CLAMAS
EVIDENCE
REASONING

Grades 6-8

JODI WHEELER-TOPPEN, PH.D.
OnceUponAScienceBook.com
INTRODUCTIONS

• What is your name?
• What do you teach?
• What are you passionate about in your teaching?
WE ARE IN THE MIDDLE OF A SIGNIFICANT CHANGE IN THE WORLD.

It is no longer enough for our students to just learn the facts and vocabulary of science.
Our students need to be able to draw from their prior experiences, texts, conversations, labs, lecture, media, and video evaluate those sources and assemble the information into an understanding of the topic that they can use to solve problems in the world.
THEY NEED TIME AND SPACE TO **TALK** AND **WRITE** ABOUT WHAT THEY ARE FIGURING OUT.
IT MUST BE NORMAL (NOT JUST OK) TO BE WRONG.

(Teachers, too.)
ONE TOOL: CLAIMS—EVIDENCE—REASONING

Did you have a great weekend? (your claim)

What made it a great weekend? (your evidence)

What does it mean to have a great weekend? (your reasoning)
Is there something solid under the cardboard sheet? If so what shape is it?

[Rutherford’s Atom Simulation]

There is something under there because some of the marbles bounced back. They would go through if there was nothing there. I think it’s square because they came straight back on all sides and we had a square shaped blank spot on our lab sheet.

[Note: an explanation of how marbles bounce against different shapes would complete the reasoning here.]

Green = Claim;  Yellow = Evidence;  Red = Reasoning
CHEMISTRY EXAMPLE

Is there something solid under the cardboard sheet? If so what shape is it? [Rutherford’s Atom Simulation]

There is something under there because some of the marbles bounced back. They would go through if there was nothing there. I think it’s square because they came straight back on all sides and we had a square shaped blank spot on our lab sheet.

[Note: an explanation of how marbles bounce against different shapes would complete the reasoning here.]
STICKY TAPE LAB
LET’S LOOK AT THE MOLECULAR LEVEL.
LET’S TAKE THIS A STEP FURTHER.

Rubber balloons pick up electrons very easily (and thus become negative). Inflate a balloon and rub it vigorously in your hair or on carpet. Use the balloon to determine the charge on Tape D.

• Make a Claim: What is the charge on Tape D and what must have happened at the molecular level to make that charge?
GALLERY WALK

One group member should stand by your paper to answer questions. All others should move around the room and read each response.

• Look for ways you can improve your group’s response.

• Ask questions of other groups.
  • Is something confusing you in their written answer?
  • Did they conduct their test in a logical way?
  • If they make a different claim, try to figure out why.

• If you stay with your paper, listen for suggestions to improve your group’s work.

More instructions for using a gallery walk (and lots of great information on CER) can be found in the Argument Driven Inquiry Books (http://www.nsta.org/publications/press/argument.aspx)
REVISE YOUR RESPONSE WITH YOUR GROUP

• (May wish to have students write individual responses at this point.)
3 KINDS OF SCAFFOLDING FOR CER QUESTIONS

- Simply give them 3 separate spaces to fill in.
- Provide specific information for each part of the answer:
  - Claim: Tell if the tape is positive or negative. What must have happened on the molecular level to give it that charge?
  - Evidence: What did you do to test for charge and what was the result?
  - Reasoning: What do you know about balloons and how charges work that would explain how you decided on your claim.
- Offer sentence frames or starters to work from. (see table tents)
REBUTTALS

• How do you know the tape didn’t have the opposite charge?
A VERY USEFUL FRAME FOR REBUTTALS

If ________________________, then
___________________________ would have ____________________.
However, ________________________________.
HOW DOES A BLANKET KEEP YOU WARM?
Claim: A blanket traps heat.

The one on our body got pretty warm and the one under the blanket got even warmer because the blanket trapped the heat. The blanket was insulation. The ones on the table were the exact same 26 and that’s because the table didn’t give off any heat.
Claim: A blanket traps heat.

The one on our body got pretty warm and the one under the blanket got even warmer because the blanket trapped the heat. The blanket was insulation. The ones on the table were the exact same 26 and that’s because the table didn’t give off any heat.

If a blanket makes heat, then the one on the table would have gotten hot, too. However, both thermometers on the table were 26.
QUESTIONS?
COMMENTS?
STOLEN GOODS!

A truck at a perfume factory was loaded with boxes containing two million dollars’ worth of exotic perfumes.

When the boxes were opened, they were filled with rocks instead of perfume. The buyer was furious!

You’ve been called in to help solve the crime.
THE CARGO ROUTE

Perfume Factory S1

train loaded S2

1st train stop S3

2nd train stop S4

boat loaded S5

destination S6
PLEASE GET INTO GROUPS OF 3.

<table>
<thead>
<tr>
<th>Sample from Perfume Box</th>
<th>Color: What color(s) do you see in the rock? Are there spots or stripes?</th>
<th>Texture: Is it smooth, rough, glassy, crumbly, etc.?</th>
<th>Clumps or layers: Describe the different parts that make up the rock.</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
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<td>S2</td>
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<td>S3</td>
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<td>S6</td>
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</table>

Sample from Perfume Box
AT THIS POINT YOU PROBABLY HAVE A PRETTY GOOD IDEA OF WHICH ROCK SAMPLE MATCHES.

• ….But you may not be as sure of why a matching rock sample is a legitimate piece of evidence.

