

# TEACHER RESOURCE

## Lesson 4: Assessment *Rubric*



### Part 2 Task Rubric - Creating an Explanation of Whey Protein

#### CEDS-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, 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.

#### 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.

#### LS1.C-H3:

As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products.

#### PAT-H1:

Different patterns may be observed at each of the scales at which a system is studied and can provide evidence for causality in explanations of phenomena.

	Emerging	Developing	Proficient
<b>Sample Student Response</b>	<p>Whey protein is important for muscle recovery after exercise because it gives your body the amino acids it needs to help repair muscle tissue. When you exercise, your muscles get damaged, and the amino acids from whey protein help rebuild those muscle fibers, making them stronger. This is how your muscles grow, and your body recovers from exercise.</p>	<p>Whey protein is helpful for muscle recovery and growth because it provides the body with amino acids, which help repair damaged muscle cells after exercise. During exercise, your heart rate and body temperature increase as your body works to meet the energy demand. After exercise, the amino acids from whey protein support repairing and growing muscle tissue.</p> <p>When muscles get damaged during exercise, they use amino acids from protein to rebuild themselves. Whey protein can provide those amino acids to the recovering muscles. By repairing muscle cells, your body can maintain homeostasis, keeping everything balanced. These processes are important for recovery and for getting stronger over time.</p>	<p>Whey protein is important for muscle growth and recovery because it provides the body with amino acids that help repair and build muscle tissue after exercise. When you exercise, your body experiences changes in things like heart rate and increased body temperature to meet the energy demands. Afterward, consuming whey protein helps the body recover by aiding in processes where cells use amino acids to repair and grow. This is how the muscles get stronger over time.</p> <p>On a smaller scale, whey protein supports the growth of muscle cells by providing essential nutrients that the body uses to repair itself. During exercise, muscle cells are broken down, and the amino acids from whey protein help rebuild these cells through processes like mitosis, where one cell divides to make more cells. This</p>

			<p>contributes to the body's ability to maintain homeostasis after physical activity.</p> <p>Patterns in how the body uses energy during exercise appear at different levels. For example, your muscles and circulatory system work together to increase energy use and oxygen delivery during exercise. Afterward, whey protein helps restore energy by providing the necessary nutrients for muscle recovery. Using resources from the unit, like the case studies, models and diagrams from the Homeostasis Lab or data from the Nutrient Detective lab on how protein affects cells, we can see how these small-scale processes lead to overall muscle growth and energy balance in the body.</p>
<b>How to Achieve This Level</b>	Student completes 0-2 out of 4 Look Fors	Student completes 3 out of 4 Look Fors	Student completes 4 out of 4 Look Fors

<b>Part 2 Look Fors</b>	<b>Prompts to Support Students Improving on Look Fors</b>
Describe the pattern in the energy flow between homeostatic changes in the body. (CEDS-H2, LS1.C-H2, PAT-H1)	Explain how energy is used in different systems (e.g., respiration, temperature) during exercise and recovery. How does whey protein play a role in maintaining or restoring balance?
Link patterns bodily changes (heart rate, temperature, body pressure etc.) and as matter and energy flow through different organizational levels of living systems. (CEDS-H2, LS1.C-H3, PAT-H1)	Compare how whey protein might support energy balance across these levels. Are there differences in how energy is stored or used in different body systems?
Clearly depict how and where growth of muscles occurs and provide explanations for the underlying reasons. (CEDS-H2, LS1.C-H2, CE-H2)	Use diagrams or models to show where and how protein impacts muscle development after exercise. How does this contribute to overall growth?
Use evidence from multiple sources in your explanation and explicitly reference the resources or data incorporated into your revisions. (CEDS-H2)	Go back to the unit's materials and identify graphs, studies, or diagrams that show the effects of protein on muscle recovery or growth. How can you incorporate them into your explanation?

## Part 4 Task Rubric - Creating a Protein Product Presentation

### INFO-H5:

Communicate scientific and/or technical information or ideas (e.g. about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).

### 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.

### LS1.C-H3:

As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products.

### 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.

	Emerging	Developing	Proficient
<b>Sample Student Response</b>	<p>Hello! Today, I'll talk about the protein supplement I designed for endurance athletes. I've learned that different proteins provide different benefits, especially for athletes. For example, whey protein is absorbed quickly by the body and helps muscles recover faster after exercise. This is important for endurance athletes who need to recover quickly after long workouts like running marathons or cycling.</p> <p>In my product, I chose to use whey protein because it supports muscle repair after intense activity. It helps the body rebuild muscle cells that are</p>	<p>Hi everyone! Today, I'll present my protein supplement designed for endurance athletes, and I'll explain how it supports muscle growth and recovery. Endurance athletes need protein for more than just building muscle; they need it for energy during long periods of activity. From what I've learned, different proteins work in different ways in the body. For example, whey protein is quickly absorbed, which makes it a great choice for post-workout recovery.</p> <p>In my product, I combined whey protein with BCAAs because these branched-chain amino acids help reduce muscle breakdown. When athletes exercise, their muscles are damaged, and these amino acids help rebuild the muscle cells. The carbon, hydrogen, and oxygen in the proteins recombine to form new cells, which helps the muscles grow and recover after a long run or bike ride.</p>	<p>Hello, everyone! Today, I'll be presenting my prototype for a new protein supplement designed specifically for endurance athletes.</p>  <p>This product is based on what I've learned about how proteins and other macromolecules function in the body, especially when athletes are training and recovering. My goal is to create a supplement that not only supports muscle growth but also helps with energy management and recovery during long periods of physical activity.</p>

