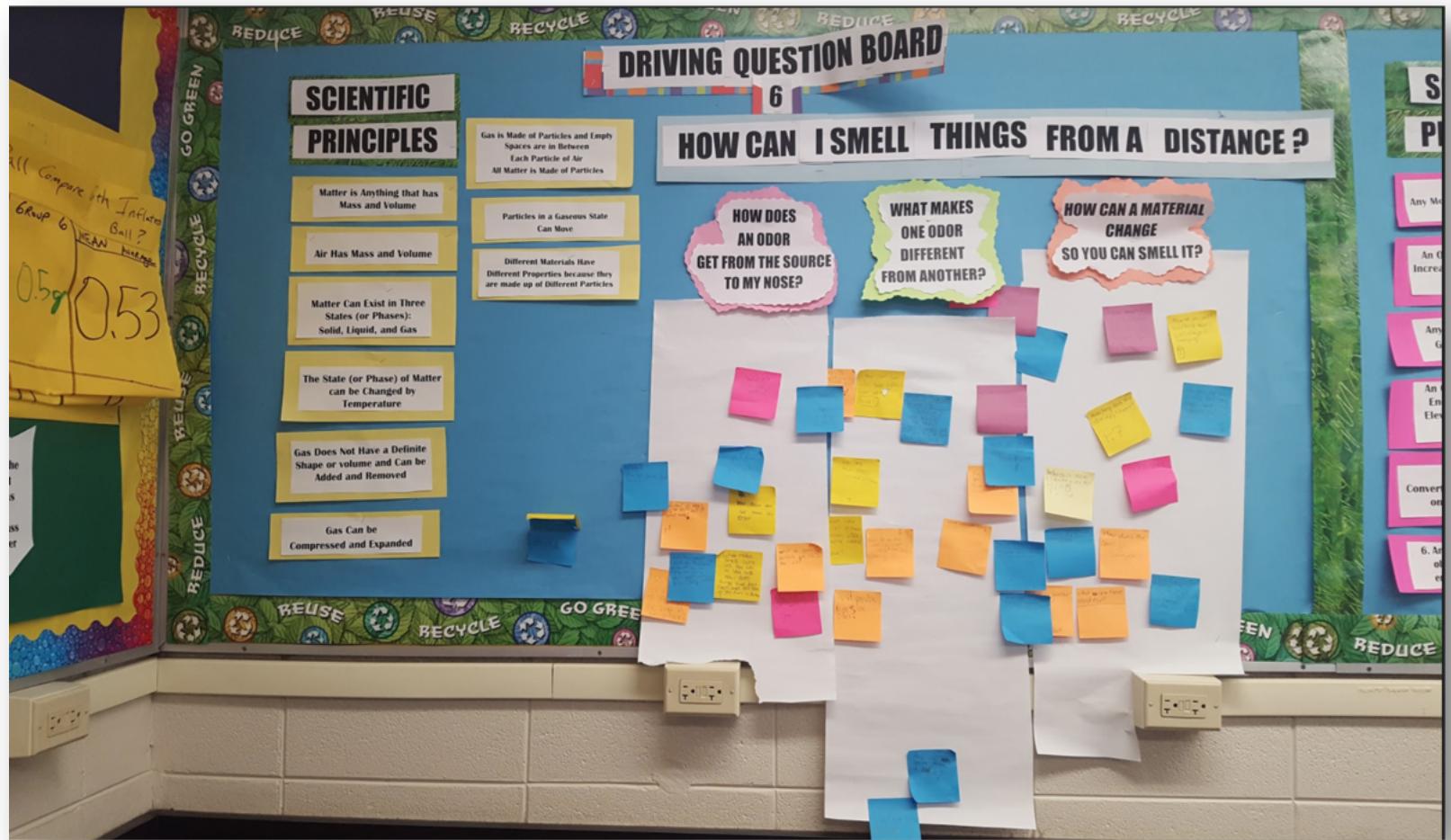




How Does a Driving Question Board
Promote the Shift
from “Learning it” to “Figuring it Out”?

