Soil & Food Security

baMEL

A few caveats….

- The Soil baMEL is in its third year of use.

Webpage

- A lot of what I have done depended on time I had to available.

- Feel free to chime in with ideas!!

Be glad you aren't teaching this in elementary otherwise our topic today might have been…

Sample On-Level Standards and Applications…

Environmental Science

ESS3.A: Natural Resources Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources, including air, water, soil, minerals, metals, energy, plants, and animals.

ESS3.C: Human Impacts on Earth Systems Recorded history, as well as chemical and geological evidence, indicates that human activities in agriculture, industry, and everyday life have had major impacts on the land, rivers, ocean, and air.

Earth Science (6th Grade)

ESS3.A: Natural Resources

- Humans depend on Earth's land, ocean, atmosphere, and biosphere for many different resources.
- Minerals, fresh water, and biosphere resources are limited, and many are not renewable or replaceable over human lifetimes.
- These resources are distributed unevenly around the planet as a result of past geological processes.

Content:

- Ecosystems
- Earth Systems and Resources
- Land and Water Use
- Aquatic and Terrestrial Pollution
- Global Change
- Sustainability

Practices:

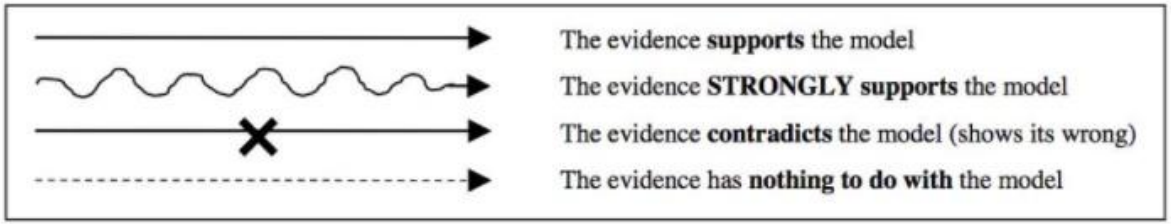
- Concept Explanation
- Visual Representations
- Text Analysis

Advanced Content Outline:

- Synthesizing to establish a collective understanding
- Listening, comparing, critiquing, debating, and responding to peers
- Refining ideas and building on other's contributions
- Engaging in multiple interactions with texts
- Allowing for diverse interpretations and responses

Directions: Write the number of each evidence you are using and for each model you have selected in the boxes below. Then draw 2 arrows from each evidence box, one to each model. You will draw a total of 8 arrows.

Key:



Cookies left near fireplace appear eaten. There is what appears to be a boot print on floor.

There is a big guy in red suit named Santa who delivers gifts.

I woke up early and may have seen mom and dad placing gifts under tree…"Helping Santa"

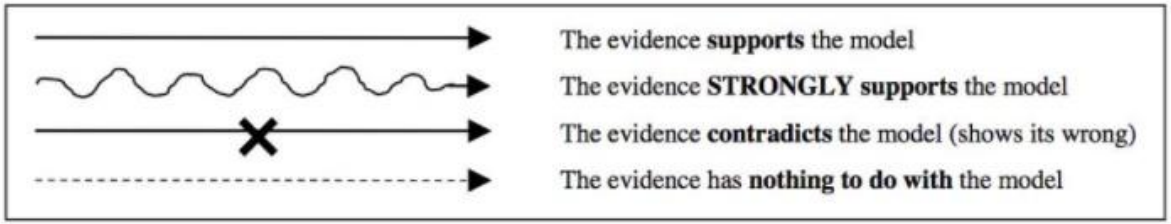
I saw a guy named Santa at the mall who fits the description.

There is no "Santa" who delivers gifts in Dec/Jan timeframe

None of my gifts appear to be made in the North Pole...they all say "Made in China"

Directions: Write the number of each evidence you are using and for each model you have selected in the boxes below. Then draw 2 arrows from each evidence box, one to each model. You will draw a total of 8 arrows.

