The LR & MEL Teacher Guides

Directions and Hints

The MEL Project Teacher Guide 2.0

This is a guide, but it is also a work in progress with updates coming…

Latest versions will be found at:

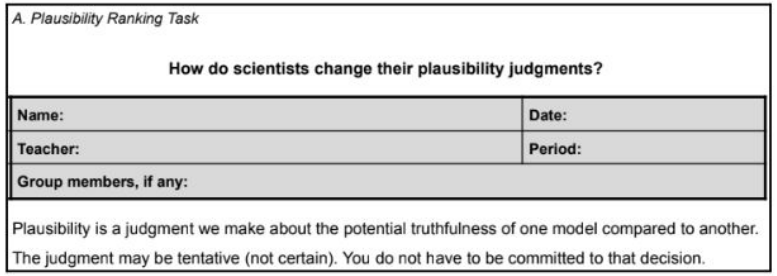
https://d32ogoqmya1dw8.cloudfront.net/files/mel/teaching_resources/mel_project_teacher_guide.v2.pdf

New Mini Guide!

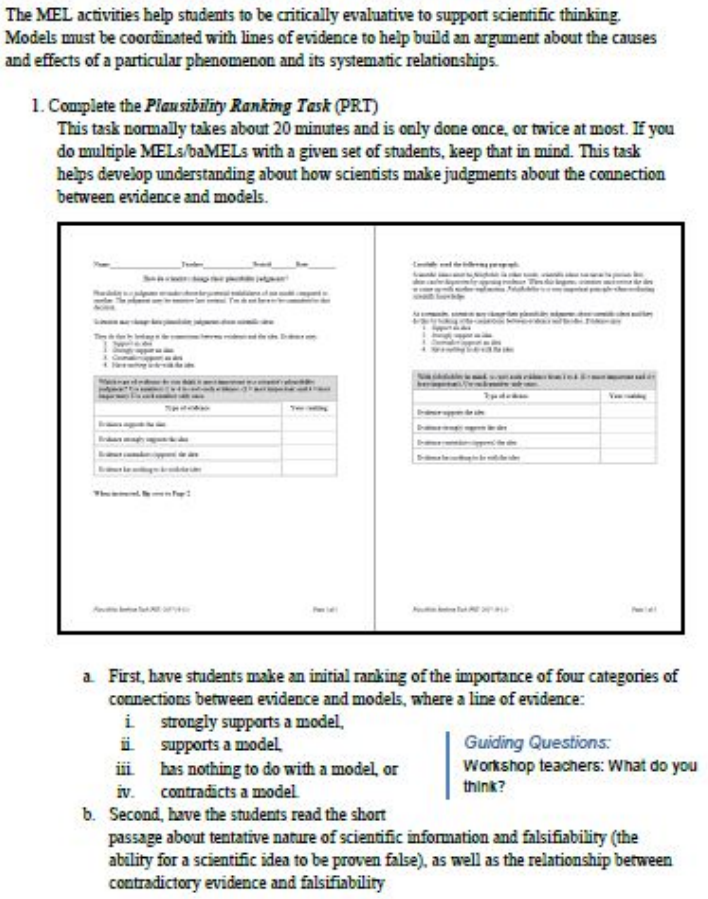
MEL Mini Teacher's Guide

(Non-Research Teachers)

Purpose: Use this mini teacher's guide to support the implementation of pcMEL and baMEL instructional scaffolds in your classes. Refer to the full Teacher's Guide for extensive details for each implementation step.

Step	Teacher's Guide pages	Description
1	4, 11, 19, 27	Administer and discuss the Plausibility Ranking Task content. Collect.  *A. Plausibility Ranking Task* **How do scientists change their plausibility judgments?** **Name:** **Date:** **Teacher:** **Period:** **Group members, if any:** Plausibility is a judgment we make about the potential truthfulness of one model compared to another. The judgment may be tentative (not certain). You do not have to be committed to that decision.
		Administer the Model Plausibility Ranking Task. Students read, discuss, then rank. Students may need to refer to their rankings later in the MEL activity.

Section 1: Plausibility Ranking Task



The MEL activities help students to be critically evaluative to support scientific thinking. Models must be coordinated with lines of evidence to help build an argument about the causes and effects of a particular phenomenon and its systematic relationships.

1. Complete the ***Plausibility Ranking Task*** (PRT)
   This task normally takes about 20 minutes and is only done once, or twice at most. If you do multiple MELs/baMELs with a given set of students, keep that in mind. This task helps develop understanding about how scientists make judgments about the connection between evidence and models.

   a. First, have students make an initial ranking of the importance of four categories of connections between evidence and models, where a line of evidence:
      i. strongly supports a model,
      ii. supports a model,
      iii. has nothing to do with a model, or
      iv. contradicts a model.

