

DAY 1			
Introduction to Being a Scientist			
Reading Strategy: Language of a Scientist and Introduction to Inquiry Circles		Science Concept: Team Building for Scientific Research (Scientists Work in Teams)	
Reading TEKS: 2.1D	Figure 19: Reading/Comprehension Skills F	ELPS: Speaking K-12, 19 TAC 74.4(c)(3) D	Science TEKS: 2(a) 1 2(b) 1(D, E)
Materials for Reading Mini Lesson: Chart paper, markers, nonfiction butterfly text to model strategy			
Materials for Inquiry Circle Groups: A list of organisms for research (frog, salamander, American alligator rattlesnake, sea turtle, hummingbird, penguin, coyote, bat, spider monkey, bee, praying mantis, butterfly) and a variety of nonfiction texts for each group (Go to project website); Science Team Roles (one copy of each role to display as a reference for students or create the class’s own anchor char of team roles)			
Materials for Science Whole Group Lesson: Copy of “Memory Pictures” PowerPoint® file for projection, smart board or LCD projector and screen; notebook or lined paper (2 sheets per student, with an additional 2 sheets per team); and Science Team Roles poster. (See section for details.) You’ll also create badges to help students identify their Science Team Roles (make sufficient copies of the Science Team Role Badges, cut them out—or have student cut them out, and use approximately 18 inches of string or yarn to create a lanyard for each badge).			
Content Vocabulary: Collaboration — Working as a team to accomplish a goal. Scientist – Person who is an expert in, or studying aspects of the natural or physical world. Team – Group of persons who work together to accomplish a goal. Data – Information collected to answer a question. Lab – Short for “laboratory,” facility where scientific investigations are done. Life Cycle – Series of change undergone by an organism over its lifespan.			
Science and Literacy Connection: Often, scientists work in teams to research a topic and perform investigations They use scientific language while working together in the cycle of inquiry. Science consists of asking questions and using a stepwise process to search for answers.			

For an expanded version of the Standards listed above, see page 7.

Daily sequence of instruction will be:
Reading Mini-lesson
Inquiry Circle groups
Science Whole-group Lesson.

You may space the three components throughout the day in the way that best fits your usual schedule.

Reading Mini-lesson — 15 minutes

OVERVIEW

Throughout this unit, students will be organized as scientific research teams. The teams will work collaboratively in small groups called “inquiry circles” to conduct research using informational texts. Each day you will lead a Reading Mini-lesson before having the students work in their inquiry circles. The

Mini-lesson is designed to help students become more strategic in their reading through intentional instruction.

Each inquiry circle of students will select an organism to investigate throughout this unit using informational texts. A list of suggested organisms (such as sea turtles, penguins, salamanders, and spider monkeys) and text resources is provided for you. Please be certain to gather or obtain access to these resources prior to beginning the unit. You, the teacher, will model research and literacy practices for students, who will work together to collect data about the organisms they selected. You will recognize the instructional model of inquiry circles as being similar to that of literature circles.

In addition to their English language arts activities, students will conduct separate hands-on investigations of the life cycle of painted lady butterflies (live animals). These activities are provided as separate lessons labeled as Science Whole Group Lesson. The Science Whole Group Lesson is a teacher-facilitated science exploration with students working in collaborative groups.

You may use a variety of methods when assigning groups. We recommend forming heterogenous groups, while providing learners with the opportunity to choose their animal of interest. Be sure to form, or enable students to form, the groups prior to beginning the first Reading Mini-lesson.

Students will be organized in teams that reflect the roles of practicing scientists. Typically, such teams have a leader, called the Lead Scientist, and various other scientists, such as Lab Director, Data Scientist, and Equipment Director. To provide variety, students should rotate positions in different activities, allowing each student to try each job.

While working with the butterflies, students will be in groups of four. Teachers may decide to have larger inquiry groups when researching the organisms or have multiple small groups researching the same organism (the decision may be dependent on class size).

Team Roles are given below. These roles also are outlined on four separate 8.5-in. x 11-in. reproducible pages, which you may want to display as a reference for students.

