ELA Lesson Plan #2

Lesson Title	**Lesson 2: Understanding the Scientific Method**	**Class Level /GLE**	**Intermediate/4-8 GLE**
Unit Title	**Find It! Prove It! Introducing The Scientific Method**	**Teacher Name**	**Joan Schottenfeld**

NOTE: *This is a heavily scaffolded lesson that introduces students to the* ***Scientific Method,*** *using* ***text annotation****. Students also learn how to* ***read the written directions for an experiment*** *and how to* ***write up a lab report****, using signal words. They will use these skills with increasing independence during the lessons in which they read and follow directions for experiments.*

Estimated lesson time: *1 hour and 40 minutes*

CCRSAE *(use notation & shorthand)*	**ELA Learning Objectives** By the end of this lesson, students will be able to:	**Evidence of Learning** Students will show their learning by:
R1C (read closely and cite)	Work with others to annotate text in order to identify and reference key details in scientific texts	Annotating a text about the scientific method; citing text to support claims in the class discussion
R3D (follow a multi-step procedure)	Identify the sequence of events in written procedures for an experiment	Annotating written procedures for an experiment, noting signal words and potential problems
L6C/D (acquire and use vocab)	Define the **scientific method** and related terms; identify the steps for the method	Listing the steps for the Scientific Method in the Exit Ticket and using 3 vocabulary words
W4D (produce writing appropriate for purpose)	(with considerable support) Complete a lab report, using appropriate language and format	Putting information in the correct places on the template and using formal language

Student Texts and Other Resources

- *Include authentic print and/or digital texts that are appropriate for adults.*
- *Include texts that accurately and respectfully represent diverse identities, cultures, and perspectives.*
- *Include text complexity level for each text.*
- *List instructional videos, websites, and handouts for students.*
- *Include hyperlinks.*

- *A Step-by-Step Guide to the Scientific Method* (GLE 5; available on Newsela.com–see your program director for access information) or another text on the Scientific Method (see Unit Plan)
- Written directions for the carnations experiment (choose one):
  - Dyed Flowers [GLE 3]
  - Colour Change Carnations [GLE 5]
  - "Make Multicolored Carnations…with Science!" [GLE 5] – This is a more narrative form of directions and will require careful reading to tease out the actual instructions.

Instructional Shifts *(Which ones are addressed in this lesson?)*	X	Engage with **complex text** and its academic language.
	X	Ground reading, writing, and speaking in **evidence** from literary and informational texts.
	X	Build **knowledge** through content-rich nonfiction.

Instructional Process

Sequence and concisely describe culturally responsive and evidence-based instruction.

- *Incorporate the "I do," "We do," "You do" model.*
- *Contextualize skill instruction within authentic texts and tasks.*
- *Incorporate a variety of tasks and interactions that foster engagement.*
- *Support learners in making connections to their lives.*
- *Involve students in using technology to find, evaluate, consume, create, organize, communicate, and share digital content.*
- *Include choice and flexibility where appropriate to meet diverse needs.*
- *Provide additional modifications as needed for English Learners, students with learning disabilities (LD), and students at different levels.*

PART OF LESSON	TIME / MATERIALS (approx. 100 minutes)	STEP-BY-STEP DIRECTIONS	FURTHER DIFFERENTIATION *(e.g., EL, LD, different levels)*
Warm-Up/ Introduction ● *Review unit goal/cumulative project.* ● *Review key learnings from previous lesson(s)/activate prior knowledge.* ● *Introduce the objectives—and address why they are important.*	**10 min.**	1. Remind students that the class has started a unit on science and what scientists do, and that by the end of the unit they will be able to read and conduct simple experiments, write up what they find, and share conclusions with others. 2. Provide feedback on student responses to the Exit Tickets from the previous lesson. Use and encourage use of the vocabulary terms introduced in the last lesson: **science**, **scientist**, **evidence**. 3. Draw students' attention to the set of carnations that was introduced at the end of Lesson 1. Ask the students if they notice any changes in the carnations in the colored water. 4. **Think-Pair-Share:** Ask students to talk in pairs for 2 minutes about the following: ● What happened to the carnations? ● Why do you think the carnations changed? Invite a few pairs to report out about their questions and further observations, emphasizing	

