RUBRIC
EVALUATE LESSON 7

Food and Agriculture Center for Science Education

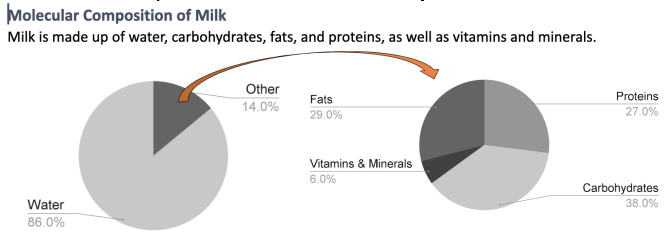
Part 2 Task Rubric

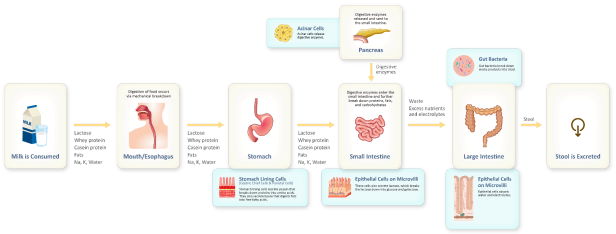
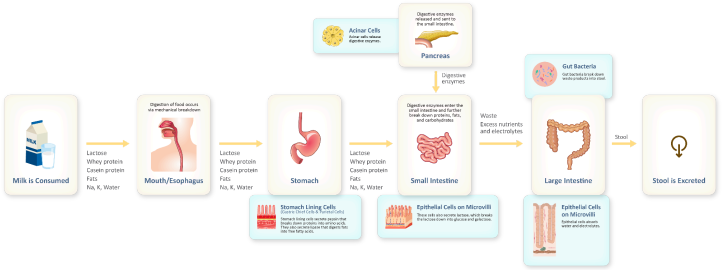
INFO-H5: Communicate scientific and/or technical information or ideas (e.g. about phenomena and/or the process of development and the design and performance of a proposed process or system) in multiple formats (including orally, graphically, textually, and mathematically).

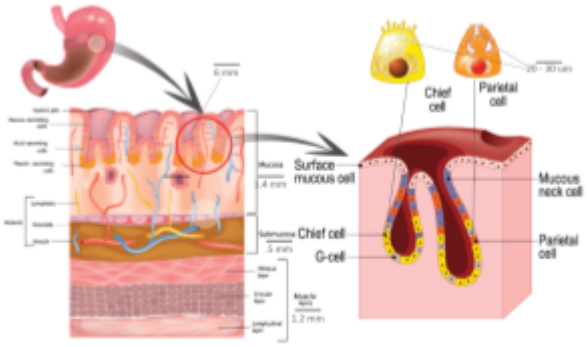
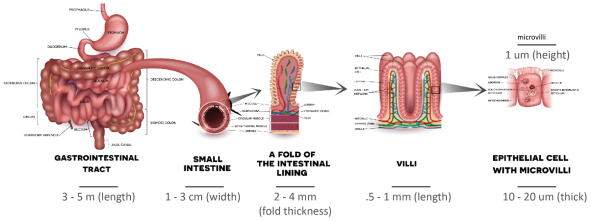
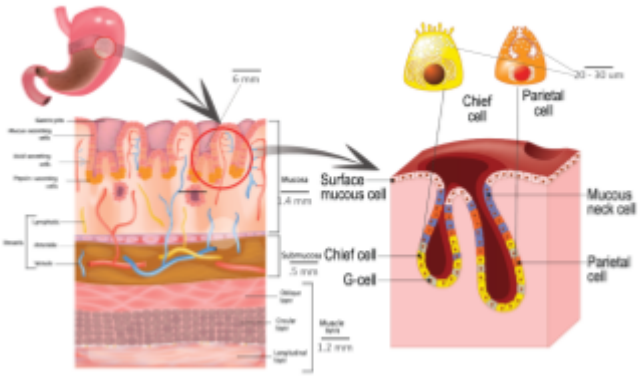
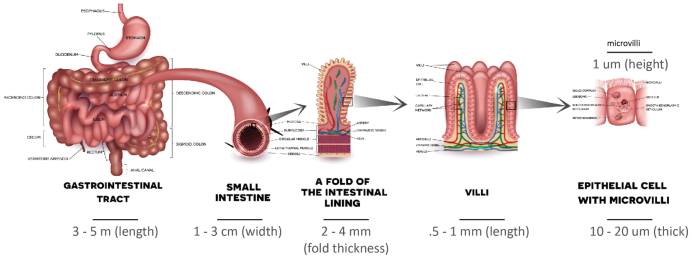
LS1.A-H1: Systems of specialized cells within organisms help them perform the essential functions of life.