Lead Scientist

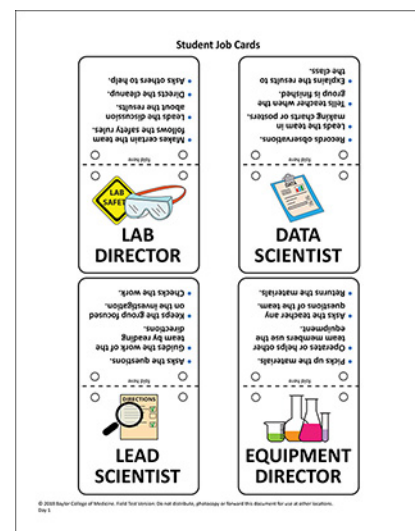
- Asks the questions
- Guides the work of the team by reading directions
- Keeps the group focused on the investigation
- Checks the work

Lab Director

- Makes certain the team follows the safety rules
- Leads the discussion about the daily results
- Directs the cleanup
- Asks others to help

Data Scientist

- Checks that daily measurements and observations are recorded.
- Leads team in making charts or posters
- Tells the teacher when the group is finished
- Explains the team results to the class



Equipment Director

- Picks up and distributes the materials
- Operates or helps other team members use the equipment
- Asks the teacher any questions the team has
- Returns the materials to designated area

PROCEDURE

• Declarative Knowledge (what)

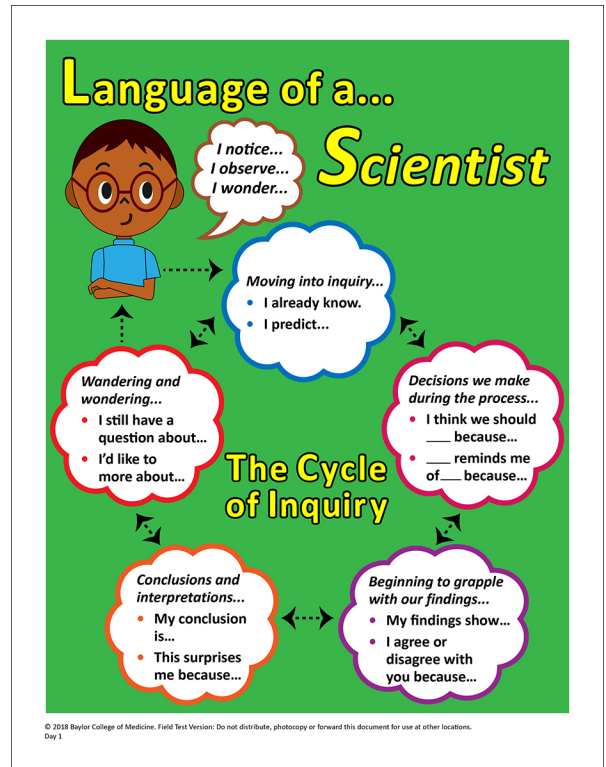
- Say something like, “Today, we will start a new unit in which we all will embody the role of a scientist. We’ll be investigating different organisms.”

• Conditional Knowledge (when and why)

- Say something like, “When we investigate living butterflies and when we research 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. There is no better way to learn about the world around us than to become a scientist!” (Scientists often observe, work with a team, ask questions, make a plan, record information, organize data, make predictions, etc.)

• Procedural Knowledge (how)

- Say something like, “While in inquiry circle groups and your science groups, you will take on different team roles.” Refer to the roles above and describe the duties to students. You may wish to refer to the anchor chart with descriptions of all four jobs.
- Say something like, “When working in our inquiry circle groups, we also want to practice speaking like a scientist. In order to do this, we have an anchor chart to help us remember what kind of language to use.” Create the “Language of a Scientist” anchor chart with the students and give examples of when to use the stems. (A model of this anchor chart is provided for you.)
- Say something like, “Every day we will have a Mini-lesson that helps us know how to read like a scientist and we will record our information like a scientist. We will talk about that more tomorrow.”



Inquiry Circle Groups — 30 minutes

OVERVIEW

Scientists frequently work in teams when conducting investigations or carrying out routine tasks. Each day of this unit, students will work in inquiry circle groups while embodying the role of a scientist. They will do so by taking on roles of scientists in research by speaking like a scientist, reading like a scientist, and writing like a scientist.

