Writing in Science

Read the following information about an experimental investigation and the data collected. Write a conclusion in which you make a claim about an explanation for the results. Argue for that claim by supporting your claim with evidence and reasoning.

How to Write a Scientific Argument

Components

- Make a **claim** about the problem.
- Provide **evidence** for the claim.
- Provide **reasoning** that links the evidence to the claim.

Grades

- Graded in 3 areas.
- Each area will have score attached to them so you can target those area(s) to work on.
- Remember your goal of improving by 2!

What are Claims, Evidence, and Reasoning?

Claim:

An assertion or conclusion that answers the original question

Claim

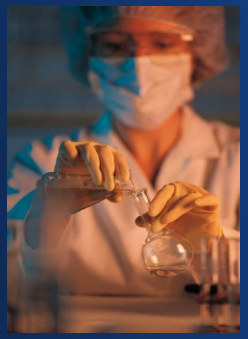
“In response to the question posed, I believe that…”

What are Claims, Evidence, and Reasoning?

Evidence:

Scientific data that supports the student's claim that must be appropriate and sufficient.

Can come from an investigation or other source such as observations, reading material, archived data, or other



Evidence

“Why do you think that?”

“What’s your evidence?”

“How did you arrive at that conclusion?”

Evidence

Evidence:

(i.e., facts, observations,measurements,statistics):

“I observed that…”

“I measured…”

“According to the video/reading…”

What are Claims, Evidence, and Reasoning?

Reasoning

Justification that links the claim and evidence.

Shows why the data counts as evidence to support the claim, using appropriate scientific principles

Developing Arguments supported by evidence

Developing Arguments Based on evidence

In science, reasoning and argument are essential for clarifying strengths and weaknesses of a line of evidence and for identifying the best explanation for a natural science phenomenon ….

Example

How can sun shadows be used to tell time?

The length of the sun shadow can be used to tell time. (Claim)

Example

At 10:45am, the shadow was 20 cm and the sun as low. At 12:25pm, the shadow was 17cm and the sun was high. Finally, at 2:15pm the shadow was 21 cm and the sun was low. Shadows are longer in the morning and afternoon while they are shorter at noon.

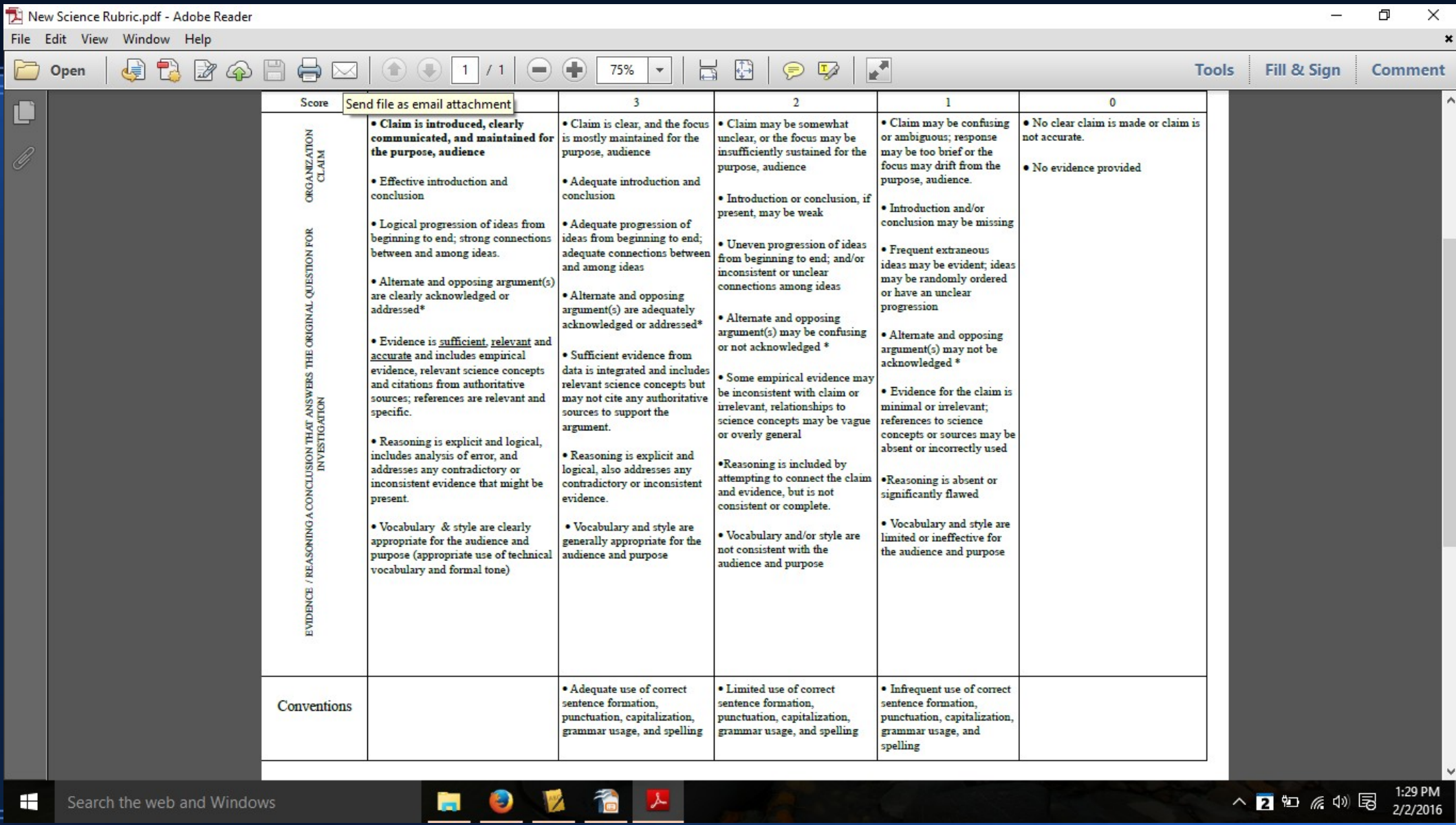
(Evidence)