Key:



A video camera was left in room all night and saw nothing. Only a 2 minute part where it mysteriously paused. Money was under pillow.

If you leave tooth under pillow a fairy will exchange it for money

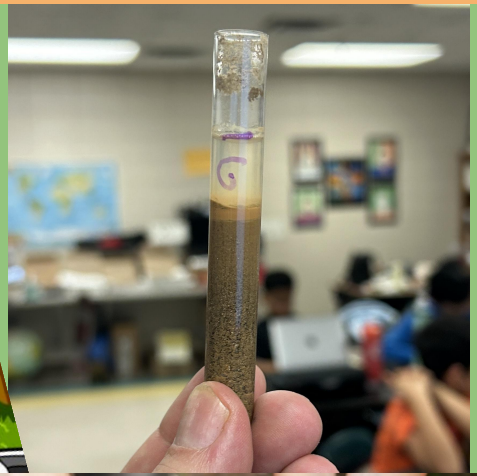
I woke up one night and found my dad with my tooth in one hand a and money in the other. He claimed he was “Checking”

I had my picture taken with the Tooth Fairy at my dentist's office. She seemed real and and smelled like pixie dust (I think)

There is no fairy involved. Money provided by some other technology.

I watched Tinkerbell, a fairy-themed movie, and noticed they didn’t have any teeth laying around.

Activating Background Knowledge Beforehand.



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EXTENSION

USDA

Model Plausibility Ratings (MPR)

~20 to 30 minutes with background knowledge activation

Investigating different ideas about the soils and their role in providing food for our growing global population.

B. Model Plausibility Ratings — *Food Security*

Name: [redacted] Date: 4/28/23

Teacher: Piper Period: 1

Group members, if any: This Table

Please work on this individually and read the following information carefully.

*Humans create **models** to help explain things.*
Below are three models. These provide different ideas about the role of soils in providing food for our growing global population.

Model A: Increased knowledge has resulted in improved farming methods and soil health. These improvements will solve food challenges.

A person who supports this model makes the following argument:
Human advances in agriculture and soil science will solve food security challenges. Farming is better when people take care of their soil in different ways. They can use soil improvement and conservation methods.

Model B: Our use of natural resources has negative effects on soil health. This places risks on food access for our growing population.

A person who supports this model makes the following argument:
As our population increases, so does the pressure placed on our natural resources. Together, these pressures affect soils, making them unusable to grow food. Soils are too wet, too dry, or lack the ingredients needed for crop production. Climate change is making the problem even worse.

Model C: Soil is not necessary for food security. Other farming methods that do not rely on soil will solve food security problems.

A person who supports this model makes the following argument:
While soil is important for farming, farming methods that don't use soil can provide new sources of food. These crops will be grown in water or come from ocean plants.

Plausibility is a judgment we make about the potential truthfulness of one explanatory model compared to another. The judgment may be tentative (not certain). You do not have to be committed to that decision.

Circle the plausibility of each model. [Make three circles, one for each model.]

	Greatly implausible (or even impossible)									Highly plausible
Model A	1	2	3	4	5	6	7	8	9	10
Model B	1	2	3	4	5	6	7	8	9	10
Model C	1	2	3	4	5	6	7	8	9	10

baMEL MPR (03/2023) — *Page 1 of 1*

Read Through the Evidence Cards (~ 40 to 50 minutes)

I’ve done this many different ways in past baMELS: Jigsaw, short spurts, all-in-one day, outdoors, and even independently.

→ Usually we read, as a class, two to four each day but they could all be done at once..

→ Helpful to have “*hooks*” from time-to-time (food, excursions, and games work well)

→ Review the models each day and perhaps past lines of evidence.

Evidence Texts

Evidence Text #1: Read

Soil is a non-renewable resource that degrades over time as humans grow crops

Evidence Text #2: Silent (simple…think pair share)

Farmers use different ways to increase soil health and make food grow. Most farming methods help soil health, but some methods do not work.

