| Day 4<br>What Makes a Good Science Question? | | |
|---|---|---|
| **Reading Strategy:** Reading for Specific Information on the Internet Mini-lesson Practice | | **Science Concept:** Good science questions are testable and should be answered in a measurable way through investigations or experiments. |
| **Reading TEKS:** 3.9F | **ELPS:** Speaking K-12, 19 TAC 74.4(c)(4) D & E | **Science TEKS:** 3b2A |
| **Materials for Reading Mini Lesson:** chart paper, markers, pond ecosystem inquiry chart, webpage about ponds to model the strategy, computer and projector; list of suggested websites | | |
| **Materials for Inquiry Circle Groups:** group inquiry charts, pencils, variety of nonfiction texts for each group, access to websites and online books | | |
| **Materials for Science Whole Group Lesson:** See Lesson | | |
| **Content Vocabulary:**<br>**Testable question –** a question that can be answered through an investigation or experiment<br>**Scientific investigation** – a planned design or approach to find an answer to a question<br>**Evidence** – data collected from the investigation that can be used to support explanations and answers | | |
| **Science and Literacy Connection:** Scientists consider specific information when formulating testable questions, or planning and conducting research or investigations. | | |

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

## Reading Mini-lesson — 15 minutes

### OVERVIEW

Mini lesson practice should be used as a time to practice the reading strategies previously taught in this unit. Teachers are encouraged to use this time to best meet the needs of their students. Perhaps your class needs more time with the mini-lesson from the day before, or you may choose to circle back to mini lessons from a week ago. The choice is yours; we just ask that you use this time to practice!

Teachers should determine if this mini lesson will be facilitated with the whole group or a small group (i.e., a particular inquiry circle group) who needs additional support. If you are working with a small group, we suggest your other learners spend additional time within the inquiry circles.


Explain the strategy:

- **Tell what the strategy is (declarative knowledge)**
  - Say something like, "Today we will continue to practice reading for specific information on the internet about the topic (ecosystems). Remember, I read for specific information on the internet when my books do not have the information I need or when I need more current information."

    Refer to the anchor chart previously made with the class.

- **Tell when and why to use the strategy (conditional knowledge)**
  - Say something like, "Yesterday, we talked about how I use key words to scan the page and find information more quickly. I should be skeptical about what I find on the internet and only use websites that my teacher has approved."

- **Tell how to employ the strategy (procedural knowledge)**
  - For this section in the mini-lesson, the teacher may choose to model the strategy again for the class. Be sure to use a different text or page in the text than what you modeled yesterday.
  - Teachers are encouraged to share examples of students using this strategy from the day before. Say something like, "Mohamed's group did a great job yesterday reading for specific information on the internet. I was so impressed when they____." Teachers are also encouraged to invite the groups to share with their peers. You may need to scaffold this and prepare the students for sharing beforehand.

***If you choose to model this strategy again, you might want to say something like:***

  - The first thing I will do is think about what I need to research today!
  - Now, I will look at my inquiry chart to determine what specific information I need to locate. Since we just started our research, I have to pick one thing to start with. In a few days, my chart will help me know what data is missing.
  - Then I think about a few key words that I need to look for on the website.
  - When I am on a website, the first thing I do is check to see if I can believe what is on the website. I will look for an author to be listed and I will be sure they are not trying to sell me something.
  - I must remember to scan the entire page on the screen. Just like in a book, the text features are important and can lead me to valuable information.
  - If I do not find the information I need, I should try another website.
  - While scanning, I may see a hyperlink that I can click on for more information. If my mouse turns from an arrow to a hand, I know this is something I can click on. Sometimes the hyperlink will be words that are often colored or bold, and other times it may be a picture or icon. I may also see short videos to play.
  - Sometimes websites have extra information that I should ignore. This could be advertisements, videos (not about my research topic), and even pop ups. I should ignore them.
  - If I find myself on a website that is not useful, I can use the back button at the top of my browser to get back to the website where I started. (Alternatively, you could have websites bookmarked and have students return to the correct place using the bookmark.)
  - Once I find the specific information I need, I must remember to record it on the inquiry chart. That includes the URL for the website I used. (You may need to model where to find the URL on the webpage and where to record it on the Inquiry chart.)
  - This is a strategy I will use every time I read for specific information on the internet. (You may have some groups working online while others are working in traditional texts throughout the inquiry circle groups.)

**Practice in text (print, video, or interview)**

Post the anchor chart in your classroom so students can refer to it while in their inquiry circles. Encourage scientists to use the strategy in their Inquiry Circles.

## Inquiry Circle Groups — 30 minutes

### OVERVIEW

Scientists work in teams when conducting research and investigations. 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**

***You might want to say something like this to the readers:***

- It is time to get into our inquiry circle groups. You will be with the same research team as yesterday.
- When we research ecosystems, we will practice our roles as scientists. We will do this because scientists have a special way in which they observe the world, read scientific texts, and write reports. There is no better way to learn about science than to become a scientist!

