Fossils

Read Through the Models

- The purpose of this activity is for you to become critically evaluative of evidence used to support scientific thinking.

- You will be choosing from 8 pieces of evidence to support/contradict multiple models of a phenomenon.

- Using scientific thinking, you will evaluate the plausibility of each model and choose which lines of evidence best fit with each model.

Read Through the Models

- **Model A:** When people interpret fossils, they often make mistakes. It is misleading to make conclusions about how Earth's surface has changed from fossils.

- **Model B:** Many organisms' fossils are missing from the fossil record. We cannot make any conclusions about Earth's past environments from fossils.

- **Model C:** Fossils provide evidence for Earth's changing surface. Understanding past life forms tells us about past environments.

Prepare

- **Read** the three models.
  - They each provide explanations for a specific scientific phenomenon.

- **Discuss** with partners and eventually as a class to clarify each model.

- **Construct** with your groupmates an argument statement in support of each model to check for understanding.
  - [ex. *How would one argue if they supported Model A?*]

Plausibility Ratings

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

Plausibility Ratings

Discuss: What are some factors that you considered when determining the plausibility of the models?

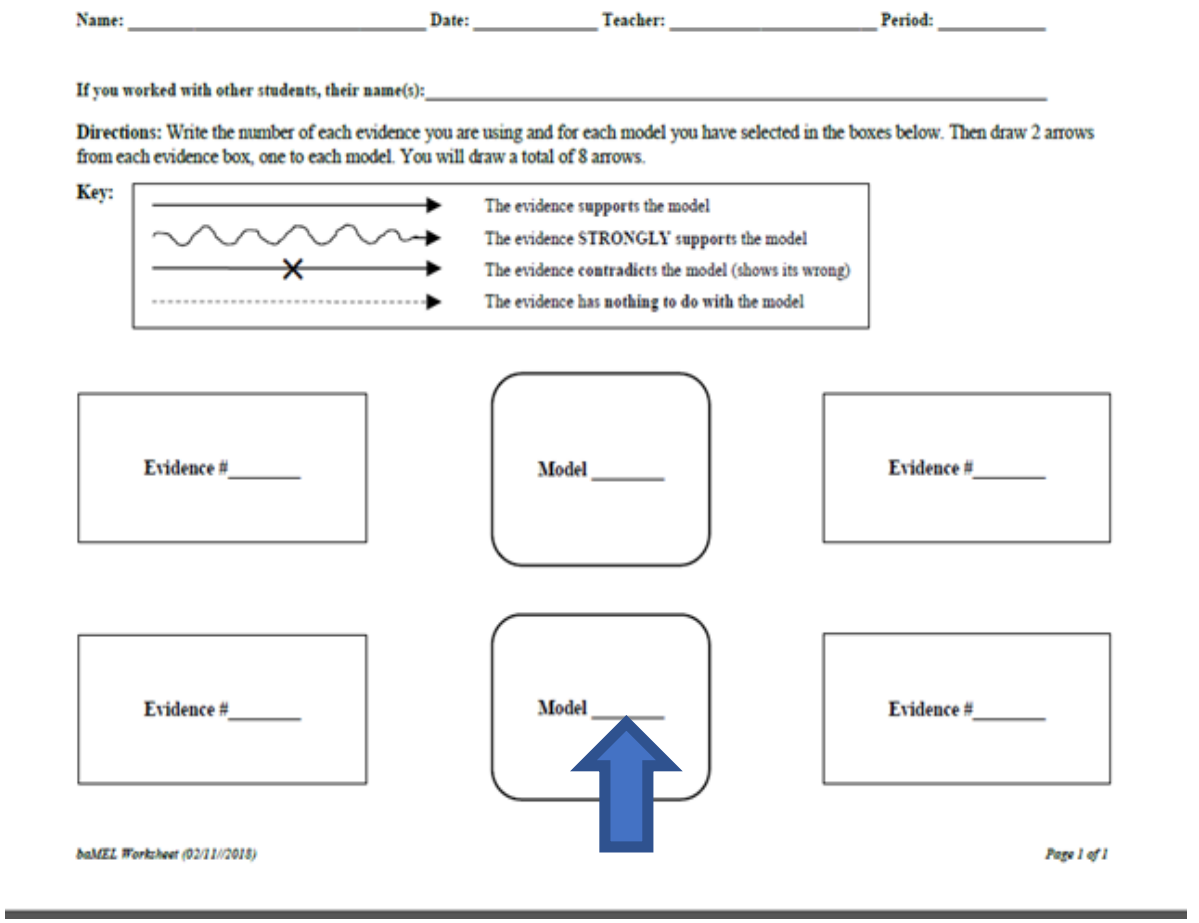
Model Selection

In your work group:

Choose **two** of the three models to use in the MEL activity.