Evidence #4: Silent (complex…think-pair-share)

Climate change has led to changes in temperature and precipitation amounts around the world. Temperature and precipitation could make soils unusable for growing crops.

Evidence Text #3: SiletIn (synthesize…outside info)

Hydroponics is a way to grow crops in nutrient-rich water without soil. There are advantages and disadvantages to using hydroponics.

Evidence Text #5: Listening (Mr. Piper)

Farmers use fertilizer to chemically balance soils and improve soil health. When fertilizers are used on a land plot too long, the soil can be harmed.

Evidence Text #6: Popcorn

The ocean covers 70% of our planet's surface. The ocean has many food sources that could increase food security.

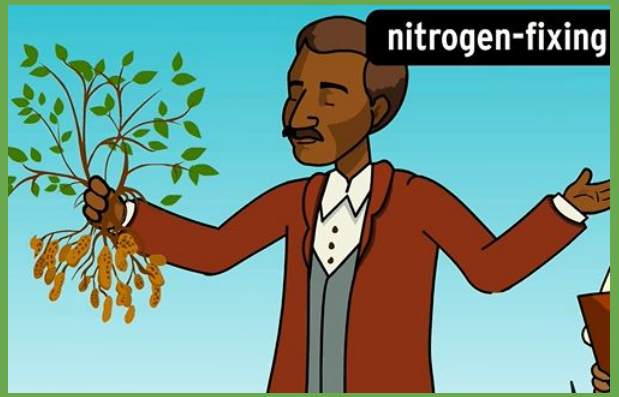
Philanthropic Vipers…

Evidence #7: Novel

Growing crops at the bottom of the ocean can provide alternatives to traditional farming. Crops can be grown without soil in underwater bubbles.

Evidence Text #8: Extend

Farmers are finding new ways to use nitrogen-fixing bacteria to help grow food.



George Washington Carver

Your Vote Counts!

MELs Diagram Day (~40 minutes) :
Part I Setting Up Diagram

I've used these several different ways with "Soils":

1. **Class** decides which models to "Analyze"

   -- **Groups** choose Evidence to Compare

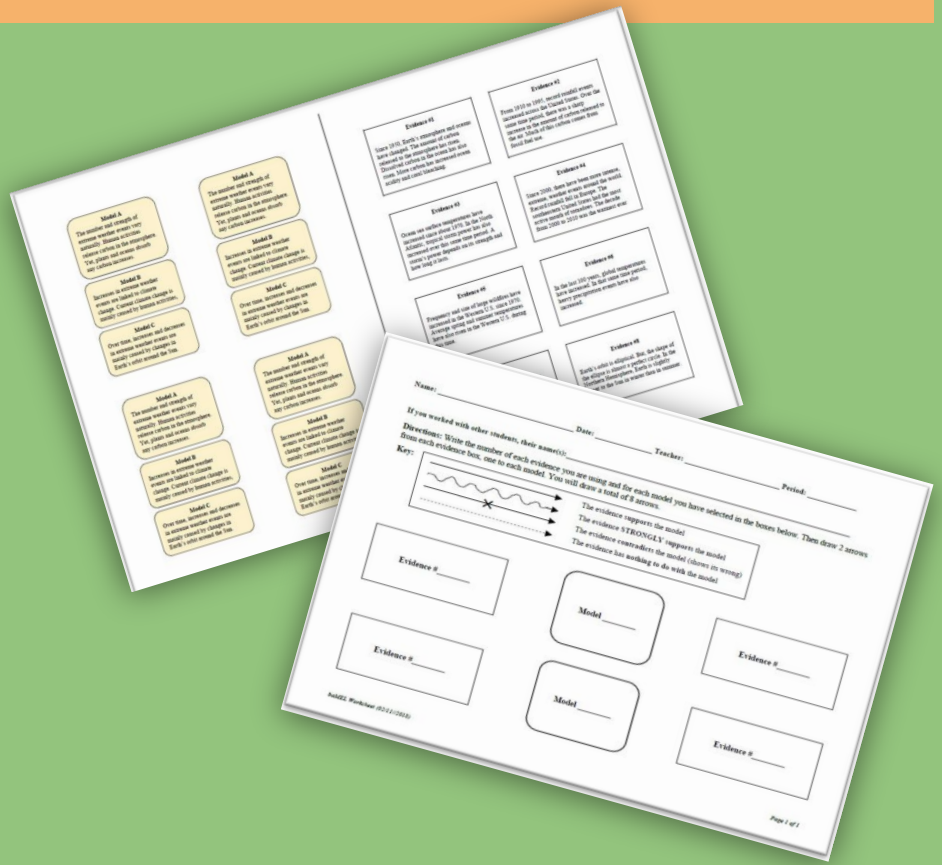
2. Class votes for Evidence
3. I Choose a few and allow them to choose others.