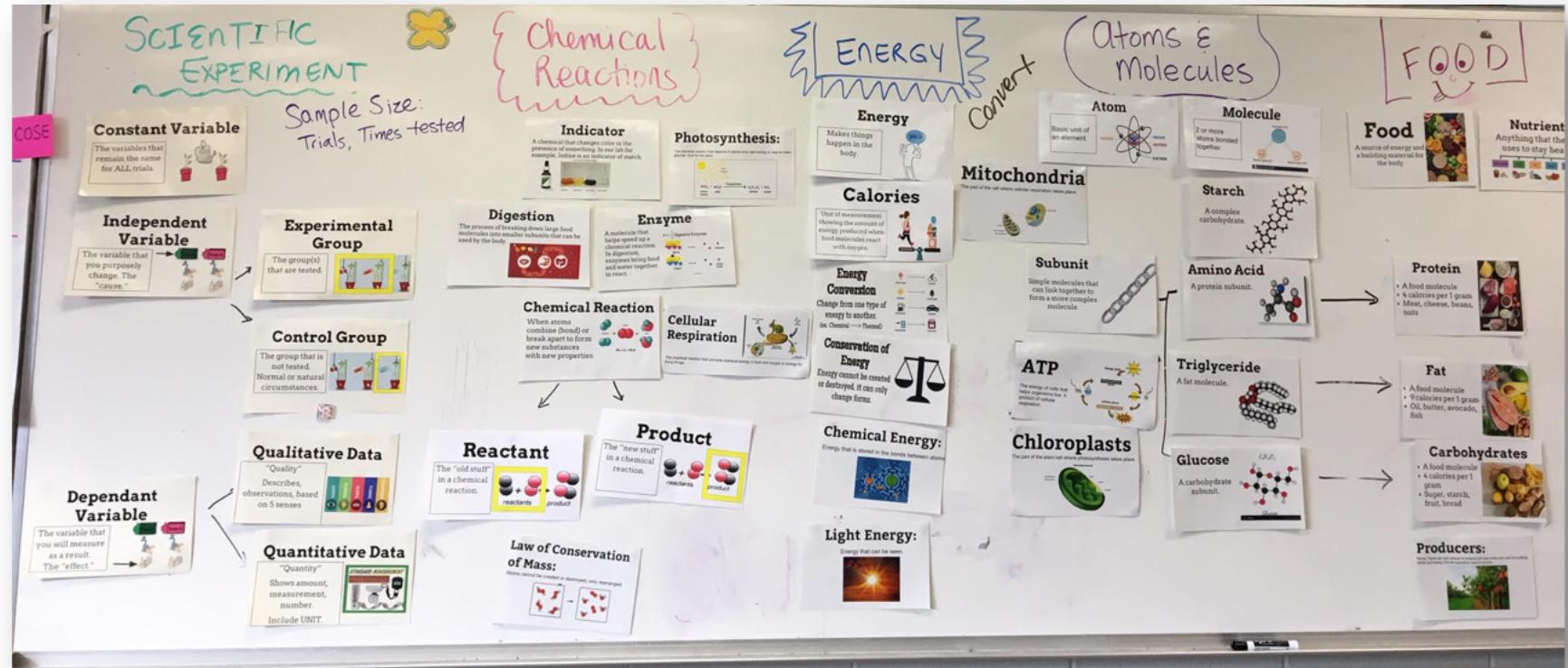
What is a Driving Question Board?

The Driving Question Board displays the Driving Question for the unit. It can be a bulletin board, a large area on a wall, the front of cupboard, or large sticky notes will work!



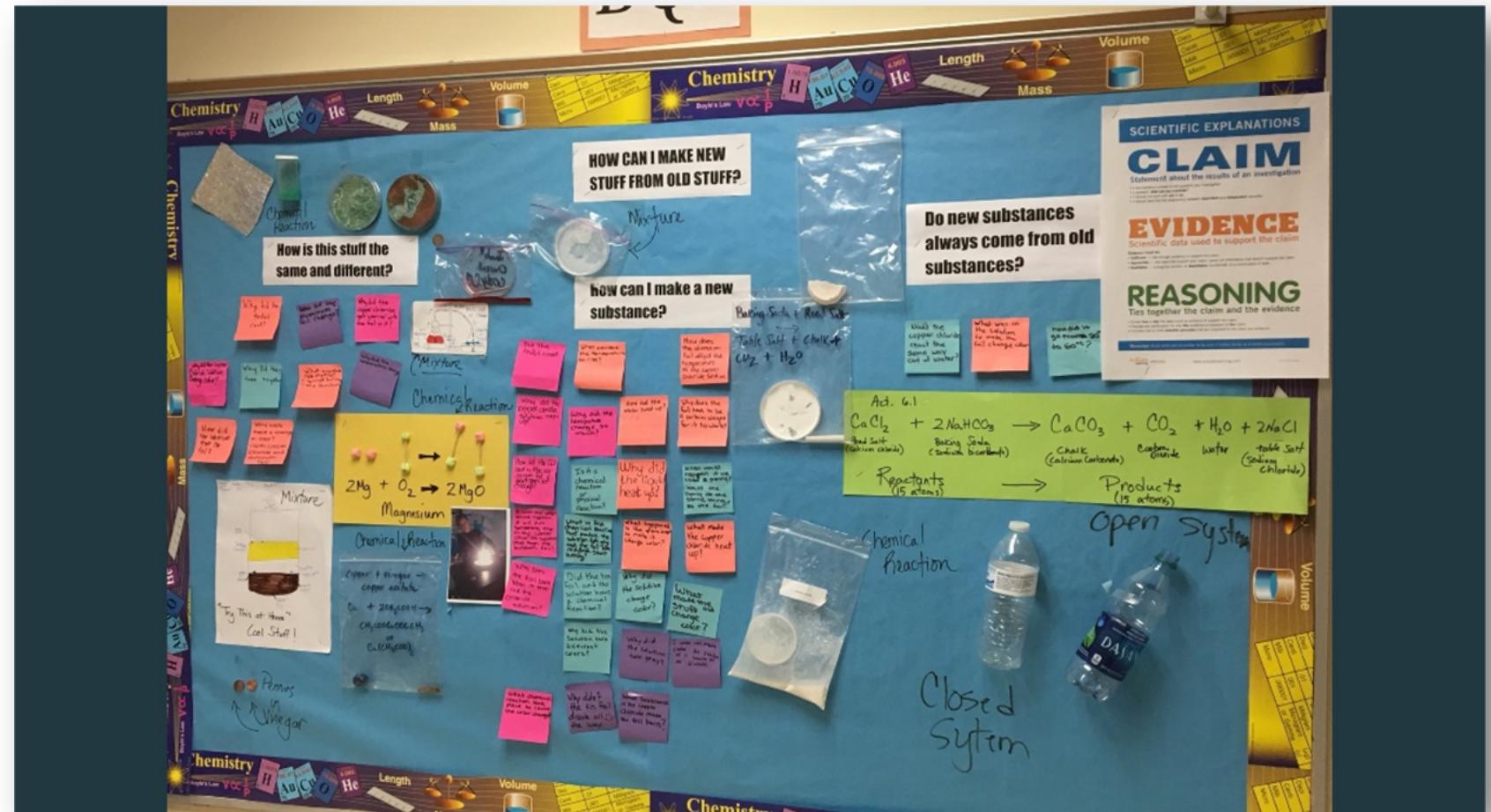
What is a Driving Question Board?