Place the model card on your worksheet. It will be helpful if you put them on the sheet in alphabetical order, from top to bottom.

Write the model letter on the line.



Name: _____ Date: _____ Teacher: _____ Period: _____

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

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

Evidence #_____ | Model _____ | Evidence #_____

Evidence #_____ | Model _____ | Evidence #_____

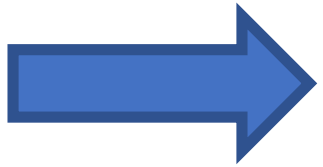
baMEL Worksheet (02/11//2018) *Page 1 of 1*

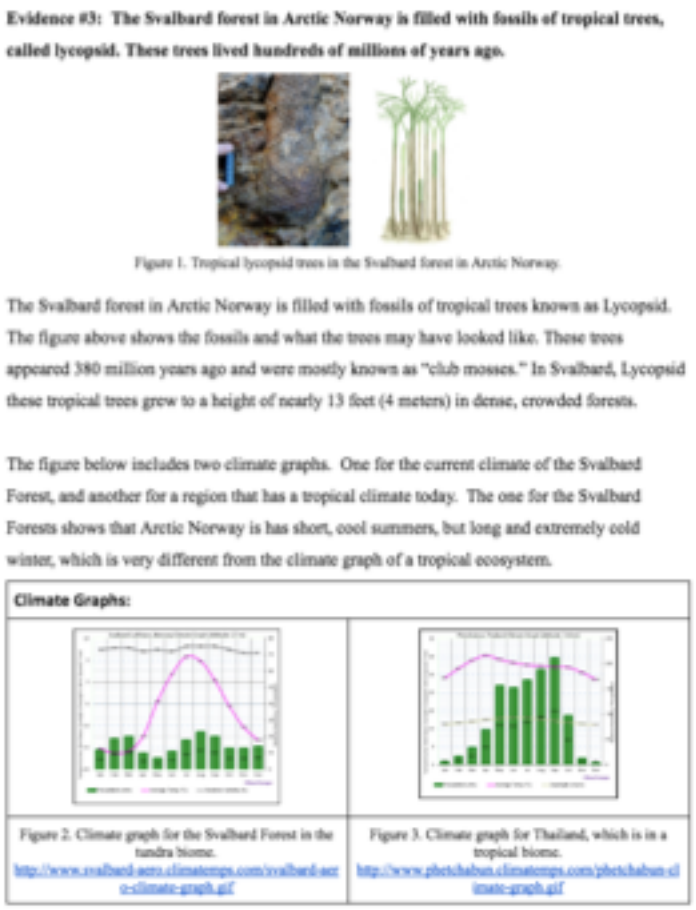
Model Selection

- Which models did you choose?
  - A vs B
  - A vs C
  - B vs C
- Why did you choose those two models?
- Why did you exclude the one that you did?

Evidence Selection

- Take some time to read and go through each of the one-page evidence texts.





Evidence #3: The Svalbard forest in Arctic Norway is filled with fossils of tropical trees, called lycopsid. These trees lived hundreds of millions of years ago.

Figure 1. Tropical lycopsid trees in the Svalbard forest in Arctic Norway.

The Svalbard forest in Arctic Norway is filled with fossils of tropical trees known as Lycopsid. The figure above shows the fossils and what the trees may have looked like. These trees appeared 380 million years ago and were mostly known as "club mosses." In Svalbard, Lycopsid these tropical trees grew to a height of nearly 13 feet (4 meters) in dense, crowded forests.