   -- Used electronic version to communicate results..

I've found it all has to do with how much time I have.

MELs Diagram: Part II Expressing the Relationships (individually)

- I often have them do their own first with the knowledge that it will be shared with a small group.



They should have eight links…note one is missing here!

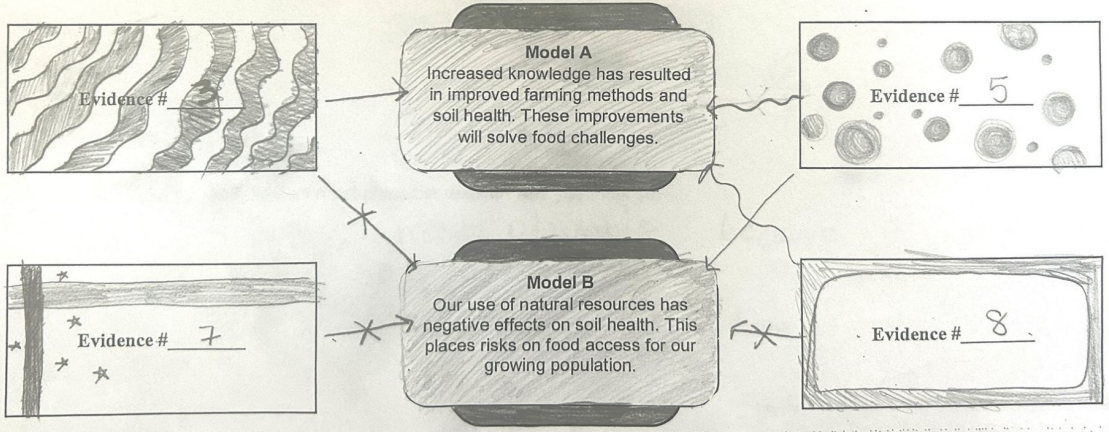
Name: Date: 5-5-2023 Teacher: Mr. Piper Period: 1