PROCEDURE

Before Inquiry Circle Groups — 5 minutes

1. Say something like, “We will practice working with our inquiry circle groups.”
2. Remind students of the introductory Mini-lesson and the “Language of a Scientist” anchor chart. Say something like, “When we research 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. There is no better way to learn about science than to become a scientist!”
3. Say something like, “While in inquiry groups, you will take on different scientific roles. These roles are the same as the roles we have during the butterfly investigation.” (You may wish to use this time to assign roles to students and determine how roles will be rotated.)
4. Say something like, “Remember when we are in our inquiry circles, we will help each other become scientists. Look at the ‘Language of a Scientist’ anchor chart to find sentence stems to assist you.”

During Inquiry Circle Groups — 20 minutes

1. Say something like, “Now each group will read a fiction portal text about the animal you will research. When reading this text, think about what questions you may have about your animal that can be researched. We will use nonfiction texts when we start our research tomorrow.”
2. Say something like, “While each group is reading their text, I will be listening for all the scientific language and teamwork in the classroom.” Allow class time to read while you facilitate when necessary.

After Inquiry Circle Groups — 5 minutes

Say something like, “The Data Scientist from each group will share with the class what your portal text was about. How did it grab your attention? What did the character do?” Be sure all members of the scientific inquiry team assist the Data Scientist, so she/he is prepared to speak. Allow inquiry circle groups to share.

Science Whole Group Lesson — 30 minutes

OVERVIEW

In this activity, students will compare the effectiveness of individuals acting alone versus how successful teams of individuals are in completing the same complex task.

GUIDING QUESTIONS

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

BACKGROUND INFORMATION

Over the course of the next four weeks, students will learn about the life cycle of butterflies by observing and investigating live painted lady butterflies. During the development of the butterflies from larva to adults, students will conduct their investigations as members of scientific research teams. Typically, science teams have a leader, called the Lead Scientist, and various other positions, such as Lab Director, Data Scientist, and Equipment Director. To provide variety for students, the positions can be rotated among students, allowing each student to try each job.

In practice, members of each student team will participate in all tasks the team performs during the investigation. For example, measuring, making observations, etc.

SETUP

- Each student will need two sheets of lined paper, and each team will need two additional sheets.
- Download the Activity 1 PowerPoint® and prepare a smart board or LCD projector to show it.
- If not done earlier, download the Science Team Roles template, print it out (4 pages) and display the pages for students to refer to.
- Using the template, make enough sets of team badges for students to wear while conducting the other activities in this unit. Use yarn or string to create lanyards for the badges, so that student can wear them.

Resources: Additional ideas for team badges and job cards can be found at the following site.
<http://bioedonline.org/library/supplemental-materials/cooperative-groups-job-cards/>

PROCEDURE

Engage

1. Ask students how good their memories are. Have they ever played the concentration game where they turn over cards and try to match pictures? After discussion, say to the class, “Let’s test your memory.” Project the PowerPoint® file, “01-Memory Picture.pptx.” Do not move past the title slide.

Explore

2. Provide each student with a blank sheet of lined paper. Explain that you will show them a slide with many pictures of objects. Tell them to look at the pictures, but to keep pencils down until you direct them to begin writing.

3. Find and project Set 1 (slide 2) for 30 seconds. Switch to a blank slide (provided before and after each set of pictures), and ask students to list or draw as many of the objects shown in Set 1 as they can remember. Tell them not to talk to each other. Listing of the objects must be done from each individual student’s memory. After two minutes, have students stop listing objects.



4. Have students exchange completed lists for review by other students. Show Set 1 again and have students count up how many objects were correctly listed. Create a 3-column chart on the board. Write the number of correct objects from each list in Column 1 on the board.

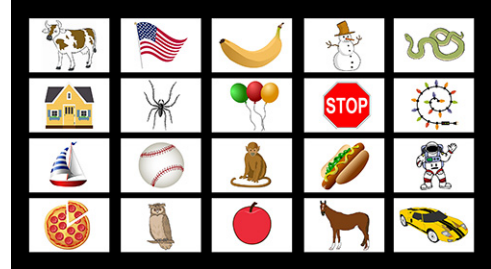
5. Next, ask students to work in their inquiry circle groups. Tell them that you will be showing another set of memory pictures. Prompt students to work together to try and remember as many objects as they can. Observe the strategies they use for remembering pictures. Show Set 2 (slide 4) for 30 seconds, then move to a blank slide.



6. Give teams a clean sheet of paper. Have teams list or draw as many objects as they can in the next two minutes. When finished, have students exchange

lists with other teams. Show Set 2 again, and have students count the number of objects correctly identified. Record the numbers for each team in Column 2.