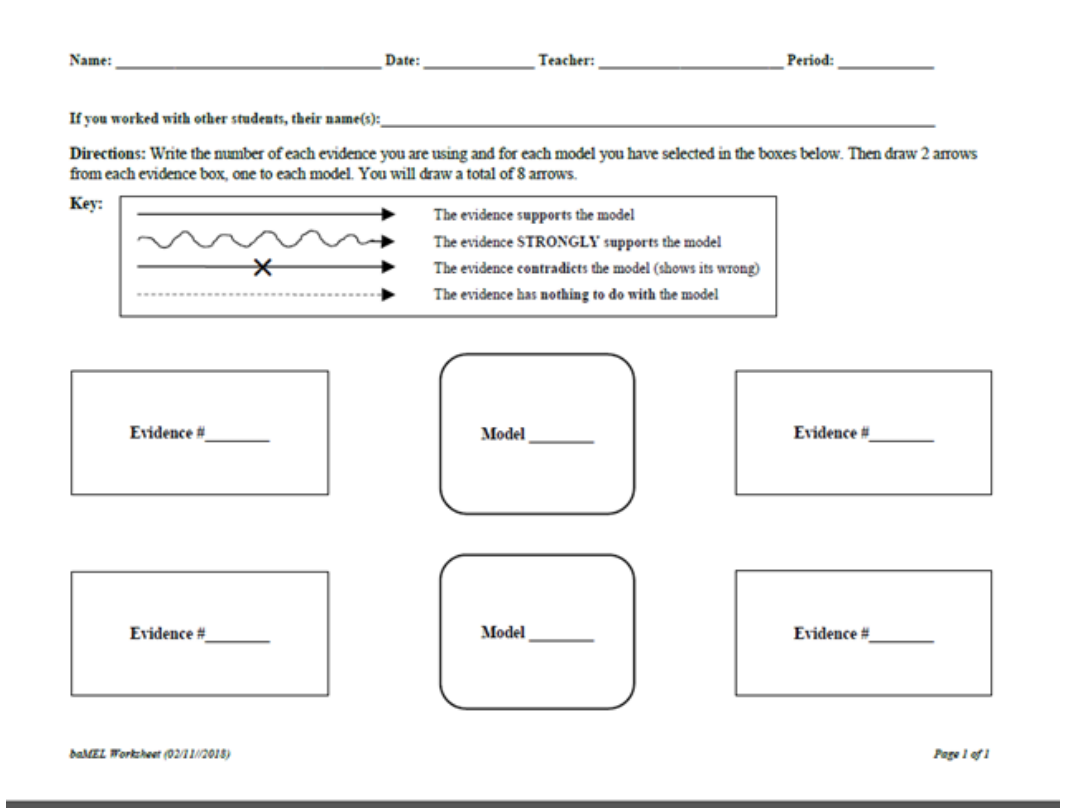
The figure below includes two climate graphs. One for the current climate of the Svalbard Forest, and another for a region that has a tropical climate today. The one for the Svalbard Forests shows that Arctic Norway is has short, cool summers, but long and extremely cold winter, which is very different from the climate graph of a tropical ecosystem.

Climate Graphs:

Figure 2. Climate graph for the Svalbard Forest in the tundra biome.
http://www.svalbard-aero.climatemps.com/svalbard-aero-climate-graph.gif

Figure 3. Climate graph for Thailand, which is in a tropical biome.
http://www.phetchabun.climatemps.com/phetchabun-climate-graph.gif

Evidence Selection



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- The evidence STRONGLY supports the model
- The evidence contradicts the model (shows its wrong)
- The evidence has nothing to do with the model

