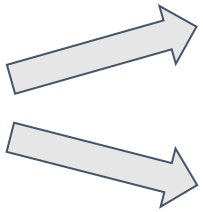
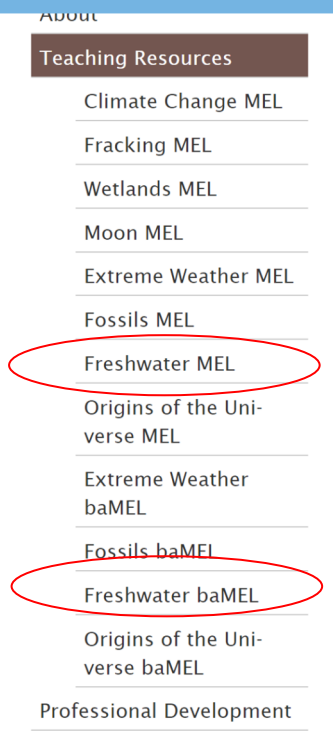
Freshwater baMEL

Remember: You can get these here

Take note





The MEL project has developed a set of teaching resources to support the teac
science topics. Previously developed MEL teaching resources include those for cl
the formation of the moon. Current baMEL teaching resources include extreme w
origins of the universe. All materials are freely available under a Creative Commo
may reuse these materials for non-commercial purposes as long as you provide a
license. Credit the Science Learning Research Group, University of Maryland, for t

MEL Teaching Resources

- Climate Change
- Earthquakes and Fracking
- Wetlands Use
- Formation of the Moon
- Extreme Weather
- Fossils
- Freshwater
- Origins of the Universe

https://serc.carleton.edu/mel/teaching_resources/index.html

baMEL Teaching Resources

- Extreme Weather baMEL
- Fossils baMEL
- Freshwater baMEL
- Origins of the Universe baMEL

THE MEL PROJECT

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: Earth's freshwater is abundant and will remain so even in the face of global climate change.**

- **Model B: Earth's freshwater challenges will be solved by engineering solutions.**

- **Model C: Earth has a shortage of freshwater, which will worsen as our world's population increases.**

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.]

Again, keep track of your rating for now as you may want them later.

	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

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

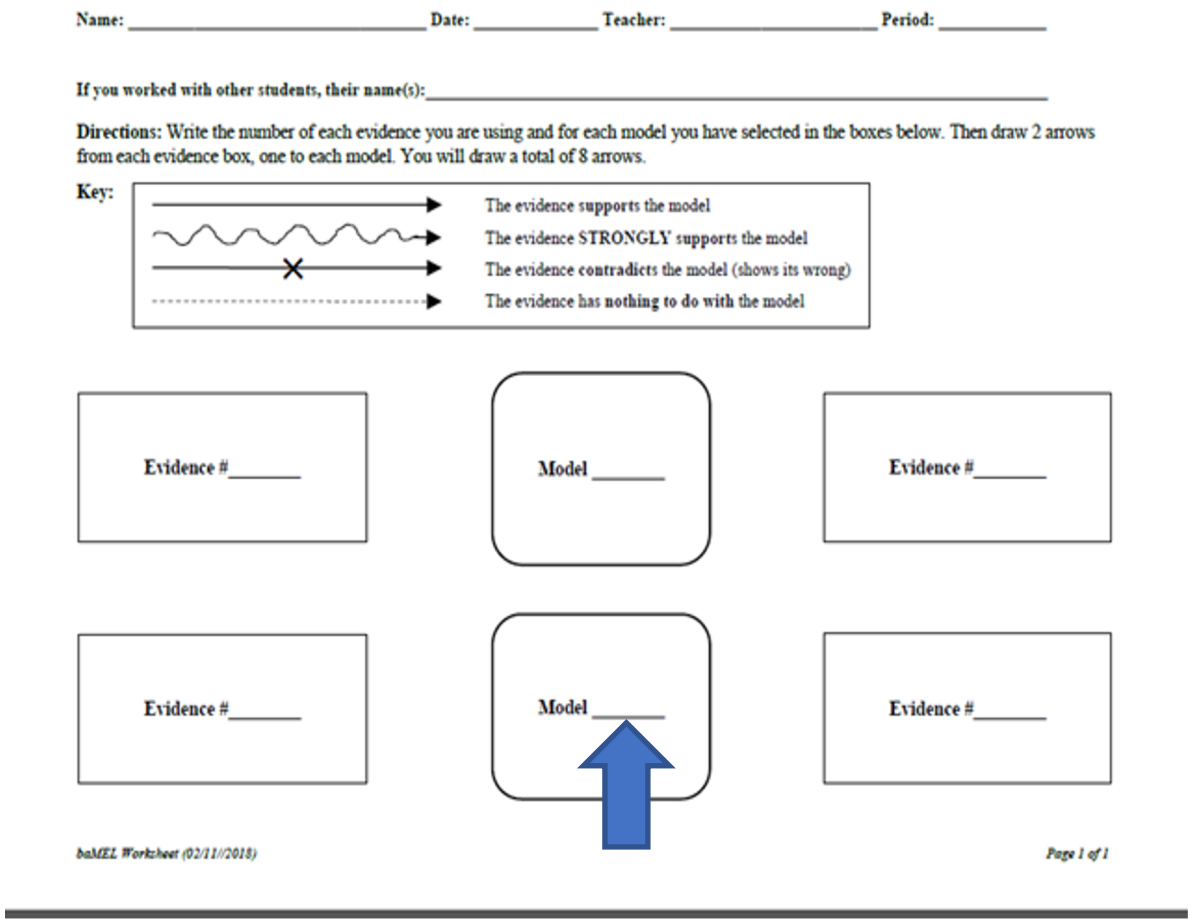
Model Selection (5 minutes)