   Guiding Questions:
   Workshop teachers: What do you think?

   b. Second, have the students read the short passage about tentative nature of scientific information and falsifiability (the ability for a scientific idea to be proven false), as well as the relationship between contradictory evidence and falsifiability

1

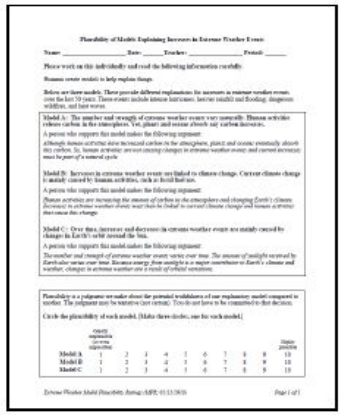
- You've heard us talk about it, now it's your turn.
- How do you talk about to your students about plausibility? Falsifiability?
- How do they talk about them?
- How are these topics articulated through your school's curriculum?
- How would you guide your students though this exercise?

Section 2: Model Plausibility Ratings

c. Third, conduct a short, whole class discussion with the students about the falsifiability passage.
d. Fourth, then have the students re-rank the importance of the categories.

2. Rate the plausibility of the three baMEL models using ***Model Plausibility Ratings*** (MPR) sheet

Completing this sheet takes about 10 minutes and introduces students to the models they will be considering for the baMEL and re-introduces students to idea of plausibility judgements. This should be done as the first activity for each baMEL



1. Guiding Questions
Workshop Teachers: What do you think?

e. Students individually read about the three models and plausibility
f. Hold a class discussion to answer questions about the model and plausibility

2

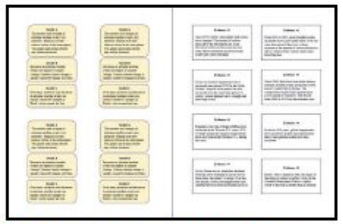
g. Have the students rate the plausibility of each model...make sure the draw a circle around one number for each model (there should be three circles)

2. Topic Hint: Origins of the Universe
The distinction between models A and C is subtle. Encourage students to look at the differences in vocabulary.

3. Use the ***baMEL*** lines of evidence and three models to construct a ***MEL diagram.***
This is a completely new activity and the essence of the new build-a-MEL (baMEL). We don't know how long this will take, but thinking that this, along with the MPR (see above) will take one traditional class period (~50 minutes). The students should have the opportunity to consider and discuss all the different models and lines of evidence when making their selections.

h. Give students the model cards and the evidence cards (these should be pre-cut prior to using). Have students lay these out. You may with to laminate the cards as they are intended for reuse.

3. Accommodation Hint:
Laminated cards can be annotated with dry erase markers by students with language difficulties.



i. Students should select 4 lines of evidence and 2 models from the set from which they will construct a MEL diagram.
j. To help them in their selection of lines of evidence, they should read the one-page evidence texts. An example of one of the evidence texts is below:

4. Teacher Hint
Have the students place unused evidence texts to the side, face down, to make collection easier at the end of the activity.