		any mention of "experiments" or "the scientific method". 5. **Lesson Objectives:** Explain that today students will build on what they already know to develop a working definition of the **scientific method** and understand how **experiments** fit in. Say something like, *"We'll see what this experiment that we just did with the carnations would look like written down, how a scientist would have followed the directions, and how a scientist would keep track of the results. This will help us keep important strategies in mind when we start doing our own experiments next week."*	
Body ● *Explain and model 1) the target knowledge or skill and/or 2) processes to follow to accomplish tasks.* ● *Provide scaffolded practice and feedback.* ● *Engage learners in inquiring, exploring, and problem-solving.* ● *Include multiple kinds of interactions (e.g., whole group, small group, pairs).* ● *Pose questions that require critical thinking and evidence from text.*	**80 min.** *"A Step-by-Step Guide to the Scientific Method"* or another text on the Scientific Method (see Unit Plan for options)	**The Scientific Method (30 min.)** 1. Remind students of what they learned about annotations in Lesson 1. Explain that they'll be using **annotations** with today's reading, but whereas last time they were mainly marking key details to help lead them to the main idea, today the **goal is to underline ideas they want to be sure to remember**. 2. Distribute *"A Step-by-Step Guide to the Scientific Method"* or some other text about the Scientific Method. [Note that the version of the Scientific Method discussed in this article is useful because it sets up the importance of the background reading students will do prior to each experiment.] Remind students that before reading a text, skilled readers always look over the text to get an idea of what the text is going to be about and then thinks about what they already know. Ask students from looking at the title, boldfaced words, headings, and pictures, what they think the topic will be about. 3. Lead the class in reading aloud the article, annotating key points along the way. They should only **underline information they need to remember about that step**. Discuss the following as appropriate: ● Point out how the headings are operating as main idea statements, so they don't need to figure out the main idea of each paragraph like they did in Lesson 1. ● Use a system for noting key terms (e.g., circling or highlighting in a specific color) and their definitions. Some of these will	

● *Use technology appropriate to the task(s).*	Lab journals	become vocabulary words for the unit (e.g., **scientific method**, **hypothesis**, **experiment).** Additional terms may include **independent variable**, **dependent variable.** ● For STEP 2: Background Reading: Point out to students how they didn't do any background reading before they did the carnations experiment. How might it have helped to have done so? Note that for the rest of the unit, students will be building their knowledge about the topic that the upcoming experiment is about in order to continue to develop the strategies that scientists and other skilled readers use to learn and remember information. **Vocabulary (15 min.)** 4. Guide the students in going back to the text and using their annotations to find definitions for key terms (see Lesson 1). They should write these down in their lab journals: ● **Scientific Method:** a 6-step process to prove if our ideas about the world are right or wrong: 1) State a problem or ask a question; 2) Gather background information; 3) Form a hypothesis; 4) Design and perform an experiment; 5) Draw a conclusion; 6) Report the results. ● **Hypothesis:** an idea that can be tested by observations and/or an experiment; an educated guess ● **Experiment:** a set of procedures used to carefully test an idea; part of the Scientific Method (Tease out the difference between the Scientific Method and an experiment: the experiment is one part (Step 4) of the full SM.) 5. You may also want to include the following terms not found in this particular text: ● **Data:** facts and numbers used in decision-making; in science they come from observations and experiments ● **Analysis:** studying something in detail, in order to better understand it ● **Conclusion:** an opinion that comes after thinking about all the information	