The visual display supports teachers and students in tracking and organizing ideas along the way.



What is a Driving Question Board?

The DQB will come to include the unit-specified question and subquestions, as well as student questions, drawings, photographs, artifacts, objects, and sample student work.



What is a Driving Question Board?

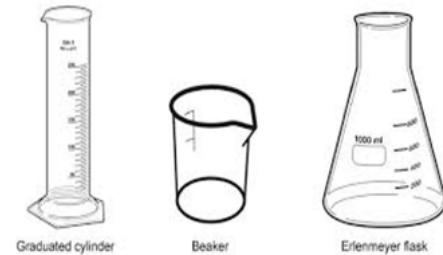
Space on the Driving Question Board may be limited, but it is important that aesthetics and the neatness of the DQB do not outweigh the support provided to students when they can frequently refer to the visual representations as a reminder of activities done and content learned throughout a unit.



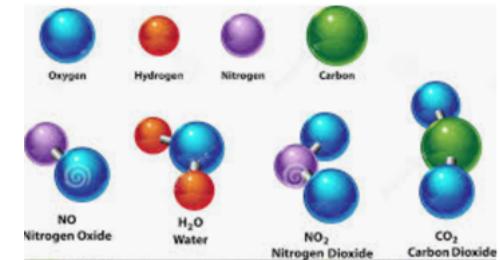
If you are creating a virtual Driving Question Board, your DQB may look more like this:

Does air take Up space?

Does Air have volume?

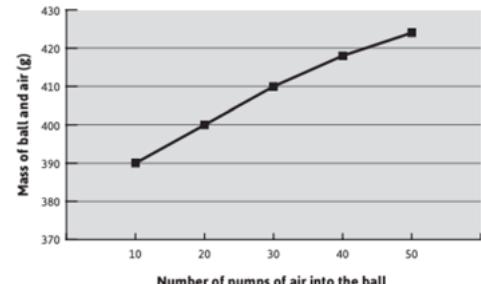


What Makes Up Air?



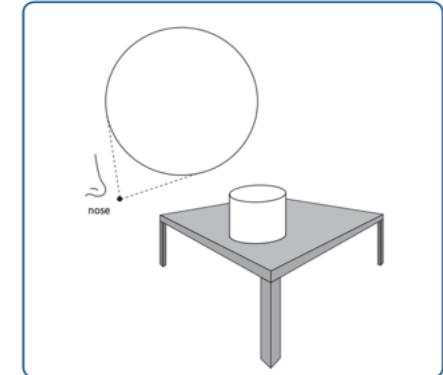
How Can I Smell Thing from a Distance?

Does air have Mass?



As the number of pumps of air increases, the mass of the ball increases.

How can I smell things before I see what I am smelling?

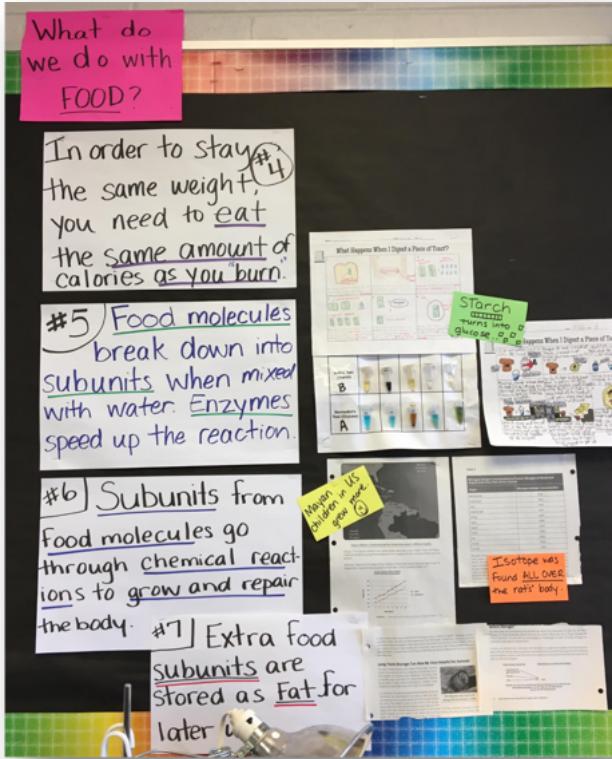


**What experience do you have with
Driving Question Boards?**

OR

**What practices will help you develop and use the
“Driving Question Board” as an *Interactive Tool*?**

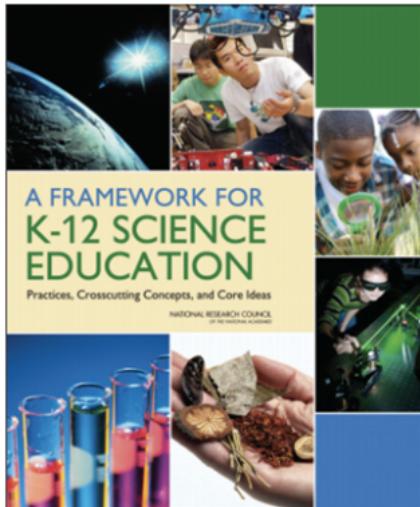
The Driving Question Board serves as a visual reference to...



