

## DAY 1: WORKING AS A TEAM IN SCIENCE



### MINI-LESSON

Teacher introduces the “Inquiry Toolbox” and “Team Roles” anchor charts and assigns rotating team science roles.

### SCIENCE INQUIRY CIRCLES

Teams peruse exploratory texts and rank their interest in specific Texas ecoregions.



### GUIDED SCIENCE INVESTIGATIONS

Teams make observations of live plants and are introduced to inherited and acquired traits.



#### ABBREVIATED STANDARDS

- Reading TEKS: 4.13A
- CCSS: SL.4.1(b)
- NGSS: 3-LS3-1
- Science TEKS: 2018–19: 4.10B; 2024–25: 4.3B; 4.3C , 4.13B

## Day 1: Working As a Team in Science

**Literacy Strategy:** Learning to think, read, write, and speak like scientists.

**Science Concept:** Scientists ask questions based on observations before they begin gathering information from texts and the natural world, and they benefit from working in teams to find answers.

**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.

### LAUNCHING THE INQUIRY PROJECT: LETTER FROM A CITY MAYOR

This unit is driven by a scenario-based inquiry project. To launch this inquiry, you will tell learners that they have received a letter from a city mayor (below). Introduce the letter from the mayor and read the letter together or in groups.

Dear Scientists,

I am concerned about my city, and I am reaching out to you for help. This year has been very hot and very dry. I have noticed that some of the city's plants look like they need attention—they have not grown as tall and fast as they usually do, and when there has been no rain for weeks or months, many plants turn brown and yellow instead of green. I am worried about what might happen to the plants in our area over the next few years. As experts on the ecosystem where we live, I think you can help me.

I am hoping you can send me a report on what might be impacting our plants (including our environment, temperature, and rainfall) and make a presentation to our city council. We will use your report and presentation in our decisions about the plants in our area.

Thank you for your help.

Sincerely,

The Mayor

**NOTE:** You might wish to create three versions of this letter, one for each city and Texas ecoregion included in this unit (Piney Woods, Trans-Pecos, Blackland Prairie). If so, you can refer to this map from Texas Highways (<https://texashighways.com/wp-content/uploads/2020/03/wildflower-regions-of-texas.jpg>) to identify major cities within each Texas Ecoregion (or select other cities that your learners might be familiar with) and sign the letter as “The Mayor of \_\_\_\_\_.”

**You might say something like this:**

*To help the mayor, you will become experts on the observable characteristics (traits) of plants and on the environmental conditions and plants in a specific ecoregion of Texas. Ecoregions are made up of a certain type of ecosystem. You will choose to become experts on one of three ecoregions: the Piney Woods (made up of temperate forest ecosystems), the Trans-Pecos (made up of desert ecosystems), or the Blackland Prairie (made up of temperate grassland, or prairie, ecosystems).*

*During this unit, you will read about your ecoregion, the type of ecosystem in your ecoregion, and the plants that live there. You will also participate in science investigations to understand how changes in the environment can cause plants to acquire new traits. At the end of our unit, you will be ready to write a report for the mayor of a city in your ecoregion and give your presentation to the city council.*

## Mini-Lesson (15 minutes)

### OVERVIEW

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

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.** Alternatively, these could be created on chart paper.

**NOTE: The teacher will need to assign children to teams before they go into inquiry circles. Review the options for creating teams in the “Unit Overview for the Teacher” (“Before the Unit Begins” section).**

### MATERIALS

**Teacher needs:**

- “Inquiry Toolbox” anchor chart
- “Team Roles” anchor chart

### 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.

**Tell what the strategy is (declarative knowledge)**

1. *Today, you will learn about characteristics that plants inherit from their parent plants. Throughout this unit you will also learn about characteristics organisms acquire during their lifetime due to interactions with their environment. Botanists, or plant scientists, can learn a lot by observing plants, but they can also learn from texts written by other scientists.*

2. *You will work together as a team in an inquiry circle to investigate the plants and environmental conditions in a particular ecosystem. This will help you understand more about how plants come to have the characteristics they have as a result of inheritance and interactions with the environment. In your inquiry circles, you will explore texts and media to find out more about the plants in your ecosystem. During inquiry circles, you can ask questions, discuss information you collect, and think about other questions you might have about plants in your ecosystem. The text-based inquiry involves asking questions and gathering information to answer these questions. In some ways, this is like the inquiry you engage in during a science investigation. We have an inquiry toolbox that will help you in your work. (Point to the “Inquiry Toolbox” anchor chart and read aloud to the class.)*

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

1. *When we investigate the plants in our ecosystem, we will practice our roles as scientists. We will do this because scientists use different ways to observe the world, including reading scientific texts, writing reports, and conducting investigations. You will take on the role of a scientist conducting inquiry by speaking like a scientist (using new science language), reading like a scientist (using strategies to find information), and writing like a scientist (using journals to organize important information and observations). 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 science roles with duties 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. Each of these roles is important to the overall success of the team. (Point out and read each of the roles on the “Team Roles” anchor chart. **At this point teacher can assign roles or allow children to choose their roles**, letting them know that they will have the opportunity to assume different roles later.)*

Post the “Team Roles” and “Inquiry Toolbox” anchor charts in your classroom where they can be referred to and encourage your learner to use them while in their inquiry circles.

