WRITTEN ARGUMENT RUBRIC
EVALUATE LESSON 14

Food and Agriculture Center for Science Education

Part 2 Task Rubric			
INFO-H4: Evaluate the validity and reliability of and/or synthesize multiple claims, methods, and/or designs **that appear in** scientific and technical texts or **media reports, verifying the data when possible.** **ESS2.D-H3: Changes in the atmosphere due to human activity have increased carbon dioxide concentrations and thus affect climate.** **SPQ-H1: The significance of a phenomenon is dependent on the scale, proportion, and quantity at which it occurs.**			
	Emerging	Developing	Proficient
Sample Student Response	I think media claim 10 is accurate. It says that the agricultural sector is one of the smallest industrial sectors for greenhouse gas emissions. I think that is true because we saw the data that showed that.	I think media claim 10 is accurate. It says the agricultural sector is one of the smallest contributors to greenhouse gas emissions. Even though its contribution is small, it does still produce some methane and carbon dioxide that participate in the greenhouse effect. This occurs when greenhouse gases enter the atmosphere. Solar energy comes into the Earth system and warms the Earth. The warmth of the Earth moves outwards, and greenhouse gases trap this heat energy in the Earth system. So, with more greenhouse gases, the Earth system will have more heat energy in it than with less greenhouse gases. Even though this is the case, I still think claim 10 is accurate because other industries are emitting more greenhouse gases.	I think media claim 10 is accurate. It says the agricultural sector is one of the smallest contributors to greenhouse gas emissions. Even though its contribution is small, it does still produce some methane and carbon dioxide that participate in the greenhouse effect. I can see from my Greenhouse Effect model that this occurs when greenhouse gases produced by human activities like agriculture and transit enter the atmosphere. Solar energy comes into the Earth system and warms the Earth. The warmth of the Earth moves outwards, and greenhouse gases trap this heat energy in the Earth system. So, with more greenhouse gases, the Earth system will have more heat energy in it than with less greenhouse gases. Indeed, the agricultural industry is the global leader in methane emissions at over 3 billion tons per year, as stated by Our World in Data. Even though this is the case, I still think claim 10 is accurate because other industries are emitting much more greenhouse gases. According to Our World in Data, globally the Energy sector contributes 74% of greenhouse gas emissions, while Livestock only contributes 5.8%.
How to Achieve This Level	Student completes 0-1 out of 4 Look Fors	Student completes 2-3 out of 4 Look Fors	Student completes 4 out of 4 Look Fors

Part 2 Look Fors	**Prompts to Support Students in Improving on Look Fors**
Student evaluates the claim and states if the claim is accurate, inaccurate, or misleading.	What specific evidence from the module did you use to determine the accuracy of the claim?
Student describes the scale of the impact of the dairy system compared to other industrial systems on the buildup of greenhouse gases in the atmosphere.	What quantitative data on the amounts of greenhouse gas contributions by the dairy and/or agricultural industries compared to other industries does your response include?
Student explains how human activity may be related to changes in greenhouse gas concentrations in the atmosphere and thus may be affecting climate and how this influences their evaluation of the claim.	How did you describe the mechanism of the greenhouse effect? How did you describe how the changes in matter and energy in the Earth system occur?
Student cites two pieces of direct evidence from the module to verify how they are supporting or refuting the claim. Evidence can come from: ● Student models ● Other resources in the module (texts, data sets, etc.)	In your response, highlight direct evidence you used from the module. Use a different color for each source.

Part 3 Task Rubric

ARG-H4: Construct, use, and/or present an oral and written argument or counter-arguments **based on data and evidence.**

ESS3.A-H2: All forms of energy production and other resource extraction have associated economic, social, environmental, and geopolitical costs and risks as well as benefits. New technologies and social regulations can change the balance of these factors.

SYS-H1: Systems can be designed to do specific tasks.