	<p>broken down during exercise. This makes it a great choice for athletes who need to recover quickly so they can keep training hard.</p>	<p>This cause-and-effect process happens at different levels in the body. On a smaller scale, the amino acids help rebuild damaged muscle cells. On a larger scale, this recovery helps athletes perform better by keeping their muscles strong and ready for the next workout. This is why I chose these specific ingredients for my supplement.</p>	<p>Endurance athletes need protein for more than just building muscle. While protein does help repair and grow muscle tissue, it's also important for producing energy over extended periods. Proteins are made up of amino acids, which the body uses to form new cells and rebuild muscle after intense exercise. For example, after a marathon or long cycling session, the body breaks down muscle tissue, and it's the amino acids in protein that help repair it. However, the type of protein an athlete consumes is crucial because different proteins are absorbed and used by the body in different ways.</p> <p>My prototype is a protein powder blend that combines whey protein with branched-chain amino acids (BCAAs). From what I've learned, whey protein is a fast-digesting protein, meaning it's quickly absorbed by the body, making it perfect for post-workout recovery. The added BCAAs support muscle recovery at the cellular level by helping to reduce muscle breakdown during long endurance events. The carbon, hydrogen, and oxygen atoms in these molecules recombine in the body to create new muscle cells, ensuring athletes recover faster and are ready for their next event.</p> <p>The effects of consuming protein, especially for endurance athletes, can be seen on multiple levels. At the small scale, amino acids help rebuild damaged muscle cells. At a larger scale, protein supports overall muscle growth and recovery. This</p>
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			<p>cause-and-effect relationship is critical for athletes who train for long hours. Without enough protein, their muscles can't recover properly, leading to fatigue and a higher risk of injury. By targeting both muscle repair and energy recovery, my product is designed to address these issues.</p> <p>In conclusion, my protein blend provides both immediate recovery benefits through whey protein and long-term muscle support with BCAAs. It's specifically designed for endurance athletes who need fast recovery and sustained energy for long periods of activity. This product can help athletes recover faster and perform better in future competitions, allowing them to meet the physical demands of their sport. Thank you for listening!</p>
<b>How to Achieve This Level</b>	Student completes 0-2 out of 5 Look Fors	Student completes 3-4 out of 5 Look Fors	Student completes 5 out of 5 Look Fors

Look Fors	Prompts to Support Students Improving on Look Fors
<p>Include multiple methods of communication, including models and evidence from the module (video plus graphics/diagrams, written report plus graphics/diagrams, or video with narration of a slideshow).</p> <ul style="list-style-type: none"> <li>You can use the class consensus explanations, data sets, and/or models, and any other resources from the unit to support your presentation.</li> </ul> <p>(INFO-H5, LS1.C-H2, LS1.C-H3)</p>	<p>Ask students to return to their resources from the unit and choose appropriate graphics, diagrams, data, or other visual resources.</p>
<p>Clearly communicate scientific information in a way that is appropriate for your chosen audience.</p> <p>(INFO-H5, LS1.C-H2, LS1.C-H3)</p>	<p>Ask students to compare their presentation language to the scientific explanations they wrote in their lesson work and reflect on how they modified the language to be appropriate to their chosen audience. What terms and ideas did they simplify? Which did they make more complex? What would their chosen audience prefer?</p>
<p>Describe the different sources of protein and how they can provide different results for athletes vs. average individuals.</p> <p>(LS1.C-H2, LS1.C-H3)</p>	<p>What are the differences between how protein is used by an athlete vs. an average individual? What biological processes are different?</p>
<p>Describe how amino acids and other carbon-based molecules can be assembled into larger molecules, such as proteins, to form new cells.</p> <p>(LS1.C-H2, LS1.C-H3)</p>	<p>How did you help your audience understand the different macromolecules discussed in the presentation? What components come together or break apart in new ways in the body as proteins are used in the body?</p>
<p>Describe the different cause and effect relationships that can be observed at each of the scales of the system.</p> <p>(LS1.C-H2, LS1.C-H3, CE-H2)</p>	<p>Identify at least three unique patterns in the data and resources and incorporate those into your presentation.</p>