Example

The length of the shadow is determined by how high the sun is in the sky. The sun changes position in the sky, because the earth rotates once each day. When the sun is higher in the sky, the shadows are shorter, which is why they can be used to tell time.

(Reasoning)

Rubric



Score		3	2	1	0
EVIDENCE / REASONING A CONCLUSION THAT ANSWERS THE ORIGINAL QUESTION FOR INVESTIGATION ORGANIZATION CLAIM	• **Claim is introduced, clearly communicated, and maintained for the purpose, audience** • Effective introduction and conclusion • Logical progression of ideas from beginning to end; strong connections between and among ideas. • Alternate and opposing argument(s) are clearly acknowledged or addressed* • Evidence is sufficient, relevant and accurate and includes empirical evidence, relevant science concepts and citations from authoritative sources; references are relevant and specific. • Reasoning is explicit and logical, includes analysis of error, and addresses any contradictory or inconsistent evidence that might be present. • Vocabulary & style are clearly appropriate for the audience and purpose (appropriate use of technical vocabulary and formal tone)	• Claim is clear, and the focus is mostly maintained for the purpose, audience • Adequate introduction and conclusion • Adequate progression of ideas from beginning to end; adequate connections between and among ideas • Alternate and opposing argument(s) are adequately acknowledged or addressed* • Sufficient evidence from data is integrated and includes relevant science concepts but may not cite any authoritative sources to support the argument. • Reasoning is explicit and logical, also addresses any contradictory or inconsistent evidence. • Vocabulary and style are generally appropriate for the audience and purpose	• Claim may be somewhat unclear, or the focus may be insufficiently sustained for the purpose, audience • Introduction or conclusion, if present, may be weak • Uneven progression of ideas from beginning to end; and/or inconsistent or unclear connections among ideas • Alternate and opposing argument(s) may be confusing or not acknowledged * • Some empirical evidence may be inconsistent with claim or irrelevant, relationships to science concepts may be vague or overly general •Reasoning is included by attempting to connect the claim and evidence, but is not consistent or complete. • Vocabulary and/or style are not consistent with the audience and purpose	• Claim may be confusing or ambiguous; response may be too brief or the focus may drift from the purpose, audience. • Introduction and/or conclusion may be missing • Frequent extraneous ideas may be evident; ideas may be randomly ordered or have an unclear progression • Alternate and opposing argument(s) may not be acknowledged * • Evidence for the claim is minimal or irrelevant; references to science concepts or sources may be absent or incorrectly used •Reasoning is absent or significantly flawed • Vocabulary and style are limited or ineffective for the audience and purpose	• No clear claim is made or claim is not accurate. • No evidence provided
Conventions		• Adequate use of correct sentence formation, punctuation, capitalization, grammar usage, and spelling	• Limited use of correct sentence formation, punctuation, capitalization, grammar usage, and spelling	• Infrequent use of correct sentence formation, punctuation, capitalization, grammar usage, and spelling	