	Emerging	Developing	Proficient
Sample Student Response	I think the impact of the dairy industry on the environment is overall somewhat negative. I think that it has negative impacts like water pollution and it adds greenhouse gases to the atmosphere, even though it doesn't add as many as other industries.	I think the impact of the dairy industry on the environment is overall somewhat negative. The dairy system is made up of dairy cows raised to produce milk that is processed into dairy products for consumers who depend on agricultural products such as dairy for food. However, the dairy system also has costs and unintended consequences such as pollution, impacts on worker health, and chemical pollution. We also found out that the dairy system contributes greenhouse gases to the environment. Overall, I think that the downsides outweigh the benefits of the system.	I think the impact of the dairy industry on the environment is overall somewhat negative. The dairy system is made up of dairy cows raised to produce milk that is processed into dairy products for consumers who depend on agricultural products such as dairy for food. The dairy system was designed to make a lot of products for little cost, but doing so has resulted in downsides that extend beyond the boundary of the design of the system, such as an environmental cost like pollution, social impacts such as health problems for workers, and environmental impacts like chemical pollution and contribution of greenhouse gases to the atmosphere. The article, "A Review of Potential Public Health Impacts Associated With the Global Dairy Sector," states that "Livestock production may also be the single largest sectoral source of water pollution. Major sources of water pollution from dairy farms include animal wastes, pharmaceutical residues (e.g., antibiotics and hormones), fertilizers and pesticides used for growing feed crops, and sediment from eroded pastures." The agricultural industry is also the global leader in methane emissions at over 3 billion tons per year, as stated by Our World in Data. But at the same time, according to Our World in Data, globally the Energy sector contributes 74% of greenhouse gas emissions, while Livestock only contributes 5.8%. So even though dairy is not the biggest emitter of greenhouse gases, the greenhouse gas contributions plus the pollution I think make the impacts of the dairy industry overall somewhat negative.
How to Achieve This Level	Student completes 0-1 out of 4 Look Fors	Student completes 2-3 out of 4 Look Fors	Student completes 4 out of 4 Look Fors

Part 3 Look Fors	**Prompts to Support Students in Improving on Look Fors**
Student makes a claim about the overall positive or negative effects of the dairy system on the environment.	Was the claim you made about the effects of the dairy system on the environment positive, negative, or somewhere in between?
Student describes the tasks(s) of the dairy system that are relevant to the argument and the possible unintended consequences of the way the dairy system was designed.	What tasks was the dairy system designed to complete? What are the unintended consequences of the system?
Student explains the costs and benefits of the dairy system overall, including economic, social, environmental, and/or geopolitical costs and benefits. Student uses one cost or benefit from each module: ● Dairy system, pollution, and health ● Dairy system and climate	What economic, social, environmental, or geopolitical costs or benefits did you include? Did you include costs and benefits from both Module 1 and Module 2?
Student cites two pieces of direct evidence from the unit in support of their claim. Evidence can be taken from: ● Student models ● Other resources in the whole unit (texts, data sets, etc.)	What specific evidence from the module did you use to determine the accuracy of the claim? In your argument, highlight the direct evidence you used from the module. Use a different color for each source.

Part 4 Task Rubric

ARG-H3: Respectfully provide and/or receive critiques on scientific arguments by probing reasoning and evidence and challenging ideas and conclusions, responding thoughtfully to diverse perspectives, and determining what additional information is required to resolve contradictions.

ESS3.A-H2: All forms of energy production and other resource extraction have associated economic, social, environmental, and geopolitical costs and risks as well as benefits. New technologies and social regulations can change the balance of these factors.

SYS-H1: Systems can be designed to do specific tasks.

	Emerging	Developing	Proficient
Sample Student Response	I think your argument was okay. I think it could be improved by focusing more on the amount of methane emissions from cattle.	Some reasoning that you shared that I think could be improved on is that cow burps are causing climate change because they emit methane into the atmosphere. I also think what you said about cattle being the biggest cause of climate change was incorrect. I'm wondering what evidence you have to support these claims.	Some reasoning that you shared that I think could be improved on is that cow burps are causing climate change because they emit methane into the atmosphere. I also think what you said about cattle being the biggest cause of climate change was incorrect. I'm wondering what evidence you have to support these claims. To make progress on this disagreement, I think we could compare the amounts of methane released by cattle to the emissions from other industries to figure out the scale of the impact of cattle relative to other greenhouse gas sources. These two actions would help us make progress on our disagreement.
How to Achieve This Level	Student completes 0-1 out of 4 Look Fors	Student completes 2-3 out of 4 Look Fors	Student completes 4 out of 4 Look Fors

Part 4 Look Fors	Prompts to Support Students in Improving on Look Fors
Student respectfully provides critiques on their peer's argument by probing reasoning and evidence.	Do you think your feedback was respectful? Did you respectfully probe your peer's reasoning and evidence in their argument?
Student respectfully provides critiques on their peer's argument by challenging ideas and conclusions.	Which conclusions did you challenge? How have you done so?
Student critique focuses on the quantity of the system's impact or on the tasks it was designed to accomplish.	How did your critique include the scale and/or quantity of the system's impact? How did it focus on the tasks the system was designed to accomplish?
Student makes a suggestion for what additional information is required to resolve an area of disagreement.	What suggestions have you offered to resolve any areas of disagreement?

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. Then have students revise their work based on the peer feedback.
- 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 out 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.