- Focus students' attention
- Record what they have learned
- Show where they have been and where they are going
- Promote student centeredness

Interest → Motivation → Engagement → Achievement

Scientific and Engineering Practices



1. Asking questions and defining problems
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Developing explanations and designing solutions
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Key Features of the Asking Questions Practice

- Questioning involves developing and revising explanatory questions about how and why phenomena happen.
- The development in the skill of asking questions will be key to moving student's questions from what happened to how and why something happened and takes place over time.
- Both teachers and students are critical players in asking productive questions.
- Questioning helps identify what about the phenomena needs to be investigated.

The Key Role of the Teacher

How do we model the type of questions we want students to learn to ask?

Teacher questioning can:

- Help students figure out where there are gaps in their preliminary ideas
“How did you get to that idea?”
- Help uncover ideas that students take for granted
“How do we know this?”
- Spark students’ realization that their current explanations are not sufficient
“How does this explain this part of the phenomenon?”

Questions to guide teachers found within the blue boxes in the TE

How do we model the type of questions we want students to learn to ask?

Issue	Weak Question	Revised Question
Lacks anything about phenomenon	Does a DNA molecule resemble a spiral staircase?	Why does Susan have a hitchhiker's thumb when neither of her parents have this trait?
Lacks evidence	Why is a volcano different from a mountain?	What caused volcanoes to form in the Azores?
Lacks how or why account	What will happen when you roll a ball on different surfaces?	Why does a ball roll faster on some surfaces and slower on other surfaces?

McNeill, Berland, and Pelletier, 2017

What kind of questions should I ask?

(Back Pocket Questioning)

1. Ask a question (usually a “what” question) to focus students on the observable (the what level). *What did you think was going to happen?*
1. Press students to hypothesize about how the observable works and what causes it (at the unobservable level) by asking a string of “how/why” and “what if...” questions (the how/why level). *“What did you notice happening here?” “What experiences do you have with.....?”*
1. Focus students’ attention on the next task by asking a “leaving question,” which can be in the form of *“I want you to think and share your ideas about...”* or in the form of a task they should be doing.

How do I improve the questions I ask?



- Wonder along with the students by asking questions
- Use student's questions to revise models or explanations
- Help students create testable questions from their ideas
- Create a classroom climate in which all students take responsibility for knowledge building.
- Encourage participation – everyone has a voice, think - pair - share
- Celebrate questions

How do we encourage students to ask questions beyond the initial activity?

- Constructing questions is not just an act of idle curiosity.
- It is an integral part of figuring out what needs to be explained and where the class needs to go next in figuring out and why something works the way it does in the world.
- It was not common practice for students to ask questions in a science class outside of clarification for directions, so how do we as teachers help them develop that skill?

What are the first steps in setting up a Driving Question Board?



Activity 1.1: Can I Make New Stuff from Old Stuff?

What Will We Do?

We will observe two materials before and after we put them together. Our observations will help us think of questions that we would like to answer in this unit.

Safety Guidelines

- Wear safety goggles, gloves, and aprons (if your teacher has them) at all times. Copper chloride solution can irritate your skin and eyes.
- If you get copper chloride solution on your skin or in your eyes, rinse the area with cold water, and tell your teacher immediately.
- Do not handle the beaker after you have mixed the solution and the foil ball. You may touch the sides of the container carefully, but do not pick up the beaker.

Procedure

- Collect your 150mL beaker with 50mL of copper chloride solution in it.
- Use a scale to measure 0.5g of aluminum foil, or collect the piece your teacher has premeasured.
- Look carefully at each material. Record your observations in the table before you move on.
- Record the temperature of the copper chloride solution.
- Gently crumple the aluminum foil into a loose ball; do not pack the foil tightly.
- Gently place the foil ball into the copper chloride solution in the beaker.
- Use the glass stirring rod to push the foil into the solution. You may stir gently during this activity.
- Record your observations in the data table.
- Measure and record the temperature again.