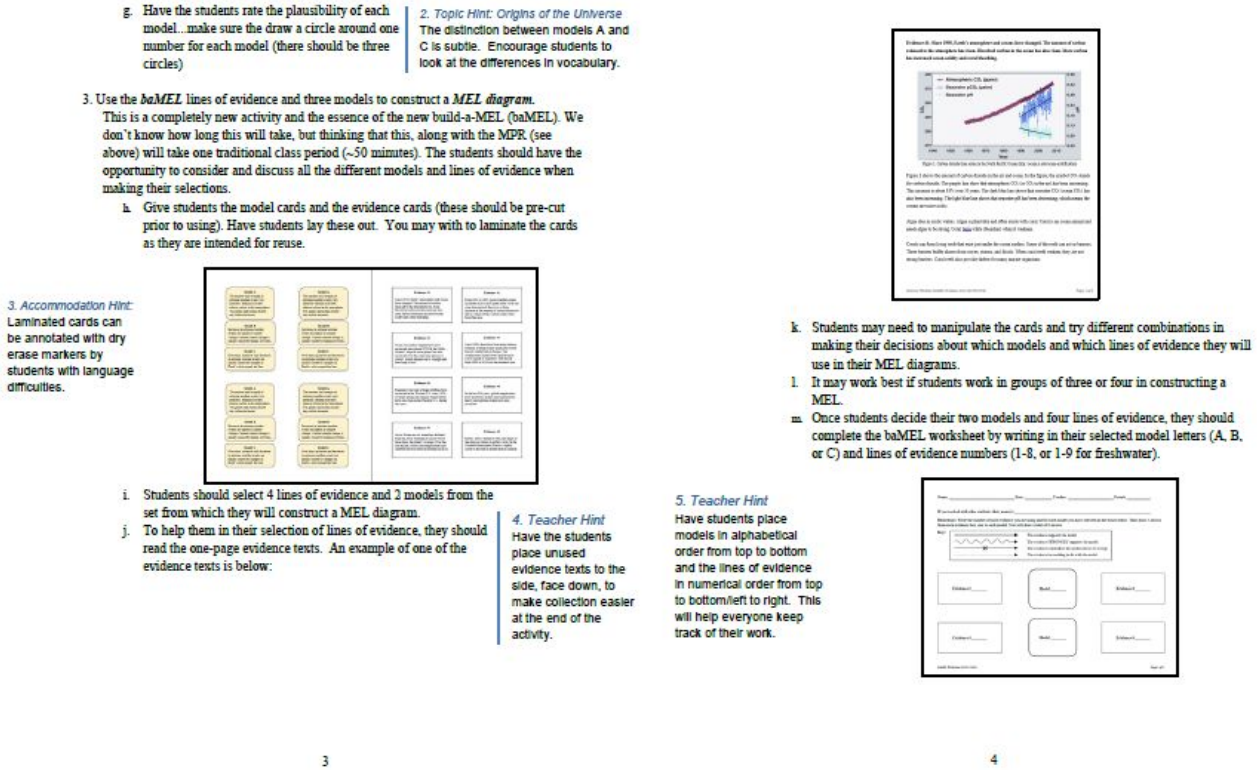
3

- Things to watch out for:
  - All the same number
  - All choices adding to 10
- Some of the models have subtle language differences
- Hands up surveys
- Input from you

Section 3: Constructing a MEL/baMEL Diagram

Particularly for the baMEL
Different ways to do this….

- Choose models and evidences
  - There is a fine line here. We want to properly scaffold them, but we don't want to direct students too much.
  - Are there other things we can do to help kids with accommodations?



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k. Students may need to manipulate the cards and try different combinations in making their decisions about which models and which lines of evidence they will use in their MEL diagrams.

l. It may work best if students work in groups of three or four in constructing a MEL.

m. Once students decide their two models and four lines of evidence, they should complete the baMEL worksheet by writing in their selected model letters (A, B, or C) and lines of evidence numbers (1-8, or 1-9 for freshwater).

5. Teacher Hint
Have students place models in alphabetical order from top to bottom and the lines of evidence in numerical order from top to bottom/left to right. This will help everyone keep track of their work.

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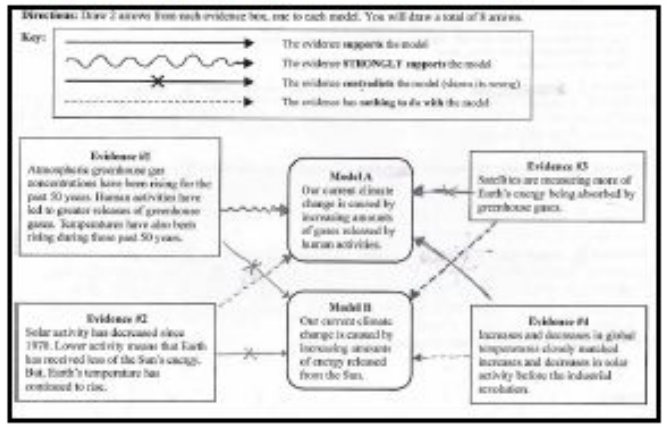
Section 4: Constructing a MEL/baMEl Diagram

Encourage students to be active participants in group discussion.

- Active does not necessarily mean talking.
- Taking notes would be helpful for when they move on to the explanation task.
- Of course, it helps us.

What else can we do to help them, but not too much?

4. Now students are ready to complete their own ***MEL diagram***.
Along with completing the Explanation Task (see below for a student example from the Climate Change pre-constructed MEL), drawing arrows on the MEL diagram and discussing arrows in groups takes just under 1 traditional class period (~30-40 minutes).