If you worked with other students, their name(s): TEAM NAME

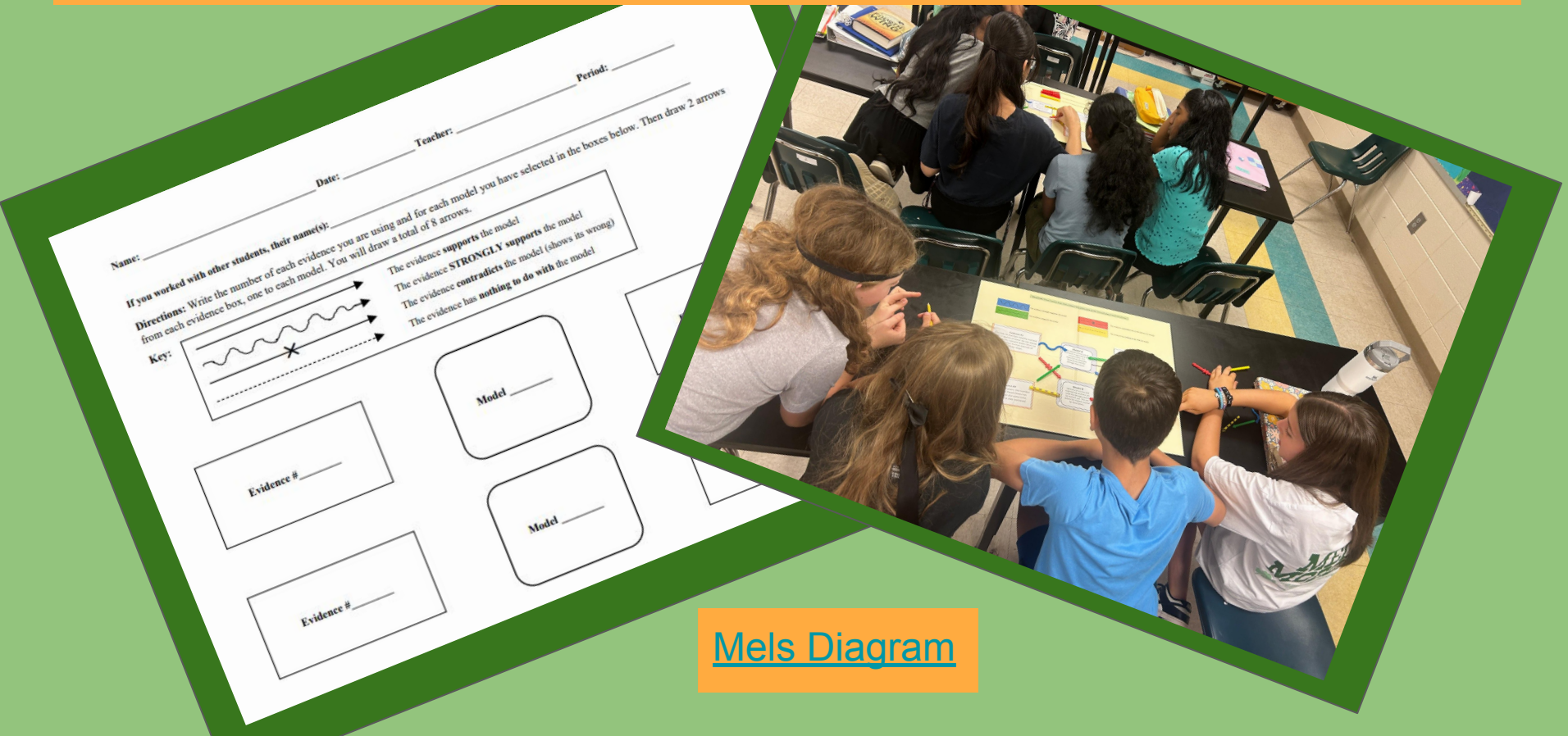
Directions: Write the number of each evidence you are using and for each model you have selected in the boxes below. Then draw 2 arrows from each evidence box, one to each model. You will draw a total of 8 arrows.

Key:

→	The evidence **supports** the model
⇝	The evidence **STRONGLY supports** the model
✕	The evidence **contradicts** the model (shows its wrong)
⇢	The evidence has **nothing to do with** the model



Mels Diagram: Group (The Soilers)



[Mels Diagram]

Explanation Task (~ 15 to 20 minutes)

Students are asked to:

1. Re-rate the plausibility of each model.
2. Why they feel one model is more plausible than another.

   → At this point I return their original plausibility ratings ←

3. Students complete one or two “slotted” prompts asking which evidence/model connection was most compelling in strongest in either changing their views or solidifying what they already believed.

   →As part of a summative I asked that they complete the prompt and then either **E**xplain, Give **E**xamples, or **E**xtrapolate (go beyond the evidence a bit) to support their answer.

   → .They could also explain how their opinion differed from their groups.

Questions 1 and 2….

1. Now that you have completed the diagram, reconsider the plausibility of Models A and B (and C, if there is one). Circle the plausibility of each model. [Make one circle for each model.]

