Establishing the problem: Expressing Ideas
- They devote time: Teachers spend ~40+ minutes on Expressing Ideas lessons.
- They encourage students to share what they really think (not looking for “correct answers”).

Foundational knowledge & practice
- They connect the activity to the phenomenon and driving question: “Your initial ideas and questions focused on what ethanol is made up of that makes it burn, so we need to zoom in to a scale too small to be seen with a microscope.”
- They explicitly emphasize how the rules and facts (on the Three Questions) are important for answering students’ questions about the phenomenon.

Inquiry: Predictions, Investigations & Evidence-Based Arguments
- They devote time: Teachers spend 20+ minutes on making and discussing predictions (especially for students to share their reasoning behind their predictions).
- They develop and discuss the investigation procedure as a class.
- They explicitly emphasize the role of empirical evidence in science.
- They discuss patterns in the data as a class and connect the data to the initial ideas and questions about the phenomenon.
- They emphasize the unanswered questions on the Evidence-Based Arguments Tool

Using Models
- They elevate the authority of models in science: “Scientists do investigations to collect data, but they also use existing scientific models to make sense of what they see.”
- They use the models to specifically address the unanswered questions from the investigation: “So, we know that CO₂ was produced when ethanol burns, but where do those carbon atoms come from?”
- They emphasize the distinction between atoms and molecules.
Constructing Explanations

- They connect the explanation back to the driving question for the unit: “We have all the pieces we need to explain what happens when ethanol burns, but now we need to put it together into a coherent explanation.”
- They have students use their EBA tools and modeling activity to work on the Explanations Tool.
- They provide students with the opportunity to discuss their explanation with others, and they also hold each student accountable for a final paragraph they write individually.

Throughout the Unit

- They connect to the unit driving question (ex: What happens when ethanol burns?) multiple times EVERY lesson.
- They return to students’ initial ideas and questions throughout the unit.
- They use intentional “back pocket” questions to scaffold sensemaking as they work with small groups of students.
- They are explicit about scale: “We saw that the BTB changed from blue to yellow, but what does that tell us about what is happening on the atomic molecular scale?”
- They are explicit about the principles of matter and energy conservation: “If energy cannot be created or destroyed, then the heat and light we saw released in the flame must have already been stored inside the ethanol.”
- They follow the Carbon TIME Discourse Routine around each Process Tool.

Carbon TIME Discourse Routine

The intentional sequence of private and public talk and writing surrounding each Process Tool.

1. Introduction
2. Private writing and thinking
3. Sharing ideas: partner or small group work
4. Sharing ideas in whole-class discussion
5. Consensus-seeking discussion accompanied by public writing