Data Collection

Material	Observations before	Observations after	Questions
Aluminum foil			
Copper chloride solution			

Making Sense

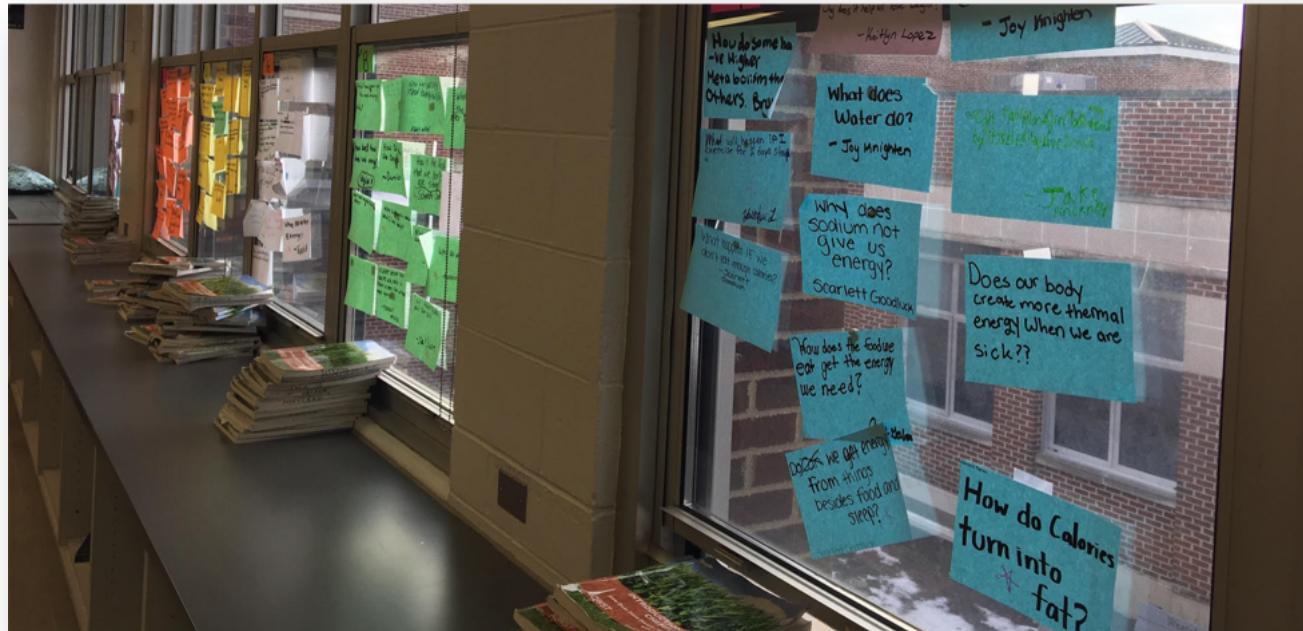
- Compare the materials before and after you put them together.
- If you think about the old stuff as the aluminum foil and copper chloride, do you think new stuff was made when you put them together? Explain your ideas.
- What questions do you have based on your observations?



- Students experience a shared phenomena
- Students make observations
- Students discuss observations
- Students pose questions regarding their observations, writing their questions on sticky notes

How do I start using the Driving Question Board?

- Your DQB is set up and visible to students and the Driving Question posted on the DQB
- Students have experienced the anchoring phenomena, made observations, and posed questions
- Have student pose one question per sticky note that they have about the Driving question or the phenomena they just experienced, and have recorded them on sticky notes



How do I start using the Driving Question Board?

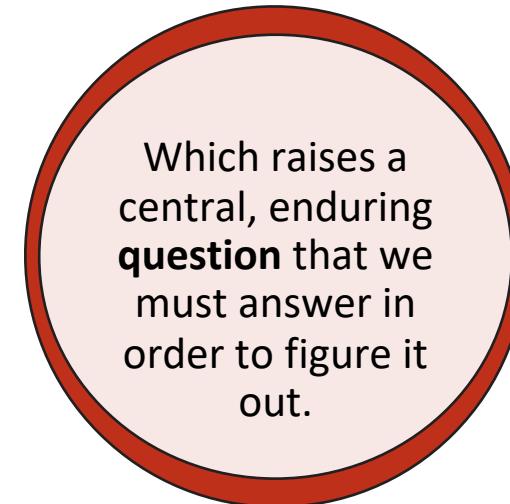
- Students share their question(s) with their group or partner. Prepare students to share their question with the whole group
- Using the following conventions: As students stand up and share their question out loud and place on the DQB, they must connect to a question that someone else shares or identify that they have a new question:
 - My idea is like his/hers because...
 - My question is different because....
 - Unrelated questions can be place on a “Parking Lot” section of the DQB for later discussion or investigation



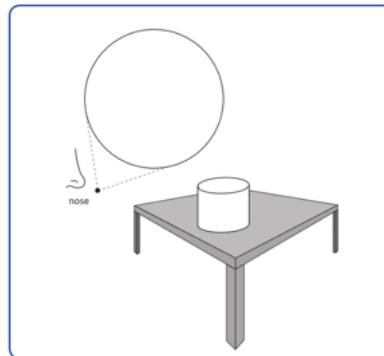
What does this look like in practice?



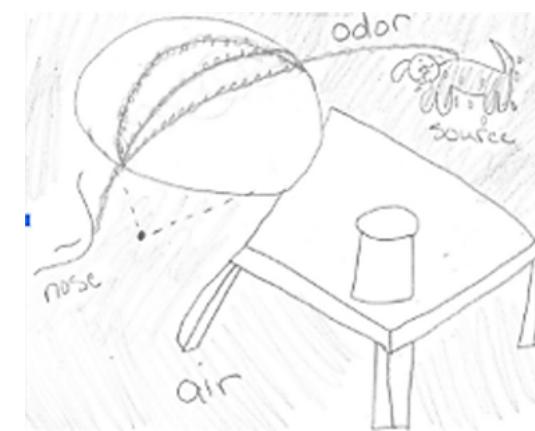
Lesson 1 Can you smell what I smell?