In your work group:

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

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

For pencil and paper, 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 #5: Advances in engineering have led to better access to quality drinking water. At the same time life expectancy and quality of life have improved.

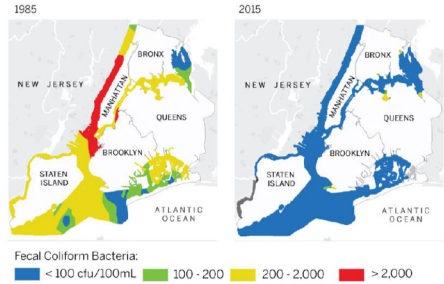


Figure 1. Changes in fecal coliform counts over time. Credit: Wright Seneres.

Figure 1 above shows data from New York City. It shows how water quality has improved from 1985 to 2015. During that time, New York City spent about $10 billion to improve the water quality. Fecal coliforms are bacteria that make the water quality worse. The figure shows how fecal coliforms have decreased over this 30-year interval.

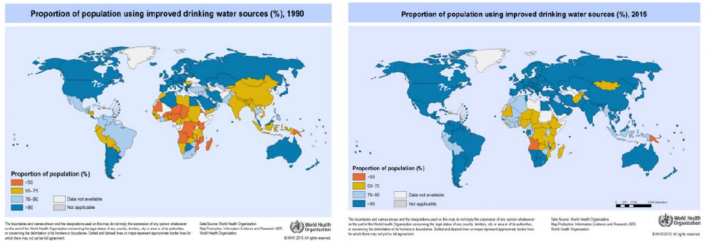
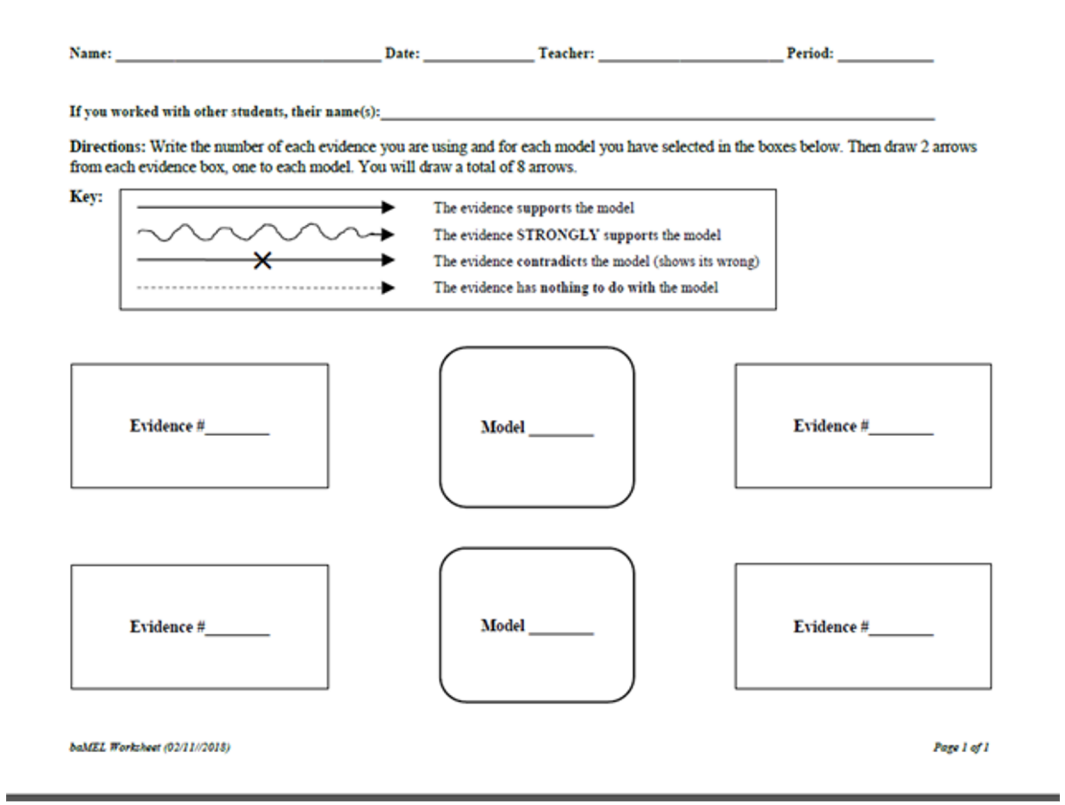