Evidence #_____ | Model _____ | Evidence #_____

Evidence #_____ | Model _____ | Evidence #_____

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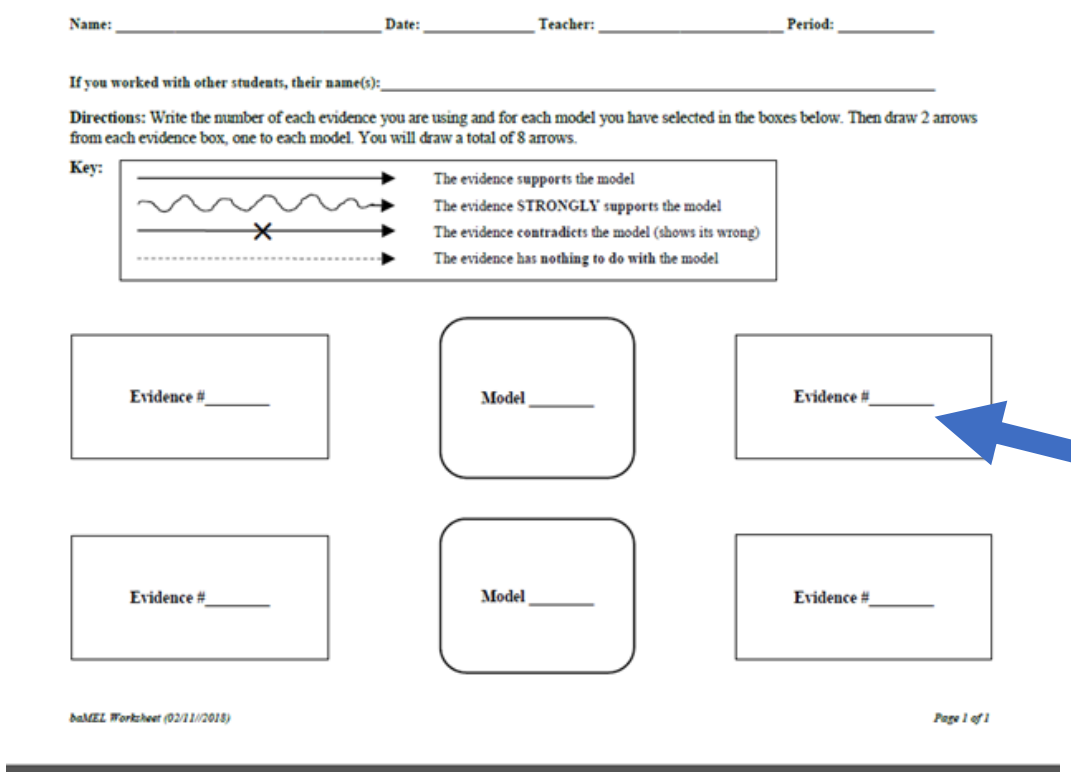
- Go through and carefully read each of the 8 lines of evidence cards. Think about each question as you read:
- Does the evidence support the model(s)?
- Does the evidence *strongly* support the model(s)?
- Does the evidence contradict the model(s)?
- Does the evidence have nothing to do with the model(s)?
- You may manipulate the evidence cards as many times as you like.

Evidence Selection



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Evidence #_____ | Model _____ | Evidence #_____