We smell an odor



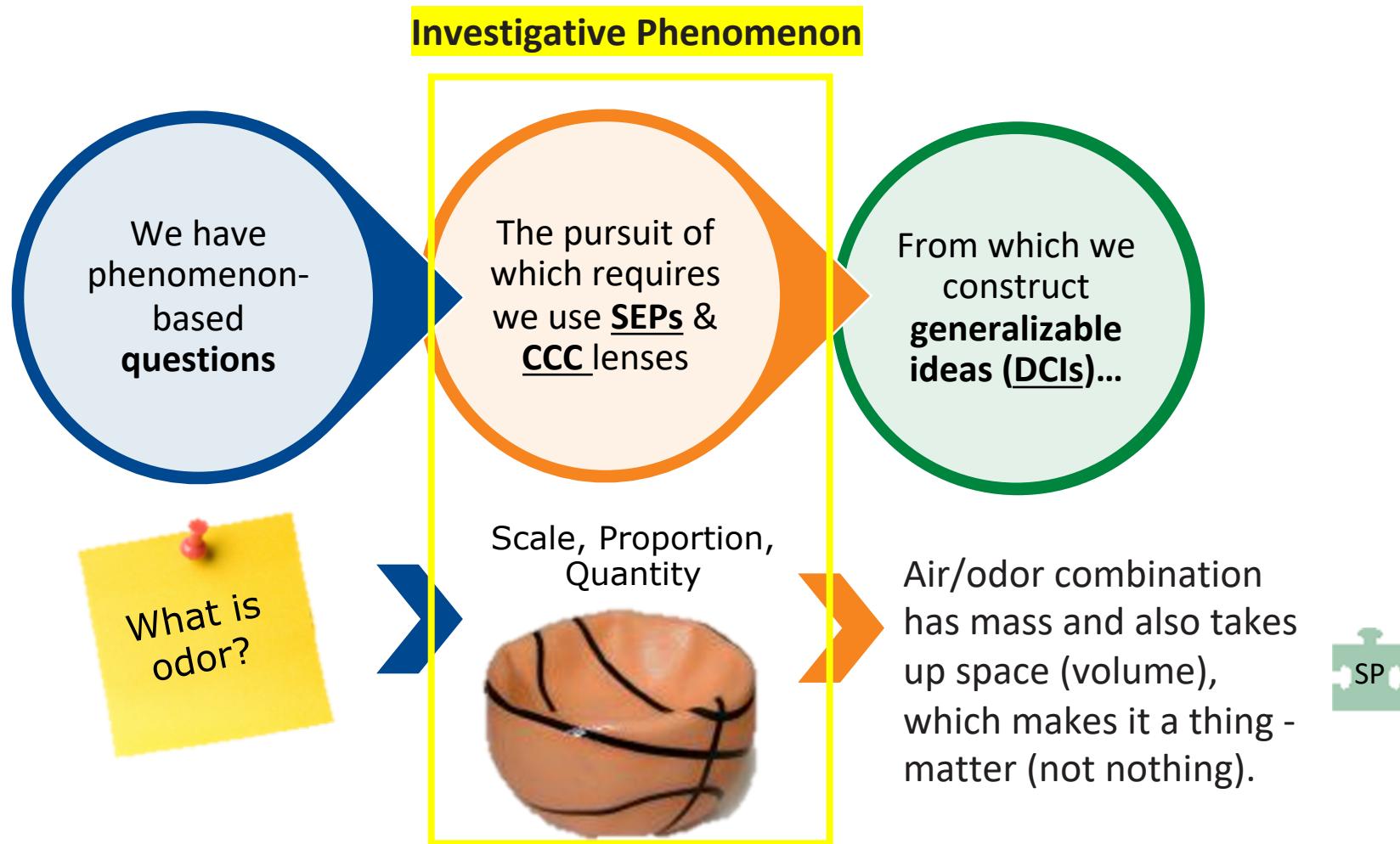
Initial Model



Driving Question

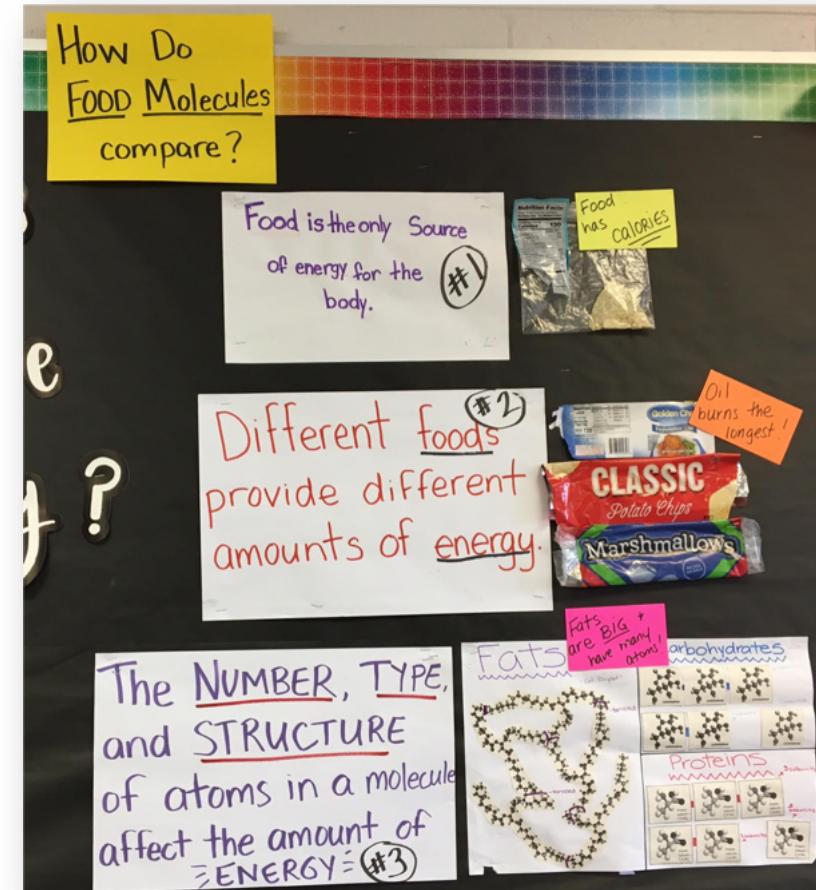


Lesson 2: What Is Similar among an Odor, Sugar, and Milk?



When and how often do I revisit the DQB?

- When students think of new questions at any time during the unit.
- Revisit the DQB with students in each lesson, and between learning sets.
- Refer to it often. Point to artifacts displayed on it as a reminder of previous activities or understandings.