	List of sequence signal words Directions for carnation experiment (e.g., *Dyed Flowers*) Google Doc: Science Lab	6. Invite students to start using these terms as they discuss their work and readings over the course of the unit. **Reading the Directions for an Experiment (15)** 7. Say something like: *"As you can see, the Scientific Method hinges on an experiment. Let's see what those look like, written down, using our carnations experiment."* 8. Explain that reading the directions for an experiment is very much like following the directions in a recipe: things need to be done in sequence and in a specific way. Ask: *"What are some other kinds of directions you've experienced?"* 9. Ask: ● *"What are some things that can trip us up in these kinds of directions?"* (e.g., poorly written instructions where key info is provided AFTER you may have already messed up.) ● *"What are some strategies that can help us keep up with what to do?"* (Students may mention looking for words like *first, second, now, then, after, next, finally, before*. Point out that, in well-written procedures, the **steps will be numbered**. However, students will need to use the "signal words" when they're writing up the procedures afterwards, so they need to be sure they know what they are. Share a list of sequence signal words for students to put in their lab journals and post them somewhere in the room for easy reference.) 10. Distribute the directions for the carnations experiment. Use student responses to make the point that annotating text, again, can be our friend. Ask students to work in groups to read through the directions for the carnation experiment, circling anything that might trip them up. Debrief. **Completing a Lab Report (15)**	Students at different reading levels may use different versions of the carnations experiment. As a scaffold for lower-performing students or to save time, the lab report template can be partially

	Report template and/or ADVANCED Science Lab Report Template SAMPLE Science Lab Report for carnations experiment List of sequence signal words	11. Tell students that the class will now fill out their first lab report, like scientists, using the carnations experiment. Display a Google version of the Science Lab Report template and distribute blank versions for students to fill in. 12. **"I Do":** Model how you would **fill in a lab report** using a "Think-Aloud". Point out that a lab report tends to use language that is more formal, unlike what we might see in a text to our friends. [See the "SAMPLE Science Lab Report" as a guide.] ● Complete STEPS 1 (Question), making the point that we want to be sure we write a question that the experiment is designed to answer. ● For STEP 2 (Background Information), remind students they didn't do background reading this time, but they will prior to future experiments. 13. **"We Do":** ● For STEP 3 (Hypothesis), invite students to remember what they had guessed would happen at the end of the previous lesson. Write those down, making the point that to be truly "scientific," our guesses should be "educated," or based on things known from our experience or from reading. ● For STEP 4 (Materials, Procedures, & Observations) and STEP 5 (Conclusions), invite student input as you complete the sections. NOTE: Refer students to a set of signal words posted on chart paper or in a Google Doc. **Open Discussion (5)** 14. Lead the class in a reflection: What surprised you? (e.g., the fact that the carnations changed color), and whether or not their hypothesis proved to be correct. 15. Talk about the "What would happen ifs" – if we changed the carnations around and put them in different colors, or if we split the stem and put each end in a different colored water. Emphasize that scientists need to be curious; they need to wonder about their world.	filled in for the carnations experiment. For instance, in the Materials section, you can list all but 1 or 2 items and have the class fill in what's missing. Higher-performing students may be given the advanced form of the lab report and be required to use more formal language. The advanced lab report may be introduced in this lesson or in a future lesson.

		16. Discuss implications of the experiment: How can students use what they learned in their own lives? What does this make them think about in terms of pollutants in the air, the food they eat, etc.?	

Wrap-Up/ Reflection ● *Lead reflection in what students learned and how they might use what they learned in their lives.* ● *Preview the next lesson.*	**10 min**	**Exit Ticket** 1. Review the day's lesson, going through the steps for the Scientific Method. Remind students that as learners we need to take time to reflect on what we've learned. 2. Invite students to respond to the following in their lab journals: ● In your own words, describe the steps for the Scientific Method, using at least 3 vocabulary words and 3 sequence signal words. You may use your notes! ● What's the most interesting thing you learned today? ● What are you wondering about? 3. Explain that you'll read through their responses and share some feedback during the next class. *[Collect at least a sampling of the annotated texts to check for appropriate use of text marking. Review the completed lab reports to ensure students are putting information in the correct places and using formal language.]*	Students can draw a number (1-6) that corresponds with a step from the Scientific Method and then describe just the step that corresponds with their number. Alternatively, students can be challenged to create an acronym to help them and the class remember the steps.