Evidence #_____ | Model _____ | Evidence #_____

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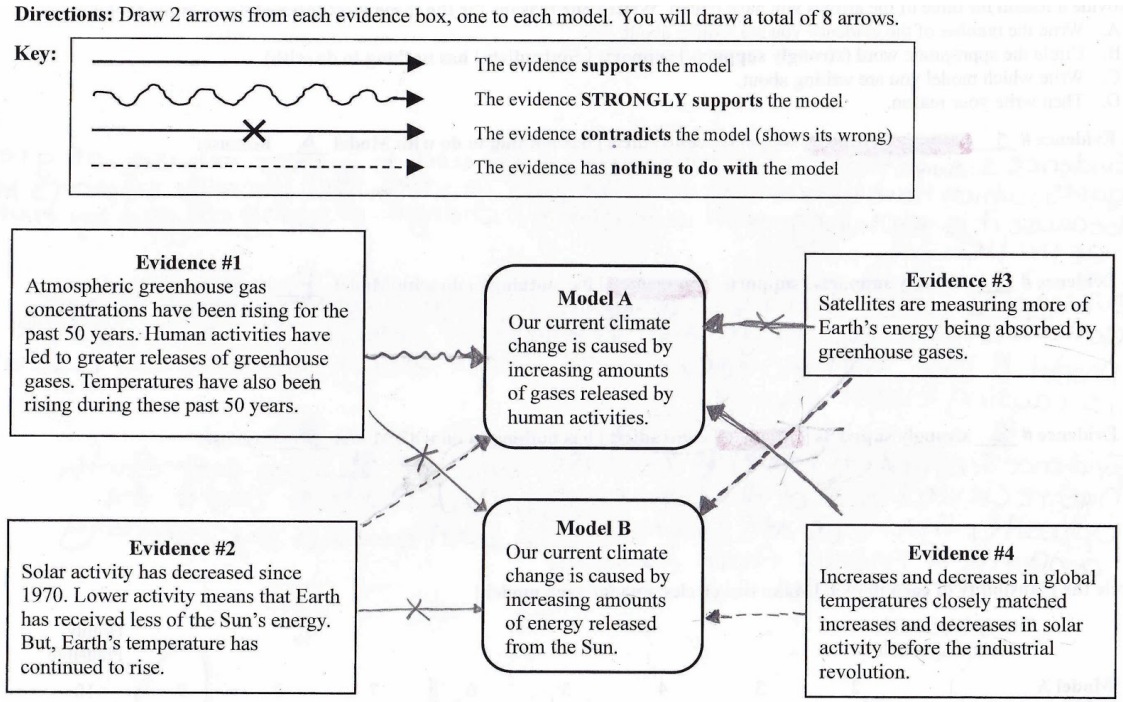
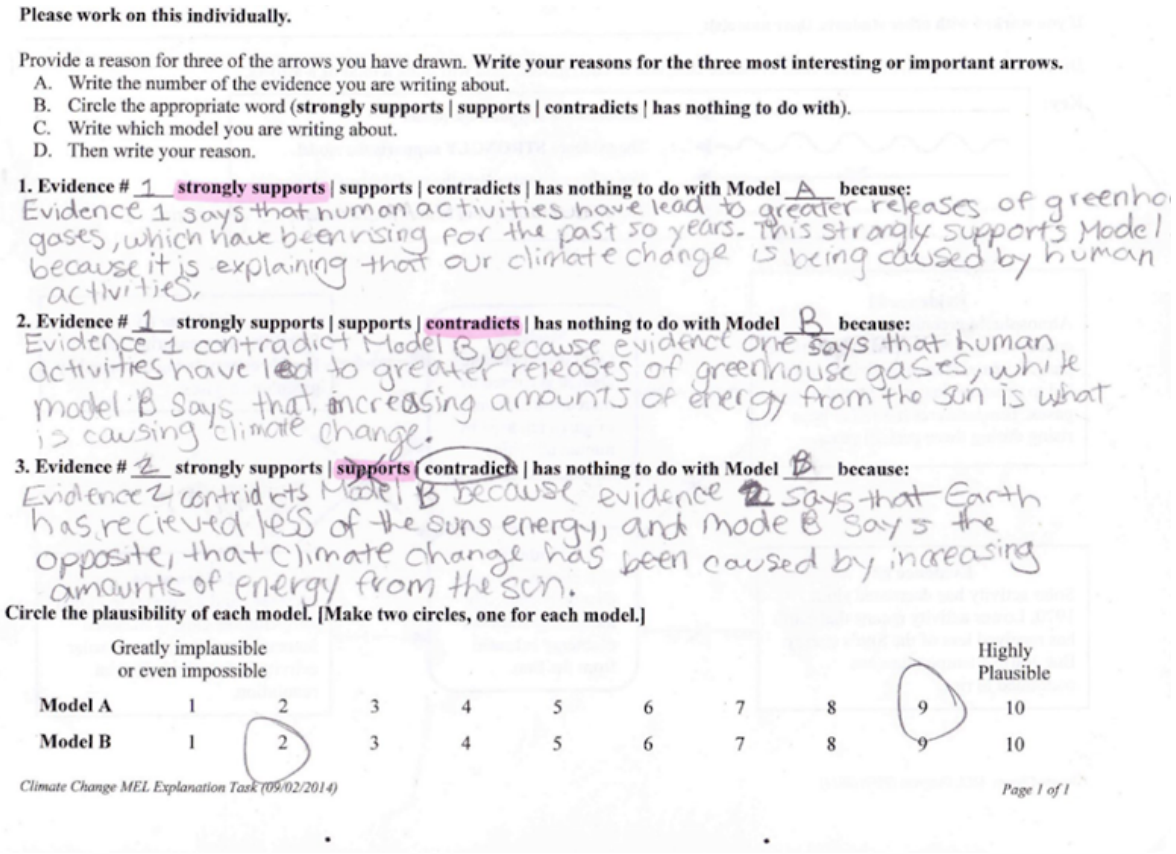
- At the end of this phase you must have chosen **4** lines of evidence total.
- Place your final evidence cards on your worksheet in numerical order, then write the evidence letter on the line.

MEL Construction



- Draw 2 arrows from each evidence box, one to each model (totaling 8 arrows)
- Use the key to determine which type of arrow to draw to show how each evidence relates to the model.

Explanation Worksheet



Please work on this individually.

Provide a reason for three of the arrows you have drawn. **Write your reasons for the three most interesting or important arrows.**

A. Write the number of the evidence you are writing about.
B. Circle the appropriate word (**strongly supports | supports | contradicts | has nothing to do with**).
C. Write which model you are writing about.
D. Then write your reason.

1. Evidence # 1 **strongly supports | supports | contradicts | has nothing to do with Model** A **because:**
Evidence 1 says that human activities have lead to greater releases of greenho gases, which have been rising for the past 50 years. This strongly supports Model because it is explaining that our climate change is being caused by human activities.

2. Evidence # 1 **strongly supports | supports | contradicts | has nothing to do with Model** B **because:**
Evidence 1 contradict Model B because evidence one says that human activities have lead to greater releases of greenhouse gases, while model B says that increasing amounts of energy from the sun is what is causing climate change.