- Make it a routine.



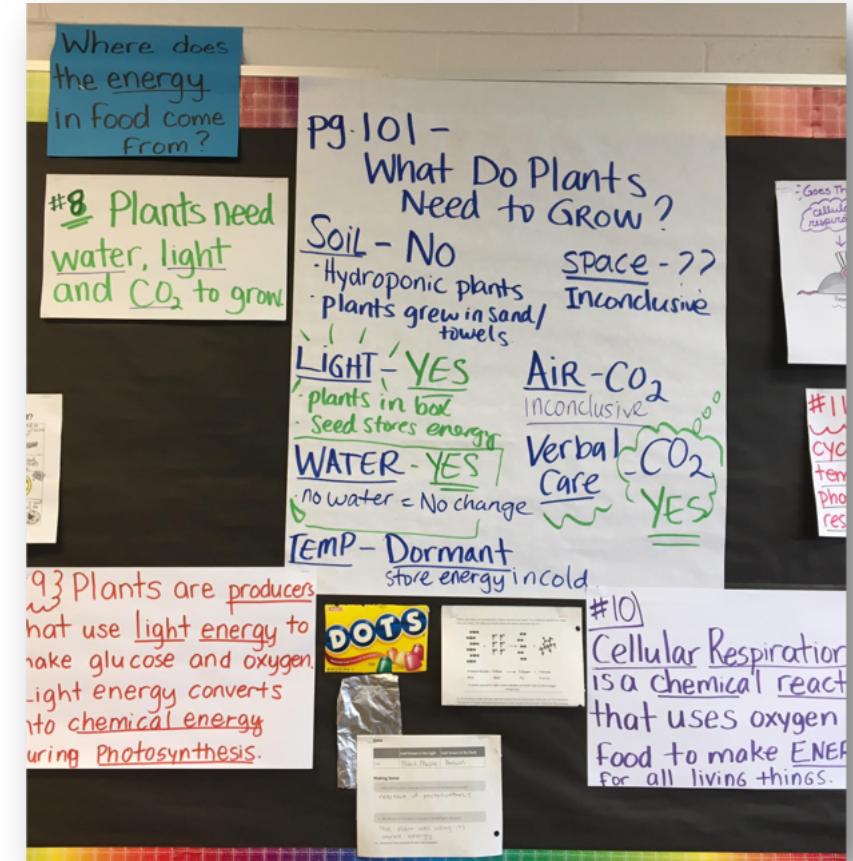
What if I forget?

The TE and the Storylines always prompt you to revisit the DQB.

What if too much time has passed since the last revisit?

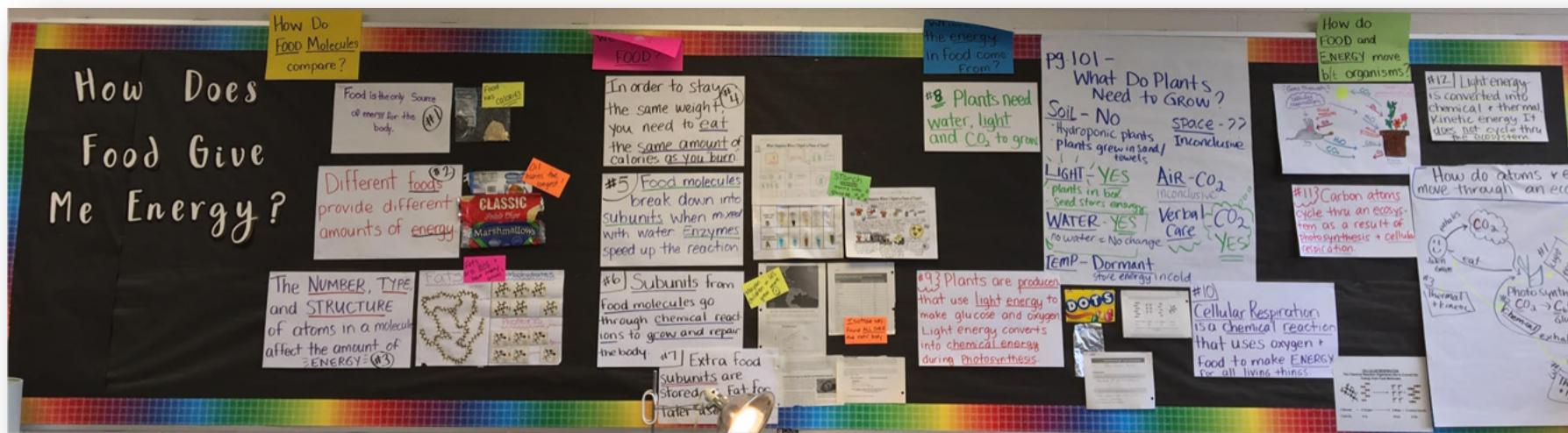
- Use it as a time to reflect on what you have done and learned and what do you still need to know to solve the current/next problem.
- Use it as a review before proceeding to the next lesson, learning set or preparing for an assessment.

