear the word **teamwork**?* Learners may offer ideas and examples—accept all responses.
2. When all responses have been considered, ask, *What is something that many of you mentioned that is similar?* Accept all responses. (Teamwork involves more than one person working on something.)
3. Tell the class that today they will work together in teams to complete a rescue mission!

Explore

1. As the class watches, the teacher removes the plastic bags revealing the snails hanging from the ceiling.
2. Tell the children that the snails got stuck on a thin wire and need a way to climb down!
3. Explain that their task will be to build something that will reach the snails so that the snails can crawl down safely.
4. Explain that **the only materials they can use to construct with** are the index cards, straws, and tape.
5. Explain that first, each team member should share an idea for a plan on how to do that. Encourage them to draw their ideas. Teacher should walk around and listen to their ideas.
6. Then, after everyone has shared, tell them to decide as a team which idea they will try.

7. When ready, ask the Equipment Director of each team to come to the designated area to collect the bags of materials and one paper plate for their team.
8. Explain that they will build their constructions on the plates at their tables to make it safer to move if they need to.
9. Tell them that they only have 15 minutes to complete the task. Teacher can set a timer.
10. As learners work, walk among the teams to listen to their ideas and offer guidance (if asked) in the form of questions, such as, *What do you think will make it stronger? How can this be changed?* Remember, this is **their** work! Encourage their problem solving!

Explain

1. When time is up, have teams stop constructing, regardless of progress. The teams should position their finished constructions carefully under the snail to see if it reaches!
2. One at a time, ask the teams, *What was your idea or plan? Did you reach the snail? If not, what would you need to change in your construction to make it work?* Allow time for learners to respond.
3. Allow teams who didn't finish to describe what their construction was going to be and/or ask them to report on any problems they had. Let them know that it is OK if their constructions did not work. Ask, *What could you have done differently?*
4. Ask the class to reflect on the activity. *What do you think was the hardest part of this construction? Do you think you worked successfully as a team? What did you do well together? What did not work well?* Allow time for discussion.
5. Explain to the class that successfully completing the "escape route" for the snail was not necessary. Tell them that communication (talking to each other respectfully), collaboration (working as a team), and respect for each other's ideas were the important things!

Elaborate

1. Ask learners to think about how scientists work as a team. (They talk to other scientists about their ideas, share information they might have, etc.) Accept all responses.
2. Explain that scientists often collaborate with each other to share the results of their research and investigations to put the pieces of a bigger picture together and that each has a specific role in the scientific team. Collaboration is when two or more people work together to accomplish a goal or task.
3. Let them know that scientists are not always successful in their work either, but that they learn from each other and find new ways to do things better.

Evaluate

1. Did learners communicate reasonable ideas about what "teamwork" is?
2. Did they work together to solve the problem? Was everyone included in the planning?
3. Some teams may not work well together, and guidance or adjustments may become necessary. Remember that the focus of this challenge is to learn how to work as a team to solve a problem together. The process of collaborative work is more important than actually constructing the object!

Science Language

- A **team**, or teamwork, is a group of people who work together to accomplish a goal or task.
- A **scientist** is a person who is an expert in, or studies aspects of the natural or physical world.
- **Collaboration** is when two or more people work, learn, and talk with each other.
- Organisms have **needs** for surviving, such as water, energy, air, and a place to live.
- A **scientific investigation** is a plan for finding answers to questions and solving problems.
- **Scientific inquiry** is using evidence from texts, observations, and investigations to find answers to questions.

Expanded Standards

Reading TEKS

ELA.1.6A: establish purpose for reading assigned and self-selected texts with adult assistance.

CCSS

RI.1.10: with prompting and support, read informational texts appropriately complex for grade 1.

NGSS

K-2 ETS1-1: Science and Engineering Practices: Asking Questions and Defining Problems: Define a simple problem that can be solved through the development of a new or improved object or tool.
ETS1.A: Defining and Delimiting Engineering Problems: A situation that people want to change or create can be approached as a problem to be solved through engineering. Such problems may have acceptable solutions.

Science TEKS

2018–19: 1.3A: identify and explain a problem such as finding a home for a classroom pet and propose a solution in his/her own words.
2024–25: 1.3A: develop explanations and propose solutions supported by data and models.