**During Inquiry Circle Groups — 20 minutes**

***You might want to say something like this to the readers:***

- We have anchor charts to help guide your thinking. Do not forget to use them while in groups. (Refer to the "Inquiry Tool Box" anchor chart and the daily anchor chart. Remind students that they can use all the reading strategies taught, not just the one for that day.)
- My role is to help guide the inquiry circle groups, but I expect you to work as a scientific team to solve your problems together.
- Do not forget to answer your research questions and record it on the inquiry chart. It is important to record your sources on the inquiry chart as you complete it. (Be sure to explicitly explain how students should use the chart.)

(While groups are working together, walk around the room to facilitate as needed.)

**After Inquiry Circle Groups — 5 minutes**

***You might want to say something like this to the readers:***

- As we are concluding our inquiry circle groups for today, each group will have a chance to share what they accomplished and learned.
- The Lab Director should lead the discussion with their inquiry circle group about today's results. For example, what did you learn about your ecosystem? Which reading strategies did you use? What problems did you encounter? How did you resolve those problems?
- The Data Scientist will now share with the entire class either something the group learned about their ecosystem, which reading strategy(ies) were used, or how the group solved a problem.

## Science Whole Group Lesson — 30 -45 minutes

### OVERVIEW
Students work through the process of defining and formulating a testable question.

### GUIDING QUESTION
What makes a good science question?

### BACKGROUND INFORMATION
After observing a phenomenon or conducting research, a scientist formulates a question or questions. The question(s) allow scientists to plan and conduct investigations either alone or collaboratively with other scientists. However, the question should be answerable in a measurable way. Their investigations should provide evidence that supports their explanation or answer. Sometimes investigations lead to more questions!

### SAFETY
There are no safety concerns.

### MATERIALS
- Science Notebooks
- Chart tablet with class lists generated the day before
- Chart tablet for new information

### SET UP
- Post class lists where all can see
- Post a new sheet of chart paper for today

### DAILY OBSERVATIONS
None at this time

### PROCEDURE
***Engage***

1. Teacher will display the list of student questions compiled the previous day.
2. Allow each team 1-2 minutes to tell the class how they arrived at their questions (What did they want to know?)
3. Tell the students that scientists always have questions about the world around us. The things we know and can explain about the natural world came through discoveries that were made through scientific investigations that began with a ***testable*** question.
4. Ask for ideas about what they think a "testable" question is. Accept all responses.
5. On a new sheet of chart paper write **"What makes a question testable?"** (You will make a bulleted list using the bold print points below. Ask students to copy this and the bulleted points you make in their science notebooks.
6. Explain that testable questions are questions that **can be answered either through observations or experiments**. Scientists also conduct research and may do field work to find answers.
7. Testable questions should be **connected to scientific concepts** and not just feelings or opinions. (Different people can have different ideas or opinions.)

8. Explain to the students that their testable questions **should be specific** (centered on the green substance), and that they should **be able to answer them using the materials or tools available**, **within the time frame allotted**.

***Explore***

9. Focus the class attention on the jar with the green substance again. Tell them that you will give them an example of how to decide if a question is testable by using a question that you have. You want to know if light has an effect on its' color.
10. On chart paper, write the question "Does light effect the color of the substance?" Ask them if this can be answered by observations or experiments (yes).
11. Remind the students that the Sun is the main source of light on Earth and that light is a form of energy that is important to us, Ask them for examples of how it is important. Accept all responses.
12. Tell them that for your investigation you want to see if light is important to the green substance, specifically to see if it has an effect on the color.
13. Guide the class through the checklist of questions on the chart paper earlier:
    - Ask them if the question connects to a science concept. (yes, light energy)
    - Is it a specific question? (yes, focuses on the effect of light on the color of the green substance)
    - Is it something I can test with materials or equipment we have? (yes, just need a light source)
    - Can it be done during class time? (yes)
    - Now that I know I have a testable question, what can I do to find out if light has an effect on the substance? (design an investigation!)

***Explain***

14. Explain to the class that now you have a testable question to investigate.
15. Ask for and discuss any questions about the process you just went through to clarify any misconceptions.

***Elaborate***

16. Tell the class that tomorrow the teams will go through the same process to determine if they have testable questions to investigate, which will begin the process of planning their own investigations.

***Evaluate***

17. Did students communicate an understanding of what constitutes a testable question?
18. Did students ask questions or make comments that reflect a deeper understanding of the topic?
19. Are the teams ready to move forward in designing their own investigations?

| Extended Standards |
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| **Reading TEKS:** 3.9F Multiple genres: listening, speaking, reading, writing, and thinking using multiple texts--genres. The student recognizes and analyzes genre-specific characteristics, structures, and purposes within and across increasingly complex traditional, contemporary, classical, and diverse texts. The student is expected to: (F) recognize characteristics of multimodal and digital texts. |
| **ELPS:** Student Expectations for Speaking K-12, 19 TAC 74.4(c)(4) The student is expected to: (D) speak using grade-level content area vocabulary in context to internalize new English words and build academic language proficiency; (E) share information in cooperative learning interactions; |
| **Science TEKS: :** 3b2A: The student is expected to plan and implement descriptive investigations, including asking and answering questions, making inferences, and selecting and using equipment or technology needed, to solve a specific problem in the natural world. |