• (For example, if I find a penny on the ground here and a penny at your house, that’s no evidence that you were both places, because pennies are everywhere. What makes rocks different?)
AS YOU READ

• In this article, you’ll read about a real crime that was solved by rock evidence. (Read the section “Infinite Variety”)

• As you read, underline information that would help you show that rock samples are a valid way to narrow down the search.

• (Quick Turn and Talk)
FOLLOW-UP QUESTION

• Use your data and the information from the article to make and support a claim, answering the following questions:
  • **Claim:** Where should police focus their search?
  • **Evidence:** Describe the rock data that supports your claim.
  • **Reasoning:** Explain why matching rock samples are useful in narrowing down the search location.
PREWRITING (ANOTHER FORM OF SCAFFOLDING)

• Science ideas: What evidence will you want to use from your lab? What reasons will you want to use from the article?

• Science words: What science vocabulary will you want to use?

• What writing words or sentence frames might you use? *(similar, different, however, and therefore might be good choices for this assignment)*

• Should you use everyday language or formal language?
WE’VE LOOKED AT 4 WAYS TO SCAFFOLD STUDENT WRITING FOR CER.

• Specifying what to look for in Claims/Evidence/Reasoning
• Talking through the claim orally.
• Providing Sentence frames.
• Asking pre-writing questions.

Which ones of these seem the most useful in your own context? Think of a lab/activity/ writing assignment that you use in which you might like to add one of these (which one(s))? 
QUESTIONS?
COMMENTS?
Meet Mr. Eyebrows.

He was adopted as a baby. Wasn’t he a cute baby?
B = Allele for bushy eyebrows
b = Allele for thin eyebrows
Write the genotype for each person.
Can you find the ones who are B?
Write a letter to Mr. Eyebrows. In your letter—

Make a claim: Based on his eyebrow genotype, is it possible that he is the son of Mr. and Mrs. Eyebrowski?

Evidence: Use the pedigree to explain the evidence that supports your claim.

Reasoning: Include a Punnett Square and explain what the results of that square mean.
## Rubric Evaluation

<table>
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<tr>
<th></th>
<th>Completely</th>
<th>Partially</th>
<th>Not at All</th>
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<tbody>
<tr>
<td><strong>Claim</strong></td>
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<td></td>
<td></td>
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<tr>
<td>- Is the claim accurate and complete <em>based on the data?</em></td>
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<tr>
<td>(What claim would we be expecting to see here?)</td>
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<tr>
<td><strong>Evidence</strong></td>
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<tr>
<td>- Is the evidence appropriate and sufficient to support the claim?</td>
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<tr>
<td>(What evidence would we expect them to share?)</td>
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<tr>
<td><strong>Reasoning</strong></td>
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<tr>
<td>- Are the appropriate scientific principles discussed?</td>
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<tr>
<td>(What concepts do they need to discuss to support their evidence?)</td>
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**RUBRIC EVALUATION: HOW DOES THE TEXTURE OF A SURFACE AFFECT HOW FAR A CAR WILL ROLL?**

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<tbody>
<tr>
<td><strong>Claim</strong></td>
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<tr>
<td>• Is the claim accurate and complete <em>based on the data</em>?</td>
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<tr>
<td>(something like: Cars stop sooner when they are rolling on a rough surface.)</td>
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<td><strong>Evidence</strong></td>
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<td>• Is the evidence appropriate and sufficient to support the claim?</td>
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<td>(There should be specific numbers (probably averages).)</td>
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<tr>
<td><strong>Reasoning</strong></td>
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<tr>
<td>• Are the appropriate scientific principles discussed?</td>
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<tr>
<td>(The surfaces should be compared (smooth to rough) and, if taught, the word friction should be used correctly.)</td>
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EVALUATION- DON’T GET OVERWHELMED WITH GRADING

• Replace lab report (or portion of it) with Claims/ Evidence/ Reasoning language

• Quickly sort by levels of understanding for short assignments (no grade or just a check; this is for your own feedback)

• Quickly mark a rubric

• Peer or self-review using a simple system (Underline the claim in green…) or a rubric. This is part of giving them time and space to think!

• Have a round of peer review before grading. The resulting papers will be better and easier to grade!

• Let some writing just be practice.

Your thoughts on grading/ evaluation?
SUMMARY OF TOOLS FOR IMPLEMENTING C-E-R

- Scaffolding
- Prewriting Questions
- Time to Talk About It
- Evaluation possibilities
WORK WITH A PARTNER. IDENTIFY AN ACTIVITY USING A CER APPROACH THAT YOU WANT TO TRY.

• What activity will give kids a chance to explore the concept?
• Will they need more information or evidence (from a text/video/discussion)?
• What will the writing prompt be?
• What will a good response look like?
CONTACT INFORMATION: ASK IF YOU NEED HELP!

OnceUponAScienceBook.com
wheelertop@gmail.com
WheelerToppen
@JodiWheelerToppen
• The charge on tape D is negative. When we moved the balloon close to tape D, tape D was repelled. Objects with the same charge repel each other. Since we know that the balloon should have a negative charge, we can infer that tape D is also negative. At the molecular level, a charge forms when electrons from one object are captured by another object. The object that gains electrons, like a balloon, has a negative charge. Since the tape also has a negative charge, it must have captured electrons from the table when we pulled it up.