Figure 2. Proportion of population using improved drinking water sources in 1990 (left) and 2015 (right) ()

The quality of water has increased around the world. Figure 2 shows how the proportions of the world's population have more and better access to drinking water. Dark blue shaded areas show where 90% of the people have access to improved drinking water.

Evidence Selection



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- The evidence has nothing to do with the model

Evidence #_____ | Model _____ | Evidence #_____

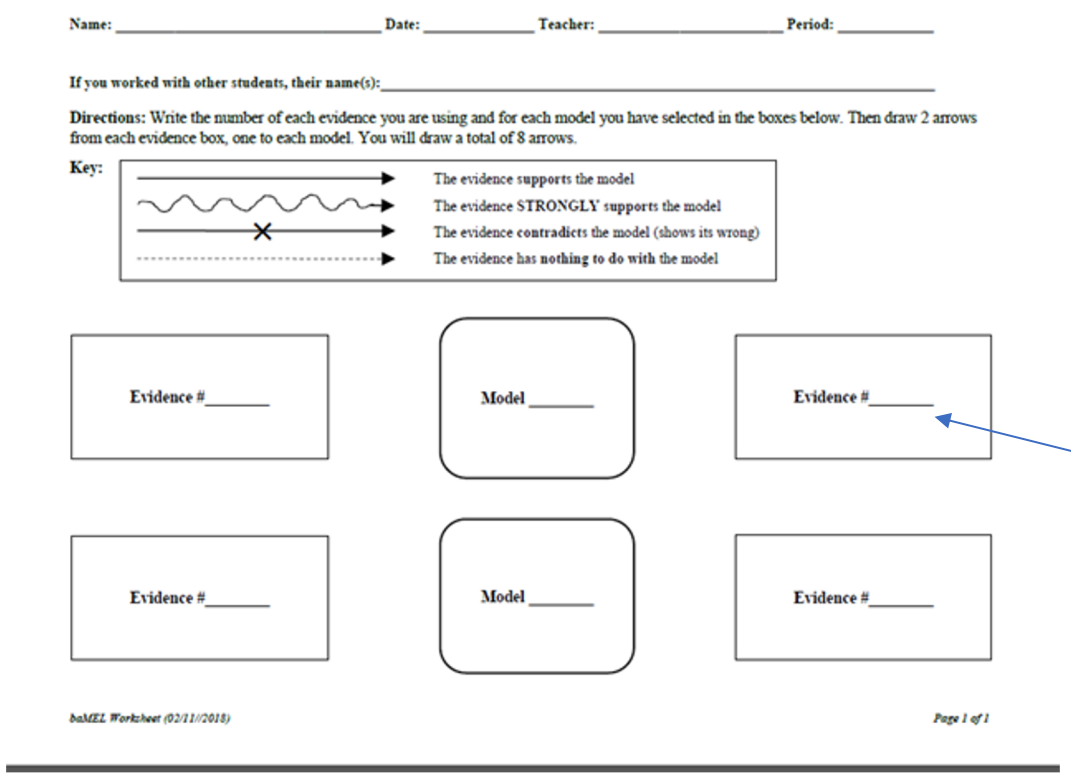
Evidence #_____ | Model _____ | Evidence #_____

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

- 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)?