- Now tell the teams that you will give them time to discuss the best ways to remember all of the pictures. Give teams a couple of minutes to come up with strategies. When ready, show Set 3 (slide 6) for 30 seconds, then move to a blank slide. Provide teams with a fresh sheet of paper. Have teams work together to list or draw all the objects they can remember in the next two minutes. After two minutes, have students stop listing objects.



- Have teams switch lists as before and show Set 3 again for review. Write how many of the 20 objects were correctly identified on each team list Column 3 on the board.

Explain

- Ask your students to examine the three columns of numbers. Have them report on their observations. What do they see? How well did students do when working by themselves?
- Have students explain what the numbers tell them in Column 1. What was the range of correct identifications (lowest number to highest number)?
- Repeat the discussion with Column 2, and then with Column 3. Which of the three columns got the best results? Ask students to explain why.
- Ask students to reflect on working in their inquiry circle groups this morning. How can the lessons they just learned about working with a team be applied to inquiry circle groups tomorrow?

Elaborate

- The purpose of this memory activity is to show how teamwork can enhance scientific research. Discuss what a scientific research team should look like. What jobs should each team member have? Refer to the “Roles” anchor chart for guidance.

Resources: Ideas for team badges and job cards can be found at the following site.

<http://bioedonline.org/library/supplemental-materials/cooperative-groups-job-cards/>

Evaluate

- Observe how well students work together in the second and third memory tests. Some teams may not work well together, and guidance or adjustments may become necessary in upcoming activities.

Expanded Standards

Reading TEKS: 2.1D Developing and sustaining foundational language skills: listening, speaking, discussion, and thinking--oral language. The student develops oral language through listening, speaking, and discussion. The student is expected to:(D) work collaboratively with others by following agreed-upon rules for discussion, including listening to others, speaking when recognized, making appropriate contributions, and building on the ideas of others;

Figure 19: Reading/Comprehension Skills. Students use a flexible range of metacognitive reading skills in both assigned and independent reading to understand an author’s message. Students will continue to apply earlier standards with greater depth in increasingly more complex texts as they become self-directed, critical readers.

(F) make connections to own experiences, to ideas in other texts, and to the larger community and discuss textual evidence.

ELPS: Student Expectations for Speaking K-12, 19 TAC 74.4(c)(3) The student is expected to: (D) speak using grade level content vocabulary in context to internalize new English words and build academic language proficiency (E)share information in cooperative learning interactions

Science TEKS:

2(a) Introduction.

- (1) In Grade 2, careful observation and investigation are used to learn about the natural world and reveal patterns, changes, and cycles. Students should understand that certain types of questions can be answered by using observation and investigations and that the information gathered in these investigations may change as new observations are made. As students participate in investigation, they develop the skills necessary to do science as well as develop new science concepts.

2(b) Knowledge and skills.

- (1) Scientific investigation and reasoning. The student develops abilities necessary to do scientific inquiry in classroom and outdoor investigations. The student is expected to:
(D) record and organize data using pictures, numbers, and words;
(E) communicate observations and justify explanations using student-generated data from simple descriptive investigations.

Image References

Memory Pictures: Set 1

1. Illustrations courtesy of Openclipart.com: Cat, sun, penguin, books, clock, pencil, flowers, heart, panda bear/bear, umbrella shark, rocket, duck, rainbow, frog, bow. <https://openclipart.org/>
2. Illustrations licensed for use: Ambulance © Oleksandr Bolotov. Basketball © Petr Novotny. Fish © Blueringmedia. Hammer © Dian Permana.

Memory Pictures: Set 2

1. Illustrations courtesy of Openclipart.com: Beach ball, bed, blocks, birdl, chair, dog, elephant, jack o’ lantern, teddy bear, rabbit, toy train, tree, turtle. <https://openclipart.org/>
2. Illustrations licensed for use: Airplane © Andrey Kokidko. Butterfly © Irina Artamonova. Flowers/roses © Nadejda Tchijova. Leaf © Almoond. Pig © Macrovector. School Bus © Denis Dubrovin. Soccer Ball © Petr Novotny.

Memory Pictures: Set: 3

1. Illustrations courtesy of Openclipart.com: Apple, astronaut, balloons, banana, baseball, Christmas lights, cow, flag, horse, hot dog, owl, snake, snowman, spider, sports car, stop sign. <https://openclipart.org/>
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