Good Morning!

- Let’s start with some science!

What's our goal here?

- Provide an example of a science lesson with literacy and dialogue strategies integrated throughout.
- Provide a model of engaging science and a sample of teacher talk that encourages student engagement.
- Give you some ideas for inserting strategies that address Common Core standards (S&L, R, W) and engaging science strategies into your lessons.

What we AREN'T trying to do:

- Teach you science content for your specific grade level.
- Provide a packaged lesson for every grade level.
- Dictate to you how to teach.

- We just want to enlarge your toolbox for teaching.

Rules of Engagement

- Be considerate and respectful in language and tone.
- Make sure everyone has a chance to express their ideas.
- Begin speaking by paraphrasing what the last speaker said, then transition to your comments.
- Try not to steal anyone's "Aha!" moment by telling them your answers—instead, ask questions that will help guide the person to these ideas.

Sample lesson

- I know this is not your standards.
- Electrical circuits WERE in the old 4th grade standards & then not again until physics.
- In NGSS, circuits are in 4th, 8th and physics.
- Our goal is to look at the STRUCTURE of the lesson, not the content.

Let's try it.

- Groups of 4 people.
- Read the Doogie & Kyle scenario
- Think silently about their ideas. Who do you agree with more?

Time to process

- We'll use a Structured Think Pair Share protocol
- Draw a chart like this:

THINK	PAIR
Your ideas go here.	*Listen to your partner and record their ideas here.*
SHARE	
Talk with your partner to come to some common understanding, and write your joint ideas here.	

Preassessment: Agree/Disagree

- Find your Thinking About Electricity handout.
- Read each statement. Mark agree, disagree, it depends or not sure.
- Then write a short sentence about your thinking.
- Do all three statements without discussion.

Paraphrase Passport

- First person talks for **one** minute.
- Next person paraphrases, then talks about their own idea.
- Continue around the circle (paraphrase ONLY the person before you, NOT the whole circle)
- When it comes back to the first person, she paraphrases the last person.

Reactions to paraphrasing?
Reactions to A&D?

Now let's investigate

- Batteries and Bulbs handout
- First, assign roles in the group of 4.
  - Recorder
  - Reporter
  - Materials Manager
  - Encourager
- Explicit roles increase participation and equity.

Ready to explore!

- Your group will get two bags, one per pair. Please do not pool the two bags for the whole group yet. Each bag has:
  - 2 batteries
  - 2 holiday lights
  - 1 piece of wire
- Your job: figure out what the rules are in lighting up the light bulbs.
- You have **5 minutes** to work.
- Record the rules on your whiteboard.

Remember…

- Materials manager gets the stuff
- Recorder (or their designee) writes your rules on the whiteboard.
- Encourager makes sure everyone gets to handle the materials, and that everyone is contributing.
- Reporter (or their designee) will share your results when you are done.

What rules did we find?

Now you get to ask the question

- Think about the Doogie & Kyle problem:
  - One string of lights was plugged in but no bulbs lit up.
  - One string had all the bulbs but one lit up.
  - Kyle thought a broken bulb made the whole string not light up
  - Doogie thought the electricity in the dark string had gotten used up.

Ask a question that will help us solve this problem

- You can use the materials you have plus:
  - More bulbs
  - More batteries
  - Different sizes of batteries
  - Extra wire
  - ???? Whatever we can scrounge
- On half your whiteboard, write your question and draw the experiment you plan to run. Show it to us to get your new stuff.

As you experiment…

- Record your observations on the other half of the board.
- Write a first-draft explanation of what you think is happening.
- Remember, everyone gets to use the materials and contribute ideas.
- You have 10 minutes to play.

What can we add to our rules now?

Now let's do some reading

- Find your text on series and parallel circuits.
- Feel free to use the highlighters as your read.
- Look for answers to these questions:
  - How are the wires arranged in each kind of circuit?
  - Does the electricity travel all on the same path or on different paths?
  - What happens if a light bulb in the circuit burns out?

Now let's process the reading

- In your group, use the graphic organizer to sort out these ideas:
  - Things that are true of just **series** circuits
  - Things that are true of just **parallel** circuits
  - Things that are true of both kinds of circuits

Did you already make each kind of circuit?

- In your group make one series circuit with more than one light bulb.
- In your group, make one set of parallel circuits with more than one light bulb.
- Are all the rules the same for both kinds of circuits?

Now we're ready to school Doogie and Kyle

- Write a letter to Doogie and Kyle solving their problem with the holiday lights.
- Use the graphic organizer to build your arguments.
- We're not going to write the final letter – just talk it through in your group.

Science Literacy Framework

- Four elements:
  - Engaging Science
  - Purposeful Reading
  - Productive Dialogue
  - Meaningful Writing
- All the elements interact and are interconnected.
- Strategic thinking throughout – all the elements advance the learning goals.

Engaging Science:

- Involves students in sense-making
- Opportunities to figure something out
- Applying ideas in a new context
- Involves students in the eight Science and Engineering Practices of the Next Generation Science Standards

Purposeful Reading:

- Students making sense of text that strategically supports the learning.
- Text has sufficient scaffolds for students.
- Students using text as evidence to support claims.
- Using a variety of text.

Productive Dialogue

- Students using talk to support sense-making and scientific reasoning.
- Students might be making sense of a science experience, prior knowledge, or text.
- Dialogue is structured and scaffolded.
- Students are accountable for a talk task – there is an expected product.

Meaningful writing

- Using writing to organize thinking.
- Constructing arguments:
  - Claim
  - Explanation
  - Evidence
- Taking a stance.
- Both writing-to-learn and formal writing.

Deconstructing the Lesson

Engaging Science	Productive Dialogue	Purposeful Reading	Meaningful Writing
Context in real life problem	Roles	Graphic Organizer	Graphic Organizer
Anticipatory set (A&D) to activate prior knowledge	Rules of engagement	Guiding questions	Persuasive writing
Guided inquiry (student-centered discourse)	Structured Think-Pair-Share	Informational text	Arguments with evidence
I do one, you do one	Paraphrase Passport	Text-based evidence	Writing to learn as well as formal writing