THE MEL PROJECT

Evidence Selection



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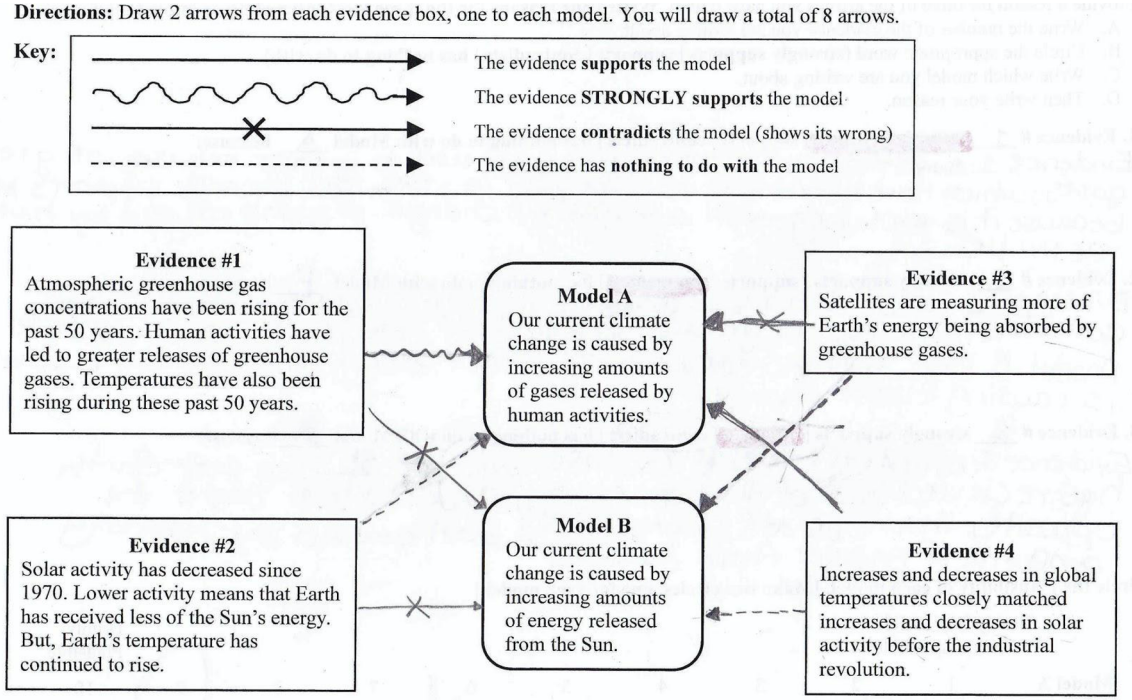
Evidence #_____ | Model _____ | Evidence #_____

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

- 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. (for the paper activity)

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

Name_____**Date**_____**Teacher**_____**Period**_____ **Topic**_____

1. Compare and contrast two (or three) models.

2. Please work on this part <u>individually</u> after you complete your diagram. 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

What were your previous ratings? Model A: _____ Model B: _____ Model C (if there is one): _____

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

4. 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 # ____ strongly supports | supports | contradicts | has nothing to do with Model _____ because:

Evidence # ____ strongly supports | supports | contradicts | has nothing to do with Model _____ because:

5. In your final ranking, did you rank either Model as "1" or "10?" Yes or No [Circle One] Why? Why not?

- Re-rate your plausibility for each model.
- Choose the link you drew that you found to be most compelling
- Justify your thinking for choosing the link between the evidence and model in the space provided on the sheet. Explain thoroughly.

Explanation Worksheet

Name_____Date_____Teacher_____Period_____ Topic_____

1. Compare and contrast two (or three) models.

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5. In your final ranking, did you rank either Model as "1" or "10?" Yes or No [Circle One] Why? Why not?

- 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 freshwater resources?

THE MEL PROJECT

ACKNOWLEDGEMENTS

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