LS1.A-H3: Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level.

SPQ-H4 Using the concept of orders of magnitude allows one to understand how a model at one scale relates to a model at another scale.

	Emerging	Developing	Proficient
Sample Student Response	Let's start from the beginning. The nutrients that make up milk, such as fats, lactose, proteins, and electrolytes. When an athlete drinks milk after working out, milk goes into their digestive system, which is made of many different organs, which are each made of many different specialized cells. Each of these has a different job. Starting at the mouth, nutrients pass through the esophagus and move	Let's start from the beginning. The Chemistry of Milk illustration showed the nutrients that make up milk, such as fats, lactose, proteins, and electrolytes. When an athlete drinks milk after working out, milk goes into their digestive system, which is made of many different organs, which are each made of many different specialized cells. Each of these has a different job. As we look at our class model, we can see each organ and what is happening in these organs. Let's walk through what happens in each of the steps shown below.	Let's start from the beginning. The Chemistry of Milk illustration showed the nutrients that make up milk, such as fats, lactose, proteins, and electrolytes.  *Milk Chemistry*. Milk Chemistry - Cheese Science Toolkit. (n.d.). https://www.cheesescience.org/milk.html When an athlete drinks milk after working out, milk goes into their digestive system, which is made of many different organs, which are each made of many different specialized cells. Each of these has a different job. As we look at our class model, we can see each organ and what

	into the stomach. This is where the digestion of milk really begins. When nutrients reach the athlete's stomach, we start to see how specialized cells are working to digest milk. The lining of the stomach has specialized cells that start acting upon nutrients with enzymes. Fats are broken down from big globs to smaller globules by gastric lipase. Proteins are broken down into amino acids by pepsin, which is an enzyme released from Chief cells in the stomach lining. Then, nutrients from milk move into the athlete's small intestine. More chemical digestion happens as an enzyme called lactase breaks lactose down into glucose and galactose. Also, fats get broken down even more now into free fatty acids by the enzyme lipase. The broken-down nutrients in the small intestine then get absorbed into the bloodstream. The lining of the small intestine has	 Starting at the mouth, nutrients pass through the esophagus and move into the stomach. This is where the digestion of milk really begins. When nutrients reach the athlete's stomach, we start to see how specialized cells are working to digest milk. The lining of the stomach, which is about 6mm in size, has specialized cells that start acting upon nutrients with enzymes. We can see from our size & orders of magnitude tool that the cells of the stomach are 1.0-1.6 mm m in size. Fats are broken down from big globs to smaller globules by gastric lipase. Proteins are broken down into amino acids by pepsin, which is an enzyme released from Chief cells in the stomach lining. The enzyme is much smaller than the cells at 5-10 nm in size. So, we can see that different structures of different sizes make up this complex system.	is happening in these organs. Let's walk through what happens in each of the steps shown below.  Starting at the mouth, nutrients pass through the esophagus and move into the stomach. This is where the digestion of milk really begins. When nutrients reach the athlete's stomach, we start to see how specialized cells are working to digest milk. The lining of the stomach, which is about 6mm in size, has specialized cells that start acting upon nutrients with enzymes. We can see from our size & orders of magnitude tool that the cells of the stomach are 1.0-1.6 um in size. Fats are broken down from big globs to smaller globules by gastric lipase. Proteins are broken down into amino acids by pepsin, which is an enzyme released from Chief cells in the stomach lining. The enzyme is much smaller than the cells at 5-10 nm in size. So, we can see that different structures of different sizes make up this complex system.