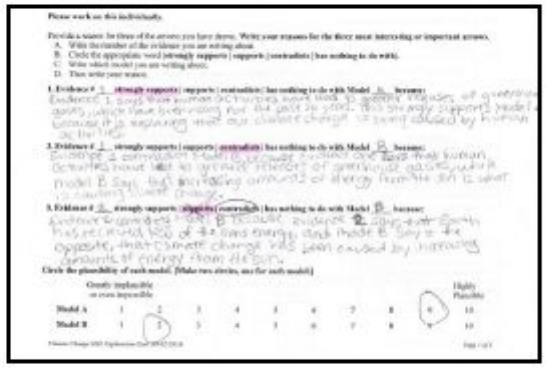
To do so:

a. Students draw arrows in different shapes to indicate their judgments (which correspond to the four categories in the ranking task) about the strength of the connection between each line of evidence and a model.
b. Straight arrows indicate that evidence supports the model; squiggly arrows indicate that evidence strongly supports the model; straight arrows with an "X" through the middle indicate the evidence contradicts the model; and dashed arrows indicate the evidence has nothing to do with the model.
c. Have students work in teams to discuss the types of connections made between the evidence and models; however, students should be told that if their thoughts lie with an arrow type that's different from their teammates, that they should not change it.

Section 5: The Explanation Task

5. Students next use completed MEL diagrams in an ***Explanation Task*** to critically evaluate their links and construct understanding. This task asks students to select and write about evidence-to-model links that they had made on their MEL diagram.

6. Conversation Tip
Students may ask which is "scientifically correct" model. Remind them that they have pieces of evidence to help them form their own ideas about that.



a. In their written explanations, students identify each end of the link, with an evidence statement (which are numbered) at one end and the model (either Model A or B) at the other.
b. Students write their judgment about the strength of the link (i.e., the evidence strongly supports the model, the evidence supports the model, the evidence has nothing to do with the model, or the evidence contradicts the model).
c. Students then provide a justification for their weighting of link strength.

- Remind students to be as thorough as possible
  - Even college students aren't!
- Ask why they chose "nothing to do with", if they did.
- There are different numbers of responses for different MEL's.
- Have them re-rate all three models, even the one they didn't do.

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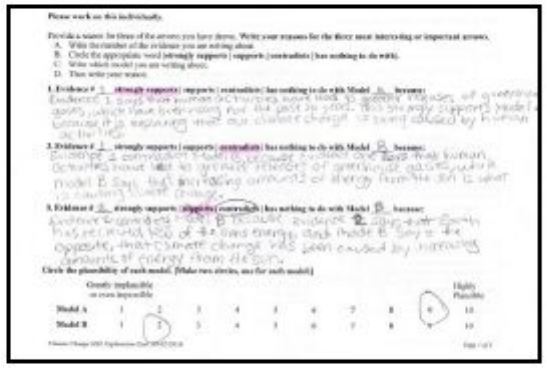

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LR Teacher Guide

https://tinyurl.com/LRteacher

Before you Teach: Select a Lesson Plan

Table 1: Select a Lesson Plan

Each link will direct you to a pop-up that prompts you to create your own, editable copy of the document.

Lesson #	Link to Lesson Materials	Focus of Lesson
Lesson 1	• Lesson plan/slides • Guiding questions	Describe what it means for a source to be "credible" Practice evaluating the expertise and trustworthiness of websites to decide how credible they are.
Lesson 2	• Lesson plan/slides • Guiding questions	Describe "lateral reading" and why it is called that. Practice reading laterally to evaluate an unfamiliar website.
Lesson 3	• Lesson plan/slides • Guiding questions	Describe unhelpful strategies for evaluating online information and why they don't work as well as lateral reading. Practice reading laterally to evaluate unfamiliar websites.
Lesson 4	• Lesson plan/slides • Guiding questions	Describe credible resources to consult while reading laterally. Practice reading laterally to evaluate unfamiliar websites.
Lesson 5	• Lesson plan/slides • Guiding questions	Review lateral reading approaches and resources from prior lessons. Practice reading laterally to evaluate unfamiliar websites.