	Greatly implausible (or even impossible)									Highly plausible
Model A	1	2	3	4	5	6	7	8	9	10
Model B	1	2	3	4	5	6	7	8	9	10
Model C (if there is one)	1	2	3	4	5	6	7	8	9	10

2. For the model you selected as most plausible, explain why you think so.

I pick modle B bc our soil is going bad and scintests have already proved that by 2050 90% will go bad. Though tecnolgy might keep us up, will but we will never get that nuatral flover and helth benfits like what will tecnolgy do -

Please Make Sure to Complete Page 2

Questions 1 and 2….(advanced/ludicrous)

Please work on this part individually after you complete your diagram.

1. Now that you have completed the diagram, reconsider the plausibility of Models A and B (and C, if there is one). Circle the plausibility of each model. [Make one circle for each model.]

	Greatly implausible (or even impossible)									Highly plausible
Model A	1	2	3	4	(5) →	6	7	8	9	10
Model B	1	2	3	4	5	6	7	8	9	(10) (11) →
Model C (if there is one)	1	2 ←	(3)	4	5	6	7	8	9	10

2. For the model you selected as most plausible, explain why you think so.

Our use of natual resources is greatly impacting our effects on our soil health. For example our use of water, (to make electricity) causes gases to escap into the atmosphere. The ocean absorbs much of these harmful gases, which causes ocean acidification. This change can make the ocean waters warmer. This confuses fis like whales, who migrate to warmer waters to stay in the same waters. Whales have an brilliant way of gathering prey. Humpbacks stir up dirt which makes e school of fish confused, which then allows whales to have their meal. When whales grate, they usually find themselves near kelp forests. Please Make Sure to Complete Page 2 lp forests get fertilized by the dirt that gets stirred . The leelp forest grows abundantly which allows other animals like sea otters to h better habitat. During storms sea otters get swept up to the shore. A type of wol ed sea wolves live on islands and survive on washed up sea otters. BACK

Question 3 (Basic)

3. Which arrows changed your plausibility judgments about the models? If your plausibility judgment did not change, which arrows supported your original plausibility judgments? Consider 2 lines of evidence. For each line, does it support, strongly support, or contradict one of the models? Why? When writing your explanation, consider the following:
   - Use the specific information from the evidence text and figures to support your response. Ex: when looking at graphs or figures, be sure to describe the patterns in the data.
   - Describe any cause-and-effect relationships found in the text.