3. Evidence # 2 **strongly supports | supports | contradicts | has nothing to do with Model** B **because:**
Evidence 2 contridicts Model B because evidence 2 says that Earth has recieved less of the suns energy, and mode B says the opposite, that climate change has been caused by increasing amounts of energy from the sun.

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

	Greatly implausible or even impossible									Highly Plausible
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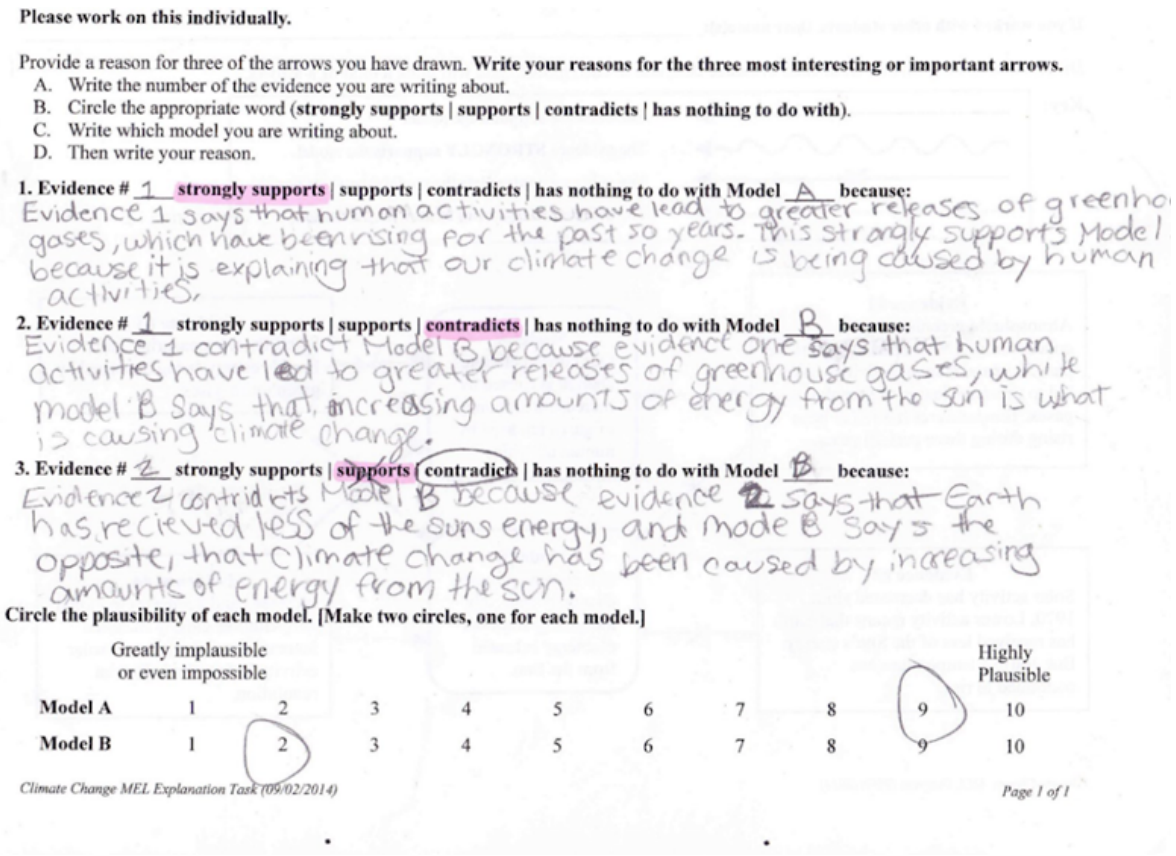
Climate Change MEL Explanation Task (09/02/2014) *Page 1 of 1*

- The final task is for you to individually choose two links you drew that you found to be most compelling, as well as discuss the plausibility of the models one last time. Select the two most interesting or important arrows that you feel are the best ones.
- Justify your thinking for choosing the links between the evidence and model in the space provided on the sheet. Explain thoroughly.
- After completing these explanations, re-score your plausibility ratings based on what you learned while doing the MEL.

Explanation Worksheet



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Climate Change MEL Explanation Task (09/02/2014) *Page 1 of 1*

- Which evidences were most compelling for you? Why?
- Did your plausibility scores change? What about the those for the model you did not select?
- How do you think differently about the topics surrounding fossils?

ACKNOWLEDGEMENTS

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