	epithelial cells that absorb these broken-down nutrients into the bloodstream. The only nutrients that move further into the large intestine are water and electrolytes, like sodium and potassium. If any of that is left over after the large intestine, it's removed from the body as waste.	 Then, nutrients from milk move into the athlete's small intestine. More chemical digestion happens as an enzyme called lactase breaks lactose down into glucose and galactose. Also, fats get broken down even more now into free fatty acids by the enzyme lipase. The broken-down nutrients in the small intestine then get absorbed into the bloodstream. The lining of the small intestine has epithelial cells that absorb these broken-down nutrients into the bloodstream.  The only nutrients that move further into the large intestine are water and electrolytes, like sodium and potassium. If any of that is left over after the large intestine, it's removed from the body as waste.	 Then, nutrients from milk move into the athlete's small intestine. More chemical digestion happens as an enzyme called lactase breaks lactose down into glucose and galactose. Also, fats get broken down even more now into free fatty acids by the enzyme lipase. The broken-down nutrients in the small intestine then get absorbed into the bloodstream. The lining of the small intestine has epithelial cells that absorb these broken-down nutrients into the bloodstream. We can see from our size & orders of magnitude tool that glucose molecules are 800 pm, such a smaller size compared to the size of an epithelial cell ~20 um thick. This shows that glucose could easily travel into the epithelial cells. 

			The only nutrients that move further into the large intestine are water and electrolytes, like sodium and potassium. If any of that is left over after the large intestine, it's removed from the body as waste.
How to Achieve This Level	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

Part 2 Look Fors	**Prompts to Support Students in Improving on Look Fors**
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) (INFO-H5). ● You can use the class consensus model, data sets, and/or models from any other resources from the module.	Ask students to return to their resources from the unit and choose appropriate graphics, diagrams, data, or other visual resources.
Clearly communicate scientific information in a way that is appropriate for your chosen audience (INFO-H5).	Ask students to compare their presentation language to the scientific explanations they wrote in the module 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?
Describe how the hierarchical organization and function of body systems, organs, and cells contributes to the digestion of milk (LS1.A-H3).	How did you explain the way the different parts of the body work together? How organs, cells, and molecules are related?
Describe the scale relationships between the models you are showing using orders of magnitude (SPQ-H4).	How did you help your audience understand the relative scale relationships shown in the diagrams or other visual resources you used?
Describe how the function of multiple kinds of specialized cells contributes to the digestion of milk (LS1.A-H1).	Identify at least three different kinds of specialized cells from the module resources and incorporate those into your presentation.

To Support Students in Revising Their Tasks Based on Peer or Teacher Feedback

- Prior to submitting their work, hold a peer-feedback session using a protocol such as Tell-Ask-Give or with norms such as SPARK. Alternatively, students can utilize the Peer Feedback Form. Students can use this feedback to revise their presentations in this lesson, in upcoming modules, and/or in the final unit performance task.
- After submitting their work and receiving feedback and a grade, hold a session for students to norm on the features of high-quality work. Choose three samples of student work (one Emerging, one Developing, and one Proficient), anonymize them, and distribute them to students. Ask students to analyze the three samples of work and annotate what features of the work are high-quality examples of the Look Fors and what features are not. Share the features of high-quality work that students identified and ask them to point to specific examples in the work samples. Build a class list of features of high-quality work. Then, allow students time to revise their work based on the list they generated and resubmit it for a revised grade.