Before you Teach:
Select a Topic Focus & Websites to Evaluate

Table 2: Selecting Websites to Evaluate in the Lesson

MEL Topic & Resources to Learn More About this Topic	Line of Evidence in MEL	Source A	Source B	Source C
Wetlands **Resource:** Why We Must Protect Wetlands	Evidence #3- Wetlands contribute 70 percent of global atmospheric methane from natural sources	https://www.metoffice.gov.uk/research/approach/collaboration/wcssp/insights/brazil_methane The Met Office is the UK's national weather service provider. They provide predictions at shorter (e.g., daily weather) and longer term (e.g., climate change) scales.	https://www.beefmagazine.com/commentary/climate-science-really-real-depends-whos-behind-it *Beef* is a special-interest magazine covering the international cattle industry, written to a target audience of cattle farmers and other internal business stakeholders. Published by Informa PLC, a large British publishing business.	https://www.zurich.com/en/media/magazine/2022/is-there-more-to-methane-than-cow-farts Founded in Switzerland in 1872, Zurich Insurance Group provides insurance services in Switzerland and around the world.
Extreme Weather **Resource:** Is the weather actually becoming more extreme?	Evidence #2- Frequency & size of large wildfires graph	https://www.climatecentral.org/news/2015-wildfire-season-sets-ominous-record-19879 Climate Central is a non-profit research and news reporting website specializing in climate science, especially as it relates to anthropogenic climate change. Climate	https://climateataglance.com/climate-at-a-glance-u-s-wildfires/ Climate at a Glance is a website that publishes original research and reporting that disputes the scientific consensus on anthropogenic climate	https://www.npolar.no/en/themes/climate-change-in-the-arctic/ The Norsk Polarinstitutt, or Norwegian Polar Institute, is Norway's national institution for research and environmental monitoring in the Antarctic and Arctic

Topics:

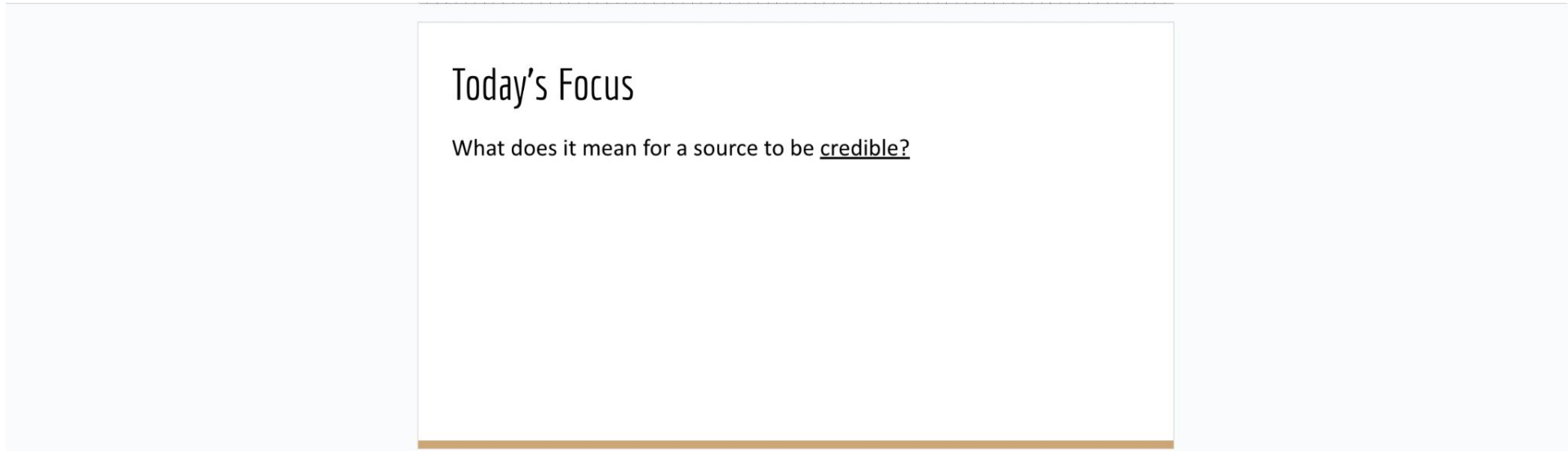
Wetlands
Extreme Weather
Fracking
Freshwater
Climate change
Eutrophication
Food Security
Moon Formation
Fossils

Before you Teach:
Copy/modify lesson slides & guiding questions

During the Lesson: Consistent lesson flow

1. Lesson introduction and focus
2. Teacher-led modeling or short lecture
3. Students practice reading laterally in small groups
4. Whole-class discussion about credibility of source(s)
5. Closure

During the Lesson:
Use “Teacher Notes” as a lesson plan



Teacher Notes:

- Tell students that we’re going to focus today and in future lessons on how to evaluate online sources. One of the most important question to ask about online information is, Is this coming from a credible source?
- Before we discuss how to investigate that question online, we need to understand what it takes for something to be *credible*.
- *Credible* means worth being believed or paid attention to. But what does it take for us to believe or pay attention to someone?

After the Lesson:

- Evaluate students' graphic organizers to gauge their progress & plan for the next lateral reading lesson
- Encourage students to practice lateral reading in other parts of your class and their lives outside your class!

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