

# TEACHER GUIDE

## Lesson 1: Driving Question Activity



**Time Estimate:** One 45-minute class period

**Items needed:**

- Driving Question Activity Student Guide
- Phenomenon Cards Handout
- Questioning Activity Handout
- Driving Question Activity Student Guide - KEY

**NGSS:**

**DCI Connections**

**LS1.C-H2:** The sugar molecules thus formed contain carbon, hydrogen, and oxygen: their hydrocarbon backbones are used to make amino acids and other carbon-based molecules that can be assembled into larger molecules (such as proteins or DNA), used, for example, to form new cells.

**SEP Connections**

**CEHS-H2:** Construct and revise an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, and peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.

**CCC Connections**

**CE-H2:** Cause and effect relationships can be suggested and predicted for complex natural and human-designed systems by examining what is known about smaller-scale mechanisms within the system.

**Driving Question:** Why might someone who exercises consume whey protein?

**Goals:**

- Establish consensus on the data presented in the phenomenon.
- Generate a list of questions to be added the Driving Question Board
- Write an individual initial explanation about the phenomenon

**Overview:**

Students will observe the cards that represent the whey protein phenomenon. Students work collaboratively to ask questions about why whey protein is connected to exercise and why it could be helpful when working out. Finally, students will write an initial explanation answering the driving question, “Why might someone who exercises consume whey protein?”

**Instructional Approach****Part 1: Observing the Anchor Phenomenon**

1. Place students into small groups. You can do this by selecting student groups based on the make-up of your class. Provide small groups of students with the “phenomenon cards”. These should be cut prior to class using the Lesson 1: Driving Question Activity Phenomenon Cards teacher resource. Ask students to look at the cards and sort them into categories however they see fit.
2. Once each group is finished, distribute the Questioning Form handout. Individually, have the students write down 3 questions that relate to the categorization of their cards.
3. Then, allow students to return to their original groups and share the questions they came up with. Each student will write down everyone’s questions into their chart, discuss each of them, and decide if the questions are open (open-ended question- involves an explanation) or closed (yes or no answer). After all questions are listed and identified as open or closed, students will rank them from most scientific to least scientific, with 1 being the most scientific. If you have a large class or made bigger groups, you can shorten it and have them rank the top 4 or top 5 questions.
4. Example Questions:
  - a. What do all the parts of milk have to do with exercise?
  - b. Are there more types of protein?
  - c. Where does whey protein come from?
  - d. How do you make whey protein?
  - e. How does taking whey protein help improve exercise?
5. Next, provide each group with a different color of post-its. Have each group put their top 4 questions on post-it notes, 1 question per post-it, and then place them on the Driving Question Board (DQB).

**TEACHER SUPPORT**

A Driving Question Board (DQB) is a tool used in NGSS lessons as a visual reference point to generate, connect and keep track of questions pertaining to the lesson’s phenomenon. Usually, DQB’s are completed on a poster board and hung in the front of the room for easy access of learners throughout the lessons. These questions the students are curating will help drive learning throughout these lessons.

6. Each group should be putting 4 separate post-its on the DQB. Your DBQ should be able to be seen throughout the unit. Suggested placement is having the DQB at the front of the room on poster board/butcher paper.
7. Once each group has done this, you can discuss the questions on the board as a class. If you have time, you can sort them into categories or rank them and decide which is the most important, most interesting, etc. This will allow you to highlight pertinent questions that will lead to subsequent lessons.

## **Part 2: Creating an Initial Explanation of Whey Protein**

1. Direct students to the Driving Question Board. Share that while it is helpful to name the different observations that we have made when observing the phenomenon card, scientists try to figure out how and why what they observed happened. Therefore, students will now try to explain not just what they observed happening but also explain why someone who exercises might consume whey protein.
2. To start, distribute the Driving Question Activity Student Guide. Students will create an initial draft to show their initial understanding of why someone who exercises might consume whey protein. Share that students will be able to add to and revise their explanations throughout these lessons and that it is okay if they are an incomplete draft right now. Students' initial explanations should show their own ideas. There is no need to do outside research at this time. Give students time to record their response to the Driving Question in *their* Driving Questions Activity Student Guide Part 2: Creating an Initial Explanation of Whey Protein.

### **STUDENT SUPPORT**

If students need additional support in writing an initial explanation, consider reminding students that, at this point, any idea is accepted. Students will revise their explanations later in the unit after gathering evidence to support their understanding.

## **Part 3: Sharing Initial Ideas**

1. After students record an explanation, provide time for them to share it with their peers using a Mingle-Pair-Share Routine.
  - a. Students will move around the classroom and find a peer who is not a part of their original group.
  - b. Students will take turns sharing their ideas.
  - c. Students will then find a new peer and share their ideas once again.
2. As they share, students can identify similarities and differences between their explanations and record them in the Student Guide Part 3: Sharing Initial Ideas. Then, hold a whole-class discussion for students to share similarities and differences that they found.

### TEACHER SUPPORT

If you haven't done so previously in the academic year, consider stating a list of norms for how students engage in productive and respectful classroom discussions. Ask students how they think they can have respectful conversations with each other. Create a class list with the norms your class generates and hold students accountable for participating in these norms throughout the unit. Some examples are shown below, but be sure to co-create your list with your students:

- Be Respectful: We can discuss and disagree on ideas, but we do not look down or talk down to people.
- Listen, Then Talk: Show that you are listening to your partner by repeating what they say or asking a question.
- Find Common Ground: When disagreeing, find at least one thing you agree with before discussing what you disagree with.

3. Once students have completed their mingle-pair-share, have students do a whole class share out. As students share, record the different ideas students have about why someone who exercises might consume whey protein. From this list, highlight any ideas that describe cause-and-effect relationships between whey protein and the body. Students' ideas may vary, and any idea is accepted and encouraged. We want to hear the genuine current thinking that students are bringing to the classroom. Some sample responses might be:
  - People will consume whey protein because it makes them stronger
  - People drink whey protein because their muscles grow faster
  - Whey protein comes from milk
  - Protein is essential for the body
  - People who exercise want to change their bodies and whey protein can do that
4. Conclude the discussion by sharing with students that throughout the upcoming unit, they will continue to refine their explanations as they gather new evidence.