However, don't just drop it.
It is an important visual of your journey!



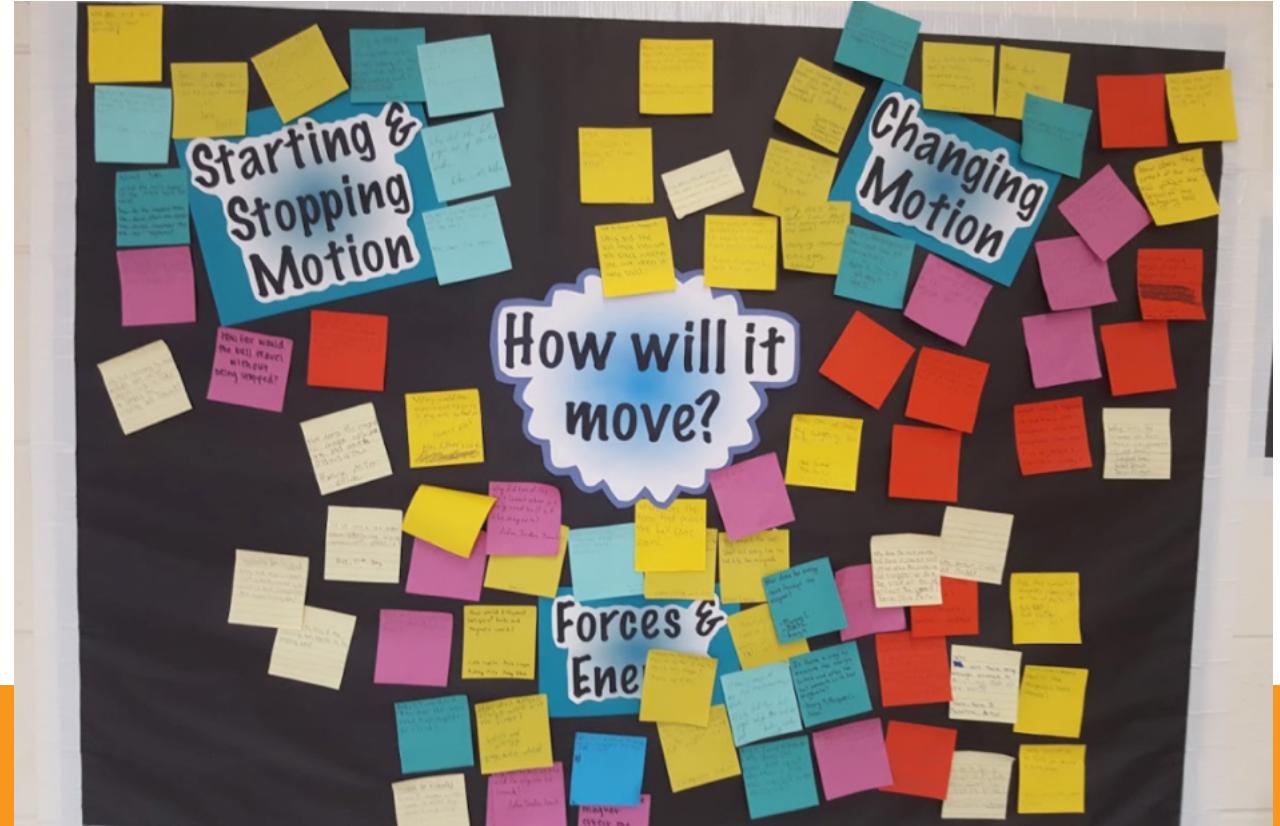
What evidence of student learning could we post?

- Pages from the SE
- Student data tables
- Copies of PIs
- Drawings of setups
- Photographs of investigations
- Written explanations
- Models
- Artifacts
- Labels, key words



What if I Teach 5 Classes? Do I need 5 DQB?

- Most middle school classrooms do not have enough room for multiple DQB.
- Teachers frequently have one board that reflects the work of all of the classes, updating at the end of the day themselves or having a capable student update for them.



What if I Teach 5 Classes? Do I need 5 DQB?

- Some teachers use multiple small tri fold boards for day to day work or large chart paper or giant sticky notes as “boards” for individual classes, displaying the correct one per section of student.
- As part of your routine addressing the DQB, you may choose one board, updated at the end of the day and highlighting what other classes added at the beginning of the next class period.
- This builds not only a learning community within a class of students but between classes of students