## **Science Inquiry Circles (30 minutes)**

### **OVERVIEW**

During the first day of inquiry circles, teams will select one of three Texas ecoregions: the Piney Woods, the Trans-Pecos, and Blackland Prairie. Teams will first explore informational texts about the ecosystems present in each of these Texas ecoregions (temperate forest, desert, temperate grassland). These informational texts are meant to grab the attention of learners and get them interested in the topic. Refer to the “Ecosystem Resources” spreadsheet (in the “Before the Unit Begins” section), which includes suggested texts and media for exploring and selecting inquiry topics. Today, you may use the suggested print text for each ecosystem. If the print texts are not available, you may choose to use the suggested EPIC eBooks for each ecosystem. If only some of these are available, you may also choose from other texts in the spreadsheet, but we suggest you choose only one print text or eBook for each ecosystem. Make sure to have exploratory texts ready ahead of time.

If you feel your learners may have difficulty reading these texts independently, you may choose to read the texts aloud to your learners prior to starting this unit. This option still allows the opportunity for learners to become interested when deciding which ecosystem to investigate.

## MATERIALS

### Each team needs:

- access to a small selection of informational texts (one for each ecosystem option)
- sticky notes
- pencils

### Teacher needs:

- “Ecosystem Resources” spreadsheet for ideas

## 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. *In your inquiry circles, you will become experts on the ecosystem your team chooses and the plants that live there. Since it is not always possible to observe an ecosystem or a plant firsthand, scientists must turn to text and media resources to expand their knowledge. As scientists, you will also explore texts and media (e.g., books and web pages) to answer your questions about plants and environmental conditions in your chosen ecosystem and build your expertise.*
2. *Today during inquiry circles, you will explore three kinds of ecosystems found in North America: temperate forest, desert, and temperate grassland (also called prairies). These ecosystems can be found in Texas too. You can choose any of these three ecosystems and associated regions in Texas: Piney Woods (temperate forest), Trans-Pecos (desert), or Blackland Prairie (temperate grassland).*
3. *No matter which ecosystem you choose, you will investigate the physical characteristics of plants in that ecosystem, environmental characteristics of the ecosystem, and other aspects of the ecosystem that you would like to know about. Before you decide which ecosystem to investigate, you will have the opportunity to read some exploratory texts to see what may interest you the most. (Be sure to have the books available for children. You may distribute the books or have the Equipment Directors choose a book for their team. You may also want to project the Texas Highways Map of Ecoregions which can be found in the “Ecosystem Resources” spreadsheet.)*

### During Inquiry Circles (20 minutes)

1. *Now that each team has a text 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 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 discover. What do they see in the pictures? What questions do they have?)*
2. *While you are reading, I will be walking around to assist you as needed. (Allow the class time to read while you facilitate when necessary. Rotate the texts so that each team had a chance to explore a book about each of the ecosystems. If you are using the EPIC eBooks, you may want to set a timer and let learners know when it is time to switch to the next book.)*

3. *When all inquiry circles are finished reading the exploratory texts, you will work together to briefly summarize what you have read and decide which ecosystem you want to learn more about. Rank the ecosystems from favorite (1) to least favorite (3). (Children can rank the ecosystems individually OR in teams, depending on which option for creating teams the teacher has chosen.)*
4. *Now that you have identified your top choices, think about your top two ecosystems that you would like to learn more about. What questions do you have about the plants in these ecosystems? Write down your questions on sticky notes. (Teacher will want to collect sticky notes and store them in a way that will allow learners to return to them tomorrow.)*

#### **After Inquiry Circles (10 minutes)**

1. *The Data Scientist from each inquiry circle will now share the team's top ecosystem choices, as well as anything interesting the team discovered today. What grabbed the team's attention? (Be sure all members of the team assist the Data Scientist so that they are prepared to speak. Allow time for all inquiry circle teams to share.)*
2. *I will assign all ecosystems for investigation tomorrow.*

### **Guided Science Investigation (30–45 minutes)**

#### **OVERVIEW**

Learners will consider observable traits in plants.

#### **GUIDING QUESTIONS**

What are traits? How are parents and their offspring similar? How are they different?

#### **BACKGROUND INFORMATION FOR THE TEACHER**

A trait is a physical attribute of an organism, such as eye color, feathers, or the shape of leaves. Animals and plants of the same kind share basic traits that help us identify a species. However, not all individuals of the same species are exactly the same, some traits vary within a species.

Traits can be inherited or acquired. Traits that are inherited are passed down from parent to offspring. Acquired traits are not passed down but are the result of environmental or external factors.

**NOTE: Starting tomorrow (unless the teacher has already assigned teams), children will be working in the same teams for the rest of the unit.** The teams children work in during inquiry circles will be the same teams they work in during the guided science investigation. However, the team roles, or jobs, may change.