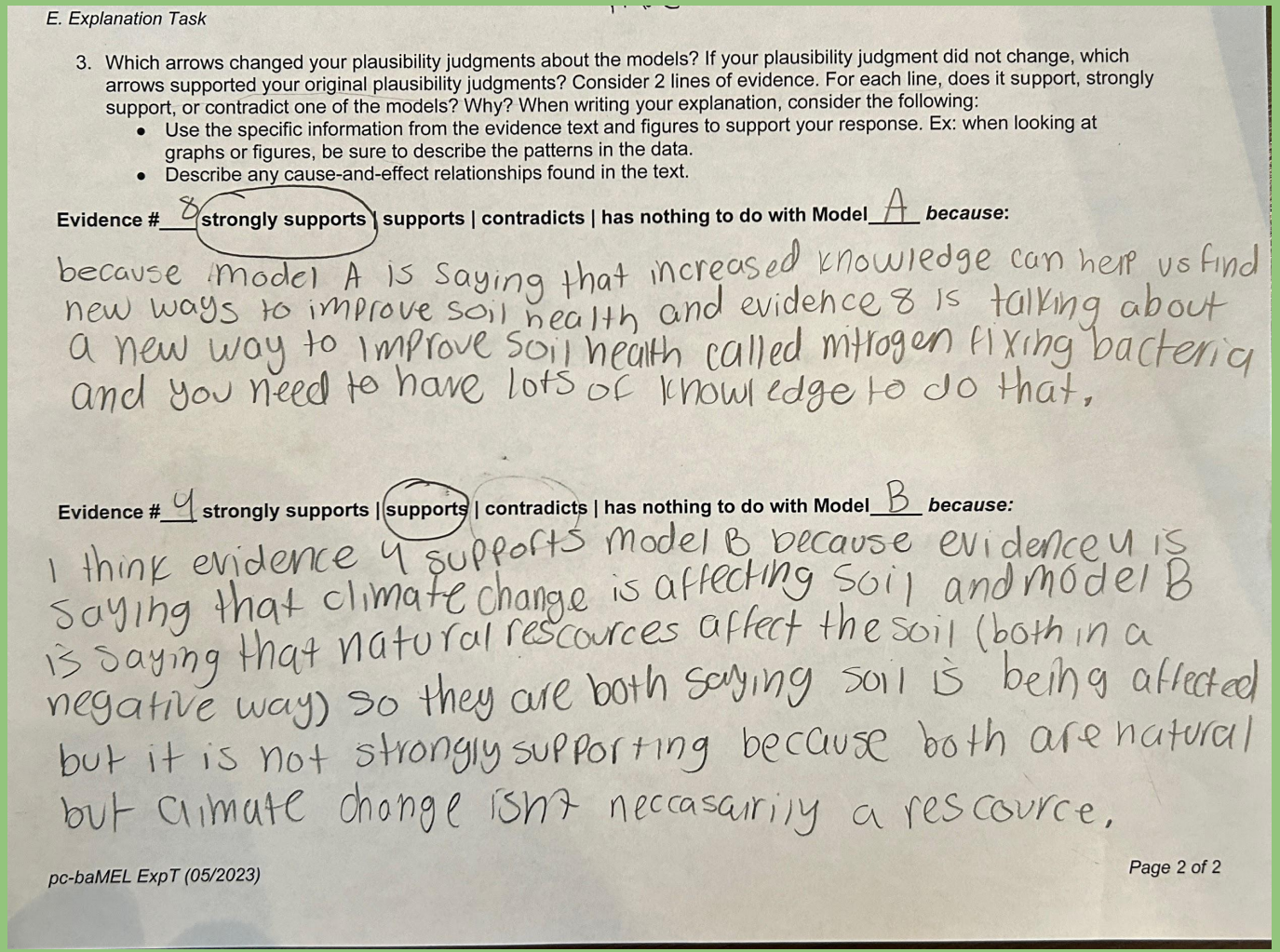
Evidence # 5 **strongly supports | supports | contradicts | has nothing to do with Model** A ***because*:**

it shows how farmers smart thinking and ideas show new ways to increase good farming.

Evidence # 5 **strongly supports | supports | contradicts | has nothing to do with Model** B ***because:***

it shows how many people on our planet use resources that could be harming farmlands.

Question 3: (advanced)



E. Explanation Task

3. Which arrows changed your plausibility judgments about the models? If your plausibility judgment did not change, which arrows supported your original plausibility judgments? Consider 2 lines of evidence. For each line, does it support, strongly support, or contradict one of the models? Why? When writing your explanation, consider the following:
   - Use the specific information from the evidence text and figures to support your response. Ex: when looking at graphs or figures, be sure to describe the patterns in the data.
   - Describe any cause-and-effect relationships found in the text.

Evidence # 8 **strongly supports | supports | contradicts | has nothing to do with Model** A ***because:***

because model A is saying that increased knowledge can help us find new ways to improve soil health and evidence 8 is talking about a new way to improve soil health called nitrogen fixing bacteria and you need to have lots of knowledge to do that,

Evidence # 4 **strongly supports | supports | contradicts | has nothing to do with Model** B ***because:***

I think evidence 4 supports model B because evidence 4 is saying that climate change is affecting soil and model B is saying that natural rescources affect the soil (both in a negative way) so they are both saying soil is being affected but it is not strongly supporting because both are natural but climate change isn't neccasarily a rescource,

pc-baMEL ExpT (05/2023)

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AP Revisited!!!!!

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Questions and Comments…

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