#### **MATERIALS**

**Each team member needs:**

- science notebook
- pencil

**Teacher needs:**

- designated outdoor area (if observations will be conducted outdoors)
- several different potted plants for making observations (if no outdoor green space is available)
- “Plant Images” PPT

#### **SETUP**

- If you are doing outdoor observations, survey the area you will be using for any potential hazards.
- If using potted plants, gather several (3 or 4) and place together on a table or at different stations for easy viewing by all teams.
- Prepare to project Plant Images PowerPoint.

## SAFETY

- Before class, if you are working outdoors, inspect the area(s) where children will be making their observations.
- Look for potential hazards, such as insects, ants, garbage, etc.
- Be aware of any allergies children may have to insects or vegetation.
- Caution the children to stay within the designated observation area(s).
- To prevent injury or irritation, advise the children not to touch any vegetation—observations will be made with “eyes only.”
- If you will be using potted plants, some of the same safety concerns apply.

## DAILY OBSERVATIONS

There are no daily observations at this time.

## PROCEDURE

### Engage

1. Ask learners, *Do all plants look the same? Turn and talk to a partner and share your ideas. After a few seconds, turn to a different partner and again share your thoughts.*
2. Announce that you’re going to take the class outside to make some careful observations of any plants they may see. Caution the learners not to touch or handle any vegetation to prevent injury or irritation to the skin. (If you’re using indoor potted plants, they should be located where they can be observed from different angles. You may want to set up several different viewing areas and allow the learners to rotate between them. The same safety rule applies.)
3. Instruct learners to carry their science notebooks with them to record their observations. They should look for physical features that are the same and features that are different. Remind them to consider plant structures they are familiar with, such as leaves, stems, and other plant parts.

### Explore

1. Allow 15 minutes for exploration as you move between the teams to listen to their ideas.

### Explain

1. After the exploration, randomly select team members to share their observations of the plants as a whole, whether outside or inside. Create a T-chart on the whiteboard to record similarities and differences. For example, a similarity might be that all plants had leaves; a difference might be that the leaves are many different sizes or colors. Record all student responses.
2. Explain that the plant features they have described are called traits. Project **slide 1** of the “Plant Images” PowerPoint. Explain that traits are physical attributes that can be seen, such as the shape or color of leaves. We can identify different species of plants by the traits they share.
3. Ask, *What traits in these plants do you see that are the same?* (Possible answers should include leaves, stems, roots.) *What traits make these plants different from each other?* (Possible answers may include shape of the leaves, size, colors)
4. Species in the same plant family may have similar features, but individuals can be different due to inherited and/or acquired traits. Project **slide 2** of the “Plant Images” PowerPoint. Ask, *What*

*traits in these plants are the same? How are they different?* Accept responses. (Possible answers may describe similar arrangement of leaves or coloring; differences may include shape of leaves.)

5. Explain that traits that are inherited are passed down from parent to offspring. Acquired traits are not passed down but are the result of environmental or external factors.

### Elaborate

1. Share that in the next class, teams will explore more about traits. Add that their work investigating plants in different ecosystems during inquiry circles is related to the work they will do in their science investigations. Both are important in helping them understand more about traits.
2. Let learners know that, starting tomorrow, they will be working in teams for the rest of the unit. The teams they work in during inquiry circles will be the same teams they work in during science investigations. However, their roles, or jobs, may change.

### Evaluate

1. Did children communicate a reasonable understanding of similarities and differences in plants based on their observations?
2. Did children communicate a reasonable understanding of what a trait is?

## Science Language

- A **trait** is physical attribute of an organism, such as eye color, feathers, or the shape of leaves. Traits can be inherited or acquired.
- **Inherited traits** are passed down from parent to offspring.
- **Acquired traits** are not passed down but are the result of environmental or external factors.
- **Organisms** are living things that carry out the activities needed to live, grow, and survive.
- **Observing** is carefully looking at something or someone to gather information.
- A **scientist** is a person who is an expert in or who studies aspects of the natural or physical world.
- A **botanist** is an expert in the scientific study of plants.
- A **team** is a group of people who work together to accomplish a goal.
- **Collaboration** occurs when two or more people work together, learn from each other, and communicate with each other.

## Expanded Standards

### Reading TEKS

**4.13A:** Generate and clarify questions on a topic for formal and informal inquiry.

### CCSS

**SL.4.1:** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly. **(b)** Follow agreed-upon rules for discussions and carry out assigned roles.



## NGSS

**3-LS3-1:** Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.

## Science TEKS

**2018–19: 4.10B:** Explore and describe examples of traits that are inherited from parents to offspring such as eye color and shapes of leaves and behaviors that are learned such as reading a book and a wolf pack teaching their pups to hunt effectively.

**2024–25: 4.3B:** Communicate explanations and solutions individually and collaboratively in a variety of formats and settings. **4.3C:** Listen actively to others' explanations to identify relevant evidence and engage respectfully in scientific discussion. **4.13B:** Differentiate between inherited and acquired physical traits of organisms.